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Use of property rights in fisheries management

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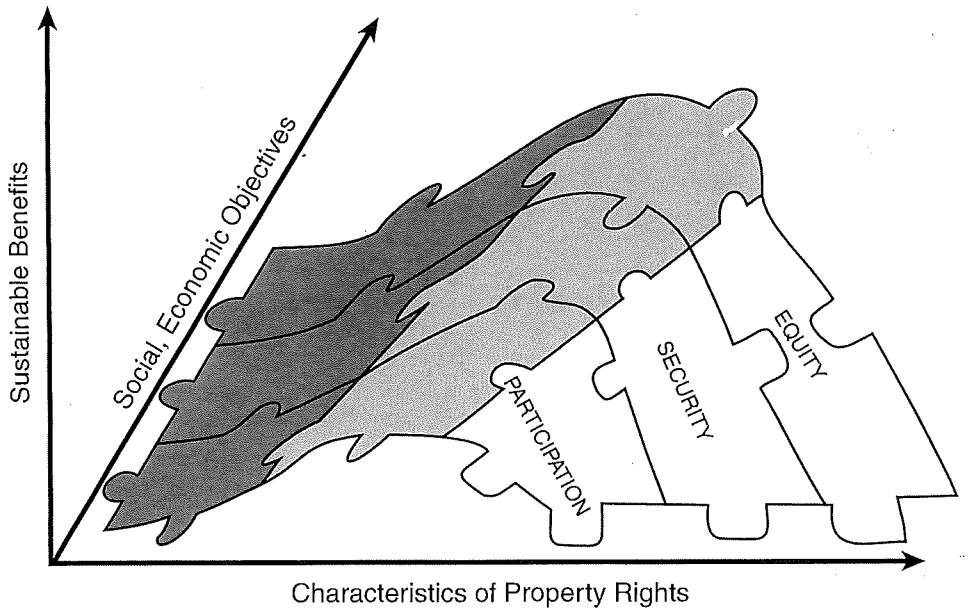

FISHERIES
WESTERN AUSTRALIA

Food
and
Agriculture
Organization
of
the
United
Nations

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Edited by
Ross Shotton
Fishery Resources Officer
Marine Resources Service
Fishery Resources Division
FAO Fisheries Department

Proceedings of the FishRights99 Conference
Fremantle, Western Australia
11-19 November 1999
Mini-course lectures and Core Conference presentations

FISHERIES
WESTERN AUSTRALIA

Food and Agriculture Organization of the United Nations

Rome, 2000

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PREFACE

The FishRights99 Conference, Use of Property Rights in Fisheries Management, was held from 11 to 19 November 1999 in Fremantle, Western Australia in cooperation with the Food and Agriculture Organization of the United Nations (FAO). Thanks to the efforts of the 352 participants from 49 countries, the conference was a marvellous success. I believe that we all learned more about the spectrum of rights-based management strategies and how these strategies may be used, and I am convinced that this knowledge will help us to better meet our obligations as stewards of the fish resources, part of the common heritage of mankind.

I believe the conference provided the perfect opportunity to address a challenge facing us all – the sharing or allocating of our finite fisheries resources through means that are equitable, socially acceptable, and efficient. As the executive director of Fisheries Western Australia (FWA), one of Australia's larger fisheries management agencies, I am constantly aware of the importance of developing management mechanisms to ensure that the exploitation of our marine resources is ecologically sustainable and accommodates the increasing resource demands from increasing diverse stakeholders. Issues of security, durability, exclusivity, and transferability are at the heart of our daily fisheries management activities, regardless of whether we are managing few or many fishermen, regardless of whether their harvest is of a few or many species and regardless of whether this occurs in low or high-valued fisheries.

The conference benefited from financial support of many organizations, including: The Government of Western Australia, Primary Industries and Resources, The Fisheries Research & Development Corporation, Pearl Producers Association, NSW Fisheries, Agriculture Fisheries Forestry, Australian Fisheries Management Authority, M G Kailis Group, Western Australia Fishing Industry Council Inc., Queensland Department of Primary Industries, Austral Fisheries Pty, Lobster Australia (Kailis and France), Queensland Fisheries Management Authority, Nor-West Seafoods Pty Ltd, The New Zealand Seafood Industry Council and Sealanes Food Services. A number of national governments also contributed to the success of the conference by sponsoring speakers. These included: Fisheries and Oceans Canada, the Ministry of Fisheries, Iceland, the Ministry of Agriculture, Nature Management and Fisheries, Netherlands, the Ministry of Fisheries, New Zealand, Sea Fisheries, Environmental Affairs and Tourism, South Africa. Other sponsoring agencies were The World Bank and the International Centre for Living Aquatic Resource Management.

I would like to take this opportunity to thank all have contributed to the success of the conference. Special mention goes to those who supported and drove the content and quality of the conference through their roles on the Organizing Committee: Mr Peter Millington (FWA), Chair; Mr Ulf Wijkström (FAO); Dr Gary Morgan (PISA); Dr Jim Penn (FWA); Mr Guy Leyland (Western Australian Fishing Industry Council); Mr George Kailis (M G Kailis Pty Ltd); and the Program Co-Chairs, Drs Rebecca Metzner (FWA) and Ross Shotton (FAO). Furthermore, it is only with the support of the FAO and the dedication of Dr Ross Shotton that we have these proceedings volumes in addition to the papers found on the FWA-maintained FishRights99 web site (http://www.FishRights.com.au). Finally, I must thank the FWA staff for their generous contributions of time and energy, which helped to keep the conference running in a timely and smooth manner.

As we look back at FishRights99, Use of Property Rights in Fisheries Management, I hope that we are standing on a more durable and secure platform from which to base our fisheries management. It is also my hope that we will continue to build on the information exchanged at the conference so that, half a decade later, when we revisit the subject, we have pushed the boundaries of how we use property rights to manage our fisheries in ways that are ecologically sustainable and that we are closer than ever to ensuring that we have Fish for the Future.

Peter Rogers
Executive Director
Fisheries Western Australia

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FISHERIES RESEARCH & DEVELOPMENT CORPORATION

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ICLARM International Center for Living Aquatic Resources Management

SEA FISHERIES, ENVIRONMENTAL AFFAIRS AND TOURISM, SOUTH AFRICA

The World Bank

FISHERIES WESTERN AUSTRALIA

FISHRIGHTS99 CONFERENCE

FAO FIAT PANIS

FOREWORD

Preparation of this Foreword, my final task in editing the proceedings of the FishRights99 conference, completes a cycle that started when Gary Morgan, then Research Program Co-ordinator for the Western Australia Fisheries Department, was in Rome in May 1997 as a Visiting Fellow through FAO's Academic and Profession Partnership Programme. I had invited him there to work on issues related to individual quotas in fisheries management[1]. The use of Property Rights in fisheries management was becoming an ever more topical issue as use of this dynamic approach to fisheries management reached a stage of maturity in many countries. As such, I felt that sufficient experience existed to justify an international gathering to exchange these experiences and consequent views on the merits and failings of this management approach and record how the management practices were evolving. FAO itself has had somewhat of a start-stop involvement in rights-based approaches to fisheries management. Francis Christy, author of perhaps the seminal work on the topic[2], had been a Senior Fisheries Officer in the Fisheries Department at FAO. And prior to his recruitment to FAO, the Department's interest in this form of management had begun with Jean-Paul Troadec, one of the Fisheries Department's early Service Chiefs. Subsequently, FAO together with Japan organized a conference on community-based fisheries management[3]. My own involvement in property rights had begun in the early 1980s in Nova Scotia. I was aware that rights-based fisheries management had become widely used in Australia and of particular interest to me was the pioneering work in the Northern Prawn Fisheries. So, it was on these foundations that the conference was built.

Once the idea was put to Gary, a quick telephone call on his part to his boss, the Hon. Monty House, Minister for Primary Industries and Fisheries, Western Australia, confirmed the willingness of Fisheries Western Australia to host the conference and co-organize it with the FAO Fisheries Department. A follow-up letter to the Minister from Dr Mori Hayashi, then Assistant Director-General of the Fisheries Department quickly resulted, and to use the cliché, the rest is history. A joint FAO-Fisheries Western Australia Conference Programme Committee was established, chaired by Peter Millington in Perth and supported by a FAO Fisheries Department Conference Committee in Rome. Then, staff at Fisheries Western Australia were left to confront the enormous organizational task they had accepted.

Many important decisions had to be quickly addressed. First, deciding at what time of the year to hold the conference - there was no time ideal for all - and how much lead-time was required. It was later agreed that there could never be enough. Second was where to have the conference. This was an urgent decision given that suitable venues get booked years in advance and at that point less than two years remained until the date that had been agreed upon. It was only after a visit by Ulf Wijkström, also of FAO, and myself that jointly with Peter Millington, Rebecca Metzner and Guy Leyland, we made one of our best decisions and with unanimous agreement Fremantle was chosen as the conference venue. I should note that at that time we had little, if any, idea how many people would come to the conference. The Esplanade Hotel - the Fremantle venue chosen, comfortably accommodated 400 people, but what if too many (or too few) people wished to attend? This uncertainty haunted us for sometime. Directly related to this was the question of financing the conference, something Peter Millington was able to finesse with the Fisheries Research & Development Corporation of Australia.

It was only as the conference proceeded did we appreciate the serendipity of the decision on the conference's location and venue. Fremantle retains almost all of its confederation charm. The Hotel was minutes away from a friendly and active commercial centre with an abundance of footpath cafés and the design of the hotel was such that 'tween sessions discussions and contacts - social and intellectual - were almost unavoidable, even by the most reclusive or jet-lagged conferee. These periods were assisted by abundant provisions of tea, coffee and high fat-content biscuits. An active evening social programme followed the day's sessions, made possible by the generosity of Australian fishing companies and Australian and New Zealand industry groups. This time too was seized upon for yet further discussions and interactions.

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[1] See Morgan, G.R. 1997. Individual Quota Management in Fisheries: Methodologies for Catch Quotas and Initial Allocations. FAO. Tech. Fish. Pap. No. 371. 41pp

[2] Christy, F. 1973. Fishermen's Quotas: A Tentative Suggestion for Domestic Management. Law of the Sea Institute, University of Rhode Island. Occ. Pap. No. 19.

[3] FAO/Japan 1993. Expert Consultation on the Development of Community-Based Coastal Fishery Management Systems for Asia and the Pacific. *FAO Fish. Rep.* No. 474. Suppl. Vol. 1 & 2. FAO, Rome. pp. 689.

An early decision of the Programme Committee was that the conference was not to be about instructing people what they should think or do in relation to rights-based fisheries management and that the sessions should avoid being, in any way, didactical. It was also agreed that no declarations or other polemic banners would formally result from the conference's deliberations. Sessions were not to be taped to encourage a not necessarily "for-the-record" nature of discussions. Our objective was to provide a forum for the exchange of views and experiences, whatever they be, and to this goal the programme committee returned time and again when organizational problems had to be resolved or programme policy issues clarified.

FAO, for its part, had one further objective in terms of the conference. Our mandate, unlike that of a national fisheries department, includes promoting better fisheries management on an international basis and we hoped that the conference would attract people who, though interested in this approach to management, might have had little background in what was involved. For this reason we believed that it was necessary to precede the Core Conference with a mini-course so that participants new to this type of management approach could be introduced to the concepts and practices involved and thus participate and better benefit from the discussions during the Core and Workshop sessions. A desirable mini-course structure quickly became self-evident - a session on theory followed by one on applications. In the event, the majority of those attending the Core Sessions elected to attend the mini-course as well - a wise decision as the lectures provided both complemented and supplemented the presentations that followed. I was delighted that we were able to have Tony Scott, Professor Emeritus at the University of British Columbia, anchor this part of the conference proceedings.

An appropriate structure for the Core sessions was also quickly apparent: we wished to address the concerns of government, those of the fishing industry and also those of the "community at large" - whether their stake in the fishery be direct or indirect. But there were many other concerns beyond the challenge of achieving a good programme structure. It became increasingly obvious that there was much disquiet among those working in the field that the conference would turn out to be an 'ITQ-fest' (Individual Transferable Quotas) or would promote, either intentionally or inadvertently, a particular rights-based approach to fisheries management. This was a difficult unease to counter. To those concerned, it was noted that the conference was to be about Property Rights in Fisheries in their widest sense and that all views would be, and were, solicited for presentation during the sessions. However, on the other hand, given the tremendous advances in ITQ management systems it was apparent that it would be unavoidable that a major emphasis would be given to this particular management approach.

Further it seemed unconstructive to insist on a strict allocation of time to all views on a subject-by-subject basis as this would do an injustice to learning about the developments in rights-based fisheries management as they had been occurring. And, none of these concerns were helped by the difficulty we encountered in trying to 'shoe-horn' into the limited conference time frame the tremendous breath of the topic that was involved. In the event, I believe that the 'warts' of ITQ management were appropriately noted and the more so in a well-argued, elegant and constructive manner - see, for example, the papers of Bonnie McCay, Rolf Willmann and David Symes. Perhaps next time the imbalance in the numbers of presentations on the different subjects may be better solved.

Concerns about possible undue attention to ITQs were, I believe, better understood as a consequence of one of the conclusions I drew from the conference. This was the increasingly common use by many of the locution 'ITQ' as a generic term for any form of rights-based management. On several occasions at the conference I watched discussions splutter along until this confusion in terminology was recognized and resolved. Likewise, similar problems arose with the multitude of interpretations of the term 'property' and here I found the progress in dealing with the potential confusion of legal and non-legal use of this term particularly scholarly, enlightening and welcome. This too was another major contribution of the conference.

Another of our requirements for the conference was that it should provide an opportunity for those working in the field of rights-based fisheries management to give their own presentations, whether they be personal experiences in applying the methods, developing new techniques or conclusions regarding the applicability and benefits of this management approach. The Programme Committee also considered it essential that there be the opportunity for people to express value-based, or cultural, views in a way that clearly distinguished between ideological-based concerns and those of the administrative difficulties and practicalities of implementing rights-based approaches to fisheries management. This was done through the two-day workshop sessions, and I refer the reader to the foreword in Volume II, Workshop Presentations, for comments about this part of the programme.

It is sometimes the practice in forewords such as this to signal to the reader particularly interesting papers in the texts that follow. This is a challenge I wisely forgo. In fact, I think that it is a measure of the overall quality of the papers that I have found that the proceedings can be opened at any point and the reader will interested and learn from the discourse on the pages in front of them. In total, there are 110 contributions, 11 from the Mini-course, 36 from the Core session and 63 from the Workshop sessions. While I have added an index to aid the reader in a hurry for particular reference material, I do stress that the time taken to read the various presentations in full will be well rewarded.

In looking back at the conference a year later, two things remain fore most in my mind. The first was the atmosphere of the event - the stimulation and common interest of so many people with like interests but different perceptions and experiences - it truly was a remarkable nine days of fomentation, which many of those present remarked upon. My second recollection, which remains ever so strongly, was that of the professionalism and excellence that Fisheries Western Australia had brought to the preparation and execution of the conference. Peter Rogers has thanked those responsible in his preface and it is only the fear of omitting some of the many that deters me from noting an even longer list of personal appreciations. But, to Carli Gettingby, FWA Conference Co-ordinator, and Rebecca Metzner, also of Fisheries Western Australia, for their dedication and efforts, no such excuse would be admissible. To the authors, my thanks and congratulations for their so-many excellent contributions. Nor can I overlook the enormous effort of my secretary, Marie-Thérèse Magnan, in single-handedly undertaking the text processing for the Proceedings, and my colleague, Mike Mann, in tracking down so many missing hyphens and incomplete references.

Fremantle '99, as I hope the conference will be remembered, has been a major part of my life for the last two years. I look forward to seeing its developments provide a significant influence on fisheries now and in the future.

Ross Shotton

Marine Resources Service,
Fisheries Department, FAO, Rome

FishRights99 Programme Committee
Editor, Conference Proceedings

Shotton, R. (ed.)
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FAO Fisheries Technical Paper. No. 404/1. Rome, FAO. 2000. 342p.

ABSTRACT

Part I of the proceedings consists of two major sections, the Mini-course lectures and the presentations presented during the Core Conference (*Mini-course*). The lectures presented during the two-day Mini-course were grouped in two sections. The first dealt with the concepts, theory and practice relating to the use of Property Rights in Fisheries Management. Subjects covered in the first past of the Mini-course included the historical development of the introduction of property in fishery management, property rights as a means of economic organization, selection of a property rights management system, resistance to changes in property rights or, whether to use Individual Transferable Quotas (ITQs), current property rights systems in fisheries management and group and community-based fishing rights. Topics covered in the second part of the Mini-course included Management Infrastructure for Rights Based Fishing, Legal Planning for Management of Fisheries Using Property Rights, The Administration of Fisheries Managed by Property Rights, Administration of Enforcement Mechanisms for Rights-Based Fisheries Management Systems and Fisher Participation in Rights-based Fisheries Management: The New Zealand Experience

The second major section of Part I of the proceedings consists of the papers presented during the three-day *Core Conference*. These papers covered the perspectives of (a) governments in introducing and administering such methods of management and the political, conservation, social and economic consequences, (b) industry; and (c) the wider community and other involved stakeholders. The topics covered in the Core Conference were introduced by two major perspectives, Moving through the Narrows: from Open Access to ITQs and Self-government and Common Property Rights: An Alternative to ITQs.

Papers presented during the first day of the Core Sessions covered government perspectives and issues, institutional arrangements, administrative challenges and the politics of the Rights-based fisheries management process. Papers presented during the second day of the Core Session described the perspective of industry, strategic responses of industry and industry initiatives in advancing rights-based fisheries management. Papers presented on the final day of the Core Conference dealt with the issues of community perspectives, recreational fishing, community property rights, customary fisheries management, community-based fisheries management and the exclusivity of rights. The session was closed with papers that provided a prognosis on the future development of property rights in fisheries management.

Thus, the conference papers addressed the theory and application of property rights in fisheries management with an emphasis on national applications and experience. The presentations included those made from the perspective of the fishing industry, government policy makers and administrators and the legal implications as a consequence of national systems of law. Eleven papers were presented during the Mini-course and 36 during the Core Session.

Keywords: Fisheries Management, Property Rights, ITQs, Individual Transferable Quotas, Fisheries Policy, Fishery Access Rights

Distribution:

Conference participants
FAO Regional Fishery Officers
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INTRODUCING PROPERTY IN FISHERY MANAGEMENT

A. Scott
University of British Columbia, Department of Economics, 2329 West Mall
Vancouver BC, V6T 124 Canada
<adscott@interchange.ubc.ca>

1. INTRODUCTION

This lead-off presentation briefly sketches the historical emergence of property rights from ancient open-access to modern licensed regulatory regimes. It then outlines what property rights mean from an economic point of view, with special emphasis on their characteristics: especially duration, exclusivity, and transferability. Permits and licences are seen as property rights that are weak and have little of these characteristics. The evolution of individual transferable quotas (ITQs) is shown as the development of the old system of licences, with more of the valuable characteristics added. This provides the basis for other lectures in the series and in a final section I show how the property-like ITQs can be the building-blocks for voluntary fisherman self-regulation and cooperation.

Many of the points referred to here are taken up in other presentations. There is indeed a great deal of healthy overlap. If what is presented here seems unclear or wrong, perhaps the other approaches will correct, or confirm, these impressions.

To keep the discussion as simple as possible, I focus on an offshore fishery concerned with a single, valuable species of fish. I assume at first that the fishery is neglected by the administrators and later becomes subject to various regulations. I acknowledge that many of the most important fisheries are found along the beach or close inshore, so that complications to my approach would arise. I also acknowledge that in many of the most important fisheries, more than one species are caught together, and I find some space to discuss the role of ITQs in this most difficult of managerial problems. Then, I return to a simplified one-species offshore version and introduce ITQs, combining many of the features of the old system of regulation in support of a total allowable catch (TAC) for the season with features of a system of property rights in land.

Other assumptions will be obvious. I say almost nothing about the managerial complications of divided international powers over fisheries, that may be shared because of stock migration or by the position of an international boundary. ITQs would be useful there too, but there is not enough space to discuss multi-national fisheries.

I have two apologies. First, I write about fishermen when it would be more appropriate today to use the word fishers. Second, I have tried to avoid writing like a cheerleader for property rights in the fishery. As the lead-presentation, I have tried to build on how fishermen and governments have behaved and what they have revaled that they want. Fishermen have given little thought to the losses of the *rest of the economy* arising in the wasteful and costly ways that competing fishermen have been induced to adopt. Here too I have steered away from these problems of general economic efficiency within and beyond each fishery. I have not dealt with the use of fishing effort in separate fisheries at different seasons, or with the lives of fishing people who divide their time between fishing and other occupations. The system of transferable property rights can be very important to them, but I leave these opportunities to other lecturers.

2. A LITTLE HISTORY OF OFFSHORE AND OCEAN FISHERIES

2.1 The open fishery

In the old days, when offshore fish stocks were large and fishing fleets were small, there was no call for either private ownership or government regulation. As well, private ownership of fisheries was effectively banned by the English king and his barons in the Magna Carta, in the 13th century. This action was followed by hundreds of years of free fishing in English waters.

In the waters of other countries, somewhat similar arrangements prevailed. As a result, within most European countries, both inshore waters and the adjoining high seas were regarded as "common property" of all those who wanted to fish. Between countries, however, foreign fishermen were sometimes excluded. Exclusion policies required policing and regulation. They reflected an economic protectionism. Their regulations were not to preserve the fishstocks, but to preserve the local markets for the local fishermen.

Indeed, the kind of fishstock specific, biological regulation known today was absent in nearly every ocean-type fishery until the 19th century. Until then, as far as I know, the main fisheries in all the seven seas were free, open-access and unregulated.

As the growing cities provided increasing markets for both fresh and salted fish, more and larger vessels put to sea for longer periods. Offshore and distant-water ocean fisheries expanded steadily over many centuries. But for long the fishstocks were so large and robust that the expanded fishing hardly affected the catches. That is why the occasional "fish war" was not for possession of dwindling fish stocks - they were not dwindling. The fish wars were fought to capture, for one country's vessels, both monopoly positions over the richest markets and possession of places for vessels to winter or to dry fish.

However, by the mid-19th century, ocean fishing activity had expanded to a dangerous level and each year's fishing left the stock a little smaller than the year before. Although fishing costs per ton began to rise, the world's markets were willing to pay these higher costs and expansion continued. The world's offshore fishermen began to realize that they were directly competing with each other for the catch. As they competed, their hours at sea, and the dangers of winter fishing, all rose. Gradually they began to "race" each other, installing more powerful gear, larger vessels, and planned to spend more days at sea for a given catch. These competitive responses to the scarcity of each fish stock raised their costs further. Some fishermen began to fill their holds with fish they would have rejected a generation earlier: fish that were undersized or belonging to other less valuable species. That was the position of most of the offshore and ocean fisheries on both sides of the Atlantic toward the beginning of this century. Some inshore fisheries were closed to foreigners. There was only a 3-mile limit, and beyond it the open-access of the high seas. There was little or no government regulation of fisheries for biological reasons. Table 1 illustrates this evolution of property rights in fisheries.

Fishermen argued that the declining catches were someone's fault. They pressurised government to ban the foreigners and the part-time fishers. When that did not help, they wanted government to ban some ways of fishing: some types of vessel; kinds of gear, some seasons, or some sizes of fish. Governments obligingly banned some of these things, resulting in shorter seasons, larger netmeshes, and so on. At first governments had no real theory about how these bans were supposed to help - but that did not matter much because at that time governments had no way of enforcing their bans anyway. At the same time, some governments invested in hatcheries for demersal species, especially plaice. They had no real theory about how a few million eggs would restore the main sea fisheries. So these random regulations and random hatchery operations made little difference.

2.2 The coming of regulation

In the last decades of the century governments' advice began to come not only from perturbed fishermen, but also from scientists. Starting with fresh-water fisheries, then with inshore fish, and salmon, knowledge spread about spawning, migratory behaviour, age structures and so on until there was some confidence that regulations, applied to some species of fish, might actually conserve the stocks and increase the catches.

Today, regulations based on biological theories can be found everywhere. Two main types are applied to offshore fishing. One is gear control, usually prevention of the use of nets with small mesh, of certain kinds of trawls, and of large powerful types and sizes of vessel. The other is the closed fishing season which is a common technique.

At first the chief purpose of regulation was to help the reproduction of large fish. To do this, the fishery tended to be run so as to allow the escape of spawning and under-sized fish. When this proved inadequate, steps were taken to regulate and reduce the total amount of fishing effort with which a stock came in contact. First seasons became shorter, then the total size and fishing power of the fleet was controlled and reduced. To do this, the number of fishermen was limited and the fishing licence, at first merely a part of the administrative and enforcement system, became a sort of proof of a personal fishing right, akin to a deed.

No other sector or occupation has been so subject to control and regulation. Fishermen agreed to them because, while they argued about the means, they agreed with the purpose. They knew that individual fishermen could not be expected to restrain themselves. This is what is called an open-access situation, one where the individual fisherman, acting alone, has no incentive to do what would benefit the group as a whole.

But the regulatory regimes, as other presentations will show, had serious disadvantages. Fishermen, government administrators, biologists and academics, began to look for a better way. It was agreed that compulsion was necessary. No individual will, by himself, voluntarily fish less or use less destructive gears, for he would be pretty sure that he would not get a full share of whatever benefit resulted. As this year's Nobel Prize winner, Amartya Sen, insisted years ago, people in the fishermen's position want what he called *assurance*. They will make sacrifices for future gain, agreeing to a smaller catch, or fishing under frustrating regulations, if they are assured that everyone else must do the same. All the same, no other sector of the economy was so tangled up in changing, *ad hoc* regulations. When it was found in the 1960s that regulatory techniques could not stop more vessel owners from applying more and more fishing capacity, two new types of control were suggested.

One was a royalty. It was well-known, from people's response to prices, excise taxes and customs tariffs, that the less the suppliers got paid, the less they produced. The idea was that, applied to the fishery, the higher a royalty on landed fish, the less the fleet would catch and land. But this idea was resisted. Fishermen preferred coping with the kinds of regulations with which they were familiar than figuring out how much fishing to do every day, to keep on the profitable side of a price plus tax. The idea made administrators uneasy: they had been trained to think about changing openings during the season, when their information about stocks changed. It was hard to picture these persons changing prices or taxes, taking cross-pricing of other species into account. Consequently the royalty alternative has never taken hold.

The other new idea was restricting access. There had always been a few observers who recommended that since regulation had become necessary, because of the over-fishing made possible by open access, the obvious policy was to close access to the fishery. There were a number of ways of doing this.

Table 1
Historical evolution of property rights in fisheries

	1000 AD	1215 Magna Carta	1600 Grotius	1750 Naval powers	1900 Exhaustibility	1960s	1990s
Inland							
Pond	Stock right	Stock right					
River	Catch right	Catch right				Regulated	
Tidal							
River	Catch	Free		Free	Regulated	Regulated & licensed	
Inshore	Catch	Free		Free	Some regulated	Regulated & licensed	ITQ
Offshore	Catch	Free	"None"	Free	No regulation	Regulated & licensed	ITQ
National sovereignty		Declared	"None"	3-mile limit		12 to 50 non limit	200 (EEZ) non limit
				Treaty Waters		Fishery Treaties	Fishery treaties
				"Open seas"			Law of the Sea

The one chosen in many fisheries was limited licensing. To start, the number of licence-holders who could fish a particular stock was fixed. Then ways were tried to reduce this number. But, as you know, this simple idea was defeated when it was found to give the remaining licence-holders an incentive to "stuff" their vessels with more and more equipment, capacity, and size. The administrators' regulatory problem was still there.

There were a number of ways to fix this. Most of them involved putting a limit both on the number of licences and on the permitted inputs (effort) available to each licensee. In Iceland in the 1970s, for example, there was a limit on the number of hours during which each licence holder (each vessel) could fish. In other places there was a limit on the size of the licensed vessel, or its horsepower, or perhaps the number of traps or nets that it could carry (for an inshore fishery). In 1984 in Australia's northern prawn fishery (also "inshore"), a composite gear or input unit evolved. These were all improvements on simple limited licensing, and versions of them are still being refined. But in offshore fishing they still involved each licensee racing for the catch, and searching for ways around the limits. Each vessel wanted to beat the other vessels and beat the regulators too.

A second approach was to pursue a territorial approach. In one variant the control of the fishery is assigned to one person, or group, be it a corporation, cooperative or community. Control by a group can go beyond co-management by local fishers and government, to something like ownership. The approach is geographical or spatial - it treats the fishery and its environment as though they were a lake or a piece of land. It has been especially advocated for fisheries that are inshore, in shallow water, and most actual examples, which are traditional fisheries, are inshore and lagoon situations.

A third approach is my subject here. It involves extending regulation bycatch and open season to regulation by setting of a catch quota. Instead of limiting the amount of capital or effort for a fixed number of vessels, it simply limited the catch per vessel. It emerged by trial and error in Iceland, and as a privatizing expedient in New Zealand. For many fisheries, it removed all or nearly all the wasteful and costly incentives at one stroke. For these fisheries, there was no longer any reason to spend money on ever more elaborate vessels or equipment.

Between 1979 and 1999, catch regulation for selected species and stocks was updated by adoption of quotas. By far the most serious initial policy problem was the transition: who should get quotas, how large should they be and at what price? The usual answer, as is apparent from other presentations, has been "grandfathering". This is a procedure in which each licensee's future quota, as a percentage of the TAC, is based on his average catch in past years as a percentage of the total catch at that time (while this sounds simple, in the pioneering systems it had to be modified to take account of recent local events, such as when various complementary fisheries were open, preventing a fisherman's participation in both). Further, its actual introduction revealed many hardship and special cases, and occupied the time of many administrators for many, many, months.

Another expected problem was that of enforcement. In the past, the closing of a body of water had been easy to monitor, for any transgressor was clearly visible to all. But under quotas, there would be no closures. Instead each fisherman's actual cumulative catch had to be compared with his own and his rented quotas. Some complicated systems of inspecting and auditing licensees' catches in relation to their quotas had to be devised, both at sea and at the dock. Experience has permitted some of these complex systems to be simplified.

Much more can be said about the development of regulation by quotas. The chief advantages were that the incentives to race and to over-investment and capital stuffing were greatly reduced. This saved the fishermen money and made the job of the fish managers easier. It further brought about the possibility of deferring catch when market prices were low or when other fisheries were not, and enabled the catch to be taken when prices were high and when fishermen and their vessels were free.

My chief point is that improving regulation was still the purpose. In each country the originators had their own local reasons for going over to catch quotas. They did not think they were introducing a revolution. They expected that, as with previous types of regulation, there would still be administrators, inspectors and watchers, and biologists calculating official TACs. As far as I can see, the public servants and the biologists never regarded the licences of the time as a kind of property, and so did not consider that they were inserting more of the characteristics of property into fishery management.

3. INTRODUCING PROPERTY

3.1 What property in the ocean means

While it is sometimes said that some fishery "belongs to" or is "reserved to" particular users, we know that this does not reflect any individual property right. The truth is that, compared to, say, farming, under most systems of law individual ownership in the fishery is rare. A good common-sense explanation of this was given by Hugo Grotius, a great international lawyer and a philosopher. His 17th century explanation relied on his observation of the two conditions for holding property in a thing. First, he said someone had to have the power to appropriate the thing and hold it in possession against others. Second, he said the thing had to be scarce and exhaustible, so that it was worth-while going to the trouble of holding it as property.

Taken together, his two conditions help to explain why fresh-water fisheries, in rivers, lakes are often private property. First, fresh-water fish populations have long been exhaustible. Second, it is possible to fence out poachers and trespassers. The two conditions also lead to a prediction that many tidal inshore and beach fisheries will be private: the shellfish and so on are scarce and exhaustible, and it is sometimes feasible to exclude outsiders.

These two conditions are usually not satisfied in offshore or ocean fisheries. In Grotius' time, there were lots of fish for everyone, and anyway, it was not feasible for most countries to exclude outsiders and foreigners. Grotius made much of this. He asserted that because neither condition was satisfied, there could be no private property, and no national sovereignty, on the high seas. His assertion, appealing to reason and natural law, became enshrined in international law as the "freedom of the seas."

Grotius's two conditions also correctly predicted that until this century in most systems of law the swimming, uncaptured fish could not be subject to ownership. A stock of fish offshore is not analogous to a herd of domestic animals, exhaustible but subject to fencing. It is analogous to a population of wildlife or of birds, that shifts from place to place. Till recently such a population was thought to be proof against depletion by hunting. Anyway, a person who claimed to own wildlife was unable to enforce his claim against others Therefore the English common law, like other systems, says that wild animals and wild fish (even fish reared in a hatchery) cannot be subject to property law until they have been caught and brought into the possession of the landowner, hunter or fisherman. This reasoning lies behind the common-law origin of the current "law of capture". Possibly a person may own a fishery as a place, but that person may not own any of the wild fish in it until they have been brought into private possession, alive or dead.

As a matter of fact, the medieval monarchs did try to enforce their personal ownership of some wild creatures: sturgeons especially, but also whales. But at that time either one or the other of Grotius's two conditions was not satisfied, so it was predictable that the monarchs would not be able to enforce their ownership claims for long. Today, as we shall see, Grotius's two conditions may now be satisfied. There are some private rights to land fish, and these can sometimes be interpreted as ownership of the fish even before they are captured. Fishing rights in Iceland and New Zealand are good examples.

3.2 What powers has the holder of a property right?

In brief, these powers were three-fold and can be found provided for in any system of law regarding property in land or water: (a) power to use the thing (or manage it); (b) power to dispose of it (to sell it or grant it); and (c) power to take its yield (e.g. as a crop, rent or royalty).

Consider the fisherman in his role as the owner of a fishing vessel. He has all three powers over it: he can run it, sell it and take the profit from doing these things. But now consider the same fisherman in his role as occupier of the fishery itself. This role does not give him powers to manage it or dispose of it. All he has is the third power, the law of capture: the power to take and keep the fish he catches. The absence of the first two powers deprives him of any incentive to look after the fishery.

To illustrate, if he were the kind of fisherman who tried to manage and exploit the fishery with care and prudence, he would not be rewarded. Although his care might have made the fishery more valuable, he would never have the powers needed to capture this extra value. His efforts would have a near-zero yield to him. That is why, lacking the necessary ownership powers, almost everyone in an offshore fishery finds it not worth while to look after it.

4. THE CHARACTERISTICS OF PROPERTY RIGHTS

4.1 Measurement of rights

Actually, in any system of property law, there is a range of the names of the rights that an individual may hold over a piece of land or a body of water. In common-law countries, for example, he may hold an *easement* or a *lease* over a piece of land, or he may hold all powers over it, as a *freehold* owner. The holder of a lease typically has more powers over the land than the holder of an easement, and the holder of a freehold has more powers than either of them. In other countries, there will be a similar range of kinds of property right.

It is commonly said that a freehold right is "complete", while the other two rights are incomplete or deficient. "Completeness" is a poor way to order them or classify them, but it has the grain of the quantitative idea. If instead we think of all property rights as being made up of *characteristics*, then we can say that the differences between the rights is in the amounts of each characteristic that comprise them. Understanding these characteristics is helpful in itself. It gives an insight into what makes a particular property right suitable for the functions it performs.

Before turning to the fishery, consider a simple example. A person drives into a private parking lot and is given a ticket, or a check. The ticket is evidence of a licence. Like an easement and a lease, a licence is a type of right over land. It is a rather primitive kind of right, with little of the usual standard characteristics. Consequently, it gives the holder, the driver, few powers. He cannot grant the parking right to anyone else, nor choose how his part of the lot is to be used. A licence to park can be considered a feeble property right having almost none of the characteristics of the right that is held by the owner of the lot.

A fishing licence is much like a parking licence. It gives the fisherman a right of access to the resource and to do something there. To understand this here, it is essential to realize that an administrative fishing licence or permit as a kind of property right, one that had few of the characteristics of a right and that therefore offered few of the powers of right ownership.

4.2 A short survey of characteristics

What are the characteristics of a property right? To survey them, consider the right that a farmer has over his land. Any holder of this right to land gets the benefit of four different and potent characteristics. These characteristics are not abstract, they are tangible and conceptually measurable. (Note that the three powers that ownership gives to the holder of a property right are not the same as the five or six characteristics, or dimensions, of a property right. The powers can be likened to the outputs of a property right; while its characteristics are more like its inputs).

The first characteristic is *exclusivity*, the freedom from interference by a holder of his enjoyment of his right. The more legal interference, the less exclusive the right. Every kind of property right has *some* exclusivity, but none is completely exclusive. Consider a right to fish. The question to ask is, to what extent must the rightholder take into account the actions and decisions of his neighbours? If his right is like that of a fishfarmer over a pond, it may be highly exclusive. If however it is like that of an Atlantic cod fisherman beyond the 200 mile line, it has little exclusivity.

After exclusivity, the second characteristic is *duration* the length of time the holder's powers may be enjoyed. A right can be exclusive, yet have a very short duration, like a three-month's rental of a house. Many open-access ocean fishery rights lack other characteristics, but they effectively have a long duration; even permanence. Other fishery rights, such as licences and permits have a short duration. What counts here is the effective total duration after automatic renewals have been taken into account.

The third characteristic is *security* (or *quality of title*). Most holders obtained their rights by grant from an earlier right-owner. Since owners may not grant what they do not own, the question arises about how good the prior owner's title was. Much of so-called property law is devoted to resolving or preventing disputes about who has the better property title to a piece of land. But a grant is not the only way of getting a good and secure title. Under some systems of law, especially in a new territory, being the first user or appropriator entitles one to become the owner. Sometimes one can get title by just squatting on a piece of private, but unused, land. And one can get a right to use land, or to do something on it, by recourse to *contracting* with the owner, or even by paying him to disregard his rights to stop you from creating pollution or some other *nuisance*. All these procedures may once have been traditional or customary, but have since been improved by registration arrangements, checked by the courts, and subjected to legislation. But since all persons' land titles have some possible flaws, every right-holder faces some risk that their ownership may be challenged by someone else. Low security in a title works like uncertainty in fishing: potential buyers tend to deduct a "risk premium" from what they are willing to pay to get it.

The final characteristic discussed here is *transferability*. In the past there was little need for ocean and offshore fishing rights to be transferable. They were not exclusive - anyone who wanted one could get it for almost

nothing from the government. Why bother buying from a holder? But when offshore rights became more exclusive, transferability was wanted (it may also be called assignability, marketability or exchangeability). All degrees of transferability are possible. On land, most freehold rights are highly transferable and most leases are transferable with the permission of the landlord. But there are exceptions - some landlords will not allow their tenants to sublet a house. In the fishery, when licences were just part of the system of biological regulation, licences were usually personal, and not transferable. It rarely mattered, for in those days anyone could get his own licence.

4.3 Why each characteristic of a right is desirable to the right-holder

When people acquire property, they may be able to choose the kind of property right they will hold: a leasehold, or a freehold for example. Up to a point, they can choose the right with the characteristics they want. Generally speaking, the more of all characteristics a right has, the more it is valued and the more it costs.

Duration is valued because it allows the right holder to get the pay-off in later years from the investments he has made in the earlier years. Indeed, if a right's duration is short, and is not necessarily renewable, the holder will avoid any long-run improvements or investments. In a fishery, it encourages the right-holder to make costly changes in the size and age structure of the fishstock that may result in larger and more more profitable catches even if there must be an extended waiting period.

Exclusivity is valued because it protects the right-holder from interference with the fishstock and with fish catching. In a fishery, we have seen that the low exclusivity of the average fisherman's licence forces him to compete, every time out, with other vessels for his usual share of the catch.

Quality of title is valued because it saves the right-holder from the costs of protecting and enforcing his rights to be fishing. In most public fisheries, the fisherman's right is secure; but he may be surprised by new arrangements and regulations that in effect arbitrarily reduce the characteristics of his right.

Transferability is valued because it allows the holder to make the best use of his time and capital, by selling his right if he so wishes.

Some analysts add other useful or essential characteristics, such as flexibility, enforceability and divisibility to this list of four, but they are not needed in this discussion.

When a person's property right is said to be "complete" or perfect it means that the right can be shown to have all these four characteristics, each one to the fullest possible extent. Now apply all this to the right of a fisherman over the fishery. Of the four characteristics of a property right, we find that his public right of fishing has: no exclusivity; long, but meaningless, duration; great security, for what it is worth; no transferability.

Thus, to put all these ideas together, to be like a farmer's ownership rights to manage, dispose and profit from his land, the fisherman's public right of fishing must be changed. His right must have more of two characteristics: exclusivity and transferability.

4.4 "Standard" types of real property rights

There are many types of standard property interest in land are recognised today. A freehold or fee-simple right for example is rich in all four characteristics. A leasehold can be much the same, but with a shorter duration. A licence can be like a lease, but with little or no exclusivity or transferability. The unfamiliar *profit-à-prendre* allows the holder to take something from another's land or water, while the similar easement allows its holder to do something on another's land or water. Both these can be transferable and exclusive. All are very old, traditional, common-law types of ownership interest in land. Over the centuries they have been adapted for new purposes by their holders and these have been assimilated into the rights by repeated exposure in the courts. Owners have gone to the courts to resolve disputes about who owns a right to property, and what ownership entitles them to do with it. The court's decisions have gradually changed the characteristics of the various rights. For example, the holder of a lease originally had security against encroachment by his landlord, but not much security when others tried to dispossess him. Today, thanks to refinement in the common-law courts, the title of a leaseholder is good against all the world.

Other types of property right in land are quite modern and have been deliberately created by acts of the legislature. An interesting example is the strata-title condominium, an ownership right with carefully-limited exclusivity and transferability. It was created by Australian and Canadian legislatures to replace clumsier ways by which occupants could "own" their space in an apartment building. A third type of property right in land, has been created by the legislature as part of its land-disposal and resource-management policies. Examples are the mineral patent (freehold), Crown grant, lease and claim. Governmental legislatures have also created a number of other resource-using grants, permits, leases, licences, reserves, titles and so on. All these have many of the characteristics of property rights, such as exclusivity transferability and duration even when not advertised as "property".

The government's offshore and ocean fishing licence was different again. It arose out of administrative laws, not land-disposal laws. Thus it can perhaps be likened more correctly to a dog licence or a building licence. One reason was that governments had not "owned" the offshore fishery resource in the same sense that they owned the inshore shallows and the public lands. They could not by licensing an offshore fisherman, give him *all* the three powers of ownership for they had not all the powers themselves.

5. VIEWING THE ITQ AS A PROPERTY RIGHT

5.1 Background

Earlier (Section 2.2), I pointed out that ITQs were introduced to improve the existing licensing systems. There was little idea of creating a property right, or of giving the old "right" additional characteristics. In Section 4, I regard the licence as a potential right and will compare its characteristics with those of the ITQ.

5.2 Behaviour in a fishery without exclusivity

Under closures and equipment regulation, the fishermen's licence had little or no exclusivity. There were no boundaries across the fishstock and so no connection between a vessel's impact on the fishery today and its own part of the total catch a few seasons later. Both the good things and the bad things the vessel did while fishing were so dissipated over the entire fishery that it had no incentive to worry about them. This changed a little when limited licensing started, and again when each vessel's licence gave it powers over a limited part of the stock. But these modifications hardly changed the licence-holder's perfectly reasonable belief that his actions had no perceptible effect on his future catch. The stock was not his. Therefore he had little personal incentive to obey the regulations or to help to improve them. For the most part, the system forced him to adapt. First, he must adapt to the regulations by competing relentlessly within the open seasons, using the permitted equipment; and second, he must adapt the regulations to the competitive struggle by avoiding them when he could and negotiating to get them changed in his favour when he couldn't.

5.3 How ITQs gave the fisherman more of the powers of ownership

The added *exclusivity* characteristic of the quota licence changed his behaviour. From having to act as though he were a tolerated poacher, it gave him some powers to act as though he were an owner. There are three general powers of ownership: to manage the asset, to transfer or sell it, and to take the income from it. The ITQ certainly gave the fisherman the third power. Instead of merely allowing him to go out and compete with others until the TAC was reached, it entitled him to a definite fixed percentage of the TAC - that is to the yield itself. The fishermen, as a group, had been given the third power of ownership. By it they collectively acquired something like a *profit à prendre* in common, a standard property right in land. Each fisherman had a fixed share of this yield, and so he possessed the third power of ownership.

The *duration* and *security* characteristics of the ITQ also gave the holder the second power of ownership: management. As for short-run management of the harvest, it gave him the power of deciding when and where to land his fish, and for what market. No longer were regulatory closures needed that governed when all fishermen must land and sell their catch. As for long-run management of the size and composition of the future fishstock, it happens that there is no other way to ensure it than by varying the size and composition of earlier catches. And, under ITQs, these earlier catches belong to the quota holders. Thus there is a direct, though fractional, link between what a quota-holder takes from the stock today, and what will be available for him to take in future years. Therefore, subject to regulation, each quota-holder has a modest *ownership* power over management. Of course, these powers of management are divided among the holders in proportion to the quota shares, so it is difficult for them actively to manage. Nevertheless under quotas it is a greater power, and opportunity, than under regulation.

What about the first power of ownership: of transferring and bequeathing it? At first, in Iceland and New Zealand, the quota licence was not transferrable. It was not clear what its originators had in mind. However, with a few years' experience fishermen applied pressure to make their quota licences *permanent,* and *transferable.* It was easy to see why. Permanence gives the quota holder opportunity to act more like a farmer. He can develop markets for fish landed at particular times and of a particular quality. He can acquire vessels and equipment adapted to fishing for smaller amounts over a longer period of time, without cut-throat racing on the grounds. Transferability allows any right-holder to allocate his time and attention to the fishery in accordance with the other uses of his time and capital. If he has other opportunities, he can sell or rent his right permanently or for a period of time. If he is doing well, and has economies of scale, it allows him to acquire more rights when he and his crew and vessel have the time and opportunity. These arguments generally persuaded the governments. The quota became movable from holder to holder, between long-term holders and from long-term holder to short-term renter, not by being turned in to government and re-allotted, but by private grant, sale or bequest.

Thus, although the quota concept itself does not call for a marketable certificate, in practice the quota licences have all acquired long duration and transferability.

5.4 Competitive behaviour under property ownership

To proceed, we may compare the behaviour of the fisherman under licensing and under ITQs. We noted earlier that the licensing system forced him to adapt by competing relentlessly within the open seasons using the permitted equipment. The ITQ-property-rights concept changed this. He no longer had to incur costs to keep and increase his share of the TAC. These costs were abolished, and his profits increased by that amount.

Of course, competitive behaviour did not vanish. Somewhat as economists define competition among farmers (behind their fences) as keeping down costs, raising quality and finding good markets, so the fishermen (their quotas established), compete in landing catches economically, raising quality and finding good markets. Those who want to expand buy more quota from those who would rather transfer to other fisheries or to other sectors of the economy.

Also as noted, under licensing, fishermen had maintained their past sharing of the TAC by circumventing the regulations. I will not claim that avoiding the inspectors does not also occur under ITQs. But, the point is, much of the incentive to do so had vanished. They do not need to cheat and poach to maintain their share. Some continued to do so, but most of them found it easier to acquire more quota or to give more of their time to other fisheries or jobs. (Recent data on the new Alaska ITQ systems confirm that illegal behaviour had been greatly reduced).

Finally, I noted above that under licensing, fishermen had battled against the regulations. Regarding the fishery as the government's, they had only a limited interest in improving it. For example, when a fishery was exploited by vessels of different types, subject to different regulations, many of the regular meetings had been devoted to squabbling about how the catch was to be divided between the openings for the vessels of different gear types, or from different communities. The point is that the conferences were *not* devoted to the exchange of information on how to increase the stock or its value. Indeed many fishermen had an incentive to conceal the special information they had required, rather than contribute it to the improvement of stock management.

5.5 Digression on the *tontine* and transferability

Transferability also allows retirement. The curious things that happens when there is no transferability can be illustrated with a *tontine*. It was a club-like arrangement invented about the same time as Grotius was explaining the freedom of the seas. Each person in a group, all about the same age, would put some money in a fund. They shared the fund's income equally, much as in a mutual fund today. As each shareholder died, the fund's income was re-divided, among the reduced number of survivors. With the years each survivor's income became larger and larger. Finally only one person was left. He or she received the entire income. When he died the capital of the fund would go to his childrem. Other members' children got nothing. One family prospered because shares in the mutual fund were not transferable.

What was a desirable feature in a *tontine* was a flaw in the design of the earliest versions of limited licensing and ITQs. In these early versions, the number of active licences was to be reduced by attrition: by the death or retirement of the licence holders. But, what the designers had not provided for was that as time passed and some fishermen dropped out, those who remained would be ageing. In 15 years 65-year-old holders would be 80. The longer they stayed on, the greater the reward for staying still longer. It was like the old *tontine*. No one would have an incentive to retire. Eventually one old surviving licensee would be found doggedly trying to take the entire catch with one vessel. The answer to this bizarre situation was of course to allow holders to transfer their licences by sale or bequest. Then the government would have to think of some other way of reducing the number of licences, perhaps by a buy-back scheme for vessels or licences, perhaps by re-auctioning some licences, or by using a lottery. All such devices have been used.

5.6 Conclusion

To conclude, the main points have been two-fold. First, the increase in the *characteristics* of the licences held by fishermen have increased the effective and legal *powers* of the fishermen (to get income from harvesting the yield of the stock; to participate in the management of the stock, and to deal in the ownership of the rights). Second, these expanded powers have turned the regime of regulations and licences into one of property rights.

6. TESTING THE ITQ IN MULTIPLE-SPECIES FISHERIES

6.1 The bycatch situation

The potential of the property approach can also be seen when we remove the simplification that the offshore fleet confronts only one stock of fish. Imagine that there are several species that feed together. For illustration assume just two species and that the second has a low value. There are usually markets for both species. Typically, vessels like trawlers and seiners, having unselective gear, catch both species. The second species is commonly referred to as a bycatch. A bycatch is not necessarily a new problem.

6.2 The "capacity" problem and the social problem of bycatch species

Vessel owners or skippers have a "capacity" problem to solve even in the absence of any policy, regulation or property right. For simplicity, imagine that on a trip each vessel of given capacity, travels to the grounds, brings in equal quantities of both species in its catch, fills its hold, returns to port and sells the two species at market prices. Because trip costs are the same regardless of the mix of species in the catch, economists define the two products as being in "joint supply".

The vessel's limited capacity is partly occupied by the species that sells for a lower price. The more valuable the popular species, the greater the gain from dumping the low-value species. That is, the vessel's returns are reduced by the act of filling half the net and half the hold with the low-value species. Carrying this species is like a "tax" on carrying to port, the high-value species.

This fisheries joint-supply problem has familiar equivalents in all natural-resource industries. For example, both miners and loggers must take some low-grade material in the process of removing high-grade product. Sometimes the second product is regarded as a low-value commodity, sometimes as a high-cost waste or pollutant.

The skipper can try either of two different strategies. The first is avoidance. He can try selective fishing. He attempts to learn where the desired species are concentrated, and heads for where the high valued species abound (unless it is too remote). The typical skipper finds selective fishing difficult; that is, the catch of the "better" fish per trip is too low (or the cost per fish of the higher

value is too high). He rejects a selective-fishing strategy and settles for a run-of-the-mill mixture.

The second strategy is dumping: the skipper brings the low-value species on board, but dumps then the side over to make room for the preferred species. He may sort through every netful, or he may just select whole netfuls by keeping some and dumping the others. Compared with carrying less popular species home, this strategy has obvious benefits, the jointness of supply is broken.

To what extent will fishermen as a group follow the dumping strategy? Some will be deterred because there are some extra costs associated with it. For example, a vessel that always had to dump half its catch to get rid of low-value species would incur the costs of twice as many sets of the net on each trip. Furthermore, the more some fishermen "high-grade" by dumping, the higher will be the market price of the remaining bycatch carried to market, and the more some fisherman will decide to carry more of the bycatch back to the port. These two influences will reduce, but not stop, a fisherman from dumping. His general rule, will be: continue dumping a low-value species unless the cost of doing so exceeds the gain from selling the high-value rather than the low-value species.

6.3 Bycatches: comparison of two regimes with a bycatch species

6.3.1 Introduction

Dumping is adopted in a free fishery, because the low-value species occupy capacity on the vessel - not because of any regulation or quota. Since the vessel owner does not own the wasted fishstock, he does not think that dumping is a source of extra cost; for him it is a way of avoiding costs. Society bears the cost of wastage and perhaps of extinction of over-fished and dumped bycatch species. Dumping has led to demands for government regulatory policies to reduce it. I imagine and compare alternative regimes: anti-dumping regulations *versus* ITQs.

6.3.2 Bycatch handling behaviour where the high-value species is regulated by closures

One policy in use is a *prohibition* of dumping and to fine those caught. However, the skipper may choose to disregard the prohibition, taking the chance that he will be caught only occasionally, adding the expected fine to the cost of dumping until it is greater than the gain from dumping. The government may increase the expected fine by placing observers on each vessel. The heavy cost of observers is billed to the vessel owner; consequently small vessels are not usually required to carry observers.

An alternative regulatory policy, that reduces the expenses of prohibition and observation, is to close a multiple-species fishing ground altogether. The low expense of this policy however is deceptive. It might be called procrustean, in that the main catch is reduced to a size dictated by the survival of another species. For example, where the species are caught in a 50 - 50 ratio, the private cost of saving each threatened-species fish is the foregone net profit on the main-species; if the ratio is 65-35, the cost is the foregone net profit on the two main-species; and so on.

6.3.3 How these problems look under an ITQ regime

Some critics imply that when ITQs are introduced, dumping begins. They seem unaware that there will always be some dumping of low-value species as long as vessels have capacity limitations. The critics' argument is that ITQs give the skipper more reward for dumping the low-value species than he gets under anti-dumping regulations. This is hard to understand, and is probably wrong. Indeed, under ITQs the skipper is in less of a hurry than under regulation, and so can tolerate more extra load of the low-catch species, than if there were no ITQs.

Setting up an ITQ system for the low-value species will make no difference to the skipper's behaviour. He will continue to dump the low-value species as long as the costs of dumping are lesss than the extra gain from freeing up his capacity for the high-value species.

6.3.4 When the second species has a high value

If the second species is valuable, the skipper's dumping rule will give a different result. In a fishery with no regulation, or with anti-dumping regulation, he will no longer regard the second species as a nuisance. Instead he will bring them on board and carry all his catches to port. It is here that the critics of ITQs are correct. If the skipper has a quota for the first species but not for the second, he will wish to land both species but will be prevented from doing so by enforcement system for the quota system. Then it can correctly be said that the ITQ system will force him to dump valuable fish, which he would not have done under the alternative regime.

The most obvious remedy is to introduce a quota system for the second species, which the skipper can acquire. This solution has been tried, and can work. I have described elsewhere an open market in short-run quotas for various species, which a skipper may acquire after he has landed the bycatches. It runs into difficulty if there is a social or external reason for not catching the second species, even if its market value *is* high. For example, it may be that the second variety in the fishery does not belong to another species, but may be under-age or undersized fish of the first species. Or, it may be that the second species is under a moratorium. Then a quota to take such fish cannot be bought or rented because it does not exist. It seems that a realistic solution would be to create new quota licences even for closed and protected species. If the species is valuable, they will be eagerly sought, at a price, by skippers who want them as an alternative to their dumping them as bycatch.

The greatest difficulty will be found where there are many species, all caught together. Then the ITQ property-right approach runs into large individual control costs. Most systems of regulation are difficult to apply when there are dozens, perhaps hundreds, of kinds of fish caught together. The ITQ system is no exception.

6.4 A suggested set of rules

In studies some years ago I sketched how the by-catch problem could be solved if every species can be placed under divisible and transferable quotas, each species subject to its own TAC.

i. Vessels using unselective gear may not enter areas with two vulnerable species without acquiring quota for each species.
ii. Quota must be assigned to every fish of all species caught on board. Sufficiency of quota for the main species can be checked at the dock. Checking quotas against landings for the bycatch-species quota however will have high enforcement costs, perhaps requiring randomised monitoring by on-board observers.
iii. Vessels whose quota for step (ii) is deficient must buy more, probably by cell phone or radio purchase or rental on the organized quota market. Obtaining quota for marginal species may involve paying a higher price than the fish are worth. Some sellers will no doubt demand repayment in the form of delivery of the bycatch species to a particular dealer or in the form of later returns of similar quota, or perhaps in the form of quota for the main species, perhaps for a future year. If the terms are strict, the skipper may be tempted to dump and face the possible penalty.
iv. Although their total bycatch must be covered by quota, vessels may economise on their capacity to hold, transport and market it by discarding the quoted bycatch. Possibly, dumping should be allowed if the second species has a low market value. Little is gained by lugging it to the market. This would be no more an anti-social waste than a farmer's decision to discard the cullings from his fruit trees. Vessels' short-run decisions to take this costly action will probably in the long run induce their investment in technology and in capacity to move themselves and the whole fleet toward an equilibrium solution: catching and landing bycatch in the same proportions as the TACs.

7. FISHERMEN, PROPERTY AND SELF-MANAGEMENT

7.1 Remaining issues

Two main property-right topics remain to be covered. One is the prospect of fishermen in offshore fisheries having to provide for themselves many of the services now performed by government. I argue that they could do this satsifactorily, probably better than government does. The other is the role of ITQs and property in getting to the setting up and operating of a self-management cooperative.

7.2 Limitations of ITQs

The discussion in previous parts has shown that the introduction of ITQs automatically solves only one set of fishery problems: those arising in a fishery with open access plus a regulatory regime utilising area closures. ITQs help rid over-crowding, racing for quota share, short seasons and low-quality product. But even when they work perfectly, they still leave each fishery in the hunting and gathering stage of economic production. The problem is that this highly individualistic mode of production does not encourage its participants to better pool information, protect stocks, achieve economies of scale in production and try other forms of cooperation.

7.3 Example: a property-basis for self-regulation

7.3.1 The incentives for self-regulation

Someone once said that because the regulations and the TAC are in effect local, undivided, "social goods", one cannot expect that any non-government, without powers of compulsion, could provide them efficiently. But today "co-management" and "self-governance" are in the air. Since the late 1970s, commissions and think-tanks have been conducting reviews of the possibilities for "de-regulating" bits and pieces of the entire economy. Many began to question the size of government's role, even in the fishery. In New Zealand especially, in the late 1980s politicians, knowing little about the subject, automatically included fishery regulation services among the branches to be downsized. One principle advanced was that everything should pay for itself; another that government should not provide free what industries privately needed. States were increasingly leaving farmers to look after themselves; why should fishermen also not look after their own needs?

I take as an example the services of regulation or management. I assume that the owners of the vessels harvesting a particular offshore fishery have successfully joined forming a self-governing organization. The question is whether this organization, which I will call a cooperative, can successfully take over the regulation of the fishery.

Does an ITQ fishery need regulation? The ITQ does solve the distributional question. There is no longer an automatic need to adjust closures to maintain equity and fairness among the fisheries and their gears. To that extent the distributive role is simplified to that for any kind of property: making sure that ownership is enforced, which is to say registered, secure, divisible and transferable, by policing and in the courts. This is no small problem. Even for quota holders, temptations abound to abuse the fish resource. True, under an ITQ regime fishermen have a stronger incentive to make the system work. But the quota institution leaves them torn between enhancing their joint fishery and breaking through their individual quota constraints. Each individual, knowing that his own impact on the joint fishstock is small, will be tempted to free ride on the quota scheme, by exceeding his quota, taking under-sized fish and dumping bycatch species. Overall enforcement and monitoring are still needed.

Can the cooperative provide the ITQ fishery with its TAC? The TAC and the biological regulations are the fruit of an overall stock management plan. How can this be worked out? There is nothing in the theory of an ITQ

fishery to produce a management plan (although Ragnar Arnason has shown that the marketability of ITQs can provide the value-maximising basis for picking the best of several management plans). Must the cooperative abdicate from providing its own TACs?

These are larger questions of organization information and transactions costs than I can cover here. To suggest how to look at them, I take perhaps the most difficult function: the setting of the TAC. Would a cooperative be competent to take on the responsibility of setting annually the TAC and other management details? Under a regulatory regime, government experts ("scientists") make and report observations, helped by fishermen's reports. The scientists interpret these data and apply what they have learned to recommend the season's TAC. For a cooperative to do as well, it needs good information about the size, growth and composition of the fishstocks. Having this information, it needs a long-run management goal, and a plan, for setting each year's TAC.

7.3.2 Information

Fishermen are already the source of much, if not most, information used by the government. Their vessels can seek and provide more kinds of data, of better quality, than they have usually been asked for. They have time for this, for under ITQs they need not be frantically busy during the short period when the season is open. As for scientific interpretations of the fishermen's observations and data, they can be provided by private consultants as well as by government.

As for the TAC decision, fishermen in cooperatives that must live with the results, can make their own decisions based on what they have seen, what the data tell them and their consultants, and what their consultants advise. The cooperative can get the same advice as government, from the same sources, public or private. (If, especially, future government belt-tightening policies require that fishermen pay for the services that government has provided free in the past, they will want to get it from the best sources).

7.3.3 Criteria

Giving the cooperative responsibility to make the TAC decision therefore is less a question of fishermen being informed and advised than it is of their using the "right" criteria in weighing the alternatives. Consider a TAC committee in a government agency compared with a cooperative's TAC committee of active fisherman. Can we predict how their attitudes and decisions will differ?

In the hands of either party, the TAC policy decision boils down to dividing this year's expected fishstock between the catch this year and, indirectly, the catch in future years. It's something like the household's how-much-to save decision, or the farmer's how-much-to spend on this year's harvest versus and how much to invest in the land and estate for future harvests. The annual fishstock decision involves an analogous choice between present TAC and stock building for the future.

To a considerable extent, the cooperative committee's TAC decisions will reflect the members' private attitudes and preferences. It is difficult to see why these should differ significantly from those of a government committee's. Both are driven by a concern for the future. Under simple regulation, the fishermen's behaviour did not reveal much concern about the future of the fishstock. It had not belonged to them, and they lacked the security that would give them faith that they would share in it in the future. But their decision-making behaviour when they hold ITQs, reveals much the same attitudes as those of the government fishery administrators. Indeed property-owning fishermen may be more interested in the future of the fishstock than administrators. For administrators, the penalties in making wrong predictions (and the rewards for being right) are not great. For the property-owning fishermen, the penalties, in the form of a time-stream of smaller catches, and, or, a lower market value of their quotas, would be much tangible and personally felt.

There are two well-known objections to allowing fishermen to make the decisions about the TAC and the gear regulations to go with it. One is that, compared to government regulators, fishermen will be short-sighted. The other is that they will be too little concerned with the survival of low-value bycatch species. I think they are probably mistaken.

The short-sightedness theory comes down to saying that fishermen will give less weight to future harvests (i.e. discount future harvests more heavily) than would be in their own interests or in those of the economy or society as whole. It could be true if property-less fishermen continued to be a race apart, risk-loving people who lived for the moment. But it will not be true if fishermen are property-owning harvesters, as concerned with biology, technnology and markets as are farmers. Even with ITQs, we observe that fishermen have long looked after their own vessels, nets and equipment, homes and their port facilities as well as anyone else. And we observe today that in the increasing number of ITQ fisheries, especially those run by cooperatives organizations, that conservation and growth, not liquidation, are their objectives.

As for the theory that a cooperative will neglect other species, there may be something to it. Left to itself, a well-informed fisheries cooperative will be more concerned to protect the habitat and the prey of the species they harvest and to get rid of its predators and competitors than its members acting alone. That is probably an advantage. When in addition society wants to protect species that the cooperative's members regard as a nuisance, society will have to intervene actively. In my opinion, the cooperative organization may be helpful in this role: certainly it would not make things worse.

7.3.4 Summing up

From a fisherman's point of view, the only reasons for retaining a government to make his regulations and set his TAC is that the government may continue to do it for

nothing. Probably, where under ITQs things are going well, money-conscious governments will opt out. So fishermen should should ask themselves whether the mix of services they need must all be provided by the government.

Here the complicated question of who should be responsible for regulation has been simplified by focussing attention of only one feature of modern ITQ-regime management: the setting of the TAC. When this particular question is examined for the case of a deep-sea fishery, it appears that fishermen could cooperate to do it themselves. They can hire observers, exploratory vessels, consultants and advisors, perhaps from government (as in New Zealand today) perhaps from private-sector sources (possibly active members of their own fishery). Their new concern for the future value of their property will help to unite them when they set about interpreting the recommendations they receive.

The same is true when we go on to consider other fisheries' services: enforcement in particular, but also those, such as:

i. running an exchange for short- and long-run transactions in quotas
ii. organizing or sponsoring joint-fishing operations and
iii. running docks or a port, and storage or repair facilities.

Still other functions become possible once fishermen unite and hold their own quotas. As a unit they might deal with pollution, stock enhancement, habitat protection and make binding "treaties" with other individuals or groups fishing the same migratory stocks. Some of these functions are best performed by, or with, government. Anyway, offshore fishermen do not need them all and they can decide among themselves which to leave to government, which to skip, and which provide themselves (and whether by their own work or by contractors). One has only to visit the Japanese inshore fishery to learn how many activities can be undertaken by one fishery cooperative. Of course, not every group undertakes the same list of functions.

7.4 Getting there and back to the role of property

How a group of independent fishermen get to self-government depends on where they start, the attitude of the government and the attitude of the industries to whom they sell their catches. In high-seas fishing, cooperation like that sketched above is still a utopian ideal. Internationally there are probably more examples of *de facto* corporate sole ownerships than of fisherman self-management (on offshore grounds). Why are there so few cooperatives? The purpose of the following sections is to review the explanations and sort them out.

The chief difficulty about an offshore cooperative is how to get there. Fishermen may realize that they might gain a better TAC policy, lower administration costs, lower fishing costs and higher prices through a cooperative. Yet they may oppose cooperation, or, avoid becoming members themselves. There are a number of reasons. Here I list three of the most important:

i. *Free riding on the sacrifices made by cooperative members*
Some clever fisherman, following their experiences as taxpayers, may favour the formation of a cooperative, yet refuse to join themselves. For example, they may want to enjoy the gains from higher yields in later periods without having suffered the pains of deliberately smaller catches in earlier periods. They want to "free ride" on the sacrifices of others. There is little harm in this, unless the majority of the fishermen try to free-ride. If so, none has the A. Sen "assurance" that I mentioned in Section 2.2 and the cooperative will fail. This problem is related to that of the "prisoners' dilemma" in game theory.
The remedy for free riding is simple: everyone must become a member and remain a member. This is the remedy used by governments in a system of regulation: everyone must conform to the rules. It is also used by citizens in political jurisdictions: every person can enjoy the public goods provided by the state, but everyone must contibute, especially by paying taxes. No one may free ride nor opt out.

ii. *Domination by a majority*
Some self-dependent fishermen, in a minority, may object to the TAC and rules made by a majority. This is inevitable in any organization, from cooperatives to business corporations, trade unions and private clubs. Outright tyranny and dishonesty are prevented by government-made voting and reporting rules, and are just as necessary in a fisheries' cooperative. If these rules are inadequate, the fisherman can try politicking within the cooperative, or, finally, sell his membership and moving to another fishery or occupation.

iii. *Losing by joining up*
There is a more profound problem: like the first item above it is also loosely related to that of the prisoners' dilemma in game theory. To put it in its simplest terms, the setting up of a fishermens' cooperative is like deciding whether to adopt a new joint policy. Each person can see that working together will raise the average incomes of the group, by getting finely-tuned regulations, cutting regulation costs, landing more fish, catching a better quality product, getting higher seasonal prices, and having lower fishing costs. But for each member, an expected increase in the *average* income will not be enough. What is to prevent his own expected increase being less than the average? Indeed, what is to assure him that he will, individually, actually get *any* increase? Under the cooperative there will be no government to protect him from losing. Therefore he will behave as game theory and organization theories predict: he will not support the policy. In this example, it means he will refuse to support the formation of a cooperative.

What would change the individual's mind and win his support? What would relieve him (and each other potential cooperative member) from the reasonable fear that his own harvest and price would fall short of the general improvement? Put this way, the answer is obvious: to win his consent, there is a need to offer *a guarantee of a fixed share of the future total TAC.* As it happens, almost by coincidence, the system of ITQs does automatically provide the fixed percentage sharing needed to make the fisherman secure within the cooperative. In the original assignment of ITQs, probably using a grandfathering procedure, the government has already, incidentally, imposed agreed historial percentage shares on the harvest from the fishery.

In a nutshell: the fishermen harvesting an isolated offshore stock, having escaped from competitive harvesting to regulation, and then from regulation to ITQs, are now likely to be enthusiastic about moving on to further developments to improve the stock and cut costs. This inevitably requires joint action. Having ITQs, the fishermen have already achieved the two indispensable features for fisherman cooperation and self regulation. First, they already have compulsory, complete and closed "membership." No one else is involved. Second, they already have in existence, as individual property rights, a sharing of the catch that is secure and reliable as the equity of shareholders in a business corporation or the rights of tax-paying local property owners in municipal government.

It is not essential that offshore fisherman form a cooperative for mutual regulation and the setting of the TAC. But it is predictable that many of them will want to try. On the whole, they are bound to fail, arguing amount the distribution of the harvest. But they need not fail if they already have the fixed property-like sharing of ITQs, with the extra incentives derived from transferability of being able to cash in on the prospects of ever more valuable catches.

PROPERTY RIGHTS AS A MEANS OF ECONOMIC ORGANIZATION

R. Arnason
University of Iceland, Department of Economics
Oddi V Sturlug, Reykjavik, IS-101 Iceland
<ragnara@hi.is>

1. INTRODUCTION

This paper is concerned with the role of property rights in economic activity. In particular, the paper focuses on the relationship between property rights and the level of production, productivity and production growth in economies. The basic thesis of the paper is that property rights are absolutely fundamental in this respect and, more generally, to almost everything that people usually regard as economic progress.

A cursory glance at economies around the world suggests that a high level of production and productivity usually go hand-in-hand with extensive, well defined and well enforced property rights. Alternatively, where property rights are poor or missing, the corresponding economic activity is generally severely depressed. Moreover, it is often seen that extensions of the system of property rights is followed by a spurt of economic growth. It follows that a major component of economic policy should be to improve and expand the system of property rights. This, however, often runs into problems of a technical nature; adequate property rights simply cannot be defined and enforced. Or, there may be problems of social nature; people may not be willing to accept an extension of property rights.

Fisheries, as so many other natural resource extraction activities, are among the economic activities where property rights are poorly defined or even nonexistent. This generally results in huge inefficiencies, frequently referred to as *the fisheries problem*. Since the fisheries problem fundamentally stems from lack of property rights, the obvious solution is to introduce these rights. There are, however, substantial technical as well as social problems with defining and enforcing sufficiently good property rights to solve the fisheries problem.

The paper discusses some of the property rights that have been proposed in fisheries and their relative quality: In Section 2, the appropriate objectives of the economic activity are discussed. The crucial conclusion of that discussion is that the purpose of the production sector is to maximize the net production of goods. Section 3 deals with technical ways to maximize the availability of goods. Two major ways are identified: (a) specialization and (b) accumulation. In Section 4 I argue that property rights are both necessary and sufficient to achieve the objective of maximizing the net availability of goods and are consequently fundamental to economic progress and wellbeing. The relationship between property rights, the market system and externalities is examined in Section 5 and I argue that the fisheries problem is fundamentally caused by the lack of property rights. In Section 6 the constituent parts, or characteristics of property rights, are considered and represented as dimensions along which the quality of given property rights can be measured. A particular measure of the quality of property rights, the Q-measure, is developed. In Section 7, the Q-measure is applied to the property rights based fisheries management systems of Iceland and New Zealand. Finally, in Section 8, the limitations of property rights are discussed.

2. THE ECONOMIC OBJECTIVE

It is as axiomatic that the social objective is to maximize the common good or, in more modern parlance, overall social welfare. This fundamental axiom is not arbitrary. It has deep roots in social philosophy and ethics. It can for instance be justified on the basis of social contract theories in the tradition of Locke, Rousseau, Kant and, more recently, Rawls (see Gough 1957 and Rawls 1971). According to these theories the proper social structure is what free and rational people ignorant of their prospective position in society, but knowing everything else, would agree on. From behind this "veil of ignorance" these people, form a contract - a social contract - specifying the organization of the society in which they and their descendants will live. In a deep sense this social organization is fair and just because this is what a free and rational individual with no particular special interests ("the veil of ignorance" serves to eliminate special interests) would agree on.

What would be the content of this social contract? Obviously two things:

i. Society should be organized in such a way that the supply of desirables should be as high as possible and
ii. The distribution of these desirables to individuals should be reasonably equitable.

The first stipulation is almost self-evident. Clearly, it does not make sense to reduce the net availability of desirables. The second stipulation warrants some discussion. Consider first risk. Obviously every individual would like to have as much for himself as possible. However, when forming the "social contract" from behind the "veil of ignorance" he does not know his future place in society. Therefore, depending on the individual's risk attitudes, he may have preferences over the distribution of desirables. Thus, perfect risk aversion would call for perfectly equal distribution and vice versa. With risk

neutrality, on the other hand, any distribution is as good as the other. Therefore, assuming some risk aversion by individuals, the "social contract" would certainly put a limit on the inequality of distribution.

The second consideration concerning the distribution of desirables has to do with their availability. From behind the "veil of ignorance" the individuals forming the "social contract" realize of course that the availability of desirables at each point of time may depend on the distribution of these desirables. Thus, with perennial equal sharing, people's willingness to produce might perhaps be undermined. Hence, it might be a good idea to maintain a system of rewards to induce people to exert themselves for the common good. This, of course, calls for a degree of inequality - an unequal distribution of desirables. It is important to realize, however, that this inequality is 'earned'. It is actually a reward for a larger contribution to the common good, just like the payment for labour. Therefore, any requirement regarding the distribution of desirables would first and foremost apply to the initial allocation, which people cannot really control, and not the subsequent accumulation of wealth, which depends largely on individual industry and enterprise.

Modern welfare theory, although built on a different foundation namely utility theory, produces the same result. According to standard results of this theory, more precisely the Pareto criterion (Ng 1980), a necessary condition for welfare maximization is that the net production of desirable things be maximized. It is important to realize that it is net production that counts here, *i.e.* production where the use of all inputs including labour and natural resources has been subtracted. The other necessary condition for welfare maximization is that this production be shared or distributed appropriately among the population[1].

So, in accordance with both social contract theory and utility theory a natural social objective is to:

i. maximize the availability of desirables and
ii. effect a fair distribution of these desirables.

To make this objective operational one must specify what is meant by 'desirables'. Basically, desirables are what people regard as valuable, *i.e.* desirables are anything that people are willing to put a price on or, equivalently, require a compensation to part with. Thus, in a perfect market system, where everything is traded, desirables are the same as goods or commodities. So, in this system the social objective of maximizing the availability of desirables is equivalent to maximizing the gross domestic product (GDP).

The real world, of course, does not contain perfect market systems and all actual market systems are imperfect to a greater or lesser degree. Therefore, in these economies, the GDP can not be regarded as equivalent to the aggregate availability of desirables. Faced with this practically difficulty, it may be reasonable to regard GDP as a first approximation to the availability of desirables, at least in reasonably well functioning market economies. Similarly, the contribution of production sectors to the common good may be measured by the net production of goods in these sectors.

It is sometimes asserted that there is a conflict between the most desirable distribution of goods and their maximum production. Therefore, the argument typically goes, the requirement of maximum net production must be relaxed in the interest of equity or fairness. This argument, while certainly not vacuous, is often given too much weight. One of the most important results in economic welfare theory, the second welfare theorem (Debreau 1959), is that any distribution of benefits that is desired is compatible with maximum production and, indeed, the market system. So, there is no fundamental conflict between the two objectives. Consequently, even in particular cases, there can be little reason to sacrifice economic efficiency for more equitable distribution of the net production. The reason is not that distribution does not matter, rather distributional considerations can, at least in principle, be taken care of by the appropriate initial allocation of endowments[2].

Thus, the assumption that the social purpose of the production sector is to maximize the net production of goods rests on fairly solid ground. It follows that the production activity and the surrounding social institutions should be organized to facilitate this. For this purpose one invents, modifies, develops and scraps social institutions in the search for those most effective, given the current technological knowledge.

The same conclusions apply to every individual production activity making up the production sector as a whole and therefore also to the fisheries sector. This should be organized and operated so as to maximize the net-production of goods. Anything else will reduce the overall availability of goods and therefore economic opportunities to society as a whole. This raises the question of the appropriate organizational framework for the fisheries activity. To this I now turn.

3. HOW TO ACHIEVE THE ECONOMIC OBJECTIVE

Over the past two and a half centuries, economic theory has accumulated a great deal of knowledge about how to increase net production of goods and services. It is now generally acknowledged (Barro and Sala-i-Martin 1995) that the quantity of output from a given quantity of scarce inputs, labour and natural resources is primarily determined by two factors:

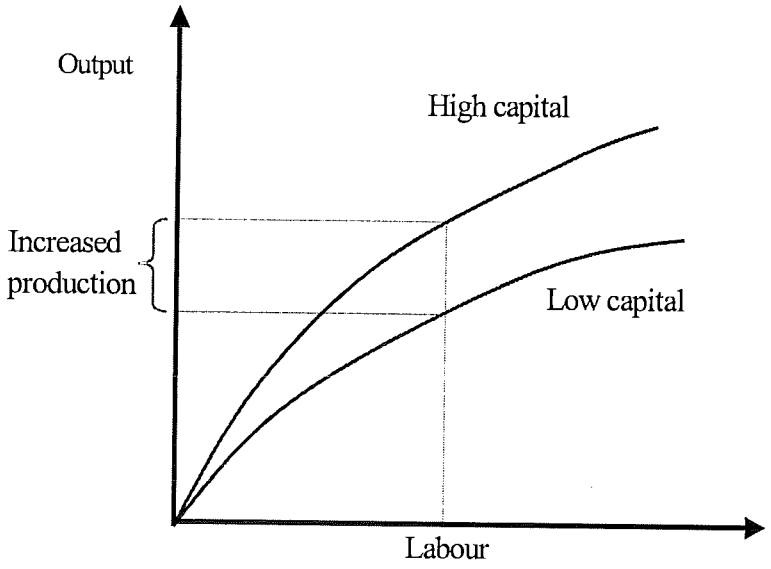
[1] One way to derive the equality result in standard welfare theory is to assume concave individual utility functions, which is equivalent to assuming risk aversion (see *e.g.* Varian 1992).

[2] This does not permit repeated or continuous reallocations on the basis of emerging inequalities for this would create a huge incentive problem.

i. accumulation of capital (physical, biological, human) and
ii. the degree of specialization.

Accumulation of capital has long been recognized as a key factor in the ability to expand production. For a given level of variable inputs, e.g. labour, increased level of capital basically shifts the production possibility frontier (the production function) upward. As a result more output is obtained from the same level of labour (Figure 1).

Figure 1
The production function: increase in capital



Capital in this context not only includes physical capital, it also includes natural capital, *i.e.* the natural resources of all types that serve as inputs into the production process, and human capital, *i.e.* the quality and ability of the human labour used in the production process. The accumulation of physical capital occurs through investment in physical capital units. Human capital is accumulated by education, training and by the accumulation of knowledge. Natural resources by their nature cannot be produced. Therefore to increase their contribution to net production it is first important to increase the access to these resources and, consequently, their flow into the production process. Second, for long term economic growth it is important to extract natural resources wisely and, if possible, on a sustainable basis.

Specialization enables producers to (a) focus on what they do best and (b) get better at what they do. Both (a) and (b) increase productivity and hence production (Figure 2). Specialization occurs both on a small scale, *i.e.* within the firm or a small community, or on a large scale between industries and countries. Specialization, which Adam Smith (1776) called division of labour, is one of the most important reasons for productivity and hence production growth in the world (Barro and Sala-i-Martin 1995).

4. HOW PROPERTY RIGHTS ACHIEVE THE ECONOMIC OBJECTIVE

The preceeding sections have shown that the keys to production and economic growth are:

i. accumulation of capital and
ii. specialization.

Now I will show that property rights, especially private property rights, are a fundamental prerequisite for this to occur.

Accumulation of capital obviously requires property rights. No one is going to save valuables in the form of physical capital, natural resources or even human capital unless he enjoys adequate property rights over his accumulation. There are two reasons for this. First, accumulation of capital necessarily means sacrifice of current consumption. Hence, to do so one must be reasonably sure of not only retaining possession of the accumulated assets but also gaining from their existence[3]. Without property rights, this is not possible. Second, even if some people decided to accumulate nevertheless, this accumulation would be seized by others and, in order to avoid a similar fate, quickly consumed. So without property rights there will be (a) no accumulation and (b) what capital there might exist will be quickly seized and squandered.

[3] This assumes something less than perfect altruistic individuals.

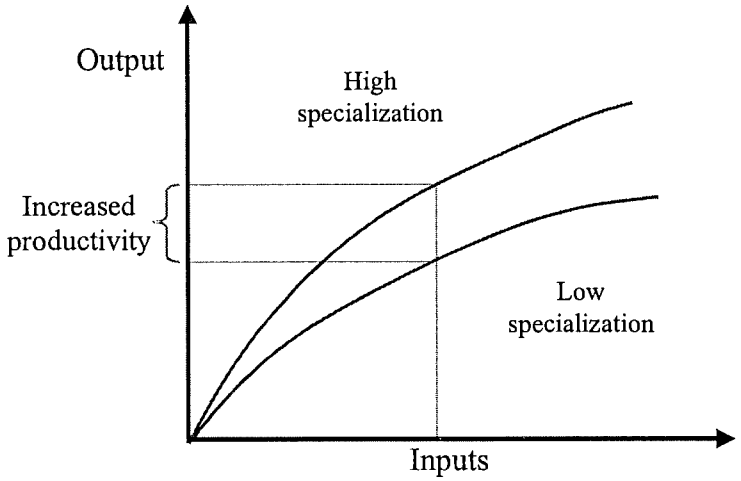
Specialization requires trade. If there is no trade, people, if they specialize in a single production process, will not be not be able to obtain the various goods they desire. Hence, in a situation of no trade, people will be forced to be self-sufficient, *i.e.* to produce all their needs themselves. This is the typical situation in primitive societies. Under these circumstances, firms, which are based on the idea of selling specialized products, could not exist. So, the modern day economic structure of specialized production and production units, *i.e.* firms, with the accompanying economic benefits is fundamentally based on the possibility to trade[4].

Trade, in turn, requires property rights, which is obvious. After all, trade is nothing but a transfer of property rights and without property rights there can be no trade. Hence, without property rights, there can be little economic specialization.

It may be illuminating to wonder about the possible extent of specialization without property rights? I have already established that without property rights there can be no trade. Therefore without property rights the only way to benefit from specialization is by the division of labour by command or custom within a larger economic unit. This economic unit which has some parallels with the modern firm, would be some sort of a community. It could *e.g.* be a village, tribe or even a kingdom. Alternatively, it could be a command economy for instance along the lines of 20th century socialist economies (although, it may be recalled, these were typically to a considerable extent based on private property rights). However, for this type of organization to work, the community as a whole must be able to uphold its property rights against outsiders. So, in fact, this solution depends on some property rights. To sustain this system, almost inevitably some coercion is required. This certainly implies certain rights by the enforcer which are close to property rights. Finally, this arrangement is probably not economically very efficient if only for the reason that it tends to stifle private initiative and invention.

So, the fundamental conclusion that property rights are necessary for a high supply of goods is established and, indeed, what is generally regarded as economic progress in general.

Figure 2
The production function: shifts due to specialization



The importance of this conclusion can hardly be overemphasized. Without property rights, there can be neither trade nor accumulation of capital. Without trade there can be little specialization. Without specialization and accumulation of capital, there can be little production. So, without property rights, human society seems doomed to abject poverty. In fact, with little or no property rights, human society would be primitive indeed, not much different from the more advanced versions of animal societies.

Given that property rights are necessary for economic progress, an interesting question is whether they are also sufficient. More to the point, does the existence of well defined and enforced private property rights inevitably lead to economic progress, *i.e.* increased supply of desirable goods? The answer to this question appears to be a qualified "yes". The qualification is for practical reasons. The actual outcome of any property rights system depends not only on the structure and extent

[4] It may be illuminating in this context to wonder about the most likely organization of a society where trade is not possible. Under these circumstances, it seems that it might be advantageous to organize society in closely knit communities where some specialization can occur on the basis of traditional sharing of the community's production with people attending to their pre-assigned duties according to tradition and social pressure. The family, of course, is an example of this kind of organization

of the property rights themselves but also on the operation of certain other social institutions most notably the market system and the property rights enforcement system, *i.e.* policing and the judicial system. For instance, conceivably, the market system might be dominated by monopolies and the property rights enforcement system riddled with corruption, in which case production would suffer. What seems to be true, however, is that if the system of property rights is complete, *i.e.* every valuable is subject to private property rights, and if the system is perfectly enforced, then expansion of output to the limit of the technically feasible is a highly probable outcome.

5. PROPERTY RIGHTS AND THE MARKET SYSTEM

5.1 The market system

The market system is known to have certain attractive economic properties (Debreau 1959, Varian 1992). Among other things, if the system is perfect, it will generate full economic efficiency and optimal economic growth. The interesting thing is that this happens without any centralized direction. As Adam Smith (1776) said, it is as if an invisible hand guided every action (privately motivated by self interest) toward the common good.

The market system also exhibits certain fundamental ethical properties, at least as specified by social contract theories and utilitarianism. First, it maximizes the availability of desirables at every point of time. Second, as discussed in Section 2, the market system can sustain any socio-politically preferred distribution of desirables by the judicious initial allocation of resources. I now argue that the existence of property rights is fundamental to the operation of the market system. More precisely, it is both necessary and sufficient for the operation of the market system.

The heart of the market system are trades in the market place. Such trades presuppose property rights over the commodities that are traded. Hence, property rights are necessary for the operation of the market system. If a system of property rights is put in place, the opportunity for individuals to benefit from production specialization and trading will arise. Therefore, assuming only a small degree of individual enterprise, trading will commence and the market system is on its way. The reverse, however, is not true. The existence of markets does not lead to the creation of property rights. The causal relationship is from property rights to markets and trades not vice versa.

So, the property rights system is really more fundamental than markets. Assuming only that people look after their interests, markets will automatically arise if there are property rights. Moreover, the market cannot exist without property rights but the existence of property rights does not depend on the market. In this sense, property rights are more fundamental than the market.

In his path-breaking treatise on the wealth of nations, Adam Smith extolled the ability of the market system to coordinate the immense complexity of individual economic decisions and activities without causing huge problems of shortages and oversupply and to direct all these diverse actions and desires toward the common good. Since the market system owes its existence of private property rights, this praise is appropriately assigned to the system of property rights. The great social coordinator is really the institution of property rights, not the market or market forces! Consequently, our current economic system is perhaps more appropriately referred to as the property rights system or the private property rights system rather than the market system.

5.2 Externalities and property rights

A well known problem of the market system are externalities. The market system is only efficient if there are no externalities (Debreau 1959). What is less well known is the close causal relationship between externalities and property rights. Basically, we may assert that lack of property rights causes externalities. How does this work?

If property rights are missing, people may simply take what they want, at least to the extent this is allowed by social custom[5]. If the resource is scarce, this causes an external effect. The act of "taking" simply leaves less of the resource to others. They are in other words adversely affect by the "taking". A negative externality is created. With property rights in place "taking" is not permissible. Consequently, with property rights, there can be no externalities. With property rights in place the method of obtaining is buying. If the resource is scarce the purchase price will be positive. This means that the previous owner will be compensated for handing the property right over.

The externality created by "taking" (as opposed to buying) is in economics generally referred to as a technical externality (Bator 1958). This is the type that causes economic inefficiencies. Property rights do not actually remove external effects. The resource is still scarce and someone's use of it will reduce the quantity available to all others. What property rights do is to turn a technical externality into a pecuniary externality which is economically harmless. A pecuniary externality is harmless because through the act of trading, the interests of both parties, the buyer and the seller, are considered in the appropriate way. Only if the buyer values the resource more highly than the seller will the trade take place, which is in accordance with the common good.

All economies are infested with technical externalities. The only difference is the pervasiveness of the externality problem, Generally speaking natural resource based economies are more affected than others. The traditional way to correct for externalities is to impose prices, so called Pigouvian corrective prices (Pigou 1912) on the externality-causing activity. An economy where all externalities have been corrected for

[5] Actually, if "taking" is not allowed then property rights exist.

in this way is called a Lindahl equilibrium (Dasgupta and Heal 1979). Lindahl equilibrium is a theoretical construct, not really feasible in reality, at least no more than it is possible to calculate all relevant shadow prices for the economy. What is possible, however, is to define the appropriate set of property rights and let the market take care of the prices. Thus, given the appropriate property rights, a full Lindahl equilibrium will be approximated by the market system. This has been the arrangement for a good part of the scarce resources in modern day market economies. For the others technical externalities still remain.

5.3 The fisheries problem, externalities and property rights

The fisheries problem manifests itself as excessive fishing capital and fishing effort, reduced fish stocks and dissipation of economic rents to the point where the fishery is economically hardly worth pursuing. Given the intrinsic productivity and richness of many ocean fisheries, this outcome constitutes a serious economic failure.

The fisheries problem is caused by externalities. Fish stocks are limited. Consequently one fisherman's catch reduces the harvesting opportunities of all other fishermen. This is a typical technical externality. As all other externalities, it arises because of a lack of the appropriate property rights. In this case there are inadequate property rights in the fish stocks from which the harvest is taken.

It follows immediately that the fisheries problem would disappear if only the appropriate property rights could be defined, imposed and enforced. This is the problem. But, it turns out that there are substantial technical and social problems to defining, imposing and enforcing sufficiently good property rights in many fisheries, especially off-shore ocean fisheries. For this reason, fisheries managers have often been forced to resort to rather weak and indirect property rights such as access licences and harvesting quotas. In some cases, however, these indirect (or pseudo) property rights can solve a good part of the fisheries problem.

6. PROPERTY RIGHTS: CONTENT, DIMENSIONS AND QUALITY

6.1 Characteristics of property rights

A property right is not a single variable. As Professor Scott (1988, 1996) has informed us, it really consists of a collection of different of characteristics. The number of distinguishable characteristics that make up a property rights is high. However, according to Scott (1996, 1999) the most crucial property rights characteristics are:

i. security, or quality of title
ii. exclusivity
iii. permanence and
iv. transferability

Security or quality of title

A property right may be challenged by other individuals, institutes or the government. Security, here refers to the ability of the owner to withstand these challenges and maintain his property right. It is perhaps best thought of as the probability that the owner will be able to hold on to his property right. Probabilities range from zero to one. A security measure of one means that the owner will hold his property with complete certainty. A security measure of zero means that the owner will certainly lose his property.

Exclusivity

This characteristic refers to the ability of the property rights holder to use and manage the resource (his property) in question without outside interference. An individual's personal things such as his clothes, generally have a high degree of exclusivity. A right to the enjoyment of a public park has almost zero exclusivity. An ITQ holder has a right to a specified volume of harvest from a given stock of fish over a certain time period. Given the conventional legal protection, this right as such is virtually 100% exclusive. However, when it comes to the actual harvesting, the question of exclusivity refers to his ability take this harvest in the way he prefers and to prevent others from interfering with this ability. Any government fishing regulations clearly subtract from this ability. The same applies to the actions of other fishermen that may interfere with his ability to harvest his quota in various ways. Thus, an ITQ right generally provides substantially less than complete exclusivity to the relevant asset, *i.e.* the fish stock and its marine environment. Note that *enforceability*, *i.e.* the ability to enforce the exclusive right, is an important aspect of exclusivity.

Permanence

Permanence refers to the time span of the property right. This can range from zero, in which case the property right is worth nothing, to infinite duration. Leases are examples of property rights of a finite duration. By convention, the label "ownership" usually represents a property right in perpetuity or for as long as the owner wants. There is an important difference between an indefinite duration, in which the duration of the property right is not stipulated, and a property right in perpetuity which explicitly stipulates that the property right lasts forever. The duration of a property right may seem related to security; if a property right is lost then, in a sense, it has been terminated. Conceptually, however, the two characteristics are quite distinct. Thus, for instance, a rental agreement may provide a perfectly secure property right for a limited duration.

Transferability

This refers to the ability to transfer the property right to someone else. For any scarce (valuable) resource, this characteristic is economically important because it facilitates the optimal allocation of the resource to

competing users as well as uses. An important feature of transferability is *divisibility*, the ability to subdivide the property right into smaller parts for the purpose of transfer.

Following Scott (1988), it is helpful to visualize these characteristics of property rights as measured along the axes in four-dimensional space (Figure 3). A given property right may exhibit all four characteristics and others to a greater or lesser extent. It is convenient to measure this on a scale from 0 to 1. A measure of zero means that the property right has none of the characteristic. A measure of 1 means that the property right holds the characteristic completely. Given this a picture of perfect property rights would be a rectangle in the space of the four property rights characteristics illustrated in Figure 3. The outcome is illustrated in Figure 4.

The map of the property rights characteristics shown in Figure 4 can be referred to as the characteristic footprint of a property right, the characteristic footprint of a perfect property right represents the outer limit for the quality of all property rights. It follows that the corresponding characteristic footprint of any actual property right in the same space of characteristics must be completely contained within this rectangle.

Figure 5 illustrates the characteristic footprint of some actual property right within the characteristic footprint of a perfect property right. The difference between the two areas enclosed by the two maps indicates the relative quality of the actual property right.

Figure 3
Characteristics of property rights

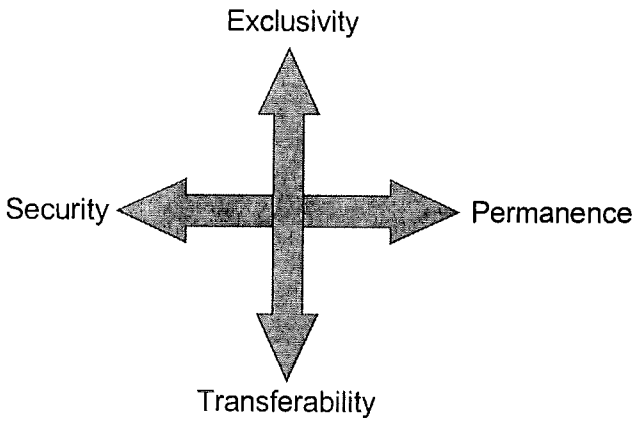
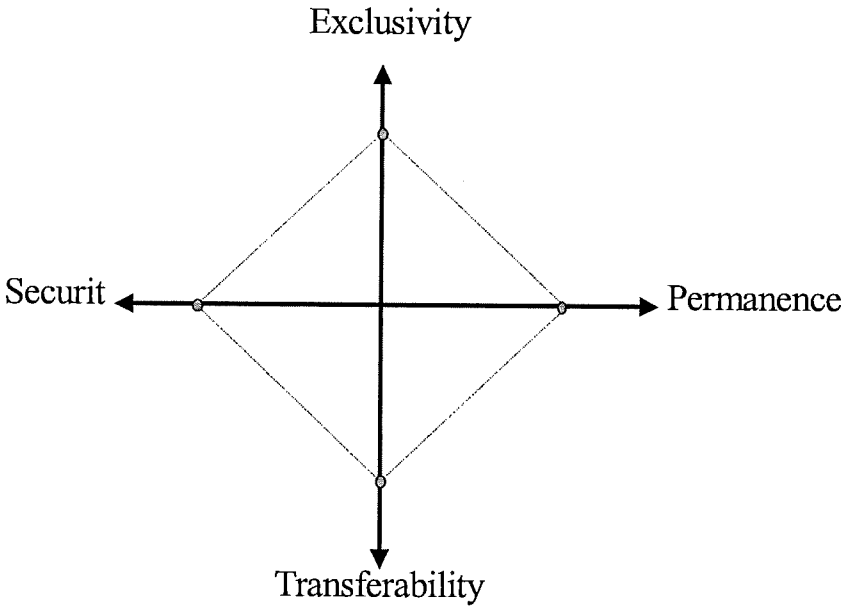


Figure 4
A perfect property right



6.2 A measure of the quality of property rights: The *Q*-measure

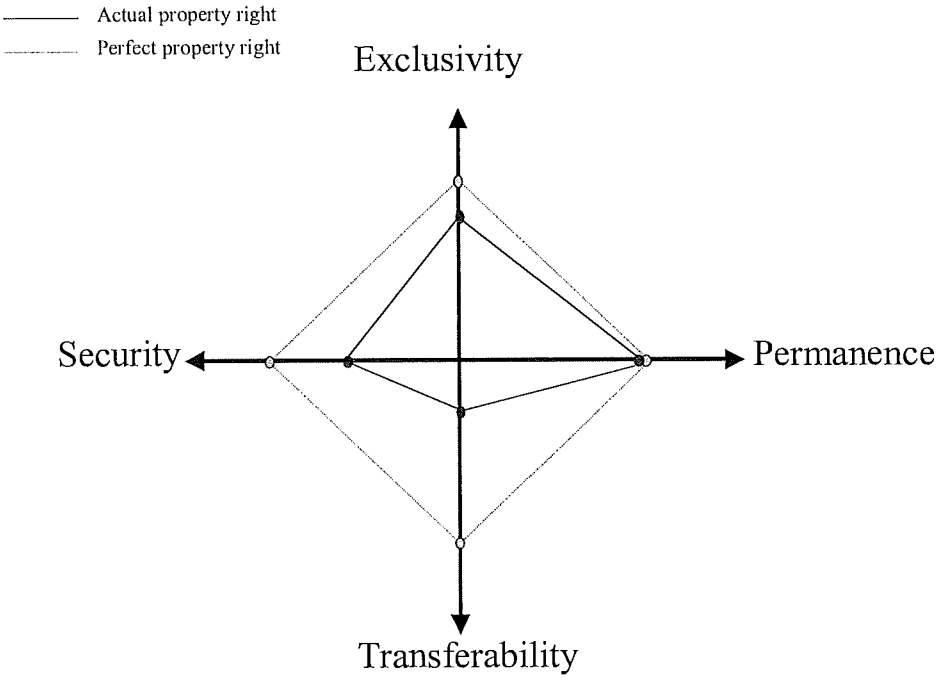
Given the multi-dimensional nature of property rights, it is useful to construct an aggregate numerical measure of the quality of a property right. Such a measure can serve in at least two ways. First, it can be used to compare the quality of a given property right with some other property rights of interest. Thus, for instance, it may facilitate the comparison of the property rights content of individual quotas across fisheries and nations. Second, an aggregate measure of the quality of property rights may help social managers to judge the economic efficiency of the institutional framework of the activity in question.

For convenience I refer to the measure of the quality of property rights as the *Q*-measure. What properties should the *Q*-measure satisfy? First, is should increase with all property rights characteristics. The higher their numerical value (on a scale from 0 to 1) the stronger the property right. Second, it is convenient to restrict its value to the same numerical range as the characteristics, namely the closed interval [0,1], with "0" indicating zero quality property rights and "1" complete property rights. Third, since it appears that a positive level of some property rights characteristics, *e.g.* security and permanence, is necessary for the property right as a whole to be worth anything, a zero value of any of these characteristics should imply a *Q*-measure of zero as well. These particular property rights characteristics are essential. Fourth, the *Q*-measure should be flexible with respect to the individual weights of the various property rights characteristics.

The *Q*-measure satisfies these requirements:

$$Q \equiv (\prod_{i=1}^{N} x_i^{a_i}) \cdot (w_1 + \sum_{j=N+1}^{M} w_{2,j} \cdot x_j^{a_j}) \qquad (1)$$

Figure 5
The quality map of a property right



This *Q*-measure comprises *M* characteristics. The first *N*, (x_i, i = 1,2..., *N*) are essential property rights characteristics, *i.e.* those that render the property right worthless if they are zero. The remaining *M-N* property rights characteristics, *i.e.* x_j, j = *N*+1, *N*+2,..., *M*, are non-essential. The exponents, a_i, i = 1,2...,*M* are all positive. So are the weights, w_1 and $w_{2,j}$, which moreover sum to unity.

It is easy to check that this Q-measure satisfies all four of the requirements stated above.[6] It is, moreover, flexible in the sense that it can account for any number of essential and nonessential characteristics.

In our special case of four property rights characteristics, the *Q*-measure corresponding to (1) is:

$$Q \equiv S^{\alpha} \cdot E^{\beta} \cdot P^{\gamma} (w_1 \cdot + w_2 \cdot T^{\delta}), \qquad (2)$$

$$\alpha, \beta, \gamma, \delta, w_1, w_2 > 0 \text{ and } w_1 + w_2 = 1$$

where *S* denotes security, *E* exclusivity, *P* permanence and *T* transferability. The first three characteristics are

[6] Remember that individual characteristics are measured on the interval [0,1].

considered essential. Note that the Q-measure is homogenous with respect to these characteristics. α, β and γ represent the elasticity of the Q-measure with respect to the these characteristics, respectively. A fairly natural assumption is that of unitary homogeneity, *i.e.* "constant returns to scale" where the sum, $\alpha+\beta+\gamma=1$. w_1 and w_2 are weights. w_1 is actually the maximum value of Q given that there is no transferability. Due to the non-homogeneous entry of transferability, T, in the Q-measure, the elasticity of Q with respect to transferability is somewhat complicated. More precisely, this is given by the expression $E(Q,T)=\delta \cdot T\delta/(w_1+w_2 \cdot T\delta)$.

An example

The Q-measure, even for our simple case of four property rights characteristics, is far too complicated to be illustrated graphically in a useful manner. However a couple of numerical examples may throw some light on how it works. First, assume that the exponents α, β and γ are all equal and exhibit constant returns to scale, *i.e.* $\alpha+\beta+\gamma=1$. Second let δ equal unity. Finally, let $w_1 = 0.6$ and $w_2 = 0.4$. Table 1 provides an example of the value of the four property rights characteristics for two imaginary property rights. The first is strong in all four characteristics. The other is also strong in security and exclusivity but weak in duration and transferability. For concreteness, we may think of the former as ownership of an apartment and the latter as a rental contract for the same apartment. The numerical details and the corresponding Q- values are given in Table 1.

A diagram illustrating the characteristic footprint of the two property rights is provided in Figure 6.

The first property right is pretty close to a perfect property right and scores well on the Q-measure as shown in Table 1. The lack of transferability (e.g. due to limited divisibility) is the main subtraction from a perfect score. The other property right is obviously fairly poor, primarily because of the lack of duration and transferability. This is reflected in its Q value which according to Table 1 is only 0.43.

Table 1
The Q-measure: an example

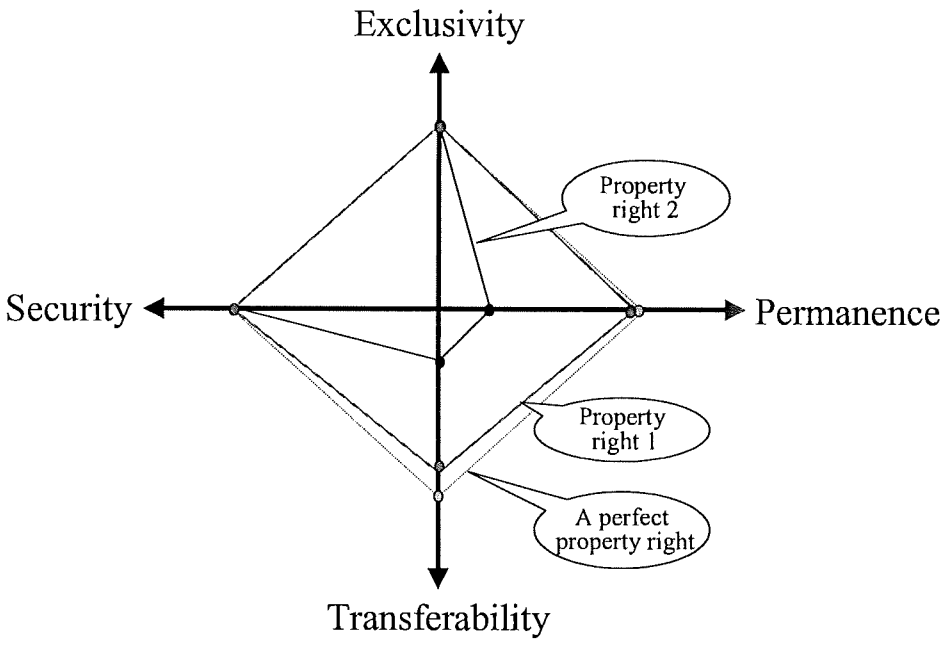
Characteristics	Property right 1	Property right 2
Security	1.00	1.00
Exclusivity	1.00	1.00
Permanence	0.95	0.30
Transferability	0.80	0.20
Q	0.90	0.43

7. ESTIMATED Q-VALUES FOR THREE QUOTA SYSTEMS

In this section, the Q-measure developed in Section 5 is used to assess the quality of the fisheries property rights in the quota systems of Iceland (Arnason 1996a, Runolfsson 1999), New-Zealand (Sharp 1996, Major 1999) and Norway (Hannesson 1994, Arnason 1996b).

In Iceland and New Zealand fisheries management is based on fairly complete ITQ systems. Norway, by contrast, operates most of its fisheries on the basis of an individual quota (IQ) system with limited transferability of the quotas. In all three countries, the security of the property right is fairly high. However, in Norway, in

Figure 6
The quality map of two property rights



certain fisheries, new vessels may be allocated quotas thus subtracting from the quota shares of the existing vessels, which reduces the security of the Norwegian property right. In all three countries the exclusivity of the harvesting right is high, limited only by government fisheries regulations which in the case of Iceland and in particular Norway are more extensive than those in New-Zealand. Permanence of the property right differs greatly between the countries. In New Zealand the quota rights are explicitly in perpetuity. In Iceland they are of indefinite duration but there are non-trivial socio-political threats to the continuation of the system. In Norway individual quota rights are explicitly non-permanent, allocated only annually. However, since quotas are customarily allocated to the previous recipients in more or less the same proportions it may be claimed that the associated property right has gained a degree of permanence. Finally, transferability in New-Zealand is close to perfect (only foreigners are excluded). In Iceland, transferability is only slightly more restricted. In Norway, as noted, there is virtually no transferability of the quotas.

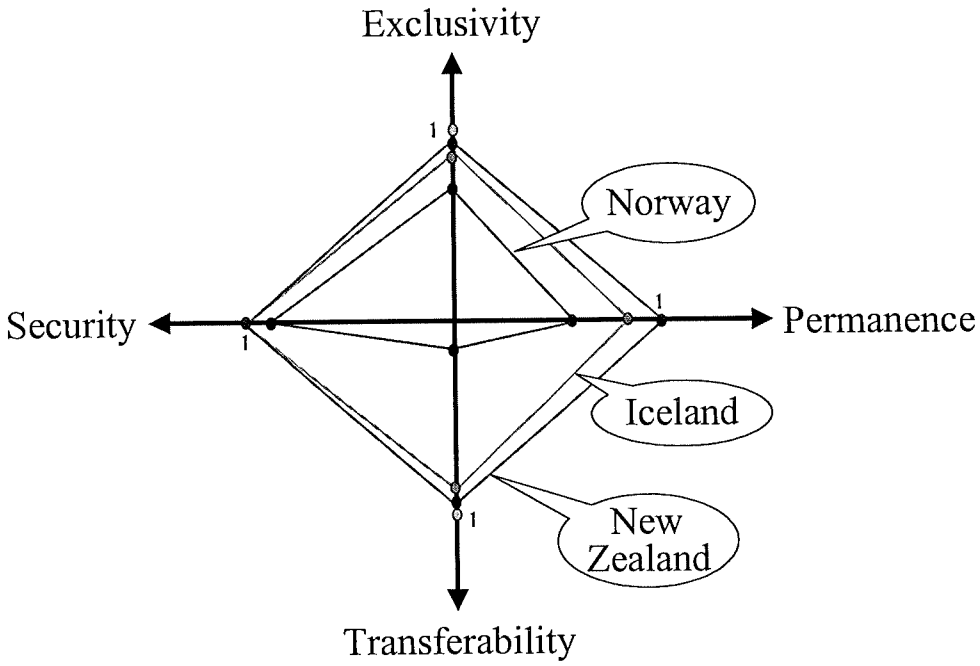
A rough numerical estimate of the values of the property rights characteristics for these three countries is provided in Table 2. The corresponding characteristic footprint are illustrated in Figure 7.

is near perfect. The property rights quality of Iceland's quota rights, Q=0.86, is considerably lower but still quite high. The property rights quality of Norway's fishing rights, Q=0.44, is much lower than that of both New Zealand and Iceland. Thus, although by no means negligible, Norway's IQs must be regarded as possessing comparatively weak property rights.

It is helpful to compare these results with a corresponding assessment of the property rights quality of a typical closed access, common property fishery employing the same methodology. In these, Q would typically be in the range of 0.5 - 0.2 depending on the number of participants[8]. Hence, compared to this, the Norwegian IQ system represents a substantial improvement.

While the above assesses the property rights quality of the harvesting rights embodied in the quotas another important issue is the quality of the property right in what really counts, *i.e.* the resource itself and its environment. IQs and ITQs, being extraction rights, form only an indirect property right in these underlying resources. Consequently, they provide the individual quota-holders with little control over the fish stocks and the marine environment and equally small protection from the interference of others (quota holders, marine predators

Figure 7
Iceland, New Zealand and Norway
The quality of quota property rights



According to the Q values[7] shown in Table 2, the quality of the New Zealand quota property right, Q=0.96, and other users of the marine environment such as mining companies, polluters etc.) in these resources. In terms of the analytical framework, this means that the exclusivity,

[7] The Q-values are calculated on the basis of the same parameter specifications as in the example in Table 1 above. In particular, $\alpha=\beta=\gamma=1/3$, $\delta=1$, $w_1 = 0.6$ and $w_2 = 0.4$.

[8] Thus, for instance, security=0.95, permanence=0.9, transferability= 0.0 and exclusivity=0.005 yields Q=0.1.

as far as these basic resources are concerned, is much reduced. Thus, it appears that the above assessment of the property rights quality of the quota rights may be unduly high. In this light Table 2 may be reworked as follows:

Table 2
Estimated quality of quota property rights
Iceland, New Zealand and Norway

Characteristics	Iceland	New Zealand	Norway
Security	1.00	1.00	0.90
Exclusivity	0.90	0.95	0.70
Permanence	0.80	1.00	0.50
Transferability	0.90	0.95	0.10
Q	0.86	0.96	0.44

As shown in Table 3, the Q-values are now much reduced. From the perspective of the underlying natural resources, *i.e.* the fish stocks and their marine habitat, the Icelandic and New-Zealand property rights values are now barely respectable. Indeed, these values might be compared to a typical farming property right on land which (depending on outside pollution and the regulatory framework) would typically have a Q-value in excess of 0.9. Clearly, the quality of the Icelandic and New Zealand ITQ property right is substantially inferior to this. The Norwegian IQ property right also appears quite weak.

Table 3
Estimated quality of quota property rights
Iceland, New Zealand and Norway

Characteristics	Iceland	New Zealand	Norway
Security	1.00	1.00	0.90
Exclusivity	0.50	0.55	0.30
Permanence	0.80	1.00	0.50
Transferability	0.90	0.95	0.10
Q	0.71	0.80	0.33

8. LIMITATIONS ON PROPERTY RIGHTS

8.1 Imperfection of property rights

In reality, property rights are quite imperfect. This applies not the least in fisheries, as is shown. Given the close relationship between economic efficiency and property rights it may be assumed that any deviation from a perfect property right results in a corresponding economic loss. Property rights are limited for two basic reasons, technical reasons and social reasons.

8.2 Technical limitations

In many cases, the available technology does not allow a definition and enforcement of the appropriate property rights, at least not at a sufficiently low cost. This applied even more so in earlier times. Technical problems of defining property rights in land, held back advances in agricultural and farming production for a long time (Demsetz 1967). In most areas of the world, progress in enclosure and enforcement technology eventually changed this (De Alessi 1999), making possible huge advances in land productivity. In modern times, valuable resources such as air and atmosphere quality (apparently excessively used for airborne emissions of various types), the ozone layer and, of course, ocean fish stocks are still devoid of adequate property rights largely for reasons inadequate technology.

As a result, indirect and imperfect property rights mechanisms must be used, such as harvesting rights in fisheries and emission rights to polluters. Since these property rights are imperfect, they will not lead to the optimal use of the corresponding natural resources.

However, just as technological progress made successive extensions of the private property rights system possible in the past, similar progress will help extend and improve private property rights the future. This applies not the least to the oceans (De Alessi 1999) where the private property rights frontier is now expanding just as in agriculture centuries ago. Of course, improvements in property rights technology would be encouraged if the potential beneficiaries of this technology were known. In an environment of no property rights, or only weak ones, it is often unclear who will receive the new and improved property rights. As a result the incentive to develop the necessary technology is correspondingly reduced. This is another example of weak property rights, but in this case, it is weak property rights within the possible new property rights.

The so-called public goods, of which roads, public parks and national defense are often-quoted examples, are by definition non-amenable to private property rights. But, on closer inspection it often turns out that there are ways to turn public goods into private goods. Road tariffs can be charged to users; admission can be charged to the users of parks and policing and even military defense (which is actually policing too) withheld from those that do not want to pay for the service.

8.3 Social limitations

There is often significant social opposition to the extension of the property rights system. Although, as argued in previous sections, improved property rights generally increase the availability of goods to society thus offering the opportunity to make everyone better off, this is not really surprising.

First, the institution or improvement of property rights almost by definition dispossesses someone. Private property rights means the exclusion of a subset of the population. Hence, an immediate impact of expanded property rights is the expropriation of prior rights, even if unused. This may be more or less dramatic depending on the details of the situation.

Second, although the opportunity exists. there is no guarantee that there will be full compensation to those dispossessed and that everyone will be better off. This depends to a large extent on who has the political and economic power in society.

Third, the establishment of new or substantially improved property rights requires an overhaul of, and

even a radical shift in, the social institutions associated with the activity in question. This, inevitably disturbs the social equilibrium, reallocates social prestige, power and respect. As a result there may be opposition to the change even if everyone gains in a more narrow economic sense.

The fourth factor is general uncertainty. A substantial change in property rights structures obviously has many implications. The ultimate outcome for given individuals is clearly uncertain. Hence, if these individuals are strongly risk averse, they may be justified in opposing the change, even when the expected value is positive.

For these reasons and others, there is likely to be social opposition to extension of the system of private property rights. In many cases this kind of social opposition is actually the limiting factor in the expansion and improvement of the property rights system. In fisheries, one of the most crucial reasons for the relatively slow adoption of ITQ fisheries management system around the world is precisely this social opposition.

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SELECTION OF A PROPERTY RIGHTS MANAGEMENT SYSTEM

L.G. Anderson
College of Marine Studies
University of Delaware Newark DE 19711 USA
<lgafish@udel.edu>

1. INTRODUCTION

This presentation provides a bridge between the two previous more theoretical discussions of rights-based management programmes and the actual design, implementation and operation of such programmes. Although the fundamentals of rights-based programmes are quite simple their real world application can be difficult because of the peculiarities of specific fisheries and the many different objectives of management. The basic theme is that there are many ways to design a rights-based programme and none of them are inherently right or wrong in the broader context of fisheries management. However, to the extent that certain elements that are related to the nature of the rights are modified (usually to achieve other objectives of management or to correct for perceived weaknesses of the rights) it is important to consider exactly what is being forgone and what is being gained. The bottom line is that if the benefits of rights-based management are to be achieved it is critical not to remove or nullify those rights by the way the programme is implemented.

The discussion will focus on the important issues which must be addressed when designing a rights-based management programme. Some sections will focus on rights-based management in general, in others, the discussion will centre on individual transferable quota systems (ITQs). The issues under consideration are:

i. The nature of the property right
ii. Management units
iii. Determination of total allowable catch
iv. Monitoring and enforcement
v. Need for other regulations
vi. Rent extraction and cost recovery and
vii. Initial allocation

There are many options for addressing each of these issues and there is no one option that always works best for all fisheries. Which option is superior will depend upon the biological, economic and cultural aspects of the fishery for which the rights-based programme is being developed as well as on the overall management objectives.

Restrictions on ownership and transferability in rights-based management especially ITQs normally increase programme complexity and reduce the individual participant's flexibility. If such restrictions are to be considered, it is important to insure that the trade-off in terms of the achievement of other fisheries management objectives is worth the costs of the increased complexity and the reduced gains from the restricted flexibility.

Rights-based management programmes may not be appropriate for all fisheries. Like all fisheries management regimes they have their shortcomings. The fundamental question is whether or not a rights-based programme that specifically designed for a particular fishery can achieve the management objectives of that fishery better than any other type of management. For more
background on rights-based management the reader is referred to Grafton (1996) Squires *et al.* (1995) Squires *et al.* (1998) all of which contain an extensive set of references.

2. THE NATURE OF THE PROPERTY RIGHT

The most basic attribute of a rights-based management programme is how the property right is denominated. What exactly does the possessor "own" and what rights does that ownership bestow. This is critical to the success of the programme in terms of biological effectiveness economic efficiency achieving distributional goals and ease of implementation and operation. There are three basic types of denominations: area, inputs and outputs.

Firstly rights can be granted to utilize a designated geographical area. Francis Christy has provided considerable discussion on this form of property right which he calls TURFs (territorial use rights in fisheries). (See Christy 1982, 1993a and 1993b). While it does not have to be the case this right normally includes control of the basic decision of how much to harvest and how the harvesting should be accomplished. This type of right may be appropriate for certain sessile species such as molluscs where relatively small areas can be harvested independently. Ideally the owner would receive all the benefits from seeding, bottom preparation, postponing harvests, etc. and would bear all the costs of improper use. Even in this special case, there will be important issues with respect to other uses of the water column such as harvest of mobile species and transportation. Area rights may also work with free swimming species in special cases such as small bays. It is important that the area be large enough to provide some control over the stocks and this could cause potential distribution issues.

Rights can also be denominated terms of inputs. Here, the owner is granted the right to use certain inputs in designated areas at specified times. The most general form would be a licence programme where the number of participants is limited. More frequently, however, the right is based on physical harvesting capacity and is measured in terms of number of boats, attributes of boats

such as units of displacement or horsepower, traps, or days at sea, etc. Sometimes the notion is to limit the inputs such that the resultant harvest will achieve the biological objectives of management, but sometimes there are other general measures imposed on the right- holders such as closed seasons or total allowable catch limits.

Finally rights can be denominated in terms of outputs whose owners are granted the right to harvest a specific amount of fish each year. These programmes are called individual transferable quotas or sometimes, individual fishing quotas. Basically the total allowable catch is divided into small parts and allocated to individual participants. These shares can be bought sold and leased so that the individual owners have flexibility in planning their fishing activities.

While the actual construction and implementation of an ITQ programme can be a complex process the basic idea is quite simple. The three words - individual transferable and quota - which comprise the term ITQ tell the whole story although it is most useful to describe them in a different order.

Quota: An ITQ programme is based on an annual Total Allowable Catch (TAC). Biological concerns for the current size of the fishstock and for how it will change over time are addressed by limiting the total amount of annual fishing mortality. The procedure for setting the annual TAC in an ITQ programme is fundamentally the same as for any other TAC based management regime.

Individual: Instead of an open race for the TAC however an ITQ programme allocates shares to individual participants. Each participant is given the right to harvest a certain amount of fish each year, usually as a percentage of the TAC. It is useful to distinguish between the share right itself which is permanent and the Annual Harvesting Rights (AHRs) which allow for a specific amount of harvest each year. The basic rationale for individualized quotas is to insure that the TAC is maintained and at the same time to maximize the flexibility and individual control of the participants. Most traditional management programmes allow all interested parties to participate but to control total harvest by restricting where when and how they operate or by shutting down the fishery when a TAC is reached. The basic premise of ITQs is to regulate the amount each participant can take but to allow them to catch where, when and how they want. This avoids the race for fish which exists in fisheries regulated only by total allowable catch limits. They also avoid the complex rules used in fisheries regulated using gear restrictions or area and seasonal closures. Both the race for fish and the complex rules can have deleterious effects on profit product quality and biological effectiveness.

Transferable: To increase flexibility for the participants the individual quota shares are transferable. Individuals can buy, sell or lease the right to catch the fish. This allows participants the freedom to operate at the scale they think is most advantageous. For example, people can buy more rights if they think they can operate more efficiently on a bigger boat or if they can obtain a better price by being able to meet purchase orders throughout the year. Alternatively people can sell if they choose to run a smaller operation or they may sell out completely if they choose to retire or go into another business At the same time new participants can enter the fishery by buying fishing rights.

In summary, ITQs are a regulation tool that can simultaneously address the biological aspects of management and avoid some of the problems of traditional management techniques. ITQs provide operators with the flexibility to increase their profits by lowering their costs (by finding the most efficient way to harvest fish) and by increasing their revenues (by selling their products at those times and in those markets where prices are higher). This flexibility arises because fishery managers do not have to tell the harvester how to operate. The manager's job can also be easier because he does not have to worry about Derby openings or about trying to figure out ways of keeping the catching power of a fishing fleet to a level that does not overfish the stock. By facing the allocation decision at the outset the dual questions of how much to catch and who can catch it are separated. This separation leads to a system which can provide incentives for matching the fishing power of the fleet to the productivity of the fishstocks.

This is not to say that ITQs do not have their problems. There are drawbacks especially in certain types of fisheries. One special issue is that ITQs are a relatively new and a fundamentally different way to manage fisheries even though similar concepts are used in other types of resource management.

Depending on the exact nature of the input denomination a system that is analogous to ITQs is possible. For example, if traps or days at sea are the unit of measure it is possible to have an individual transferable trap programme or an individual days at sea programme. Individuals can increase or decrease their holdings of the rights to match the capability of their vessel or their desired level of activity. Denomination in terms of vessels or other "macro" elements does not have this potential.

There is no ironclad rule that a rights-based management system will achieve the management objectives of a particular fishery better than one of the traditional types of management. However, as made clear in the first two lectures there are good reasons to believe that a rights-based system will provide significant potential benefits and should be considered. Similarly there are no ironclad rules about which type of denomination – area, input or output - will work best when designing a rights-based system. Area rights may work very well in certain types of fisheries but will have many drawbacks in other types. In choosing between input and output based ITQs, an output based system has some important advantages. For one thing ITQs are based on a traditional form of management - total allowable catch limits which, to the extent they can be enforced, have the potential to achieve

biological objectives. There is a more tenuous relationship between other regulations (such as gear restrictions, closed areas and closed seasons) and the actual total harvest, especially as participants have the time to change their boats, gear and activities in response to the regulations. In addition, ITQs provide incentives to choose the most efficient combination of inputs to obtain the harvest and to plan the harvest activity such that the fish can go to its highest valued use. Input controls by their nature restrict input choices and thus provide incentives to use non-restricted inputs if these will increase harvest. This will result in higher costs and will sometimes affect product quality.

These conceptual advantages will however not always be obtained, especially if it is difficult to set total allowable catches, or if it is difficult to monitor the individual harvest of many participants landing fish over widely dispersed areas. The type of denomination that will work best depends upon the nature of the fishery and the objectives of management.

There are other dimensions of the rights which can have an effect on the success of the programme in addition to the denomination of the rights. The exact nature of the ownership right can have many facets some subtle and others overt. The nature of the right can be changed or limited to accomplish biological managerial or cultural objectives - any of which may be fully within the purview of overall fisheries management. However, it is important to compare what is being gained by meeting these other objectives to what is being lost by the diminished flexibility which often results from limiting the right.

3. ISSUES RELATING TO THE NATURE OF THE PROPERTY RIGHT

3.1 Eligibility to own

Should any legal entity be allowed to own the right or should ownership be limited to natural persons or to specific types or groups of persons? On the one hand preventing corporations or the general public from participating may help maintain industry and community structure and may prevent the possibility of absentee "sea lords". At the same time the limited flexibility may prohibit rights-owners from having the opportunity to organize their activities to their best advantage and this may adversely affect the efficient use of fishstocks or the accomplishments of other fisheries management objectives.

Options

i. allow any legal entity the right to own rights
ii. allow only persons the right to own ITQ shares and
iii. establish other restrictions on eligibility, such as banning foreign ownership or requiring that only bona fide fishermen or individuals from certain areas or who use certain types of gear can own rights.

3.2 Duration of ownership right

Should the ownership right be permanent or should it be for some limited period? In some programmes, such as ITQs in the USA the ownership right can be guaranteed at most only as long as the management plan which implemented the programme is in effect. An ITQ programme can be eliminated if the fishery management council develops a new plan that meets all the standards in the law, including that the change will be an improvement over the *status quo*. In other countries, ITQ programmes are part of the fisheries law itself. By allowing the ownership right to be as permanent as current policy allows the right-owner will have the securest possible planning horizon and will have better incentives to make efficient investments in harvesting and processing equipment and to develop market channels. On the other hand, there may be hesitation to make long term plans if rights may be given to someone else at a later date.

However, managers may wish to set limits on ownership rights to maintain some long term control over the fishery. By setting a term of X years, managers will have the opportunity to reassign rights if it feels current owners are not using them properly. However, doing so would require that they face the difficult distributional task of reallocating the rights at regular intervals.

Options

i. ownership rights can be assigned permanently
ii. ownership rights can be assigned for the duration of the existing management plan
iii. ownership rights can be assigned for fixed periods subject to renewal if specified criteria are met and
iv. ownership rights can be temporary initially but after a trial period made permanent.

3.3 Transferability I

A fundamental issue is whether rights should be transferable at all. Some argue that making the rights transferable is not appropriate because it is a permanent and (oftentimes) free consignment of a public resource to a private individual. In this view, transferability just offers the possibility of certain individuals obtaining wealth from a "public resource". However, restrictions on transferability would constrain the flexibility of owners which is one of the potential advantages of rights especially ITQs. Additionally, with no transferability, the agency must devise ways to reallocate the right once an owner has died or retired from fishing. Without transferability, the allocation question must be faced over and over again.

Options

i. Rights can be fully transferable by sale, lease, gift, inheritance. In the case of ITQs both the share-right itself and the AHR can be fully transferable by sale, lease, gift, inheritance, or through joint-harvesting arrangements.
ii. Rights can be sold but not leased. In the case of ITQs the share-right may be transferable but the AHR may not be sold. This will prevent the emergence of absentee "sea lords".
iii. Rights can be leased but not sold. In the case of ITQs the share-right may not be sold but the AHR annual harvest right is transferrable perhaps with some restrictions. This will allow flexibility for

emergencies such as illness or vessel breakdowns.

iv. Rights can be made non-transferable. The individual who receives the right is the only one that may harvest the fish.

3.4 Transferability II

Even if rights are to be transferable some would argue that limitations on the types of trades that are permitted may be justified in certain circumstances. The initial allocation will likely include individuals who differ by gear type, boat size, firm size, type of final product, home port, etc. Free transferability among all such individuals may result in changes in the industrial or cultural aspects of the fishery which managers may wish to prevent. Restrictions on transfers between specified groups may help prevent such changes. However, they will also limit the flexibility of ITQ owners and in the long-term could become a stifling influence on the development and utilization of the fishery as a whole.

Options

i. Place no restrictions on the transferability of rights among different groups of owners and

ii. Determine critical groupings of participants and prohibit or restrict purchases leases etc. between members of these groups.

3.5 Ownership caps and restrictions

There is some concern over the potential of certain entities obtaining "excessive shares" of the rights when implementing ITQ programmes and the problem may be relevant for other types of rights as well. Although there is no clear definition of what an excessive share is, it normally refers to market power for ex-vessel fish, final product, or even ITQ shares. It could also refer to the general historical industrial and cultural make up of the fishery. Managers can take specific actions to address these issues or they may determine that other applicable laws are sufficient for doing so. For example in many countries existing antitrust law addresses problems of excess market power in industry including fisheries and managers may conclude that this is adequate. On the other hand, managers may have an interest in directly addressing such issues in the construction of a rights-based programme because of the fear that antitrust law may not be applied to the fishery in a routine manner or that the appropriate criteria for excessive shares may differ from that in the antitrust law. If this is done, however, the difficulties of defining market power and of measuring the gains and losses of various actions, such that they can be approved as part of a management plan should not be underestimated.

Options

i. Leave excessive share problems to antitrust law.

ii. Place caps on the percentage of ITQs for a particular management plan or for a particular stock within a management plan that any one entity can own.

iii. Place other restrictions on how firms or individuals can combine to harvest the ITQ. For example, limit the percentage of total catch that can be landed by one boat or landed in one port.

4. MANAGEMENT UNITS

4.1 How many species in the quota system

Defining the management unit or units is an important part of any fisheries regulation programme. This is no less true with a rights-based programme. A management unit in an ITQ programme is the species, stock or aggregation for which a TAC is specified and for which harvesting rights are distributed. In the Surf Clam and Ocean Quahog ITQ programme there are only two units: Surf Clams throughout their range and Quahogs throughout their range. At the other extreme, the proposed ITQ programme for Alaskan Sablefish and Halibut has many management units. Each stock consists of several geographic areas. Selecting and defining the management units for an ITQ programme is an important step. The success of the programme can depend critically on how well it is done. There are two types of questions pertaining to the selection and definition of the management units that must be answered.

The first question is: How many species should be included in the programme? If different species are biologically or commercially related there may be grounds for managing them jointly under the ITQ programme. Some of the considerations that need to be addressed are: (a) Are the species caught as a bycatch or as a directed catch with the same gear or by the same fleet? (b) Are there ecological or spawning relationships between the species? Care must be taken when selecting the stocks as there are two types of errors that can be made. An error of exclusion occurs when a species that is closely related to those in the ITQ programme is left out. This makes it difficult to appropriately manage the species that are in the programme and/or the one that is left out. For example if the catch of a species which is not covered in an ITQ programme has a significant bycatch of a species which is included it may be quite difficult to account for bycatch mortality. On the other hand, an error of inclusion occurs when a minor or unrelated species is included in the programme. Determining and enforcing the TAC for such a species can involve more work and managerial repercussions on the major species than the gains from managing the minor stock are worth.

The second question is: How should each of the included species be classified? There may be several stocks or geographically distinct units of the same species. If so it may be appropriate to have a separate TAC for each. At the other extreme, there may be certain groups which may be treated as aggregations for management purposes even though they consist of separate species. Rockfishes in Alaska are a good example. These aggregations can have a joint TAC.

Here again the decisions are critical. An error of conglomeration can occur if biologically distinct stocks are not separated. A single overall TAC on two separate

stocks may put too much pressure on one stock if it is closer to port or has a higher catch-per-unit of effort. On the other hand, the error of excessive specificity may occur if the different species are divided into too many stocks because the programme can become unwieldy and difficult to manage.

There is definitely a trade-off in answering these two questions. The larger the number of stocks that are included in the programme the more inclusive the system will be and the lower will be the need for a separate management programme to handle species and stocks that are not included. And, the more finely the quota share stocks are geographically defined the easier it will be to focus management on narrowly defined species or species groups if there are biological technological or distributional reasons for doing so. However, the larger the number of area divisions, the more complex and difficult it will be to manage the ITQ programme. There will be more TACs to set, and the monitoring programme will have to distinguish landings according to the stock from which they were harvested.

If there is only one directed fishery or if there are many truly independent directed fisheries the actual operation of an ITQ system is fairly straightforward. For the most part, the core of the problem is the selection of which species to include and how to enforce the independent TACs once that decision is made. There are special implementation and operational problems when using ITQs with interrelated species, however.

4.2 Handling bycatch

A bycatch fishery is where the harvest of one species results in the catch of another. The actual percentage composition of catch may vary depending upon type and disposition of gear, area, depth and time of fishing. But, harvest of only the directed species will be a rare occasion. Interdependent directed fisheries are where certain species can be targeted relatively cleanly, but which result in occasional harvests of other species. Because of the vagrancies of Mother Nature and of the men and equipment used to catch fish, this occasional non-target harvest is almost ubiquitous in marine fisheries.

For the most part, marine fisheries can be classified into these two groups. Bycatch fisheries result in the harvest of more than one species, and interdependent directed fisheries will occasionally result in the harvest of other than the target species. The problems of ITQ management in bycatch fisheries are present, though to a limited degree in interdependent directed fisheries. The following discussion will be primarily in terms of bycatch fisheries but the applications to interdependent bycatch fisheries are obvious.

The fundamental issue in an ITQ system in a bycatch fishery is the selection of which species to include. ITQ systems are driven by biologically determined TACs. And since the ratio of TACs will only balance with the average bycatch ratios by chance, one inherent problem is that it will not be possible to simultaneously and exactly meet the TACs for all species.

It has been argued that a major advantage of ITQ programmes is that they are output based. Outputs are normally easier to measure than inputs and so enforcement is easier. Just as important the system provides incentives to use the minimum cost combination of inputs. However, with bycatch fisheries the optimal operation may be in terms of multiple activities (*i.e.* so much effort directed at species 1, so much at species 2 and so much general effort, etc.). Therefore managing a bycatch fishery in terms of output is not as straightforward as it is with independent species.

The purpose of this discussion is to describe the problem of species selection and the complications which can result when rules are instituted to mitigate some of the enforcement difficulties which result from that selection. It will prove useful to use a simple two species example. Assume that the desired mortality for two interrelated species 1 and 2, are 1000t and 100t respectively but the bycatch ratio between them is 5 units of species 1 for every unit of species 2.

While this example masks some of the complexities, it allows some important but often-ignored points to be made quite clearly. One option is to only include species 1 in the ITQ programme and put no constraints on the harvest of species 2. This implicitly says that species 2 is not worth "saving" or rather that the full potential harvest of species 1 is more important than maintaining a high stock level for species 2. Setting the TAC of species 1 to 1000t the mortality and landings of the two species for at least the first year will be as indicated by Result 1 in Table 1. If the "safe" catch of species *2 is* really 100t then ultimately its stock will be reduced and its safe catch level will fall accordingly.

If for biological or economic reasons it is determined that the stock of species 2 should not be allowed to fall then it should be included in the ITQ programme. However, inclusion of a species in the programme by itself is not enough. If both species are included and the TACs are set to the desired mortality and the programme is perfectly enforced the mortality and landings will be as indicated in Result 2: Species 2 will be maintained but at the expense of 500t of annual harvest of species 1.

Perfect enforcement in this instance would include dockside monitoring to insure that individual, and hence total quotas, are not surpassed. But in addition it would be necessary to have a no-discard policy and onboard observers or other mechanisms to insure that all fishing mortality is counted.

For example, without an enforced discard policy, mortality and landings would be as indicated in Result 3 in Table 1. Participants would take the TAC of species 1 which would result in the harvest of 200t of species 2. Since that harvest would be above the permitted landings the rest would be discarded. As far as the health of

Table 1
Charts are in nominal tonnes

Results	Landings	Actual mortality	Desired mortality	Mortality over/under	Discard waste
Result 1					
Species 1	1000	1000	1000	0	0
Species 2	200	200	100	+100	0
Result 2 - Legal fishing					
Species 1	500	500	1000	-500	0
Species 2	100	100	100	0	0
Result 3 - Illegal fishing					
Species 1	1000	1000	1000	0	0
Species 2	100	200	100	+100	100
Result 4 - Trade ratio 1/1					
Species 1	917	917	1000	-83	0
Species 2	183	183	100	+83	0
Result 5 - Trade ratio 5/1					
Species 1	750	750	1000	-250	0
Species 2	150	150	100	+50	0
Result 6 - Trade ratio 10/1					
Species 1	667	567	1000	-333	0
Species 2	133	567	100	+33	0

species 2 is concerned, there is no difference between an imperfect enforcement policy and not including species 2 in the ITQ programme. The only difference would be economic in that while the mortality would be 200t a year only half would be landed. The rest would be wasted as discards.

An exception would occur when the catches of both species are needed to cover the variable costs of a fishing trip. In that case, perfect enforcement of landings is enough. After the quota of species 2 is taken, fishermen would not continue to operate because it would not be economical to fish only for species 1.

In instances where the set of TACs in a multi-species fishery is not compatible with bycatch ratios there will be considerable pressure from rights-owners to make some changes. An often-heard plea is to increase the binding TAC which in this case would mean an increase in the TAC for species 2 up to 200t. Such a move will produce Result 1, the same thing that would have happened if species 2 were left out of the programme. Obviously the only change in TAC that would be consistent with preserving species 2 and which would allow TACs to equal actual landings would be to reduce the TAC of species 1 to 500t. It is not surprising that this is not advocated by industry.

Another suggested method to mitigate the restrictions on industry is a bycatch trade-off programme where AHR for one species can be traded for AHR of another at a specified trading ratio. In the context of the current example when individuals run out of AHR for species 2 which would occur when harvest equals 500t of species 1 and 100t of species 2 they would be able to trade some of the remaining 500 AHRs for species 1 for AHRs for species 2. The amount of species 1 AHR that would be traded and the harvests it would allow will depend upon the bycatch ratio and the trade-off ratio. This can be demonstrated as follows:

Let α_c be the bycatch ratio as defined as the amount of species 1 caught with every one unit of species 2. Let α_t be the trade-off ratio as defined as the amount of species 1 AHR that must be traded to obtain 1 unit of AHR for species 2. Let H_2 be the amount of species 2 AHR that are obtained in the trade-off and let H_1 be the amount of species 1 AHR that are maintained and used for harvest after the trade. Since there will be 500 units of species 1 AHR available for trade the following relationship must hold.

$$H_1 = 500 - \alpha_t H_2 \qquad (1)$$

In order to abide by the constraints of the system the relationship between H_1 and H_2 must correspond to the bycatch ratio.

$$H_1 = \alpha_c H_2 \qquad (2)$$

Substituting (2) into (1) and solving for H_2 gives

$$H_2 = [1/(\alpha_c+\alpha_t)]\ 500$$

Using (2) it follows that

$$H_1 = [\alpha_c/(\alpha_c+\alpha_t)]\ 500$$

The amount of species 1 annual harvest rights (AHR) traded is 500-H_1 or

$$\text{Amount traded} = [\alpha_t/(\alpha_c+\alpha_t)]\ 500$$

Table 2 displays the results of these trades for various trade-off ratios in this case. The number traded and

Table 2
Amount to trade: 500, bycatch ratio: 5/1

Trade ratio	1/1	2/1	3/1	4/1	5/1	6/1	7/1	8/1	9/1	10/1
Number traded	83	143	188	222	250	273	292	308	321	333
H_1	417	357	312	278	250	227	208	192	179	167
H_2	83	71	63	56	50	45	42	38	36	33

H_1 always sum to 500 and except for rounding errors the ratio of H_1 to H_2 always equals the bycatch ratio. The higher the trade-off ratio, the more units of species 1 AHR will have to be "traded" to keep fishing legally and the lower will be the amount by which the actual catch of species 2 exceeds the TAC.

This can be seen more clearly by comparing results 4, 5 and 6 in Table 1. The basic notion of bycatch trade-off programmes is to discourage individuals from fishing illegally by discarding species 2 after the AHRs have been used up, see result 3. By comparing results 3 and 4 it can be seen that bycatch trade-off programmes do have some potential advantages. First the over-run of the TAC for species 2 is reduced and discarding is eliminated however, this comes at the expense of giving up some of the safe harvest of species 1. By comparing what happens with higher trade-off ratios in results 5 and 6, it can be seen that as the trade-off ratio is increased the fishery is pushed from result 3 to result 2. There is no doubt however that trade-off programmes do produce the same kind of result, although at different levels than leaving species 2 out of the programme all together.

However, the results are more complicated than this because it is necessary to take into account the economic incentives involved. Whether rights holders will participate in a trade-off programme will depend, at least in part, upon the effect it will have on net earnings. Consider the four cases presented in Table 3. Given a trade-off programme, technically participants have four options. They can fish legally which means they will stop fishing when the TAC for species 2 is taken. They can fish illegally, which means they will continue to fish after the TAC for species 2 is taken and land only species 1. Third, they can participate in the trade-off programme and trade away some of the "extra" AHRs for species 1. Finally, they can trade away all of their AHRs for species 1. The cases show the net returns for each of this options for different trade-off ratios or prices for the two species. To keep things simple the amount of effort used to harvest legally is defined to be 1 and it has an assumed cost of $4250.

In the first case in Table 3a, the trade-off ratio is 5/1 and the prices for species 1 and 2 are $10 and $12 respectively. Without enforcement at sea, there will be

Table 3

a) Bycatch ratio: 5/1 Trade-off ratio: 5/1 Price species 1: $10.00 Price species 2: $12.00

	Species 1 (t)	**Species 2** (t)	**Revenue** ($)	**Effort**	**Cost** ($)	**Net revenue** ($)
Legal	500	100	6 200	1	4 250	1 950
Discard	1000	100	11 200	2	8 500	2 700
Trade-off	750	150	9 300	1.5	6 375	2 925
Trade all	0	300	3 600	3	12 750	- 9 150

b) Bycatch ratio: 10/1 Trade-off ratio: 5/1 Price species 1: $10.00 Price species 2: $12.00

Legal	500	100	6 200	1	4 250	1 950
Discard	1000	100	11 200	2	8 500	2 700
Trade-off	667	133	8 267	1.33	5 667	2 600
Trade all	0	200	2 400	2	8 500	- 6 100

c) Bycatch ratio: 10/1 Trade-off ratio: 5/1 Price species 1: $10.00 Price species 2: $18.00

Legal	500	100	6 800	1	4 250	2 550
Discard	1000	100	11 800	2	8 500	3 300
Trade-off	667	133	9 067	1.33	5 667	3 400
Trade all	0	200	3 600	2	8 500	- 4 900

d) Bycatch ratio: 10/1 Trade-off ratio: 5/1 Price species 1: $10.00 Price species 2: $150.00

Legal	500	100	20 000	1	4 250	15 750
Discard	1000	100	25 000	2	8 500	16 500
Trade-off	667	133	26 667	1.33	5 667	21 000
Trade all	0	200	30 000	2	8 500	21 500

incentives to fish illegally and discard the catch of species 2 above the TAC. This will take twice as much effort as fishing legally, but the returns for landing the extra 500t of species 1 are more than the extra cost. Note that this would not be the case if the cost for effort were above $5000, the marginal return for continuing to fish after the TAC for species 2 is achieved.

In this case participating in the trade-off programme will increase net returns. Trading away some of the AHR for species 1 will reduce the amount of effort that will be needed and this, plus the difference in revenue from the loss of some species 1 but the gain of some species 2, combine to produce higher net returns. If the trade-off ratio were increased to 10/1, perhaps on the notion that more protection for species 2 is needed. (Table 3b), the change may not have the desired results because given the changes in the allowable harvest levels and the required amount of effort the returns from participating the programme are less than fishing illegally.

Tables 3c and 3d are the same as Table 3b except that the price of species 2 is increased. The results can be generalized as follows. For a given trade-off ratio and cost of effort the incentives offered by trade-off programmes will depend upon the relative value of the bycatch species. If it has a relatively low value there will be no incentive to participate because there will a loss of revenue from trading species 1 for species 2. For intermediate relative values, there can be gains from trading species 1 AHRs to make the landing of species 2 legal. In the extreme case of very high relative values, there will be incentives to trade all of the annual harvest rights for species 1 and only land species 2. This will produce exactly the opposite of the desired result of lowering mortality on species 2.

4.3 Catch surrender programmes

Another option to address this problem is a surrender programme where inadvertent catches of a species for which no quota is held may be surrendered to the government with no penalty. The purpose is to discourage discards without encouraging further catches. With a surrender programme the mortality and landings will be as in Result 1. It is better than the no observer option which produced Result 3, because all fish that are killed are landed. However, it is no different biologically than leaving species 2 out of the system altogether.

To summarize: once the species to include in the system have been selected the basic problem is to avoid over catching any of the quotas while at the same time providing the opportunity to harvest as much of the main species as any restrictive bycatch quotas will allow. However, once a decision has been made to include a species any concession to mitigate the under harvest of some TACs will in effect reverse the decision to include the species in the first place. One could argue that if a species is going to be left out of the programme it should be an explicit decision. This will allow for a more objective basis for judging the programme on its real objectives and it will also avoid the use of the unnecessary and potentially costly mitigating rules.

While the above discussion in terms of fixed bycatch ratios allows for the strongest possible statement of the problems, the conclusions must be moderated for real world policy application. For example, with a bycatch ratio ranging from 10/1 to 3/1 depending upon the gear, location, or time fished, a perfectly enforced no discard policy would provide incentives to fish such that the amount of directed catch per unit of bycatch is maximized. Therefore over time, through the transfer of ITQs to those with higher ratios or through research into methods to increase bycatch ratios, the bycatch constraints on directed catch will become less binding. Those fishermen with higher ratios or those who are able to develop them can take more directed catch with each unit of bycatch and hence will be able to pay more for each unit of AHR for the bycatch species.

In addition there are some very strong advantages to surrender programmes. With interdependent species it is possible to harvest significant amounts of species that are not being directly sought. If people will be penalized for landing fish for which they have no quota then these catches will be discarded. Allowing industry to land them and perhaps paying them a small "handling fee" to cover any out of pocket costs of getting the fish to shore may prevent significant waste. On the other hand a surrender policy in a bycatch fishery where there is a regular, but not constant, amount of a secondary species caught with a directed species will essentially allow unlimited catch of the secondary species. This is especially true if the directed species has a high price relative to the variable costs of fishing. It comes down to a question of which is worse: potentially allowing a stock to be damaged by unenforceable no discard rules, or absolutely letting it be damaged by allowing open fishing on the stock with a surrender policy.

Whether surrender programmes are appropriate or not will likely depend on the exact nature of the fisheries involved. All else equal, they are more likely to be advantageous in interdependent fisheries than in bycatch fisheries. However, they still may work with bycatch fisheries to the extent that intent to over-catch the secondary species can be determined such that penalties can be validly applied.

Another related issue is the need for retroactive trading. In its most simple terms retroactive trading occurs when fishermen are allowed to purchase or rent AHR after they have already landed the catch. It can easily be seen that this could be an alternative or a supplement to a surrender programme. If firms land extra bycatch, they then have the option of trying to purchase sufficient AHR after the fact: if they cannot they are forced to surrender it.

The case for retroactive trading is normally based on two related arguments. Since accidental catches do occur, fishermen should have the opportunity to keep rather than

surrender them if AHR is available. This is especially true in that if they do obtain AHR, then the catch will be part of the legal total allowable catch. If they just surrender it, the fish are dead but others still have the right to go out and catch more even if the current sum of legal catch and surrender catch is greater than the total allowable catch. Basically the argument is that every opportunity should be given to make the catch count as part of the TAC. However, there are some drawbacks to retroactive trading.

In extreme, retroactive trading means that fishing can be done "on speculation". Vessels cruise with or without AHR of their own and when they come upon stocks they begin to harvest hoping that they will be able to buy AHR for their catch when they return to shore. If enough people do this, it is possible that total landings can be more than the TAC and it will be impossible for all to obtain AHR. Those that do not will surrender the catch. Although all fishing activity is legal, the catch is higher than the safe TAC. The possibility of this occurring should be grave news to a fisheries manager.

When building contractors build homes "on speculation" it is possible that some may not be sold and the firm may go bankrupt. However, fishing firms' over-optimism under a retroactive trading programme will have social as well as private consequences. The overall effect could be the depletion of the fishstock. None of the participants own the stock and hence do not take its value into account when making the financial decision to speculate by harvesting without AHR. Granted they are limited by the expected returns relative to the variable costs of fishing but they will not consider the total social costs of their actions.

Therefore it appears that retroactive trading should be allowed only in restricted circumstances. It should only be allowed for those species where surrender programmes are used; otherwise it loses its main justification. Further it may be wise to disallow it for interdependent species just to prevent people from taking too many "accidental" catches of directed species for which they have no AHR. Finally it may be wise to assess non-trivial fines for that catch for which no AHR can be obtained by the end of the trading year. This would lessen the incentives to fish on speculation.

5. THE DETERMINATION OF THE TOTAL ALLOWABLE CATCH

Because the TAC is the main biological component of an ITQ programme, it is essential that it is set with care. TACs are used in many other types of fisheries management programmes, whether as actual binding limits or as implicit or explicit targets to be achieved using gear restrictions, season closures, etc. For the most part, the rules and procedures for developing TACs under other programmes can apply under ITQ programmes as well. The basic idea is to set a total fishing mortality level that is a balance between what can be taken this year and what should remain to grow and reproduce for future years. Application of this principle will vary according to the population dynamics and the current status of the stocks under consideration. This may involve a stock rebuilding plan if an ITQ programme is instituted in an over-fished stock, where the TAC is kept low until the stock rebuilds. In such cases the policy relationship between stock size and the TAC should be set out in advance.

There are some facets of TAC determination under an ITQ programme that merit special consideration. One important issue is the definition of the harvest-right especially when TACs will likely vary from year to year. The right to harvest cannot be defined in terms of a constant amount of fish each year. In the extreme case this would mean that the TAC which by definition is the sum of the individual quotas of all participants could never change. The right to harvest a particular stock must depend upon the current productivity of the stock. Therefore ITQ programmes work better if the individual rights are defined in terms of a percentage of the TAC. As the TAC goes up or down according to biological conditions, the individual right to harvest in terms of actual catch will vary accordingly.

Another issue is how to set TACs in those fisheries which have not previously used them. In newly developing fisheries, the accumulated biological data may be insufficient. In other fisheries, current management may be based on the notion that biological issues can be addressed without using TACs. For example, they have not been used with shrimp which are essentially an annual crop the size of which depends upon factors other than the number of spawners, and so recruitment overfishing is unlikely.

If ITQs are to be used in these situations, the relevant question is: Are the gains from a reduced race for fish and increased flexibility of participants worth the effort and possible drawbacks of instituting TACS? In developing fisheries is the information available sufficient to balance between setting the TACs too high and adversely affecting future catches and setting them too low so that current harvests are unduly restricted?

Another consideration pertaining to TAC-setting is the relationship between TAC determination and the other components of the ITQ programme. As noted, there is a wide range of issues to be considered in selecting the number and make up of the management units, and one that deserves special mention is the basis for determining a TAC. There needs to be sufficient theory and data to set a credible TAC for a certain species in a specified geographical area. If the problem is a lack of data, it can potentially be overcome. However, if the management unit is defined purely on political grounds the problem of a credible TAC will remain. In summary another drawback to expanding the number of management units is the increased data needs and work load of setting one more TAC.

The setting of TACs can also be related to certain enforcement problems. If it is likely that highgrading and bycatch discards will result in a fishing mortality that is significantly different from landings, and if there are no other satisfactory ways of correcting for this, adjustments in TACs may be appropriate. For example, if participants can be expected to discard smaller less valuable fish of a particular species and if the smaller fish normally represent 10% of the catch, the TAC can be reduced by 10% of what it otherwise would have been.

While the basics of TAC-setting in ITQ fisheries should be the same as in non-ITQ fisheries, there are some exceptions. For example, if non-owners participate in the TAC-setting process they may argue for higher TACs than are justified in order to lower the price of acquiring share rights or AHR. On the positive side, it may be possible to allow rights-owners more power to set TACs so that the net present value of harvest over time can be considered, rather than just focusing on biologically safe TACs.

6. MONITORING AND ENFORCEMENT

Fisheries management systems are only as good as their monitoring and enforcement systems. This is as true of ITQ systems as of other types of management. However, there are some fundamental differences in the formulation and operation of a suitable monitoring and enforcement system for an ITQ programme. ITQ systems, as for other TAC-based programmes, must have a way to monitor the total harvest and ensure that it does not surpass the TAC. In addition, it is necessary to monitor the harvest of each participant and to ensure that it does not surpass their annual harvest rights. With transferability, it is also necessary to keep track of the current amount of share rights and AHR owned by each participant. While these extra burdens may seem formidable, it is necessary to evaluate an ITQ management and enforcement system relative to the other options for management and relative to the potential management benefits of an ITQ programme. Will overall monitoring and enforcement costs be higher or lower? Even if the costs are higher are the accomplishments of ITQ management worth it?

The successful operation of an ITQ programme requires that the monitoring system be seen as capable of detecting abuse. Participants must be confident that others cannot beat the system and thus diminish the value of their rights. In addition the participants must know that the system will detect any misconduct on their own part so incentives to cheat are small. This does not necessarily mean that every fish brought to the dock and every landings report filed must be personally inspected by an enforcement officer.

In-person inspections will still be important aspects of an ITQ monitoring system, but their ultimate success will require computerized systems of electronic reporting and data management. In addition there must be at least two sources of information for any transaction. For example both the harvester and the first fish receiver must fill out independent landing forms that can subsequently be checked against each other. Similarly a transfer of share right or AHR from one person to another must be verified in writing by both parties. The computer system should have a series of tests that can verify the accuracy and consistency of reported landings and trades.

The work of monitoring agents will change under an ITQ programme. The emphasis will shift from checking the daily operations of the fleet to monitoring catch levels. It is unclear how the actual amount of monitoring activity or its cost will change with an ITQ programme. Depending upon the circumstances, it is likely that at-sea monitoring which can be expensive, can be significantly reduced. On the other hand, the amount of bookkeeping type activities will likely increase. Concurrently, because participants have a long term interest in protecting their harvest rights they will be more inclined to adhere to the rules and to assist agents in detecting abuse by others.

Permits for both harvesters and processors will likely be a crucial part of an ITQ monitoring system. These permits should be available to any interested party at a nominal fee. A fisherman would be required to obtain a harvester's permit to own or lease 1TQs. Any harvesting activity would be recorded against the harvesting permit number. Processors would be required to obtain a fish-receivers permit to buy fish landed under the ITQ programme. All purchasing and processing activity would be recorded against the fish-receivers' permit number. The idea behind a permit programme for processors is twofold. First, it provides for the double entry system that is necessary to establish proper supervision. Second, it provides for a broader-based enforcement programme. If processors have to show that fish in their possession were legally harvested, they will be careful from whom they buy. If they will not buy illegal fish, there will less incentive for ITQ owners and non-owner alike to land non-quota fish.

Penalties for non-compliance should be firmly established, rigorously enforced and severe enough to encourage compliance. There should be provision to revoke harvesting or fish-receiving permits and even to confiscate the basic ITQ harvesting right for intentional cheating.

7. RENT EXTRACTION AND COST RECOVERY

One of the advantages of rights-based fishing, especially ITQs, is the incentive generated to produce efficiently so that the rents from the fishstock are not dissipated, but rather accumulated by the rights-owners as a result of their search for efficient harvesting processing and marketing. This raises the question whether some (or all) of the rents should be extracted for the public coffers either to pay for the costs of managing the system or to insure that the gains from a resource that belongs to the entire nation are shared by all citizens. This is strictly a matter of public policy. There are some economic considerations however and more detailed discussions will be provided in other lectures.

Rent extraction and cost recovery are separate issues and one could argue that cost recovery should be included in all management programmes whether they are rights-based or not. If fisheries management is a necessary part of bringing food to the table, then it makes sense that the industry, and ultimately the consumers of fish products, cover these costs. This insures that the nation truly makes net gains from fishing and it will also create incentives to keep management costs as low as possible. In addition, if cost recovery is only considered to be a part of rights-based management, then there will not be a level playing field if a choice between rights-based and other types of management is to be considered.

One serious problem with cost recovery programmes is the difficulty of estimating what part that the government spends of fisheries is attributable to management and how it can be allocated to the different species under management. If this cannot be done in a routine, transparent, and non-accrimonous manner, it may be wise to impose a landing tax as a percentage of the ex-vessel price.

There are two important facts to consider when considering rent extraction policies. First, one of the basic premises of permitting fishing rights is that they provide socially beneficial incentives to rights-owners because they have claims to the profits of production. If they retain these gains they have incentives to seek efficiencies in their operations. In the transition from a traditionally managed fishery to a rights-based fishery, this may involve considerable research and development costs to design and build better vessels and/or processing plants and to develop new markets. This is because traditional management often provides incentives to produce in a way that provides the most gains given the particular management plan which will not be the most efficient. Also, in the long run there will be technological advances or changes in tastes for fish products that allow for increased returns from modifying harvesting, processing, and marketing equipment and procedures. It is important that the rights-based management system provides incentives to undertake these changes and not be undone by over zealous rent collection policies.

A second and related issue is that it is difficult to identify the rent that is due to the ownership of the fish-stock. Technically rents are the residual that remain after subtracting costs of production from gross revenue. And these must include all rents to intra-marginal factors of production (Copes 1970, 1972). This includes the so-called "highliner rents" earned by participants who have unique skills or knowledge which enables them to produce at lower costs that other participants operating under the same conditions. It would be a mistake if rent extraction programmes sought these rents.

Basically the rent from a fishery is determined by the size and reproductive capacity of the fishstock and the types and amounts of fixed and variable inputs which are used to harvest, process and market the fish. It is difficult, if not impossible, to state how much is due to the fish-stock and how much is due to the choice of inputs. The creation of rights-based fishing if done correctly provides the incentives for owners to select the appropriate inputs. Care must be taken to insure that incentives to seek out and implement new ways of production are not unduly weakened.

This does not mean that rent extraction policies should never be implemented, but that the policies should be designed for the particular fishery under consideration. In well established fisheries where there is little potential for technology improvements and the minimum average cost of the marginal producer is known, or can easily be determined, a significant portion of the difference between price and that minimum average cost can likely be extracted with little effect on short term viability or long term efficiency. In other cases there is a potential to adversely affect short term operations and the possibility of future operations. Johnson (1995) provides an interesting discussion of rent collection in ITQ fisheries.

Options for collecting rents include:

i. auctions
ii. resource rental as a percentage of estimated annual rent due to the resource
iii. resource rental as a percentage of AHR price
iv. resource rental as a percentage of rights share price
v. resource rental as a percentage of ex-vessel price and
vi. reclaim a percentage of total rights shares annually and auction them off (perhaps with original owner having the right to match the highest bid).

All of these options have their strengths and weaknesses, but one may be best for a particular fishery. Auctions have the advantages that they do not require research effort by the government. Perspective bidders make their bids based on their estimated gains after taking into account any changes they will have to make in harvesting, processing and marketing. As a result there should be little negative effect on long term efficiency. It will likely cause resentment amount current participants who feel that the initial rights should be granted for free. A resource rental as a percentage of estimated annual rent due to the resource will require extensive research and will likely cause much acrimonious debate between industry and government.

Resource rentals based on AHR or quota share prices, which should provide some measure of the value of rents being earned, will eliminate the need for extensive research but they may not provide an accurate picture of current rents, *e.g.* individuals will have incentives to report lower transfer prices. In addition AHR prices may overestimate current rents because they may include "highliner rent", or be based on variable rather than total costs, as participants bid for AHR to complete their season. A resource rental as a percentage of ex-vessel price will be easy to calculate but it may not be based on true rents if costs are not the same percentage of ex-vessel

price for all species. Reclaiming a percentage of total rights shares annually and auctioning them off eliminates the need for research and depending on the depth of the market, allows the government to obtain a return equal to the residual of revenue over all costs. It also provides opportunities for new entrants by guaranteeing that some rights shares will come on the market each year. At the same time it would weaken the property right because an owner cannot insure that he will maintain control of the right into the indefinite future.

8. THE NEED FOR OTHER REGULATIONS

The heart of an ITQ programme is the TAC. If properly enforced it will address all conservation issues. However, there are conservation issues that are not satisfactorily addressed in a basic ITQ programme. For example:

i. If the TAC for one species is taken in a particular area during a particular season, or with a certain type of gear or fishing method, the bycatch or discard mortality of other TAC species may higher than would otherwise be the case.
ii. Individuals in a particular stock may exhibit high growth rates over a season such that the biomass and value increases if a fish is taken later in the season.
iii. Fishing in nursery grounds or during spawning periods may have larger effects on future stock sizes than taking equivalent catches at other times or places.

If these or other situations occur, the actions of individuals trying to maximize their profits from their rights may result in harvesting patterns which do not optimally utilize the long term productive capacity of the stocks. In short, the TACs and the incentives offered by share rights will not always address all of the biological concerns, and in such instances, it may be worthwhile to consider supplemental regulations.

Any additional measures that will be worthwhile will depend upon the particular fishery. A suggested approach for addressing these problems is:

i. Describe exactly the conservation problem that will not be addressed by a basic ITQ programme
ii. List possible ways in which the ITQ programme can be modified so as to solve the problem
iii. List possible supplemental regulations that will address the problems
iv. Determine which of the potential solutions derived in items ii) and iii) best address the problem and specify a modified ITQ programme which incorporates these additional rules or procedures and
v. Compare the basic ITQ programme with the modified ITQ programme to determine which one most adequately addresses the management objectives. If the modified one is judged superior, it should be adopted; if not, the basic programme should be used (assuming that an ITQ programme is to be used). The basic issue is to make sure that the modifications do not introduce problems worse than those they solve.

Consider the case where there are nursery grounds or spawning periods where harvests can have significant long term effects. If the quality of the flesh or the product recovery rate falls during spawning, this may not be a problem because ITQ owners may not want to use their ITQs on lower-valued fish. However, if costs are reduced by fishing spawning aggregations or if the roe is commercially valuable, there may be incentives to harvest spawning fish rather than at other times of the year which may create a problem for optimal utilization of the long term productivity of the stock.

The problem could be addressed within an ITQ programme by adjusting the TAC level. Or it may be possible to assign coefficients that would transfer catches at different times of the year into equivalent terms with respect to future stock sizes. For example each ton of fish harvested during the spawning period could count as 1.5t of fish harvested during other periods of the year. This would allow individuals the flexibility to operate when they wanted but it would force them to consider the long range effect of their decisions. This adjustment would increase management costs. Research would be necessary to calculate the appropriate coefficients and enforcement would become more complex and perhaps more expensive.

The problem could also be addressed by adding a supplementary regulation that fishing not be allowed in spawning areas or during spawning periods. This would likely be easier to enforce but its inherent lack of flexibility may reduce the potential gains to individual operators that ITQs can provide. It is important to ensure that the gains that are provided in an ITQ programme are not annulled by supplemental restrictions unless it can be shown that the overall gains are greater than the costs.

The ultimate questions are: which of the two modifications best addresses the problem and if adopted, will it provide an overall improvement in the system as a whole? The answer will depend upon the exact biological economic and institutional characteristics of the fishery involved.

9. INITIAL ALLOCATION

The initial allocation of quota shares to individuals is obviously important. It will determine who will initially participate in the fishery and so will have substantial distributional implications. How future participants are determined depends upon the rules for transferability and the duration of the ownership rights. This will also affect who gets the gains from the fishery in the long run. For the most part the initial allocation issue is independent of other components of an ITQ programme. It is a once-and-for-all-step. Given flexible transferability rules and non-expiring ownership rights allocation decisions only have to be made once. To maintain a balanced focus when considering ITQs, the independence of the initial allocation

question from other fundamental issues should be highlighted. Otherwise, the distributional issues may unnecessarily cloud or overshadow the discussions of other important, but independent issues.

There are many initial allocation options, too many to list and discuss all here. However, to develop one for a particular fishery the following questions must be answered:

i. Will the rights be sold or given away? If the rights are to be sold, will it be by an auction, by tender, or by some other means, and will existing participants be given a preference?
ii. If the rights are to be given away how will the recipients be selected?
iii. Once the recipients have been selected, on what basis will the quota shares be distributed among them?
iv. Will the quota shares be based solely on the definition of quota share stocks, or will they be further subdivided by vessel category, gear type, or some other classification?

In the past the recipients have typically been chosen on the basis of past participation in the fishery. Historical catch and vessel size or other indicators of investment are the most common basis of distributing quota shares among this pool. For the Pacific halibut and sablefish ITQ programme the North Pacific Council divided the individual quotas into vessel share classifications but this has not normally been the case in other ITQ programmes. In recent discussions of allocations there has been an emphasis on developing allocation systems where crew members and hired captains can be eligible and not just vessel owners.

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RESISTANCE TO CHANGES IN PROPERTY RIGHTS OR, WHY NOT ITQs?

B.J. McCay
Rutgers University
Cook Office Bldg, Room 210, 55 Dudley Road
New Brunswick, 08901 New Jersey, USA
< mccay@aesop.rutgers.edu>

1. INTRODUCTION

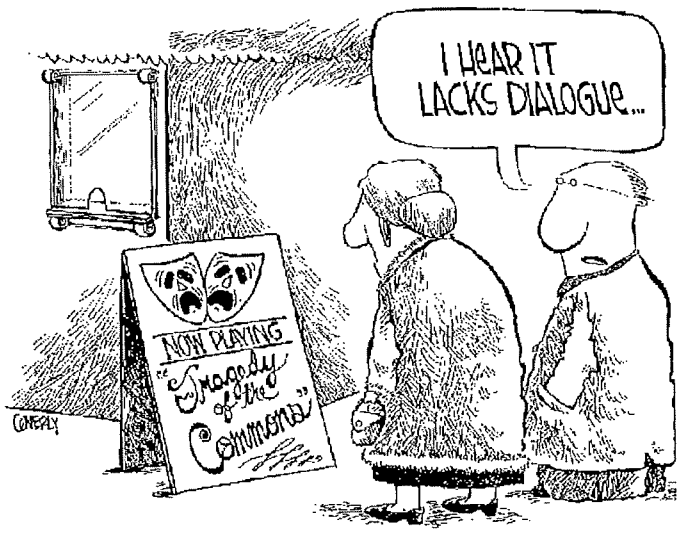
1.1 The Commons and ITQs

One of the strongest arguments for using individual transferable quotas (ITQs) is that they represent a particularly efficient way to avoid so-called "tragedies of the commons." Government intervention, or command-and-control regulation is one way to reduce or prevent the overfishing that tends to occur in fisheries; another is to change the prevalent condition of open-access – which is said to lay behind the tendencies for overexploitation in fisheries – by limiting access. ITQs are close to private property in the extent to which they limit access by assigning exclusive, and marketable, access rights to individuals.

This presentation explores the reasons for resistance to ITQs in the fisheries of the world. To do this, I must sketch the background to the approach I am taking, which is based upon a critique of the conventional notion of the tragedy of the commons (see McCay and Acheson 1987, Berkes 1989, Bromley 1992, Ostrom 1990).

1.2 The Commons: open access

A common error is to confuse or misuse the terms "commons" and "open access". When Garrett Hardin



wrote about "the tragedy of the commons" (1968) he referred to the old village "commons" as a metaphor for any situation of un-regulated open access. Consequently, people have come to understand the commons as an un-regulated situation where "freedom" causes overexploitation. They forget the lessons of history that "the commons" – or equivalent terms in other languages – actually refers to certain places and resources marked not only by common use but also by restrictions and regulations. The English agrarian commons is, and was, a diverse and changing institution, but an institution it certainly is (Cox and Buck 1985, Hanna 1990).

1.3 Property: exclusive, individualized and tradeable property

A similar error is found in the works of economists who created much of the arguments for the use of ITQs and similar market-based tools to manage common pool resources[1]. Often, they use the term "property" to mean the Western notion of private property, that is, exclusive, individualized, and tradeable property rights (Gordon 1954, Demsetz 1967). Anything else is not property. What this does is define out of existence the possibility of institutions such as common property, or exclusive property rights assigned to members of a group, who hold common use-rights to it.

Once we recognize that "commons" institutions exist – including common property – and that they may have restrictions on access and use of common resources, the argument for privatization is weakened. There are clearly more alternatives.

2. ACCESS

2.1 Open access: not necessarily a sufficient cause of tragedies of the commons

Open access is an important cause of the social dilemma we call the tragedy of the commons: if there is no way to keep others from enjoying the fruits of one's work, or of one's self-restraint, why should one bother? (This is also known as a public-goods problem.) However, decline of fish stocks and other common pool resources can come about for other reasons. For example, even though access is closed, assuring to current resource users the right to future benefits, the resource users may decide to exploit it beyond the point of sustainable use. One reason for doing so may be uncertainty about the future; another can be the opportunity to invest the proceeds in another activity promising greater returns. Yet another may be unusual market opportunities or unexpected personal crises. Risk, uncertainty and rates of discounting the future all contribute to decision-making behavior irrespective of access questions (see Clark 1973). So do personal and cultural

[1] Common Pool Resources are resources with features that make them difficult to divide or fence them off, like so-called 'public goods', but also are such that one person's use can diminish anothers'. Some call them Common Property Resources but that practice confuses the physical features of the resource with one of several social institutions (common property) that may be used to allocate and manage them.

preferences (see C. Smith 1981; Gatewood and McCay 1990 on worker satisfaction in fisheries). Accordingly, the difference made by the fact that a resource is managed with open access conditions, limited access, or even exclusive, tradeable rights as with ITQs may be small relative to other factors. Open access is neither necessary nor sufficient to cause tragedies of the commons.

2.2 Private property: not necessary a sufficient tool for comedies of the commons

The converse is that private property–including the quasi-private property represented by ITQs – is neither necessary nor sufficient, to cause "comedies of the commons," or the ability to develop sustainable use patterns for a common pool resource.

One argument for this proposition is that the particular property right system in question is not "private" enough. Scott (2000) has outlined the dimensions of "property" and discussed ITQs as a more "perfect" kind of property, depending on provisions concerning their duration, exclusivity, transferability and divisibility, and security and quality of title. The ITQ holder (typically a vessel owner) has "the exclusivity and security" that an owner needs to economize his operations. Nonetheless, the asset itself remains "essentially collective – exclusive property rights in a fishstock that cannot be divided into individual parts. The right-holder cannot protect and improve 'his' property, and, because of public-good features, he has only a limited desire to try to do so" (Scott 1994). Public goods have benefits that are not divisible and exclusive; consequently, the individual's rational strategy is to let others do the work, because s/he can "free-ride" on the fruits of their efforts (Olson 1965).

While this is true enough, Scott, like many other economists, assumes that whatever is in "collective" ownership is not therefore within the domain of rational management. If we expand his argument to include the assumption that ITQ holders and others have some kind of interest in managing the collective, despite their "free-rider" incentives, then we can see the potential for commons management with, or without, ITQs. What is interesting in this light is Scott's earlier argument (1993) that ITQs can create the structure and incentives for resource user self-management. But my general point is that the exclusive property rights created do not necessarily, nor sufficiently, lead to the incentives for appropriate sustainable use. Some kind of collective system of monitoring, deliberation, and rule-making appears to be necessary.

3. WHY NOT ITQS?

3.1 Background

I turn now to the question of why people resist ITQs when the idea is proposed. Four general reasons for resistance to ITQs are: (a) cultural preference for competitive and non-marketable fishing rights; (b) the transaction costs of changing to ITQs in relation to perceived benefits; (c) concerns about the intended results of ITQs, particularly the downsizing, efficiency goals; and (d) concerns about the intended and unintended consequences of such systems, particularly the displacement of people, the "tragedy of the commoners".

The discussion that follows is based on my own research and involvement with policy committees as well as knowledge gained from the research and reporting of others. I have watched the development and results of the ITQ system of the US Surf Clam and Ocean Quahog fishery since 1979; the ITQ system itself began in 1990 (McCay *et al.* 1990, McCay and Creed 1990, 1994; McCay 1994, McCay 1995a, 1995b, McCay *et al.* 1995). I have also collaborated on research with that of others on Atlantic Canada's groundfish and crab fisheries (McCay *et al.* 1998, Apostle *et al.* 1998, McCay 1999). The discussion is also informed by my work editing a special issue of a journal that focused on ITQs (McCay 1995) and my participation on a US National Research Council committee asked by the US Congress to review ITQs and alternative management measures in order to recommend whether it should lift a moratorium it imposed on ITQs in 1996 (NRC 1999).

3.2 ITQs and changes in the fishery

3.2.1 Property rights and social changes in the fishery

ITQs and other changes in property rights can affect the social structure and relations of a fishery in a variety of ways that concern people and provoke resistance. These include: working relationships on a boat; the structure of the fleet and larger industry; power relations between harvesters and buyers; changes in fishing-dependent communities; in the structure and function of the management system; and even in science and policy.

3.2.2 Changes in the structure of the fleet and industry

The effects of ITQs on the structure of a fishing fleet and industry are widely known and discussed, particularly the consolidation of ownership and control that may attend downsizing, as ITQ-holders economize on their assets. The actual paths and patterns of structural change vary greatly, but the fact and fear of it are virtually universal. Economists refer to this and other issues as "transition costs," but designers of fishery management regimes and their constituents are increasingly mindful of the need to take these changes into account and find ways to moderate them according to local standards.

3.2.3 Changes in working relationships on the boat

Less well appreciated is that working relationships on a boat can be affected by ITQs. For example, when the vessel owner also becomes the owner of the right to fish, as has been typical in ITQ systems to date, the traditional co-venturer and semi-egalitarian nature of relationships between owner, captain, and crew often changes, with a further distancing of the owner from the others. If, as has also been typical, the granting of ITQs creates windfalls for present vessel owners and high entry costs for others, crew and non-owner captains may find themselves in dead-end jobs. They have little opportunity to work their way up. This issue has been addressed in Alaska's halibut and sablefish IFQ system, where a portion of the proceeds goes into a loan fund for crew-members to purchase IFQ, and units are small enough to make this possible. Even more likely, more and more crew find their jobs in jeopardy where ITQs are a tool for downsizing a fishery. The power structure on the boat is thus structured in favor of the owners and owner-captains; incentives for skilled

crew to stay on may be reduced, and paradoxically, although jobs may be fewer as owners economize, the quality of crew willing to work may be reduced. A related phenomenon is the possible shift away from the widespread system of payment (part of the co-venturer social structure), whereby owners, captains, mates, and crew share the proceeds of a fishing voyage according to some locally recognized system. An ITQ-based fishery may become more like a wage labor or piece work system, with comcomitant changes in how people evaluate and value their work.

3.2.4 Change in power relations between harvesters and buyers

An important effect of ITQ regimes where the initial allocation of the ITQ goes to vessel owners is to change, or threaten to change, the distribution of bargaining power between buyers and sellers of marine products. In some ITQ schemes, traditional buyers are excluded from that allocation because of attempts to reserve ITQs for active harvesters, in order to maintain the structure of a fleet. Where this happens, buyers may argue that they are unfairly disadvantaged, given their roles in developing a fishery industry. A recent example is in the Alaska halibut and sablefish fishery where processing companies continue to argue for some kind of "processor IFQ." However, buyers have other ways to redress the imbalance, including financing the acquisition of ITQ on the part of harvesters, who become beholden to them or, in some cases, "fronts" for ownership by the buyers. In other schemes, buyers too may participate in ownership of ITQ and may be able to shift the power in their direction not only by using their access to capital to finance harvesters, but also by becoming ITQ owners themselves and providing ITQ to harvesters on a share or other basis. It is this behavior that leads to the frequently heard complaint or fear that with ITQs fishermen become "sharecroppers," with the implication of poverty-inducing dependency.

3.2.5 Changes in fishing-dependent communities

Resistance to ITQs is fierce in many coastal communities that are heavily dependent on owner-operator fishing and the effects described in Section 3.2.4 are of major concern. In some communities the advent of ITQs has created schisms between families that participated in, and benefited from, the initial allocation and subsequent trade, and other families. Because a veneer of egalitarianism is often important in small coastal communities, these schisms can be harmful in many ways, affecting the local politics of school boards, town councils and churches. Moreover, communities in which most fishers are small-scale are concerned about losing rights of access to the fishery altogether. These and other concerns lie behind a social movement in the Canadian province of Nova Scotia to develop "community-based management" as an alternative to ITQs (Kearney *et al.* 1998). Another community concern is the transmission of knowledge and culture of fishing, where access is restricted to relatively few.

Fishery-dependent communities are also affected by geographic shifts in fish landings, the location of processing firms, and changes in ancillary industries like welding and ice-making that can be triggered by ITQs. Interestingly, some communities have obtained (*e.g.* Chatham Islands, New Zealand) or are trying to obtain (Gulf of Alaska) ITQs in the name of the community rather than individuals, in order to gain more control over the transfer and distribution of quota and hence opportunities for jobs and income.

Two more "community" issues should be mentioned, each of which deserves much fuller treatment than I can give here. The first, recognizing that one important community is "the public," is the issue of how the initial allocation and subsequent transactions appear to equal a "giveaway of public resources." Management bodies have been forced to find ways to get the fishing industry members to 'buy in' to the shift to ITQs, and thus search for ways to preserve something like the status quo in devising the criteria for initial allocation (*i.e.* using historical participation as the major criterion). In the process, finding methods of allocation such as auctions get short shrift because there is usually little public information about or interest in this process. A second and related issue concerns the claims of other groups, particularly indigenous populations, recreationists, and conservationists. Their interests and claims also seem to have been given short shrift in the initial negotiations and design of ITQ systems, and their responses have sometimes been costly to resolve, as in the case of the Maori of New Zealand.

3.2.6 Changes in the structure and workings of the management system and in science and policy

One hoped-for effect of ITQs is to get government agencies out of the business of dealing with the sticky issues of allocating rights to a common resource; that role is relegated to markets. It can be difficult to get there – determining the initial allocation and rules of subsequent transfer can nearly overwhelm managing bodies because so much is at stake. However, once the system is developed, the management system should have reduced responsibility, more being taken over by the ITQ holders themselves. Government will, or should, retain some control over important biological conservation parameters because the resource itself is usually construed as a public one because of the bycatch, fish habitat and other side-effects of any fishery.

Yet there will be pressures for greater involvement of ITQ holders in the scientific domain as well, because of the now direct and measurable way that changes in total allowable catches and other measures affect the value of their assets (Scott 1993). Thus, somewhat paradoxically, ITQs may lead to an increase in co-management and in their participation in science (McCay *et al.* 1998). This is evident in New Zealand, as attested by many presentations at the Fremantle 99 Conference concerning the organizations created by ITQ-holders to engage in fisheries research. It is also evident in the United States, where ITQ-holders in the surf clam and ocean quahog fisheries have created a direct role for themselves, with the government, in scientific research.

Another effect of ITQs on the management process is the sharp narrowing of the "community" involved by the definition of ITQ-holders. In the extant systems, the initial ITQ holders were vessel owners. Although this can

change in some systems after the initial allocation, the general effect is to truncate the participation of the people who have an interest in the process and who therefore are asked and choose to participate. The downsizing and consolidation that often accompanies ITQs further affects the management process: with smaller groups and more narrowly defined interests, developing consensus positions and hence strength in bargaining *vis-à-vis* government agencies and their decision-making bodies becomes easier.

4. LESSONS LEARNED

4.1 "No free lunches, mates": tradeoffs cannot be avoided

One thing that is clear from reviewing ITQ systems is the importance of looking at the tradeoffs and the distribution effects. Yes, ITQs do result in increased efficiencies, lowering costs of the "race for the fish." Investors can better match capital and labor to the resource itself. On the other hand, the social structure gains new fracture points, co-venturers become owners or labourers, people who thought of themselves as independent fishers begin to use terms like "sharecroppers" and "tenant farmers," or "businessmen" and "fish lords." Clearly there will be new equilibria. But is this what people wanted? The message is that the tradeoffs should be identified as much as possible prior to decision making, and their outcomes should be monitored to provide informants for adjustments in the future (NRC 1999).

4.2 "Them that has gits...": Reproducing the structure of the past in the initial allocation and transfer rules

Another issue that arises from comparative research on ITQ systems is that the structure of the industry prior to ITQs and the initial allocation and transferability rules make a big difference to the outcomes, at least in the short term (3 - 10 years). The windfall benefit of the initial allocation reverberates throughout the system for a long while. Consequently, the initial allocation and transferability rules are indeed important, and it is therefore no wonder that people who do agree to consider ITQs put so much time and effort into this phase of the process. In the US surf clam and ocean quahog system, for example, the process lasted for 11 years. Consequentially, as expected, small-scale fishers became concerned about the fates of themselves, their families, and communities resist ITQs or become involved in efforts to design them in ways that protect those interests.

4.3 "You can't go home again": irreversibility of the process

There is a processual quality to the creation of limited access management measures, from trip limits or boat quotas to ITQs. And the record suggests that the process is difficult to reverse. For example, a decision to impose boat quotas will often, especially in the context of declining resources, create pressures to allow "stacking" or consolidation of quotas from several boats onto one. It is but a short step to ITQs. Once something like an ITQ system is created, it is difficult to end it. Although governments often insist that only "revocable privileges," not "property rights," are created with ITQs, the social fact quickly develops that ITQs are thought of, and treated as, property, creating demands for greater security if not compensation when they are threatened. As Scott (2000) argued in his presentation at the Fremantle 99 Conference, the "better" the property right in relation to economic goals, the more "durable" and "secure" it is.

Once again, the message is the importance of examining trade-offs and possible consequences with great care before agreeing upon ITQs. Not only can the consequences be unexpected and undesirable but it also may be difficult to make changes, once the process is well advanced.

4.4 "You can't do it alone": stakeholder participation

ITQs, IQs, and other more restrictive access rules require full and effective participation of all interested parties. There is no question that such a process is messy, difficult, and unreliable, but it is also necessary to meet objectives such as fairness and equity not to mention the legitimacy of the process and its results. Arguably, more legitimate processes have higher rates of compliance. In addition, fuller participation brings the knowledge and experience of practitioners, which should result in more effective and enforceable design of the system.

A persistent argument for ITQs is that "ownership" will increase the incentives for stewardship over the resources. I have also noted one limitation to this conclusion, which is that ITQ holders do not really own the resource, just access rights to it; ownership remains in the larger collective. However, it does seem that ITQs bring stronger incentives for participation in management, for some measures of "self-regulation", and for industry sponsorship of, and collaboration in, biological research. ITQ holders, some of whom have invested heavily (others of whom are working with their initial allocations), have a particular interest in what they will be allowed to catch and when, since their individual catches no longer depend on how well they compete with others but rather on what their portion of the TAC amounts to (disregarding any cheating that might occur). In addition, in situations increasingly marked by "precautionary" approaches to fisheries management (that is, erring on the conservative side when there is uncertainty), they, like other fishers, have strong interests in more accurate fisheries data. Consequently, some ITQ-holding groups have organized to improve the accuracy of fisheries data.

It is indeed possible, as Scott (1993) argues, that ITQs will foster viable systems of self-regulation for sustainable use. Not only are there incentives for more accurate information but there is also the opportunity to measure each individual's stake, and hence, responsibility. Assuming a public accounting of ITQ ownership, it is possible to assess ITQ owners some fraction of their assets to cover the costs of research and other collective activities. This appears to be happening in some New Zealand fisheries, according to reports at the Fremantle 99 conference. In the US surf clam and ocean quahog fishery, it has not yet happened: some ITQ holders remain "free riders" on the actions of others more willing to contribute funds to research initiatives. More than property

rights are required to get collective action (as any homeowner trying to organize a neighbourhood-level action knows).

4.5 "Foxes and others in the henhouse": is the public good served when there is close collaboration?

Another tradeoff is between a narrower "community" for more efficiency. The actors in management arenas become the ITQ holders. Non-holding fishers and members of the larger communities affected by the fishery are marginalized and for the most part excluded. A related question is the tradeoff between the well-organized management participation of ITQ holders and the interests of the larger community. "Agency capture" is a well-known social fact. Government agencies mandated to serve public goals serve the interests of smaller, better-organized interest groups instead.

4.6 "What you wants is results; what you gits is consequences": unexpected consequences and social learning

The creation of ITQs in fisheries since the late 1970s has resulted in many unexpected consequences. Creating commodities out of the right to fish might be expected to provoke claims of right where none had existed before, and such has been and will be the case. The most famous example to date is that of the Maori of New Zealand, who invoked a treaty to challenge the New Zealand ITQ system and eventually gained control of a majority of that country's ITQ. A more recent instance is that of the Miq'maq of Atlantic Canada, who have court backing for their claims of rights to engage in commercial as well as subsistence fisheries, and who may (but have not yet) extend their claims to ITQ fisheries in the region. Another case is that of the mostly native coastal communities of the Bering Sea of Alaska, who initially claimed rights to quotas for deep-sea pollock, but have more recently also obtained preferential rights to shares of ITQ fisheries for halibut and sablefish as well; these are in the form of "community development quotas" which can be used by the communities or their lessees, profits to go to community needs such as education.

ITQs also have provoked counter-forces, especially the "community-based management" movement, through which fishery-dependent coastal communities are claiming the right to shares of either an overall quota or ITQ, to be managed on behalf of the community rather than individuals *per se*. Consequently, the very notion of ITQ has been greatly expanded. Related management systems include not only ITQs, but, more simply, IQ (without transferability), BQ (boat quota), CQ (community quota). In addition, CQ2, or cooperative quotas: especially in the United States with its Congressional moratorium on ITQs, have stimulated a new emphasis on cooperative quotas which have many of the attributes of ITQs is found in heavily-capitalized offshore fisheries in the North Pacific and are being considered for other fisheries.

In addition, the question of transferability continues to receive close scrutiny. Although the economic benefits of full transferability are evident, the social benefits of partial, or/no, transferability are reflected in the design of some systems, such that ITQs are really IQs.

5. SOCIAL LEARNING

The history of ITQs is still young, the first such management systems having begun only in the late 1970s. It is possible to trace an historical trajectory that suggests that social learning is taking place. New Zealand's experience in the mid-1980s with orange roughy showed the folly of using absolute shares, or poundage of fish, as the currency of ITQs. Since then, ITQ systems have been devised as proportionate to some annual figure such as total allowable catch. Canada's early experience with ITQs in its Atlantic herring fishery showed the folly of poor monitoring and enforcement, which made the ITQs themselves worthless because who really needed them? Subsequent systems in Canada and elsewhere have given great attention to monitoring and enforcement, including, in Canada, the development of industry-sponsored dock monitoring. The US surf clam and ocean quahog fishery ITQ regime had no explicit limits on accumulation and concentration, and although its industry already had high levels of concentration, the consequence after ITQs became a regional if not international lesson in the dangers of unfettered market activity for people who prized independence and small-scale fishing. In the meantime, in Iceland, where ITQs began in the early 1980s, fishermen went on strike against the absentee ownership and other changes that were occuring in the fishery industry. Consequently, the US halibut and sablefish ITQ system in the North Pacific (known as IFQs, or Individual Fishery Quotas), off the State of Alaska, was developed with explicit attention to the challenge of protecting the existing, predominately owner-operator, structure in the fisheries while achieving some of the economic and safety benefits of ITQs. Also in the United States, in the Gulf of Mexico, attempts were made to develop ITQs for the red snapper fishery. But this was aborted by Congress moratorium in 1996 on the further introduction of ITQ systems. But, one of the lessons that arose in the course of that effort was the importance and difficulty of dealing with the position of recreational fishing when designing ITQs.

6. CONCLUSION: IN OR OUT OF STEP?

The last issue I wish to address is whether ITQs are "in, or out of, step" given changes in how we think about and address natural resource management. The "traditional" system of management, ensconsed in our schools and government agencies and hearkening back to the 19th and early 20th centuries, emphasizes utilitarian values ("greatest good for the greatest number"), commodity production (including "maximum sustainable yield"), single species models and management plans, deterministic scientific models, reliance on scientific expertise and a top-down system of governance. The "social" or "human dimension" is relegated to little more than being a source of fishing mortality or "political" obstruction.

The change, found in forestry, water, and fisheries areas, may be labelled "ecosystem 'management'" ("management" is put in scare quotes to indicate the possible hubris in suggesting that humans can actually manage ecosystems; we certainly do affect them, though). It includes the incorporation of more bio-centric values into

our predominantly utilitarian ones; appreciation of the importance of multiple-species interactions and habitat considerations; a humbler science, which accepts uncertainty and recognizes discontinuities and surprises in nature; calls for bio-regional and adaptive management; and a more bottom-up and collaborative way of making plans. The "social" is far more central to this paradigm. User groups and members of their communities and the general public are active and engaged participants in ecosystem management.

The question is, then, what is the place of a regime based on privatized rights in relation to the goals of ecosystem management? ITQs are commodity-oriented. They usually are designed around single-species. They have the short-term horizons of systems dependent on market signals. In those ways they are closer to "traditional" management and arguably antithetic to goals of socially and ecologically responsible fisheries management. On the other hand, ITQ regimes have seen bottom up, collaborative initiatives and partnerships in science and research. They have potential for increased stewardship, linked causally with increased ownership. The answer is, at this point, open.

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CURRENT PROPERTY RIGHTS SYSTEMS IN FISHERIES MANAGEMENT

R. Shotton
Marine Resources Service, Fisheries Department, FAO
Viale delle Terme di Caracalla
00100 Rome, Italy
<Ross.Shotton@fao.org>

1. INTRODUCTION

1.1 Conceptual attributes

Property Rights in fisheries, and elsewhere, are often defined as a 'bundle of attributes' and exist as a continuum in terms of their characteristics. Scott (1996) refers to the most important of these as: a) transferability, b) exclusivity, c) security and d) durability.

These four conceptual elements provide a basis for looking at the characteristics of existing fisheries property rights systems. These attributes are mediated, or conditioned, by the need to manage the fishery. Transferability requires ownership registries plus the rules and means to make them function; exclusivity requires monitoring and enforcement systems; and security of title requires an effective and honest legal system; durable rights are those that the possessor holds for a long time, perhaps in perpetuity. Many of these management needs may exist, irrespective of whether the fishery is considered to have weak or strong property rights.

The strongest fisheries property rights systems will be those in which Scott's characteristics are the least constrained, and by looking at how different national and regional management regimes have developed and, or, constrained these attributes, an understanding of the development of 'strong' property-rights fisheries systems can be gained.

In many areas of the world, there exist property rights systems in fisheries that depend on unwritten, traditional, or customary agreements about who may fish in a particular location, and sometimes, what type of gear they are allowed to use (*e.g.* Foale 1996). While unwritten, these rights may be well accepted and fiercely enforced and be just as effective in achieving their objectives as those that have been legislated into existence. In these situations, social, or cultural, traditions will determine the nature of the property rights in terms of the criteria mentioned above.

Depending on which criterion is to be given greatest weight, property rights systems in fisheries may be structured as follows:

i. *"Individual" transferable harvest quotas"*
These are commonly called ITQs - the famous, or perhaps infamous term, which is now well known if not so commonly understood. Various terms have been used to describe these depending on the circumstances of their application and some writers use the term ITQ in a general sense. For example, ICES 1997[1] in their characterization of ITQs uses the term 'Individual' to include when rights are held by a person, a vessel, a community, an enterprise, or some other form of collective. They assume that the 'quota' can be either an output unit - tonnes caught - or an input unit - the amount of fishing gear that can be used. Non-transferable quota management systems are commonly termed (Individual Quota) *IQ systems*.
ITQs may be stinted[2] in various ways and to various degrees. If the harvest right is attached to a fishing boat, they may be referred to as IFQs - Individual Fishing Quotas, but in other ways they may have no operational differences to an ITQ (See *e.g.* Grafton 1996, for a detailed review on their conceptual characteristics).

ii. *Community quota*
Community quotas may share most of the characteristics of ITQs except that there are additional constraints on who may own them - this may be perceived as a constraint on their transferability - they cannot be sold (or even leased) to someone who is not a member of the community. The existence of a community quota may have a legal basis: in this case a condition attached to the quota may be that it legally must remain 'in' the community. However, municipalities, for example, may buy quota in the market as other quota holders do and then lease them to fishermen they deem to be part of their community, as is the case in the Shetland Islands.
Another issue relates to how the community is defined. Conventionally, communities have a geographical context, but in some management regions, a different approach has been adopted. In these, a *community* has been taken to mean a collection of people with similar interests, now often referred to in a fisheries management context as a *virtual community*. In the Maritime Region of Canada for example, two of nine communities that

[1] This document contains an excellent bibliography broken down by national case studies (USA, Canada, Iceland, U.K., Australia, New Zealand and Norway) and formal analyses.

[2] This word has the sense of "Limitation, restriction, especially in respect in the supply of the necessities or comforts of life" (OED). In has a specific Property Rights connotation, now little used I am sure, of "A limited number of cattle, according to kind, allotted to each definite portion into which pasture or common land is divided, or to each person entitled to the right of common pasturage".

have been awarded quota to manage themselves are defined in terms of the type of fishing gear they use.

iii. *Territorial user fisheries rights*
Conventionally called TURFs[3], these convey to the 'owners' some fishing rights to a specific area. There is no reason why they need not have all the attributes of for example an ITQ system, except the right is to undertake fishing in a defined area, rather than remove an amount of fish. The rights may be transferable and of variable durability, exclusivity, etc. Christy (1982) and Panayotou (1984) provide further details.

iv. *Fishing input rights*
These may be exactly analogous in the sense of their property-rights attributes to ITQs, except that the right relates to the amount of fishing gear that can be used. A particularly well known example is the Western Australia lobster fishery where the unit of ownership is a individual lobster trap. Another Australian example is found in the Northern Prawn Fishery. Originally, when input control was introduced into this fishery, the measure of vessel capacity used was based on vessel gross registered tonnage and engine power. This input unit subsequently changed to a unit length (one foot - 12 inches) of the shrimp trawl ground rope because the vessels started towing four trawls rather than just two.

1.2 Administrative attributes

Systems are also defined by how they function. In the context of this paper, the following functional attributes are relevant:

i. *Starting, or transforming, the management of a fishery into a rights-based system*
The key here is obtaining agreement, or deciding, on how many 'rights' will be assigned to the participants. This includes avoiding undue 'gaming'[4] by fishermen to influence any future fishing-rights allotment.

ii. *Funding of register and other management costs*
When formal rights-based fisheries systems are introduced they make clear the benefits that accrue to those who obtain the access rights, and thus at the same time highlight their associated responsibilities. These management responsibilities must be funded and usually this is done through a form of levy on the catch.

iii. *Extending the attributes of the rights*
One of the important aspects of strengthened fisheries property rights is that they become an asset, which can be used in a manner similar to other property or capital assets. For example, depending on their legal definition, they can be seized and divided among spouses in divorce disputes, used as collateral in obtaining finance and be attached with liens by disgruntled creditors in relevant circumstances.

iv. *Resource management*
This is, in my view, the most important functional attribute relating to fisheries property rights systems. With few exceptions, the total desirable catch in terms of obtaining the maximum benefits from the fishery will change from year to year, either to avoid growth overfishing[5] or because of an expectation of excessive declines in recruitment. In this case the stock may fall below some minimum biological acceptable level unless fishing mortality is reduced. In out-put, *i.e.* quota controlled fisheries, the amount of fish a rights holder is entitled to remove is usually defined as a percentage of the total allowable catch. Thus the rights holder's absolute catch each year will vary as does the total allowable catch (TAC). How the TAC is determined is usually independent of the type of rights system used in the fishery (though in rights-based fisheries management systems the quota holders are often formally involved in the TAC-setting process). Thus, monitoring and enforcement is necessary to ensure quotas are not exceeded, as in any fishery where catch in limited.
In input-controlled fisheries, adjustments are required to the amount of effort that is exerted to control fishing mortality. In the case of trap fisheries this may mean adjusting the number of traps by removal of a percentage of the traps that are fished (though varying the length of fishing seasons remains an option). In the case of a ground-rope rights-based fishery, *e.g.* the Australian Northern Prawn Fishery, fishermen may be required to forfeit a percentage of their foot-rope length entitlements if the TAC is to be reduced. This in turn requires that they either purchase the difference from other rights holders to maintain their level of effort in the fishery, or they become unable to participate.

v. *Resource rents*
Another functional, perhaps more accurately termed policy, issue relates to whether some form of

[3] For those for whom English is not their mother tongue, *turf* is the noun describing the covering of grass and other herbage on the surface of the ground. It also has developed a possessive sense, *e.g.* this is my 'turf', or his 'turf', implies a proprietary right.

[4] Gaming arises when people alter their behaviour to influence the outcome of a future decision. An example is asking for a salary raise of 20%, when wanting 10% and expecting to get half of what is requested. A fisheries example could be targeting species not usually fished to qualify in a future allocation of ITQs, or even more directly, (mis)reporting catches that are not actually taken to increase one's historical catch record, again to increase any future ITQ allocation when the allocation will be based on past catch levels.

[5] The biomass of the fishstock will depend on its growth rate - a function of the ages and numbers of fish, and mortality, either from fishing or natural causes. If mortality is excessive, the fish will be caught when they are too small and potential fish yields will be forgone.

resource rent will be charged and if so how the amount should be determined.

2. CURRENT NATIONAL PRACTICES

2.1 Introduction

An exhaustive account of this topic should include *all* countries with fisheries, but this would not be helpful and this account concentrates on those that have introduced transferable fishery property rights in the last few decades. A functional approach has been taken based on literature that is available.

2.2 General applications

The following table gives an indication of the start of some important 'strong' rights-type fisheries. It is not exclusive, but provides and indication of general developments around the world.

Country	Start	
Australia		
Southern Blue Fin Tuna	1984	TQs
South East Trawl Fishery W. Australia	1992	ITQs
Lobster fishery	1964	Tradeability in licences soon after limited entry introduced; pot licence tradeablity from early 1970s.
Prawn Northern Fishery	1969	
	1983	Tradeability in vessel licence to which catch rights were assigned (fixed vessel and headline length)
		Tradeability extended to 35 fisheries (depending on fishery: either gear units, quota or time & gear limits)
Canada		
Lake Winnipeg	1972	IQ; became transferable in 1986 (Crowley and Palsson 1992)
East Coast Enterprise Allocation System	1982	Allocations to companies in the programme as Transferable Property Rights
Atlantic Herring	1983	ITQ to the vessel
Lake Erie	1984	ITQs
Maritime offshore scallops	1986	Enterprise allocations
Northern Shrimp (Nfld. – Labrador	1987	Enterprise allocations (IQs) but no limit on number of vessels that may be used.
Pacific Geoduck	1989	ITQs
East Coast (Scotia-Fundy) – groundfish	1990	ITQs for *bona fide* licensed fishermen (who might also be processors).
B.C.[6] Pacific Halibut	1991	IQ
Chile	1992	ITQs were permitted for industrial fishing after stock depletion and recovery management programme and for new previously unex- ploited fisheries
Iceland	1976	Individual vessel quotas introduced into the herring fishery
	1979	Quotas made transferable
	1981	ITQs introduced into the capelin fishery
	1984	ITQs introduced into the demersal fishery
	1985	Effort quotas introduced
	1986	Vessel quotas made transferable in the capelin fishery
	1988	IVQs in all fisheries
	1990	System made uniform in all fisheries
Netherlands		
Plaice and sole	1976	IQs within the EU national quota allocated to the Netherlands; full transferability introduced in 1985
Cod and whiting	1981	Full transferability introduced in 1994
	1990	System made uniform in all fisheries.
New Zealand	1983	ITQs started with previously unexploited orange roughy, a deepwater resource; the major period of introductions started in 1986. New species are still being added to the QMS.
United States		
Surf Clam/Ocean Quahog	1990	ITQ system
Wreckfish	1992	ITQ programme
Alaska Sablefish and Pacific Halibut	1994	Individual Fishing Quota (IFQ)

[6] (Herring) Spawn-on-kelp, Groundfish trawl, Red sea urchins, abalone, Green sea urchins, Roe herring and sea cucumbers are also managed under IQ.

An interesting development has been the trend to transfer management of quota to the industry itself. This process started in the Netherlands as early as 1993 at the same time leasing began to be permitted. This solved the government's problem of needing to monitor all the trading taking place but it led to a ban on leasing after September in the annual fishing year so that accounts could be balanced. This process is being privatized at the present time. In New Zealand, industry-specific management companies now exist for orange roughy, scallops and rock lobsters.

2.3 Nature of owners

A variety of practices exist in relation to who may own quotas, whether they be nationals, enterprises, or enterprises through ownership in the vessels to which the quota has been assigned.

Country	Owners
Australia Southern Blue Fin Tuna South East Trawl Fishery	Vessel owners Trawler operators
Canada	Varies depending on fishery; may be the 'vessel' (B.C. halibut); on the east coast ITQ holder in the demersal fishery must be a registered fisherman; in the Enterprise Allocation System it is the company.
Chile	Individuals/companies who were successful bidders
Iceland	Quota is assigned to vessels, which must also have fishing licences. These are not automatically transferable and approval is only given if the exchanged vessel is comparable in fishing power.
New Zealand	New Zealand citizens, residents and companies qualifying as New Zealand companies (≥75% N.Z. ownership).
United States Surf calm/Ocean quahog Alaska	Any U.S. citizen or commercial entity that qualifies to own a fishing vessel may purchase or lease an allocation. Rights entitlements exist in form of tags - vessels must have these if they participate in this fishery. Ownership of a vessel is not a prerequisite. Vessel owners who are US citizens or companies satisfying a particular legal requirement. In subsequent transfers, new owners must demonstrate that they have worked as a crew member on a US fishing boat for at least 150 days.

2.4 Initial allocations

Invariably, the first question from those who may have to operate under this form of management is "how will my share be determined?" Two methods have commonly been used (a) the catch history based on a receding period of the fishing and (b) some function of the dimensions of the vessel.

Country	Method	Owners
Argentina*	Based in part on the average performance of the permit holders during the period 1989-1996.	Fishing permit holders

* Note - this form of management in Argentina is still in the process of implementation.

Australia Southern Blue Fin Tuna	Catch > 5t; then 75% based on catch history in one of two years at choice of fishermen; 25% based on investment in vessel as determined by independent assessor.	Fishermen owning vessels.
Australia South East Trawl Fishery	Based on catch history and investment. Based on best 5 years between 1984 and 1989. For most trawl-caught fish, historic catch was given an 80% weighting in the allocation. For newer fisheries (*i.e.* orange roughy and grenadier/hoki), the weighting was 50%. Allocations were made on a species-by-species basis. Investment was determined by a formula based on the vessel's dimensions and engine power.	Licence holder
Canada B.C. Halibut East Coast Enterprise Allocation System Scotian Shelf Demersal fishery Northern Shrimp	70% of initial allocation was based on the catch record between 1986 and 1989; 30% was based on the vessel's overall length. Initially, while quota could be transferred with the permission of the government and other companies, it could not be sold. Average catch for the best two years of the four year period 1986-1989 Equal allocation of the TAC (because of failure to agree on any other formulae). This was changed in 1997 and seven companies were given additional temporary quota.	 Companies
Chile	Open bidding in public auction	Successful bidders
Iceland	Method varied with fishery. For the demersal species, lobster and deep-sea shrimp allocation, was based on historical catch during the base years - usually a three year period qualified by exemption if the vessel was not operating. For herring and inshore shrimp, the initial allocations were equal. For capelin, 2/3 of the catch was allocated equally; the rest was in proportion to vessel hold capacity.	

The Netherlands	The national quota provided by the EU was divided among enterprises on the basis of their historic catch and a measure of vessel capacity based on engine size (Hoefnagel 1998)	
New Zealand Inshore fisheries	Based on catch history - the best two our of three years with appeal process	Vessel owners
United States, Alaska	Recipients must have been boat owners or leasees during 1988 and 1990. Initial quota share was based on landings for halibut/sablefish for the best 5 years during the period 1984 – 1990. Many management areas exist.	
United States Surf Clam/Ocean Quahog	Surf Clam: based on nine years catch history (1979-1988); contribution from the last two years was doubled and the two worst years dropped. Vessel size was included in considerations for non-New England vessels. Ocean Quahog: based on catch only. Rights were divided among all vessels that harvested these species; replacement vessels were allowed.	ITQ is given to person or commercial entity, not to a vessel.

2.5 Durability

Strong property rights imply they are durable, *i.e.* ownership conferred for a long period. A variety of approaches to this aspect of property are found in rights-based fisheries management systems.

Country	Durability
United States, Alaska	U.S. State unable to revoke rights to recover quota subject to certain conditions and with out legal liability for legal compensation. QS is a harvest privilege and good indefinitely. However, they constitute a use privilege, which may be modified or revoked by the Council and the Secretary at any time without compensation.
Iceland	Are permanent quota or TAC shares
Chile	Initially 10 years
Netherlands	Short term right assured - long term right not assured. Rights to transfer quota exist only for owners of vessels listed on the central register. Fishermen may not sell the rights in parts (*i.e.* nor divisible) though purchasers can buy portions. Transfer must be approved and registered by the minister.
New Zealand	Rights are held in perpetuity - though significant redistribution of rights occurred to satisfy aboriginal (Maori treaty) settlements
United Kingdom	Long term nature of right NOT guaranteed by government

2.6 Controls on concentration of ownership/ transferability

Once participants have determined what their share in a new rights-based fishery may be, the next question raised is "will the new system end up as a monopoly?" A variety of approaches have been undertaken to avoid this situation.

Country	Method
Australia Western Australia lobster	Traps licenced to vessels, minimum of 63, maximum of 150. Fisherman may own more than one vessel. Owner must remain " fit and proper to be a fisherman"[7].
Argentina	Quota allocated to the ice fleet cannot be transferred to the factory trawler fleet.
Canada B.C. Halibut	No aggregation of quota for the first two years (to allow participants to adjust to the system)
Maritimes Groundfishery	Maximum holding limited to 2% of any species in any management area (McCay *et al.* 1996).
Offshore scallops – Maritimes	Maximum quota accumulation 50% of TAC
Northern Shrimp	No permanent transfers between companies
Chile	10% of quota sold through zero revenue[8] auction; owner limited to buying no more than 50% of quota on sale.
Iceland	TAC-shares and vessel annual quota are transferable, the former without any restriction, however, vessel quotas can only be freely transferred between vessels in the same geographical region. Transfers outside of the region are subject to approval – which is normally given.
New Zealand	In principle, no single owner can hold and/or lease >35% of quota for all areas (there are 10 management areas, though many are combined for different species). Minimum holding of 5t for finfish and 1t for invertebrates exists.
United States, Alaska Halibut/ sablefish	A variety of vessel types and fishing areas are defined that determine how the catch of sablefish and halibut may be taken. No more than 0.5% of the combined International Pacific Halibut Commission area quota may be caught by a single vessel (with a grandfather provision for initial allocations above this limit). No more than 1% of sablefish may be taken by any one vessel with the same grandfather provision. Depending on the management area similar restrictions exist.
Surf clam/Ocean quahog	A minimum holding of 160 bushels is required. There is no maximum holding or limit to accumulation subject to U.S. anti-trust laws (NRC 1999).

[7] Usually meaning that the person does not undertake activities harmful to the fisheries.

[8] In zero revenue auctions, the proceeds are returned to the seller. One function of such auctions is that they establish what the market value is for the quota, at least in theory.

2.7 Enforcement

Property rights imply rights can be asserted or enforced. The following table lists some national approaches.

Country	General methodology
Australia South East Trawl Fishery	Option for dockside weighing of catch supplemented by monitoring of fish sales records. Catch records must be provided within 24 hours of landings. VMS system in operation for several fisheries.
Canada B.C. Halibut	Vessel must 'hail' when landings will be done so that they can be monitored; 24 hour update of information. Fishing privileges can be suspended.
Maritime Offshore scallops	Dockside monitoring of landings, port sampling and "black" box vessel tracking system.
New Zealand	Primary emphasis on auditing of landings, sales and shipping records which must be completed at all points of sale or transfer of ownership of fish. All those dealing in fish must be licensed. Strict requirements for operation of VMS to enable tracking of vessels within and between quota zones
United States, Alaska	The Secretary will promulgate regulations to establish a monitoring and enforcement regime. Penalties include forfeiture of QS. Fish sales must be to registered fish buyers.
Surf clam and Ocean quahog	Emphasis on shore-side monitoring through checking of logbook data. Records of vessels and processors are monitored. Offences are treated as commercial fraud. Penalties include fines and forfeiture of fish, vessels and quota holdings.

2.8 Cost recovery

With rights come responsibilities, notably invitations, one cannot refuse, to pay for management. A variety of approaches exist as tabulated below.

Country	Method
Australia	National policy requires 90% recovery of management costs attributable to managing the fisheries. Applies to all fisheries irrespective of whether they are managed by ITQs.
Canada B.C. Halibut	All costs for management, monitoring and enforcement are recovered from licence holders (*e.g.* port validation of landings, salaries, travel, overtime, etc. Two thirds are collected in advance through a licence fee, the rest through a fee of $Can250/vessel plus $Can0.09/lb levy.
Maritime Offshore Scallops	Pay DFO $Can 2.9 million in fees.
Iceland	Upper bound of 0.2% of estimated catch value to cover the cost of monitoring and enforcing the ITQ regulations.
New Zealand	Full management cost recovery from industry
United States Mid-Atlantic Surf clam/Ocean quahog	Allocation permit fees are collected to help cover administrative costs including the production and distribution of cage tags.
Alaska	3% of ex-vessel value of IFQ harvests collected by NMFS to cover management and enforcement costs and fund a loan programme (NMFS 1999)

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GROUP AND COMMUNITY-BASED FISHING RIGHTS

R. Willmann
Fishery Policy and Planning Division, FAO
Viale delle Terme di Caracalla, 00100 Rome, Italy
<rolf.willman@fao.org>

1. INTRODUCTION[1]

This paper briefly overviews some important characteristics and features of group and, or, community-based rights in the use of fisheries resources (abbreviated as Group Rights in Fisheries – GRF). In the case of GRFs, important co-ordinating functions required for the management of fisheries are performed by groups or communities of people who have been jointly vested with, or who have jointly acquired, rights to fishing grounds or to fish-stocks. Fishing rights held by individual fishermen or sub-groups of fishermen may be nested within GRFs, but these are attenuated to a varying extent by group or community rules. GRFs are not always characterized by the same extent of exclusivity as is the case with individual transferable quotas (ITQs) either because of the group's inability to ensure and protect such exclusivity (the cost might be prohibitive to do so) or because the group willingly allows others to share in the benefits conferred by the GRFs.

While GRFs of traditional and modern designs are found throughout the world, their current global importance in the management of capture fisheries is limited, though important exceptions exist, in particular in Japan (Yamamoto and Short 1992, FAO 1993) and in several Pacific islands (see Ruddle 1994 and references therein). GRFs are more prominent in the management of inland fisheries including lakes, reservoirs and rivers (*e.g.* Scudder and Conelly 1985).

With the exception of some recently-established management systems where groups or organizations of fishermen hold catch-quotas, GRFs are primarily based on territorial rights to fishing grounds, fish aggregating devices, natural and artificial reefs, stretches of rivers or sections of bays and lakes. Within such exclusive territories, use rights and/or utilization rules (*e.g.* type of gear; time of fishing; etc.) may be further defined for specific fisheries and individual fishermen or groups of fishermen. Utilization rules may change in accordance with variability in resource availability and abundance.

The prevalence of territorial rights is likely to be due to the often extra-ordinary difficulty of defining, assigning, monitoring and enforcing rights based on catches. The costs associated with these tasks, commonly referred to as transaction costs, may often outweigh their benefits from greater productivity of resource exploitation, capture of resource-rent and conflict avoidance. In the words of Demsetz (1967), the gains of internalization of externalities may not be large enough to surmount the costs of internalization. In fact, as long as the exploitation rate of a stock is not high, the major externality arises with crowding and excess pressure on the best fishing locations (Scott 1993). Schlager (in Scott 1993) has shown that several of the self-management groups she studied were able to prevent congestion and arrange for the rotational use of the best fishing spots (see also Berkes [1989], and Platteau and Seki [in press]). The ease and lower costs of defining fishing rights based on territoriality is one of the important arguments in favour of stationary fishing methods (another is energy savings) (Christy 2000b).

Territorial rights have obvious limitations in the management of migratory fish stocks. Where the migratory route is extensive, a GRF encompassing the full range of a stock would likely have many participants and incur high transaction costs in agreeing on management objectives, information collection, implementation and enforcement of management measures.

Scott (1993) argues that another important reason why self-management by fishermen groups is relatively rare is the difficulty of deciding (or the high cost of bargaining) on the distribution of costs and benefits. He notes that contrary to the case in fisheries, in many land-based resources, historically, the distribution of rights often happened quasi-automatically through rules like 'finders keepers' (or 'first-come, first-served'). Consequently, by resolving this major impediment the assignment of catch quotas can be a powerful incentive for self-management by fishermen groups and for accepting increasing responsibility (and cost coverage) for all or most management tasks. There is evidence that the allocation of quotas to individual fishermen or to fishermen groups have indeed encouraged self-management (*e.g.* Māori fisheries in New Zealand, Scottish producer organizations).

Where an ITQ-regime is imposed in a non-participatory manner on a fishery, it may however, undermine the social fabric on which the success of collective action in natural resources management largely hinges. All traditional GRFs rely significantly on so-called social capital, which comprises, *inter alia*, group or community values, behavioural norms and social networks.[2] Norms of trust and reciprocity lower the costs of bargaining, contracting, monitoring and enforcement (Baland and Platteau 1996, Ostrom 1990). Social networks can reduce the cost of information collection

[1] The views expressed in this paper are those of the author and do not necessarily represent the views of the Food and Agriculture Organization of the United Nations (FAO).

[2] Samuel Bowles (1999) argues that 'capital' refers to a thing possessed by individuals. For that reason, he dislikes the use of the term 'social capital' to describe trust, commitment to others, adhering to social norms, punishing those who violate them, etc., *i.e.* relationships among people.

and sharing and provide insurance mechanisms against the adverse effects of economic shocks (accidents, natural disasters, etc.). The role of local-level social capital is even more important under conditions where general trust in a society is low (Platteau 1994, Putnam 1993)[3].

There are several issues related to the introduction of ITQs that can potentially erode the social fabric of fishing communities. Arguably, a fully participatory and transparent process of introducing ITQs, and qualifications and/or temporary restrictions on transferability, might often avoid social disruptions. A first concern is the method and criteria for the initial allocation of quotas. Historical catches and the current level of investment in the fisheries often form the basis for quota allocations. In some instances, quotas are allocated to the highest bidder. Where data on past catch performance are poor, or may be subject to manipulation, the allocation process may not only result in much litigation in the courts but also spread mistrust, envy and conflict among fishermen, fishing communities and industry. Moreover, these two criteria ignore other factors such as family size, dependency on fishing for livelihood, the requirement to care for disabled and old people, etc., that might be considered were allocation is done at the community level.

While public auctioning of quotas might guarantee a high degree of transparency in the allocation process, it could exclude many current operators from acquiring quotas because of lack of access to capital. Inadequate access to capital is especially pervasive in developing countries as the fishermen usually lack collateral assets. In fact, some people may have privileged access to capital because of extraneous reasons that could cause strong misgivings among those unable to obtain capital and successfully bid. If that were to occur, the propensity could be large among the latter to disrespect the ITQ regime. As a consequence, enforcement could become prohibitively expensive or even impossible.

A further concern is the transferability of quotas. While transferability ensures that the price-mechanism comes to bear in the management of the fishery, unconstrained quota transfers could cause profound and rapid structural changes in a fishery that could greatly disrupt the existing social and economic fabric in fishing communities and the fishing industry.

Last, at the psychological level, the individualization of fishing rights may weaken other 'regarding behaviour' such as income and knowledge sharing, and assistance to the less able and weak members of the community. The latter often perform indispensable insurance functions in poor communities of developing countries.

[3] Note however, that traditional norms and social ties may not be unequivocally positive for local-level management and development. Customary rules and behaviour may discriminate against certain groups in the community and the traditional power structure may prevent fair and equitable treatment of participants in the fisheries.

2. CHARACTERISTICS AND EXAMPLES OF GRFs

Excellent analyses and case studies of the role of communities in natural resource management are provided by Baland and Platteau (1996), Proceedings of the Conference on Common Property Resource Management (1986), Ostrom (1990), Berkes (1989) and Pickerton (1989)[4]. More detailed treatments of many of the issues can be found in papers presented in these proceedings, (*e.g.* Christy 2000a,b, Kurien2000, McCay 2000and Campbell 2000).

For examples of GRFs in the countries of Asia and the Pacific, I refer the reader to the guide on traditional community-based fishery management by Ruddle (1994) and to the papers presented at the FAO/Japan Expert Consultation on the Development of Community-based Coastal Fishery Management Systems for Asia and the Pacific. Kobe, Japan, 8-12 June (FAO 1993). For examples in Africa, I refer the reader to papers listed in the annotated bibliography on community-based and traditional fisheries management in Africa by Brainerd (1991), to Weigel (1985) and to Horemans and Jallow (1997) for West Africa. For the Caribbean region, the reader is referred to the work and papers by the Caribbean Natural Resources Institute (CANARI and Panos Institute 1994) and its director, Yves Renard (*e.g.* 1991). As the literature is vast and growing rapidly, these references are only some of many in this field.

In recent years the International Centre for Living Aquatic Resources Management (ICLARM), the Institute for Fisheries Management (IFM) at the North Sea Centre in Hirtshals, Denmark, and local research partners have investigated the performance and outcomes of fisheries co-management arrangements in a series of Asian and African countries. A summary has been provided by Kuperan (2000) for the *Fishrights99 Conference* that also contains a list of references.

2.1 Types of GRFs

Territorial rights are at the core of most traditional fisheries management regimes. They are the principal characteristics of the Japanese fisheries management regime and are increasingly claimed by small-scale fishermen's unions and organizations in many countries around the world[5]. In India and Sri Lanka customary rights continue to exist in some lagoon fisheries. In the Philippines, the recently promulgated local government code has assigned exclusive fishing rights up to 15km from the shore to municipalities. Territorial fishing concessions, however, have already a longer history in Philippines municipal fisheries (Smith and Panayotou

[4] An excellent source for the latest research findings and for information exchange is the International Association for the Study of Common Property:
http://www.indiana.edu/~iascp/index.html

[5] The International Collective in Support of Fishworkers (ICSF), Chennai, India, is a strong advocate of assigning exclusive inshore fishing rights to coastal fishing communities, and campaigns for the better monitoring and enforcement of existing reserved inshore zones. More details on the ICSF can be obtained from its web site: http://www.icsf.net

1984). Recently, with the introduction of artificial reefs in some areas in Kerala, India,, exclusive fishing rights around these structures are claimed by the communities or groups of fishermen who erected them (Kurien 2000). In the Philippines and Indonesia territorial rights are claimed around fish aggregating devices in tuna fisheries (FAO 1991).

In a few localities of Indonesia, traditional territorial fishing rights continue to exist and there is evidence that many more existed in the past. Here, as well as in many Pacific island fisheries, territorial rights are often derived from an extension of land rights into nearshore waters. They are more likely to occur where valuable sedentary resources in confined areas such as bays, lagoons, reefs, etc. exist and which can be easily demarcated and, or, observed.

Examples of *output-based GRFs* are found in the Netherlands, New Zealand, Philippines, Senegal, UK and USA. In the case of Netherlands and UK, producer organizations have been given the right to distribute quotas among their members. In New Zealand, Māori have been assigned both territorial and quota-based fishing rights. In the USA, community development quotas have been allocated as part of ITQ regimes. Recently in Senegal, local fishermen's organizations have introduced catch-quotas per vessel and fishing trip for high value demersal resources (Gaspart and Platteau) in some areas. An objective of similar schemes in Argentinean and US fisheries is to influence the market price.

Examples of *input-rights* or controls are found in The Gambia, India, Japan, Norway, Senegal and Sri Lanka. Rights to place anchors or to fix tidal stake-nets for the capture of shrimp in the Gambia River are assigned and regulated by local communities (Leendertse 1995). Japanese fishing cooperatives hold rights to assign fishing licences for the capture of non-sedentary coastal resources. Moreover, limits on the number of vessels and of fishing-trips and hours-fished are common management measures within the exclusive fishing territories of Japanese cooperatives. Recently trip-limits were introduced in some villages in Senegal for the canoe purse-seine fishery for small pelagic fishes (Gaspart and Platteau, in press). In the Norwegian Lofoten fishery, fisheries cooperatives undertake various regulatory functions, primarily based on input-limitations as well as technical management measures such as closed seasons and areas (Jentoft and Kristoffersen 1989). In India and Sri Lanka territorial rights in lagoons are usually complemented by input regulations concerning the type and size of the fishing gear and the time of fishing.

Mixed nested rights systems that prevail in Japanese inshore fisheries have been typical for most traditional and informal fisheries management systems. They may also comprise individual harvesting quotas which may only be transferable with the consent of the group or cooperative.

2.2 Objectives of GRFs

GRFs usually attempt to achieve a number of objectives whose relative importance depends on the particular management situation. These include:

i. conflict avoidance and resolution: an important reason for sometimes violent conflicts between large-scale and small-scale fisheries is that no exclusive zones have been created, or when they are defined by the law, they are not enforced
ii. fairness in access to resources and net benefits: the group or community is often better able to take into account the specific situations of individuals and families when sub-dividing rights
iii. protection of return on investment, *e.g.* in the case of FADs and artificial reefs
iv. resource conservation: this objective is not always met, partly because the knowledge about resource abundance is insufficient and partly because people cannot afford to 'save for the future'
v. exertion of market power among more recently created GRFs, *e.g.* in Senegal and Argentina (This is often the primary motivation for fishermen to claim rights and introduce self-regulations.) and
vi. capture of resource-rent: this is rarely a priority and is usually only partially achieved.

2.3 Legal status of GRFs

GRFs may exist in a number of legal forms depending on the management regime. These forms include:

i. codification in formal law, *e.g.* as in Japan, Norway and elsewhere where countries have assigned exclusive inshore zones for small-scale fisheries
ii. informal and of recent origin, *e.g.* in Senegal and for artificial reefs in Kerala
iii. customary and protected under formal law, *e.g.* in Sri Lanka, Vanuatu, Micronesia, Kiribati and other Pacific Islands and
iv. customary, but not codified in formal law, as is the case for most traditional GRFs.

2.4 Rights holder or authority of GRFs

As with the objectives and legal status, the identity of the stakeholder who is assigned the rights or authority to impose the rights varies depending on the particular management regime. Among the possible forms are:

i. multi-functional fisheries cooperatives, *e.g.* Japan, Canada, Turkey, Senegal and USA
ii. producer organizations (UK and Netherlands)
iii. fishermen's organizations and guilds, *e.g.* Gambia, Sri Lanka (Negombo lagoon), India (Pulicat lake), Indonesia and Spain (When a resource is exploited by fishermen from several fishing communities, an organization is needed that can represent fishermen from different communities.)
iv. local administrative units, *e.g.* municipalities in the Philippines – which had exclusive rights to the collection of milk-fish fry which they usually auctioned, and now have additional rights (see Section 3 above)

v. villages, communities, *e.g.* Senegal, India and Sri Lanka (These apply primarily to local sedentary resources
vi. village headmen, chiefs of tribes and clans *etc.*, *e.g.* in some South Pacific islands.) and
vii. NGOs, *e.g.* Bangladesh – in the case of some flood-plain and reservoir inland fisheries. Earlier government policy had been to auction rights which then were acquired by rich people who employed labourers or sub-leased their rights to local fishermen.

2.5 Rights defining or accompanying rules

Rights in fisheries are subject to a variety of rules. These rules determine how a rights-based management regime will function and they reflect the political, legal and social circumstances in which the rights-based regime has developed. There are many characteristics of rights regimes that affect the nature of operational rules. These include (see also Ruddle 1994):

i. eligibility criteria for group membership, *e.g.* residence, birth, clan, tribe, caste, gender and marital status (a detailed study is that on the Pulicat Lake fisheries by Mathew 1991)
ii. rules on transferability-rights are often not transferable or are restricted to intra-group transfer through bequest, sale, lease or marriage dowry
iii. secondary or temporary rights for non-group members, usually in exchange for a fee or gift, *etc.*
iv. gear rules, *e.g.* for non-permitted types or relating to their technical specifications
v. species rules, *e.g.* reserved or taboo species
vi. conservation rules, *e.g.* for closed seasons, buffer zones or non-fishing zones and
vii. sharing rules, *e.g.* for fishing rotation; lotteries for participation, income/cost-sharing rules as in the Japanese pooling systems.

2.6 Means of monitoring and enforcement of rights

For a right to have meaning in a fisheries system, it must be enforceable. Enforcement is usually achieved through a system of monitoring and the prosecution and punishment of trespasses. Monitoring may be done by rights holders themselves (*e.g.* many traditional systems), specially assigned staff employed by the group or community of rights holders, or in cooperation with a government enforcement agencies (*e.g.* Japan). In traditional GRFs, little enforcement may be needed because of voluntary compliance based on mutual trust of rules. More commonly, however, rule-compliance is based on the threat of social, economic, physical and supernatural sanctions, *e.g.* shaming, ostracism, banishment, corporal and supernatural punishment, and monetary and in-kind fines (Ruddle 1994).

3. ADVANTAGES OF GROUP AND COMMUNITY-BASED RIGHTS

The advantages of GRFs derive principally from the fact that essential management functions are performed by the rights holders themselves and not by a central management authority. These functions may encompass all or several of the following:

i. decision-making on management objectives
ii. conflict avoidance and resolution
iii. decisions on distribution of net benefits
iv. monitoring of abidance with management rules and
v. sanctioning of trespasses against management rules.

Easier and more complete access to critical information and the use of embedded social capital are the primary advantages rights holders have over a centralized management authority in performing these functions. Through their multifarious interactions and social relations, rights holders usually know much better about their individual and collective needs and preferences. For management decision-making rights holders can, through their direct participation in the fishery, draw upon their individual and collective knowledge on the location and abundance of fishery resources, observations of catches and catch rates and seasonal and annual changes, technological changes, economic returns and other information. This facilitates achieving mutually satisfactory management objectives. Better and more up to date information and less 'red tape' also engender greater flexibility and adaptability in fisheries management. Moreover, there is greater likelihood that rights holders respect and comply with management rules that were designed and agreed upon by them. The rights holders are also able to monitor each other's behaviour and detect trespasses against management rules.

It is obvious that the size of the community, or group of rights holders, has a strong bearing on the ease, or difficulty, of information sharing, collective decision-making and mutual monitoring. Where the number of rights holders is large and spread out over a wide geographical area, direct information-sharing, decision-making and monitoring by group members may become impossible. Moreover, large groups tend to undermine the incentive for each member to act in the collective interest because (a) the internalization of externalities diminishes with increasing group size, and (b), the threat of loosing one's reputation - high in regular and repeated close interpersonal relationships - is less among large groups (Baland and Platteau 1995).

Where group size is large, rights holders would have to elect individuals who represent their interests in management decision-making bodies and confer information acquisition and monitoring functions to specially employed agents or rotate such functions among group members. Both types of solutions can be found in some traditional management systems (*e.g.* McKean [1986] on the management of common land in medieval Japan).

While there is wide agreement among social science researchers that successful collective action is more likely to occur in small groups (*e.g.* Olson 1965, Baland and Platteau 1996; Orstrom 1990) the influence of group heterogeneity on the outcome of collective action is less clear. By distinguishing different sources of heterogeneity (*i.e.* heterogeneity in endowments, socio-cultural characteristics or objectives) Baland and Platteau (1995) have shown that under certain conditions heterogeneity in endowments may be conducive rather than an obstacle to

successful collective action. Failures in collective action, therefore, should not be unquestionably attributed to inequalities in wealth as heterogeneity in objectives may be the real culprit.

In summary, in economic terms, the advantages of GRFs lie in the potential of lower transaction costs in the management of a fishery compared to centralized management or individual property rights (*i.e.* savings in information, monitoring and enforcement costs through the use of information held privately by fishermen and the use of social-capital embedded in local and professional organizations and institutions). Abdullah, Kuperan and Pomeroy (1998) demonstrate some evidence for lower transaction costs in fisheries co-management regimes compared to centralized management.

4. FREQUENT SHORTCOMINGS OF GROUP AND COMMUNITY-BASED RIGHTS

All or most of the shortcomings of GRFs, as evidenced from the study of traditional fisheries management regimes, derive from the fact that group rights as well as individual rights embedded in GRFs are insufficiently specified, exclusive and protected. The consequence of insufficiently specified rights (*e.g.* the GRFs do not encompass the full range of the fish stocks) is the existence of significant externalities that undermine the incentive of rights holders to seek long-term resource conservation. Similarly, GRFs not recognized in formal law and, or, inadequately protected from encroachments are under the continuous threat of new claimants that erode long-term stewardship and legitimacy.

Even where GRFs are recognized in formal law and well protected from external threats, they may fail to achieve effective fisheries management because of weak internal governance. A frequent weakness is that management rules are not able to accommodate technological progress and, or, natural population growth. This is often a direct consequence of the manner in which the entitlement to participate in the fishery is specified. Where the entitlement is based purely on membership in a household of the community (or group of rights holders), fishing power and effort may grow beyond sustainable levels with technological progress and increase in the number of households and their members. The pressure for accommodating excess fishing capacity and effort is often especially high where there is a dearth of alternative livelihoods in other sectors of the local economy. As a consequence, stocks may become over-exploited and the community (or group) is unable to capture resource rents. There are examples of traditional GRFs that have been able to devise rules to overcome these problems but they are rare in fisheries. McKean (1986), for example, reports that each household was allowed to send only one member to harvest common forestry resources in Japan (and only as much as she/he could carry) and that there were impediments to the establishment of new households in the communities. In fisheries, a common response has been to halt, or retard, technological progress but this comes at the cost of loss in efficiency. This cost may not be very high where labour costs are low and capital is dear as is the case in many small-scale fisheries of developing countries. The loss in potential efficiency would also need to be weighed against the difficulties and costs of defining, allocating and monitoring compliance with more specific entitlements such as catch quotas. These difficulties are likely among the reasons why entitlements in terms of catch quotas have rarely been observed in traditional GRF regimes but they are of growing importance in modern rights-based management regimes.

5. DIFFICULTIES IN ESTABLISHING GROUP AND COMMUNITY-BASED RIGHTS

There are formidable difficulties to overcome in establishing group and community-based fishing rights that would usually require long and consistent efforts on the part of national and local governmental and non-governmental organizations and on the part of the communities themselves. A pre-requisite is the political will to decentralize decision-making power and fisheries management functions to the local level. In recent years, there is evidence in many countries *(e.g.* Philippines, Thailand and Malaysia) that such political will is indeed forthcoming but current fisheries law may not yet allow in all instances confering exclusive fishing rights to communities, groups or individuals.

Efforts for the introduction of GRFs would generally benefit from the existence of prior traditional community organizations and management arrangements. Indeed, one of the first steps in any such effort would usually be to enquire and appraise in a participatory manner past and existing structures and arrangements for collective action by the community in the provision of various kinds of collective goods. Such an appraisal would indicate current strengths and weaknesses of the community in performing collective tasks and provide guidance on the kind of external support that might be required to foster successful collective action. Current weaknesses at the community level may include the absence of a viable organization or authority to hold and administer fishing rights, insufficient awareness on the need and potential benefits of improved fisheries management and large membership that necessitates the build-up of complex collective decision-making structures.

The fact that many fisheries are already heavily over-exploited and over-capitalized is a great impediment to the introduction of GRFs. Currently, while many countries have in place provisions that assign exclusive fishing rights to small-scale fisheries in inshore zones, these are hard to enforce as long as industrial fishing fleets are excessively large and dependent for economic survival on infringements of inshore waters. Thus, in many instances, the process of specifying and conferring exclusive fishing rights would likely have to go hand in hand with measures that are geared towards reducing fleet sizes and the number of participants in the fisheries. Such measures may include the cessation of economic incentives (*e.g.* subsidies, tax rebates) that enhance fishing capacity and fishing effort, the provision if incentives and direct investments to create alternative

employment opportunities for displaced fishermen, and possibly too, the provision of economic compensation for the owners of decommissioned fishing vessels.

Christy (2000a) provides a more extended discussion of the critical issues that need to be considered when endeavouring to establish a GRF (or to rejuvenate a traditional system).

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MANAGEMENT INFRASTRUCTURE FOR RIGHTS-BASED FISHING

D.L. Burke
Policy & Economics Branch, Dept. of Fisheries & Oceans, P.O. Box 1006
Dartmouth, NS, Canada B2Y 4T3
<BurkeL@mar.dfo-mpo.gc.ca>

1. INTRODUCTION

The commercial exploitation of fishery resources must be carefully managed if sustainable outcomes are to be achieved. This can be done through regulatory measures or through the use of appropriate access rights and the use of market forces. The infrastructure needed to enable management to be effective must perform a number of essential functions. In general the functions are similar whether the management regime is based primarily on governmental regulation of the fisheries, or if the functions depend on an appropriate regime of access rights and market forces. However, the nature of the functions and the infrastructure needed to implement them differs between (a) regulatory and (b), rights based systems (See, *e.g.* Christy 2000).

This paper describes the generic functions of a fisheries management system and the infrastructure required to implement, and support, a rights-based management system using individual transferable quotas (ITQs). This paper should be read in association with those of Edwards (2000) and Crothers (2000).

2. THE FUNCTIONS OF A FISHERIES MANAGEMENT SYSTEM

The infrastructure needed to support fisheries management must undertake seven distinct high-level, but interrelated, service functions. Figure 1 shows these functions in a networked view that demonstrates the main functional relationships between them. The boxes are labelled with the names of the management functions. The arrows describe the main services that are exchanged between the service functions. The arrows indicate the direction in which the services flow.

This description of fisheries management focuses on "function" rather than on "organisational form ". Subsequent consideration can be given as to where and how the functions are actually provided. The seven functions are described further as follows:

Strategic Policy Planning: This function establishes the policy and planning parameters within which the fisheries will be conducted. This includes the development of legislation and regulations, the creation and support of institutions and the objectives and strategies to be applied in fishery management plans.

Fishery Operational Planning: This function supports the development of seasonal harvesting plans for each fishery. A plan can apply to one or more stocks, one or more fleet sectors and the licence or rights-holding fishers who have access to them. It defines quotas, specifies catch quantities in terms of total allowable catches (TACs), fishing seasons, fishing areas, input controls, reporting requirements and other parameters and administrative requirements related to the harvesting activity.

These two planning functions are informed by two main research actviities; one of these functions focuses on the human aspects of the fishery, the other on the marine ecosystem and more specifically on the condition of the fishery resources targeted for exploitation.

Socio-Economic Research and Analysis: This function conducts research on the performance of fishing enterprises and the industry as a whole. It addresses all aspects of the economic, social and business climate, in the country and abroad that could affect the fisheries at a strategic or fishery-specific level. Thus, it should provide timely and accurate analysis of the consequences of the different management options.

Resource Research and Analysis: This function is responsible for undertaking research on marine resources and their ecosystems to develop an understanding of the dynamics of ecosystem, how the operate the and methods used, and needed, to assess the status of the fisheries resources. It provides regular evaluations of the status of marine resources (stocks), makes recommendations on amounts that may be harvested and assesses the impact on the resources of various fisheries management and conservation measures.

The last three functions are operational in nature.

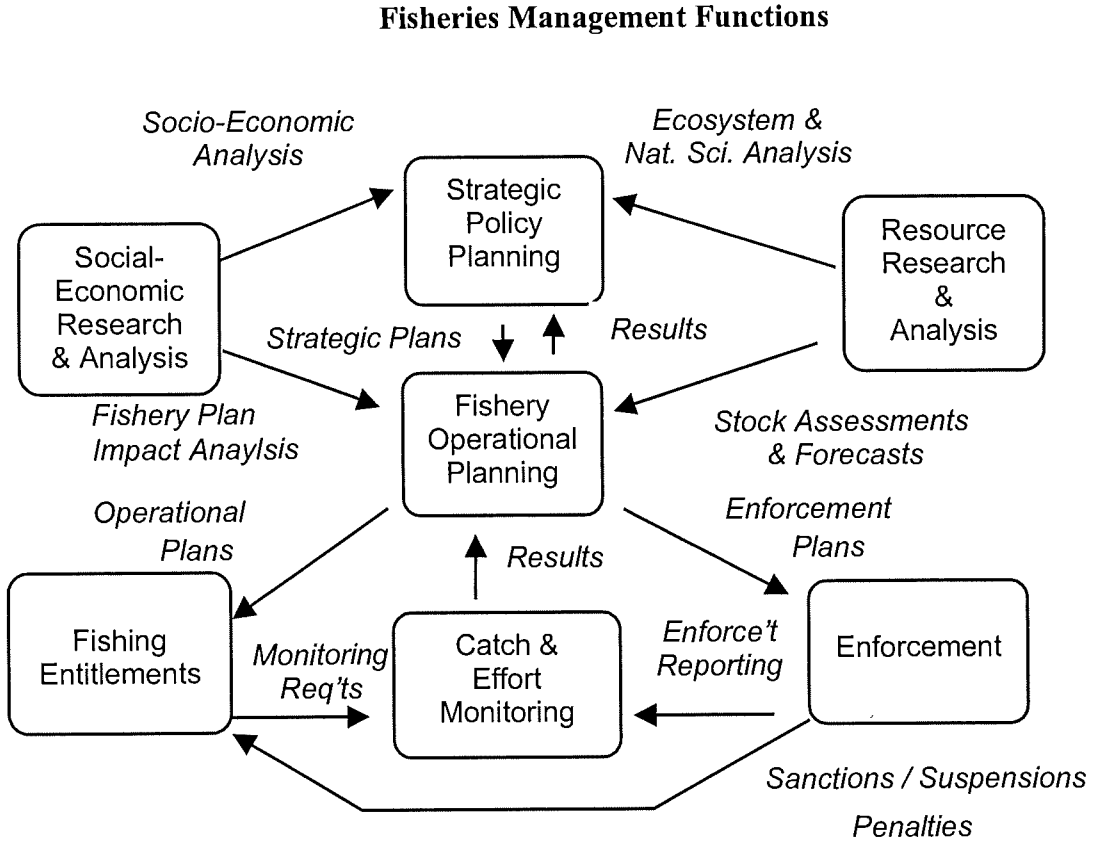
Fishing Entitlements: This function supports the requirements of the need for fishers and vessel owners to register and be licensed for entitlements to fish and receive fishing rights or allocations in accordance with seasonal harvesting plans. This includes transfers of those rights or entitlements and any resulting revocation or suspension of entitlements.

Catch and Effort Monitoring: This function provides timely, accurate data related to the use of entitlements and the fulfilment of harvesting plans.

Protection and Enforcement: This function monitors compliance with the country's legislation and management plans and takes necessary action against violators. It includes the adjudication of guilt and the imposition of penalties.

All of the functions are required for an effective management system. Some of the functions have organisational implications but this is not to say that they need be provided by any particular single organisation or by the public sector. Some of the functions will be performed in whole or in part by public agencies, some by private companies, or by the fishers/right holders themselves.

Figure 1
Service functions of a fisheries management system



3. IMPLICATIONS OF ITQ MANAGEMENT FOR THE FUNCTIONS

3.1 Strategic policy planning

This function involves the ultimate responsibility for management of marine resources. It lies at the interface between rights-holding harvesters, other stakeholders, the political process that must approve the management regime and the infrastructure that delivers the other management functions.

Strategic Policy Planning must articulate the objectives for management and secure consensus on those objectives from all stakeholders with an expressed interest in the protection or use of resources. It must also develop the legal base (legislation and regulations) needed to pursue the objectives. Once that is in place, the function must approve a framework of policies and practices to guide operational planning and must, as a minimum, guarantee the integrity of the remainder of the management system. It must also insure that the management infrastructure is adequately funded from general taxes, directed taxes or cost recovery so as to perform its tasks.

The political, socio-economic, and resource characteristics determine the management complexities that this function must address. The most straightforward situations are found in unitary states solely that manage resources within their EEZ. Here, a single level of government has clear and undiminished jurisdiction and control. Administrative and management complexity increases when the state is involved in the management of stocks shared with other management regimes such as straddling stocks. Further, federations with national and provincial levels of government often share jurisdiction over resources, and other areas of law, affecting resource management such as taxation, safety, trade etc. This results in more complex consultative and decision-making processes with consequential longer time frames needed to ensure management actions.

ITQ systems are seldom adopted in a theoretically pure form. Many choices are made to tailor the systems to fit the conditions of the resources and the broader socio-economic and political realities of the fishery. The policy choices made in design will depend on the objectives selected for management. Generally, the strongest form of property rights with the fewest constraints on the operation of markets will maximise the long-term economic productivity of the fishery. Access rights that most resemble other forms of real property best serve to integrate fisheries into the national economy. This facilitates the ability to raise capital, to organize fishing enterprises in the most efficient manner, and to transfer responsibility and cost of management to industry. A system with weaker, or stinted, access rights supplemented with regulations to achieve certain social or demographic

objectives will operate at a lower level of efficiency. For example, while unfettered transferability maximises the benefits of ITQs, some control or limitations are often placed on quota markets to limit concentration of quota ownership, to restrict foreign ownership or to place geographical limits on trade of the rights. These constraints may reduce the efficiency in achieving other desirable outcomes.

Many of the policy issues are discussed in other papers presented in this volume. They include the characteristics of the access right - Duration (perpetuity or limited term), Exclusivity (freedom from interference), Quality of title (security), and Transferability (freedom to lease or sell), the taxing of resource rents, the recovery of management costs and the manner of denomination of rights, in fixed tonnage or proportional shares.

The legal framework provides the authority to implement policy. Authorities are required to create property rights, to recover costs or collect rents and to make regulations or operational policy. Legislation also clarifies the delegation of responsibility and authority for management to a department, a management agency or right holders as required. Fish rights are, in reality, access rights rather than allocations of physical property. They are defined quantitatively and are dependent on information to define their limits and quantify their use. The effectiveness of an ITQ management system is dependent on the integrity of the information systems that support it. There is an overriding requirement for data (including commercially sensitive data) that are accurate, complete, and are made available in a timely manner for management purposes. This obligation must be specified in legislation. The legislation must also describe the nature of the enforcement regime and the roles of enforcement officers, the judiciary and any special tribunals.

ITQs are typically used to manage commercial fishing, but in some fisheries the interests of other groups have to be considered. Aboriginal or indigenous peoples may have a customary or food claims. Artisanal, or "traditional", users may have longstanding dependencies that require protection. A broader "public right to fish", which often takes the form of the recreational access, is a feature in many fisheries. Though possible, it is usually difficult to accommodate these other users with *individual quotas*. Large numbers of low intensity users can tax, and exceed, the administrative capacity of ITQ systems. To overcome this, shares of the TAC can be allocated to these groups or to co-operatives that represent them. These shares must be subtracted from the TAC leaving the remainder as a Total Allowable Commercial Catch (TACC) for ITQ holders.

The decision rules required for setting annual total allowable catch (TACs) limits should be enshrined in policy. This usually involves the use of a limit reference point that constrains the minimum level permitted for the biomass of the stock. A conservation policy can specify target exploitation rates that vary depending upon the resource status. It could include re-building measures for overexploited stocks, contain principles to be applied to protect associated or dependent species, and contain principles to be applied to protect habitats. Many jurisdictions are now making efforts to incorporate the use of ecosystem objectives and to applying the precautionary approach when setting exploitation limits.

ITQ systems require a high level of support from the participating rights holders. Most jurisdictions that now use ITQ management have applied a gradual approach to their introduction beginning first in fisheries that have a high likelihood that this management approach would be successful. Single species fisheries with relatively few vessels that are easily monitored are good candidates to begin with. Success with these fisheries provides a base for extending the system. The policy and legal framework should provide for this approach by, for example, identifying ITQ management as the preferred, or even the recommended, system but not the only one. Experience suggests that the imposition of an ITQ system on a fishery increases the risk of management failure.

Most jurisdictions that manage fisheries will have much of the institutional capacity to support the strategic policy planning function in a department or ministry. They would also draw on the two research functions described below. But, other relevant stakeholders must be involved. The introduction of a rights-based management system requires leadership and a considerable investment of political capital to make the main policy choices and support them with appropriate legislation and regulations. This process can take several years depending on circumstances and complexity of the fisheries. Many of the rights-based systems currently in place were initiated in times of crisis when the need for fundamental change in management rose to the top of the political agenda and considerations of administrative costs were accorded secondary importance.

A structured approach should be taken to consultation with stakeholders. It is best to separate the policy and governance issues from operational issues in so far as is possible. Broad stakeholder involvement is appropriate for the governance issues that must be resolved at the strategic level. Operational issues should be referred to the operational planning function where rights holders and local, or immediate, stakeholders can resolve them. Separating issues this way allows meaningful agendas to be set so the protagonists can bring value and closure to the topic. Separation also promotes efficiency and reduces transaction costs.

While it is best to have a comprehensive policy framework in place prior to implementation of ITQ systems, it is not uncommon to launch an ITQ program with many policy issues unresolved. The policy function will require a greater infusion of resources when a new system is being introduced but there is an ongoing requirement for the function to maintain a relevant strategic perspective and policy framework over time.

3.2 Resource research and analysis

Fisheries management requires a biological understanding of the targeted populations, their relationship with the environment, and the impacts of fishing upon them. This information is especially critical where the level of exploitation is high. Many countries maintain an

appropriate institutional capacity in the marine sciences and invest in acquiring the information needed for research. Some countries use input control systems that do not require the setting of catch limits, but the need for such information remains.

The focus of research is typically on understanding the biological and environmental processes and the results of applying input controls. If global, or olympic (*i.e.* those involving a rave among the participants to maximize their share), quotas are used in management, analytical stock assessments are required to produce TACs. ITQ systems make analytical assessments essential, indeed they often increase the demand for assessments by requiring TACs to be set for new fisheries or updated more frequently in established fisheries.

Stock assessment is that part of marine biology which focuses on the dynamics of exploited populations. It includes studies of biological and population processes such as growth, reproduction, recruitment and mortality. Stock assessment describes the past and present status of fish stocks and forecasts future trajectories of stocks under different exploitation scenarios. In addition to its direct applications for fisheries resource conservation, stock assessment sheds light on population processes and provides information on key components of marine ecosystems for incorporation into broader management models so contributing to the broader scientific endeavour. Stock assessment primarily focuses on the individual population, but complete understanding of populations requires that they be considered in a broader context: metapopulation structures, species interactions (predation, competition, etc.) and variations in conditions in marine environments (water temperature, primary productivity, water current changes, etc). While the focus is generally on exploited populations, the techniques of stock assessment can be applied to non-exploited populations, for example in work on endangered species.

Stock assessments are the result of teamwork. These teams bring together scientists from a variety of disciplines, from fishing gear experts to biologists, geneticists to statisticians. Fishermen, the harvesting industry and other interested stakeholders can also play an important role in data collection, facilitating scientific fieldwork, undertaking research, data interpretation and decision-making. In this way, the broadening of stock assessment science modifies practices, and opens new communication channels for discussing assessment results.

Stock assessment and related research includes a wide variety of initiatives aimed at monitoring fisheries and fish stocks, at evaluating the status of marine resources and at assessing the impact of human activities (in particular, harvesting) on these resources. Typically, stock assessment initiatives include:

i. fundamental research on biological characteristics (*e.g.* stock unit definition), fish growth, migration, recruitment processes, etc., and research on new approaches or survey techniques
ii. the monitoring of resources through various survey techniques
iii. the sampling of commercial catches
iv. an assessment function, which includes such activities as analysing data, constructing and running models of population dynamics, conducting risk analyses and writing scientific and technical reports on resource status
v. scientific peer review, which includes a well-defined process to review scientific data and analyses, and to communicate results or conclusions
vi. an advisory function, which includes providing information on specific questions related to the management of resources either on demand or through participation in committees or regular meetings of advisory bodies and
vii. an administrative function.

ITQs place demands for quality in stock assessments that affect the scientific advisory process. Scientific advice is by nature uncertain. It must be made as credible and understandable as possible through the scientific advisory process. If there is a cost recovery policy as part of the ITQ system, there will be an increased interest by the fishing industry determining the nature of the activities, setting the research priorities and stock assessment methods and results. There is a need to ensure that the essential long-term monitoring functions are supported, and that the appropriate balance between generating new knowledge and the provision of timely assessment advice is maintained. The scope of investigation with respect to biological research has to be focused, while maintaining an ecosystem perspective. The science administration function may also have to be strengthened. There would may also be a need to tighten research management controls and to define the true costs of research and monitoring activities. A defensible policy on recoverable and non-recoverable research costs will be required.

In conclusion, ITQs are likely to affect the resource research and analysis function in a number of important ways. Improved linkages between research, management and the fishing industry will develop. Industry will increasingly contribute to stock assessments and participate in peer reviews of the management process. Science-industry co-operation often extends to the provision of vessels for research surveys, to the conduct of complementary industry surveys, fishing programs to establish biomass trend indexes, habitat mapping, and the provision of improved catch and effort data from the industry. This all will reduce what are otherwise expensive survey costs.

3.3 Socio-economic and research analysis

The setting of a socially beneficial fisheries policy is as much an economic as a biological problem. In general, with respect to the strength and influence of the two research functions, most countries make substantial investments in understanding what controls their living marine resources through natural science research. They invest far less in research on the human dimension that would produce sustainable use practices. Accordingly, the capacity of this function within management agencies can be relatively low, but none-the-less important.

This situation is often reflected in the lack of available economic data for analyses and because of insuffi-

cient resources, difficulties are usually encountered collecting it. In most fishery management jurisdictions a voluntary disclosure policy is followed. But, this brings poor results when seeking commercial information from fishermen and the fishing industry who often perceive the provision of such information as a 'lose-win' affair rather than a win-win one.

Among the basic economic information that needs that must be continuously collected and regularly tabulated are:

i. costs and earnings of enterprises
ii. the asset and liability structure (balance sheets) of the fisheries companies
iii. the industrial structure (ownership, vertical and horizontal integration of the fishing industry, labour, and other contracts, etc.)
iv. commodity flows
v. input and output prices
vi. fishing effort and the use of inputs by fishery and fleet segments and
the nature of the fishing fleet and processing capital.

These important data will only be provided if disclosure is mandatory. The data are inputs for the analysis and modelling required to evaluate alternative fisheries management measures and provide operational advice for setting TACs, evaluating biological measures (area closures, mesh size, etc.) and determining rent and cost recovery levels.

ITQs systems create new demands for socio-economic analysis because of the need to understand and evaluate the changes to how the fishery operates that adoption of a property-rights management approach brings. Security of access allows the restructuring of the harvest sector; security of supply permits similar changes in the processing and marketing chain. ITQs unlock the forces of efficiency that rationalise excess capacity and disrupt the status quo. Effects include loss of employment, changes in income levels and population losses in fishing communities. Changes due to efficiency and improved productivity are not always welcome in the fishery and political pressure to mitigate these impacts may grow, especially when obvious discrepancies arise between those who have access to public resources and those who are excluded. The long history of fishery resources as common property gives political and cultural weight to this resistance.

The skills required in this function include those of fisheries economists, econometricians, mathematical modellers, accountants, computer scientists, sociologists and legal experts.

3.4 Operational planning

This function develops annual harvest plans for fisheries. The plans apply to one or more stocks and the licence holders who have access to them. Some jurisdictions without ITQs use fishery plans in their management system. Developing plans on a meaningful scale can provide a forum for dialogue and negotiation between licence holders, researchers and the resource managers. This is especially needed where the fisheries are diverse and geographically distributed.

Where fishing plans are used with ITQs, they translate the annual TAC/TACC into quotas for the respective participants for the fishing season. They also provide an efficient way to fine tune other management measures such as gear restrictions, fish size, biologically-based closed areas etc., and to engage licence holders in the selection of other appropriate measures of self-control. Feedback to the strategic planning function is used to secure needed changes to the regulatory or policy framework. Operational plans should identify sensitive or vulnerable issues that have to be addressed through targeted enforcement activities.

The operational planning function plays an important role in the introduction of ITQ systems if the policy and legal framework provide for a phased fishery by fishery approach to change. The formation of relatively homogenous groups with exclusive access to specific stocks, or with fixed allocations in shared stocks, creates conditions that are favourable for stronger access rights. When fisheries are organised to this point, the licence holders themselves often seek individual quotas. The licensed participants in such a fishery are often able to agree on a formula for the initial allocation or negotiate individual shares without undue administrative intervention. This is satisfactory provided that the interests of all eligible rights holders are considered.

There is a need for fishing plans in mature ITQ systems as the planning process facilitates collective action on management. They can also help launch other measures such as resource enhancement initiatives that require co-ordinated action. The use of ocean space is intensifying and competing user effects are become an increasingly consideration in planning the operations of fisheries. This can result in demands for the control of competing uses to protect fisheries or the restriction of fisheries in certain areas to permit the activities of other uses. New processes in coastal zone and or, ocean use management are now evolving. Horizontally integrated planning bodies are likely to emerge to resolve such use conflicts. Planning should occur on an "ecosystem" basis though practical administrative considerations, including political and jurisdictional boundaries, will influence or define these areas. Annual fishing plans will have to fit into this structure and will probably do so through a nested approach by which species plans are incorporated into the fisheries sector level and are combined with plans from other users (aquaculture, seafloor cable or pipeline routing activities, areas protected for the conservation of biodiversity, etc.).

Fishery operational planning should be supported by a secretariat. Each individual fishery requires the support of a "fisheries manager". This might occupy a person part-time for a small fishery or full-time for a complex fishery. The fishery manager will co-ordinate the inputs from research, enforcement, the fishing industry and other user groups to develop the operational fishing plan. The fishery manager is also responsible for securing approval of any plan and of the regulations needed to implement it.

3.5 Management of fishing entitlements

Most fishery licensing systems are designed to perform simple administrative tasks such as recording the ownership of licences and vessels, and maintaining data on the physical characteristics of the vessels, etc. However, property rights registry systems require more functionality and rigour.

A quota registry must convert the annual TAC/TACC to an annual catch limit by weight (kilograms or tonnes) for the individual right-holders. The registry must be connected to the catch monitoring system in order to track the use of quotas held and support in-season leasing and long term sales of quota by right-holders. The registry must also accommodate suspensions or penalties imposed against a licence. If the ITQs are long term and secure they may serve as collateral in capital markets. They may also have a high standing in the adjudication of civil matters where property is involved.

If rents or cost recovery are a feature of the programme, the registry will play an important revenue collection service. In order to support these functions the registry must be dynamic and be interconnected with information systems used to support other management functions.

The costs of building, maintaining and operating the information systems needed for a registry can vary significantly depending on the complexity of the situation. A single species fishery with few participants can be simple to handle. However, a system that must support a multi-species fisheries with full property rights that also serves to register encumbrances for purposes of security and supports active in-season and permanent quota trading, will require a sophisticated computerized system that may cost millions of dollars to develop and use.

The skills required to operate a registry are administrative and commercial. They include computer scientists, information managers and individuals with a comprehensive understanding of the workings of the fishery.

3.6 Catch effort monitoring

Monitoring and data collection are often the weak link in catch managed fisheries. In global or 'olympic' quota systems, catches are often estimated based on sampling, on partial reports or other catch projections. Fleet quotas can be deemed caught and the fishery closed on the basis of these estimates. This is not the typical case in ITQ systems where the individual must have the confidence that he will be able to catch to his quota or otherwise dispose of the uncaught quota to another fisher. A poorly monitored ITQ has no integrity, the declared quota would never be caught. Further, there would be no incentive to buy quota to cover one's operations if the catch were, in effect, unrestricted.

ITQ systems require rigorous record-keeping and mandatory reporting and disclosure rules. Trip-by-trip monitoring is also adviseable. This includes requirements to report departures from ports for fishing, reporting the time of vessel arrival before landing of the catch following a fishing trip, and other information on fishing activities. This is particularly necessary where larger and more sophisticated vessels are involved. In most circumstances, dockside verification of landings by an independent party third party is also advised. Monitoring costs will depend on the size of the fleet and the number and distribution of landing ports. Industry behaviour (time of landing, port chosen, etc.) will also affect these costs. A direct form of cost recovery for the monitoring service can have a significant effect in restraining the costs for these activities.

High-grading and discarding is often identified as a problem in ITQ systems, particularly in multi-species fisheries. The problem should be approached with a combination of penalties and incentives to minimize the practice. A general prohibition against discarding of any species at sea simplifies monitoring and a prosecution should occur when discarding is detected. This combined with high penalties for violators will help insure that all of the catch is landed so it can be monitored and be debited against the annual catch quotas. Flexible trading rules to allow fishers to lease or purchase quota to match actual catch reduces the need to discard and will encourage compliance with the mangement plan. End of year 'over-catch' and carryover rules for uncaught quota will also minimise the incentive to discard to match landed catches to the portfolio of quota that is owned.

Some fisheries require the use of at-sea observers to deter discarding. This has to be considered particularly in multi-species fisheries with difficult by-catch problems. Observer coverage might be required for a specific time of year or throughout the year in some fisheries. Some at-sea monitoring requirements can be aided by new technologies. Satellite tracking can locate vessels in real time and can be particularly useful where fishing areas have to be monitored, *e.g.* when they have been closed. Increasingly, new computer and communication technologies permit information to be maintained in electronic logs while vessels are fishing and allow these data to be transmitted in real time so facilitating monitoring of the fishery and fishing operations.

The monitoring function must record data on catches against quota that is held. This information must be tracked through the quota registry. The institutional skills required for the monitoring function include the ability to identify the various species of fish in the catch and the capacity to produce the reports required by the monitoring system. Marine observers, particularly at-sea monitors, can perform the dual roles of serving as biological technicians who sample the catch for information needed in assessments as well as recording details of fishing operations, such as bycatches and discards.

3.7 Enforcement

Many fisheries jurisdictions use a game approach to enforcement. In an ITQ system, there is a need to target and deter the activity of illegitimate fishers, or poachers, who have no access rights. There is also a requirement to focus efforts on illegal activity by right-holders. This includes enforcing rules against discarding, fishing in closed areas, enforcing gear restrictions and other technical measures. The increased use of information technology and satellite tracking can reduce costs and increase

effectiveness in this regard, especially for some at-sea needs.

The most important enforcement task is to insure that fish landings do not occur outside of specified monitoring channels and that no collusion occurs between fishers, fish buyers and monitors to undermine the integrity of the system. Because of the importance of catch reports there is usually a need to re-focus enforcement resources away from technical measures to this task. More sophisticated investigative methods are required. This means that skill in audits and commercial crime detection should be added to the enforcement team. Joint action between fishery enforcement, Coast Guard, police, defence forces, and tax authorities are needed for some investigations.

Violators must be judged by appropriate tribunals and penalized if found guilty. Specialized administrative tribunals established for the fishery sector which follow the rule of law can be used to adjudicate certain offences by right holders. They can be more effective because of their understanding of the fishery law and the speed with which they can operate. Otherwise regular court systems are used to assess guilt and apply penalties. Offences by non-right holders may have to be adjudicated by the regular court system. Tickets, fines and surrender of quota can be effective deterrents for many offences and for encouraging compliance with reporting requirements. The overall effectiveness of enforcement is reliant on the deterrent effect of meaningful penalties for transgressions, so more serious offences such as large scale fraud should attract heavy fines or even complete forfeit of vessels and quota . Industry self-interest in protecting property can be enhanced by awareness and participation in the judicial process.

4. COSTS AND BENEFITS OF EFFICIENT MANAGEMENT

The cost of operating a fisheries management system varies considerably from country to country. An efficient, low costs system would be 5% (or less) of the ex-vessel value of the fishery, a high cost system could reach 15 % of its value. So the management costs for a $100 million fishery could range from $5 to $15 million. The distribution of these costs over the seven management functions is also highly variable among countries and over time. The following distribution is provided as a general guide intended only to relate the relative complexity of the functions:

Strategic policy planning	< 5%	of the ex-vessel value
Fishery operational planning	< 5%	
Socio-economic research and analysis	> 5%	
Resource research and analysis	>30%	
Fishing entitlements	<10%	
Catch and effort monitoring	<15%	
Protection and enforcement	>30%	
Total	100%	

With respect to the overall cost, even 5% may seem a high price to pay for management but this must be considered against the benefits. Fishery resources are able to provide a sustainable flow of benefits to a nation's economy. The differences in the level of those benefits between good and poor management are significant. Failure to adequately set and apply appropriate levels of harvest could reduce the annual productive capacity of fish stocks by 50% or more due to over-exploitation - the fishery may even be closed and at that same time welfare benefits paid to the unemployed fishermen. In addition, the failure to apply a suitable management regime to the fleet results in an industry structure that is more costly than it needs to be. Efficient regimes harness market forces so that rational economic decisions by the licence owners lead to "right sizing" of fleet capacity and the adoption of a long-term perspective on resource conservation and use. ITQ regimes do this. Regimes that do not cope with the common property problem encourage unnecessary investment and are wasteful economically. They also pose a threat to the biological sustainability of resources. A system that does not deal adequately with the "common property problem" can add 20 % or more of non-productive costs to the industry. The cost of poorly managed fishery can be high! Good management has significant pay back ratio.

Although the potential benefits of good management far exceed the costs, even at the 15% level, the objective is to implement the most cost-effective management. A relatively concentrated fishery will have lower management costs. However, there are many influences that tend to increase costs. Existing management systems are often well established and withdrawing existing services and paying off the associated staff with the introduction of a new management regime is not easy. A complex political environment with national and provincial interests adds to costs. New methods and systems have to be developed to support management functions. These conditions tend to increase the costs of introducing an ITQ system. In the longer term, as industry is restructured and systems mature management costs can be reduced.

Most of the initial revenues for management is likely to come from public funds. Thus, it is reasonable that these management costs be recovered from industry. This practice should be introduced as soon as it is feasible. User charges are most effective if they can be used to ration or otherwise discipline the use of the services demanded. The obvious risk of using this approach is that some management functions will be under-subscribed if users are required to pay for them.

There are a number of ways to collect revenues. User charges can be applied at the point they are incurred or be billed on an annual basis. Management costs can be levied through a fee collected through licence charges. (A licence fee can also be used to recover rent.) The experience in jurisdictions where the responsibility and costs of an ITQ management system have been transferred to fishing industries is that the value of effective management is increasingly recognized and industry comes to regard good management as an investment.

5. AN EXAMPLE OF AN ITQ IMPLEMENTATION

This example describes the introduction of a new ITQ system for a fleet following the approval of a policy

framework. The system must be applied to all major species targeted by the fleet or the fishing pressure will shift from the managed stocks to those other species that are of most commercial value. The ITQ system for other fleets and fisheries can be put in place over a longer time period. The first consideration is the definition of the boundaries of ITQ and the species to be included.

The second consideration is the definition of the criteria for the initial allocation of the quota. The eligibility rules must be clearly defined and be decisive. The sharing formula for species traditionally exploited is usually based on historical performance within fleets, following an initial allocation amongst fleets that is based on policy considerations. The reference period for historical performance should be short enough to reflect the most recent situation. For developing fisheries on underexploited species where the historical performance may be less relevant, other criteria such as investment in the industry, or vessel characteristics, need to be defined. A fair formula needs to be developed that can deal with irregular participation by vessels during the reference period relevant to the calculation of historical performance such as using the best 4 years of a 5 year reference period.

Although management measures such as mesh size regulations and closed areas should become less important following the implementation of ITQs, existing regulations of this type should be maintained for at least a few years. However, rules which encourage the discarding of small fish should not be retained. Vessels should be allowed, or required, to land undersized fish that would be debited at some discounted rate, from their quota.

A final point is the need to review other laws or regulations that may interfere with or affect the implementation of ITQs. Points of potential concern are: appeal procedures for those who feel that their cases are mishandled by the administration accounting procedures in relation to the trading of quotas taxation of quota as a property rights to enforce the ITQ system and access to information on fishing practices. It may be necessary to enact new laws and, or, regulations to resolve conflicts of an administrative nature.

6. CONCLUSIONS

Fisheries management is an expensive activity but one that is essential for the sustainability of fisheries. Introduction of an ITQ system has implications for all seven fishery management functions. Introducing a new management regime takes time and setting the policy framework to support secure access rights in fisheries can take several years. Reaching agreement on individual shares and implementing ITQs in a specific fishery can add a year to the process. Introducing new monitoring regimes and developing sophisticated information systems to support ITQ management can also take one to two years. Thus, it can take up to five years to introduce a new fisheries management system. However, once the basic infrastructure is in place new fisheries can be introduced to ITQ management more quickly.

The third consideration is the allocation process itself. An "Allocation Committee" needs to be formed to oversee the one-time task of preparing and actually performing the allocation. The allocation of quota shares must be transparent and all industry participants in the fishery must be treated justly. The Committee should include representatives of government, the right-holders (vessel owners and fishermen) and be supported by technical experts. The process involves the following steps:

i. information gathering on historical performance and other selected criteria
ii. publishing of the criteria and consultation
iii. initial allocation and feedback from right-holders and
iv. final allocation.

Transferability, or leasing of quota to others, is considered an important part of an ITQ system. Therefore, the restrictions on transferability should be minimal. Also, some degree of under- and over-runs of fishermen's quota holdings should be allowed. However, given the complications of administering adjustments to address bycatch imbalances between species, such arrangements could be phased in at a later date.

One of the main differences between management regimes relates to the responsibility for the management functions. Regulatory systems are by their nature, command and control systems with the regulator accepting most of the responsibility for management. Rights based systems rely on enlightened self-interest to a greater degree. Right-holders who have a greater vested interest in the resource are motivated to take more responsibility for management. This has a significant impact not only on the ability to recover costs but also on the responsibility for performing the functions. In most ITQ systems management functions are enhanced through increased participation of right-holders. This is particularly the case in operational planning, in the research functions, and through the creation of new private sector delivery options for the registry and monitoring functions. There is also greater tendency to comply with the rules and increased support for the enforcement function to protect valuable access rights.

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LEGAL PLANNING FOR MANAGEMENT OF FISHERIES USING PROPERTY RIGHTS

W. Palmer
Australian Fisheries Management Authority
P.O. Box 7051, Canberra, ACT 2601, Australia
<Bill.Palmer@AFMA.gov.au>

1. INTRODUCTION

Legal planning for the use of property rights is a function of the legal system that applies in the relevant country. Major considerations are:

i. Is the country a federation or a unitary state?
ii. Does it have a written or unwritten constitution?
iii. What is the nature of its fisheries legislation - merely an outline or prescriptive?

This paper discusses the Commonwealth of Australia model and experience, while that experience is derived from a federation with a written constitution and detailed fisheries legislation, it will nevertheless have some general application.

At common law the right of the public to fish in the sea has been established for many centuries. The right to fish includes the right to take away fish. There is no absolute property in living fish; in their natural state they are regarded as being in the same position as wild animals and not goods or chattels. The Crown was not the owner of fish in the sea except in England in respect of whales and sturgeons taken in certain places. The general position therefore was that, until reduced to possession, no title in them was acquired.

All had access to fisheries with the result that no one had a right that had any value as property. This common law position was applicable both in countries in which British common law applied and was the position under Australian common law.

At first the steps to overturn the common law were tentative with much fisheries legislation providing that licences to fish would be granted on request. Such rights held little value as property but over time more restrictive provisions to protect the stocks were introduced, which started to give licences some value. In the Commonwealth sphere the first restricted entry fishery dates back to 1963. However, outside of restricted fisheries, licences continued to be granted merely on application until 1985 when a freeze on further fishing licences was imposed.

The effect of fisheries legislation is to overturn the common law and to deprive the general public of its rights to exploitation. What was formerly in the public domain was converted, with the passage of fisheries management legislation, into the "exclusive but controlled preserve"[1] of those who hold licences under that legislation.

As the rights to this preserve gained value, fisheries managers had to begin to take into account that licences were being regarded by industry as "property". In many cases managers tended to deny the existence of such "property rights" and I remember instructions in the Commonwealth sphere not to use the term lest its use might give to fishing licences characteristics which they might otherwise not have.

Even when the *Fisheries Management Act 1991* was introduced and came into effect there was still a reluctance to use the term property notwithstanding that the legislation provided for secure long-term access rights. I can only put this down to fears of misinterpretation, managers having one view of what property rights meant and industry having another.

While fishers and fisheries managers were coming to terms with the new emphasis on property rights, a new element came into the equation with first the High Court *Mabo*[2] decision and the subsequent passage of the *Native Title Act 1993*. Henceforth there was a new form of property rights based on indigenous rights to be considered in management decisions.

Coming to terms with the different aspirations of various stakeholders is the fisheries management challenge of today.

2. THE COMMONWEALTH APPROACH TO MANAGING FISHERIES USING PROPERTY RIGHTS

The Australian Fisheries Management Authority (AFMA) is the Commonwealth statutory authority with responsibility for managing fisheries on behalf of the Commonwealth. To those unfamiliar with the Australian federal system, a brief outline is given in Appendix 1 of this paper.

The *Fisheries Administration Act 1991* and the *Fisheries Management Act 1991* establish a comprehensive regime under which fisheries may be managed using property rights. At one extreme such a right may be a short-term, non-transferable permit, while at the other it may be a long-term, secure and transferable right, which, even when the management plan under which it was created ceases, may continue as an option in the event of a subsequent management plan being determined for that fishery.

Under the *Fisheries Administration Act 1991*, AFMA has functions which, among others, include:

[1] Harper v Minister for Sea Fisheries (1989) 168 CLR 314 at 325.

[2] Mabo v The State of Queensland (No.2)(1992) 175 CLR 1.

i. to devise management regimes in relation to Australian fisheries
ii. to consult and co-operate with the industry and members of the public generally in relation to its activities
iii. as provided by an associated law (the *Fisheries Management Act 1991*)

(a) establish and allocate fishing rights
(b) establish and maintain a register of fishing rights
(c) undertake functions relating to plans of management and
(d) such other functions as are conferred under the Management Act.

3. AFMA OBJECTIVES

The Management Act provides that AFMA must either pursue or take account of the following objectives in carrying out its functions:

i. efficient and cost-effective fisheries management
ii. management consistent with the principles of ecologically sustainable development and the exercise of the precautionary principle
iii. maximising economic efficiency
iv. accountability to the fishing industry and to the Australian community
v. achieve government targets in relation to the recovery of the costs of AFMA
vi. ensure that the living resources of the AFZ are not endangered by over-exploitation
vii. achieve optimum utilisation of the living resources of the AFZ and
viii. implement measures adopted in pursuit of above objectives, and not inconsistent with the preservation, conservation and protection of all species of whales.

Details of the AFMA's objectives are listed in Appendix 2.

Recent amendments to the *Management Act* to enable Australia to ratify the United Nations Fishstocks Agreement include a further objective of :

ix. ensuring that management measures in the AFZ implement Australia's obligations under international agreements.

Although these objectives must all be pursued, the Courts have recognised that in some circumstances it will be appropriate to weight certain objectives, so long as all are considered in the making of the management arrangement.

There is another aspect however to the pursuit of the objectives: that considerations of fairness and equity do have a role and there is a legal duty to treat persons fairly in the exercise of discretionary powers which has been described as "subject to the requirements of good management, discrimination between one group ... and another does not arise; to ensure that there are no favourites and sacrificial victims."[3]

4. PROPERTY RIGHTS UNDER THE FISHERIES MANAGEMENT ACT 1991

The *Management Act* provides for two types of property rights which may be classified as short term and long term.

The short term right is a permit granted under Section 32 of the *Management Act* for periods of up to 5 years. The long term rights are statutory fishing rights (SFRs) under Section 22 which are created under management plans determined under Section 17.

Although the AFMA is moving towards, and is required by legislation to determine management plans for all fisheries, it has for several years managed a number of fisheries under a permit system with an administrative form of property rights. Although not specifically recognised in the legislation, it has been accepted by Courts and Tribunals and as commercial reality by industry and financiers. AFMA and industry accept that these are basically interim arrangements pending the determination of management plans and the granting of SFRs.

5. NATURE OF STATUTORY FISHING RIGHTS

Section 21 of the *Fisheries Management Act* provides for a wide variety of statutory fishing rights under a plan of management which include:

i. a right to take a particular quantity of fish, or to take a particular quantity of fish of a particular species or type, or a proportion of the fishing capacity, from, or from a particular area in, a managed fishery
ii. a right to engage in fishing in a managed fishery at a particular time or times, on a particular number of days, during a particular number of weeks or months, or in accordance with any combination of the above, during a particular period or periods
iii. a right to use a boat or particular type of boat or boat of a certain power or particular equipment in a managed fishery for purposes stated in a plan of management and
iv. any other right in respect of fishing in a managed fishery.

Details of the types of SFRs are given in Appendix 3.

The section also provides that SFRs may need to be held in combinations before fishing can take place and a specific right need not be referrable to an amount of gear, or fish that can be taken, using a single right.

The Act also provides that:

i. the right is subject to obligations imposed under a management plan
ii. the fishing right will cease to have effect if the plan of management for the fishery is revoked (but note discussion of SFRs options below)

[3] Regina v IRC (1983)AC 617, at 651.

iii. the fishing right may be cancelled under the Act
iv. no compensation is payable if the right is cancelled, ceases to have effect or ceases to apply to a fishery (acquisition of property is discussed in Section 7 below) and
v. the right may have a specified life or otherwise remains in effect for the duration of the plan under which it was created.

There are various features of SFRs:

i. They are provided for under management plans. Section 20 of the *Management Act* provides that a management plan may be amended or revoked provided that the same procedures as used in determining the plan are followed. This means that SFRs are susceptible to change should a management plan be varied. An example of this was in the Northern Prawn Fishery in which the management plan has been amended to substitute SFRs based on gear for SFRs based on boat size and engine power.
ii. Should a management plan be revoked then the *Management Act* also provides that those who held rights under the revoked plan will receive preferential treatment in the granting of SFRs under a subsequent Plan.
iii. Where the subsequent plan is the same, or substantially the same as the former plan of management, the former holder will be granted an option to acquire SFRs with the same proportional share in the fishery as held under the former plan.
iv. Where the new plan has some features in common with the former plan, the former holding must be taken into account in any subsequent allocations under the new plan.

Appendix 4 describes the nature of SFRs granted under Management Plans.

6. THE REGISTER

Details of SFRs are recorded in a statutory Register which also records third party interests. The Register is merely a record of third party interests and does not give that interest any effect or validity that it does not otherwise have. Any transactions relative to an SFR must involve all parties with a recorded interest in that right. Where a third party has an interest in an SFR it is the responsibility of that party to ensure their interests are protected by recording that interest in the Register.

AFMA does not recognise interests unless recorded in the Register.

7. WHAT ARE PROPERTY RIGHTS?

7.1 Characteristics

The literature refers to property rights in terms of "strong" and "weak" and refers to "strong" rights as generally having the characteristics of being:

i. long term
ii. capable of precise definition
iii. transferable
iv. secure both from an owner's and potential mortgagee's point of view
v. part of an overall management regime and
vi. having an exclusivity from those that do not hold the right.

"Weak" rights may have none of these characteristics yet still be regarded as property and be worth fighting for.

7.2 How fisheries managers view property rights

Fisheries managers are generally not interested in "strong" or "weak" property rights as such but in how the holding of such property rights will modify a fisher's behaviour so that goals of fisheries management may be achieved.

It is generally agreed that poorly-managed fisheries tend towards the undesirable states of resource over harvesting and economic inefficiency. It is also generally accepted that lack of effective property rights in fisheries is the underlying source of these conservation and economic difficulties.

Managers are interested, however, if the property right becomes so strong that it inhibits the ability to change management arrangements in response to resource conservation requirements. Managers may also need to become interested if rights develop a separate identity as a form of general property rather than as a specific form of property linked to fishing.

7.3 The fisher's perspective

Fishers have a different perspective. To them property rights mean an asset that is safe from the whim of managerial or political changes, that can be used and relied on, and upon which long term decision-making can be based.

There is, perhaps, an increasing subset of property rights in Commonwealth fisheries becoming increasingly noticeable because they are being held by investors. No longer is the fishing right being seen solely as a right with which to fish but as a store of wealth for which personal fishing is only one option. The right is available for short, or long term lease, and depending on the level of management levies, may simply be held dormant for capital gain. Financial institutions have a similar perspective to fishers so that loans made to fishers are made on the basis of the security of property rights so thatr the loans have a maximum protection.

7.4 The Courts' perspective

Ultimately it is left to the Courts to decide what are property rights and what is the nature of those rights. Past Court decisions are a guide as to how Courts may consider a particular case before them but unless the case is specifically on the point at issue, past decisions might be distinguished from the one at hand. Even when the point at issue may appear to have been the subject of an earlier Court decision, a different composition of the Court might yield a different result.

Generally the Courts take a more pragmatic view of property rights with a concept of property that is broad

and probably includes any valuable right or interest that has a reasonable degree of stability and ascertainably. Assignability is not a necessary characteristic of property rights but the capacity to be assumed by other parties is an indicator that an interest is "property".

Within this position however, the Courts have recognised that rights may be subject to the statute under which they were created and accordingly under that statute may be diminished or varied, the extent to which this is possible depending on the provisions of the statute. For example, the *Management Act* specifically empowers the AFMA to vary conditions on fishing concessions, and such variations could enhance or diminish the value of that right. As referred to in Section 5 above on the discussion of the nature of SFRs, the management plans under which they are created are subject to amendment, which, in the example of the Northern Prawn Fishery, will alter the nature of the SFR.

The Court has rejected the view that a right that is wholly a creature of Commonwealth law is, in all cases, inherently susceptible to modification or diminution by a later Commonwealth Act[4].

7.5 Indigenous perspective

The indigenous population have a different perspective. To them there is no distinction between land and sea and "land" including the sea extends as far as the eye can see and ownership rights indicate individual and group responsibility for maintaining and looking after the land and its resources.

7.6 Legal considerations

Apart from general considerations of compliance with legislation in the context of litigation, the question of the nature of fishing rights is relevant to a provision of the Constitution that relates to the acquisition of property. Claims under the *Native Title Act 1993* and the ongoing litigation about the nature of native title offshore are also relevant.

7.7 The constitutional position

Section 51(xxxi) of the Constitution of the Commonwealth provides:

> "51 The Parliament shall..... have power to make laws.....with respect to:-
> (xxxi) The acquisition of property on just terms from any State or person for any purpose in respect of which the Parliament has power to make laws."

An example of how the Courts consider this provision was provided when a compulsory reduction of fishing capacity occurred in the Northern Prawn Fishery in 1993. The fishery was managed under a system of "boat" and "hull" units with a person being unable to fish unless a "boat" unit and the number of "hull" units appropriate to the size of the nominated boat were held. Under the compulsory reduction scheme, the number of hull units in the fishery was reduced by approximately one-third which meant that many operators were faced with the choice, if they wanted to remain in the fishery, of purchasing hull units to have the requisite number for the nominated boat, or alternatively, to sell out of the fishery.

The scheme was challenged and in *Minister for Primary Industries and Energy v Davey*[5] the Court was able to assume that hull units issued under the Northern Prawn Fishery Management Plan made under the *Fisheries Act 1952* were property for the purposes of s.51(xxxi) so the Court did not have to specifically address the issue. However statements by their Honours indicated that they would probably have taken that view had it been necessary to decide the issue whether units were property.

The Full Court of the Federal Court held that this extinction of rights did not constitute an "acquisition of property" within the meaning of s.51(xxxi) because:

i. the extinction did not confer any proprietary right or equivalent benefit on any person (it affected all fishers the same way, even though some were in a better position to survive than others), and it did not confer any proprietary benefit on the Commonwealth and
ii. the NPF Plan provided that units were issued subject to the Plan which was defined as meaning the plan as amended from time to time, so that extinction by means of an amendment to the Plan was something to which units were inherently liable.

8. NATIVE TITLE

In *Mabo* the High Court of Australia:

i. rejected the doctrine that Australia was *terra nullius* at the time of European settlement
ii. held that the common law of Australia recognises a form of native title that reflects the entitlement of the indigenous inhabitants of Australia in accordance with their laws and customs, to their traditional lands and
iii. held that native title is extinguished by valid government acts that are inconsistent with the continued existence of native title rights and interests.

The response of the Government was to pass the *Native Title Act 1993*, which was intended to give statutory recognition to native title and at the same time to provide a mechanism for the establishment of native title.

The existence of native title offshore was not specifically recognised in the *Mabo* decision nor in the subsequent *Native Title Act* although this Act does provide a process in relation to acts in offshore places. In the absence of specific recognition it has been left to the Court to decide the nature and extent of offshore native title.

In *Yarmirr and others v The Northern Territory and others*[6] (known as the Croker Island Case) a single judge of the Federal Court held.

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[4] Commonwealth v WMC Resources Ltd (1998) 194 CLR 1.

[5] (1993) 119 CLR 108.

[6] (1998) 156 ALR 370.

i. native title exists in relation to the sea and seabed within the claim area
ii. the native title rights and interests do not confer possession or occupation, use and enjoyment of the sea and sea-bed within the claimed area to the exclusion of all others and
iii. the native title rights and interests that the Court considers to be of importance are the rights and interests of the common law holders, in accordance with and subject to their traditional law and customs to

a) fish, hunt and gather within the claimed area for the purpose of satisfying their personal, domestic or non-commercial communal needs including for the purposes of observing traditional, cultural, ritual and spiritual laws and customs and
b) have access to the sea and sea-bed within the claimed area for all or any of the following purposes:

- to exercise all or any of the rights and interests referred to above
- to travel through or within the claimed area;
- to visit and protect places within the claimed area which are of cultural or spiritual importance and
- to safeguard the cultural and spiritual knowledge of the common law holders.

iv. the native title rights and interests of the common law holders in relation to the sea and sea-bed within the claimed area may be affected by rights and interests in relation to the sea and sea-bed within the claimed area validly granted or which may exist or which may hereafter exist pursuant to the laws of the Commonwealth or the Northern Territory (*e.g.* fisheries laws).

The Croker Island decision has been appealed by both sides. For its part, the Commonwealth took, among other grounds, the view that the Court erred in recognising native title offshore. The native title claimants took the view that the Court, among other things, failed to take account of prior commercial activity in the area by the ancestors of the claimants and Macassan traders.

The Full Court of the Federal Court has heard argument and a decision may be handed down before the end of 1999. As the test case for offshore native title it seems likely that the Croker Island case will ultimately be decided by the High Court .

9. WHY DO COMMERCIAL FISHERS LITIGATE AGAINST MANAGEMENT ARRANGEMENTS?

One thing that can be said without doubt is that litigation is always expensive and even when a case is heard before a Court in which costs are awarded against the loser, the winner is certain to be out of pocket. In tribunals where each party carries their own costs, costs can still reach crippling levels and I am aware of one Administrative Appeals Tribunal Case where costs are estimated at some A$750 000. And this is in a matter where, on paper, the right would be described as "weak".

The primary reason for litigation is that fishing rights are valuable property worth fighting for. They may be valuable and tradeable in themselves or there may be the expectation that the holding of a right now, which on paper may be "weak", may fulfil the requirements for the granting of a "stronger" right at a later date. There may also be other reasons for litigation such as defending a particular lifestyle, which has intangible benefits.

10. WHAT IS LEGAL PLANNING?

10.1 A process

Legal planning is a process that ensures that management arrangements comply with the requirements of fisheries and other relevant legislation such as environmental, regulatory impact and native title. In regard to property rights the major aspect of legal planning is to ensure that the management arrangements do not result in an acquisition of property within the Constitutional sense. Legal planning should also ensure that management arrangements are fair and equitable.

10.2 Why do we need legal planning?

Legal planning is needed simply to minimise the chance of a successful legal challenge, which although it may be brought by an individual, may have the potential to bring down complex management arrangements with resulting chaos in the fishery.

The AFMA spends considerable sums each year in the defence of management arrangements and averages approximately 8-10 cases per year before the Administrative Appeals Tribunal. However, even though the record of the AFMA has been good, the existence of litigation casts uncertainty over management arrangements until they are resolved. An Administral Appeals Tribunal case, at best, is unlikely to be concluded in under six months and generally takes 12-18 months to be resolved.

10.3 How has emergence of property rights affected managers?

The major impact of property rights has been to impose greater discipline. Management systems now have to be planned with an eye to potential legal challenge in which the courts will scrutinise the arrangements and strike down those which are contrary to the legislation or that do not meet requirements of fairness and equity.

The most celebrated example of this was the case of *Austral Fisheries v Minister for Primary Industries and Energy*[7] in which the Federal Court struck down the allocation provisions in the *South East Trawl (ITQ) Management Plan 1991* because it found that the allocation formula was "irrational" and "capricious". In that case allocations were partly based on a formula under which the proportions of total catch taken each year by an operator over a period were averaged regardless of total catch for

[7] (1992) 37 FCR 463.

any year. This meant that a person who took for example 50% of the catch in a year when total catch was 100 units was treated more favourably than a person who took 25% of the catch when the total catch was 1000 units.

The Austral Fisheries case was a tragedy attributable to faulty planning on the part of management and the decision resulted in chaos in the fishery and mistrust of managers, which persisted for several years. The tragedy lay in that management felt compelled by politically imposed time constraints to push the plan through with little time for industry comment on the final proposals.

10.4 How does the AFMA undertake legal planning?

10.4.1 Legal advice

Perhaps the first step is to recognize that lawyers cannot be avoided. If they are not involved in the development of management arrangements then the likelihood is increased that those arrangements will be challenged and lawyers will definitely be involved at the end.

The AFMA has adopted the practise of seeking legal advice at all stages of the development of management arrangements. The AFMA has inhouse lawyers who provide advice. However advice is sought also from external sources and from specialists in particular fields such as administrative and constitutional law. In the Northern Prawn Fishery amendments referred to previously, advice was sought in-house, from the Australian Government Solicitor, from a private solicitor and from a Queens' Counsel.

10.4.2 Allocation issues

The allocation process with management arrangements involving property rights is crucial because any dissatisfaction is likely to trigger a legal challenge.

Establishing well-defined, divisible, secure and transferable fishing concessions is a major factor in the pursuit of AFMA's ecologically sustainable development, economic efficiency and cost-effective management objectives. However, it is recognised that continually changing the method of allocating fishing concessions will weaken them and make effective fisheries management difficult. Accordingly, AFMA has taken the approach that the fishing concessions that exist in a fishery at the time that the new management arrangements are proposed, are the ones that will be considered in any new allocation required by the move from old management regime to another.

Therefore AFMA's approach to allocation of new fishing concessions is to ensure that:

i. such changes are consistent with, and support the pursuit of, AFMA's legislative objectives and
ii. any differential economic impacts of allocations on individual fishing concession holders are minimised unless they are justifiable with respect to AFMA's objectives.

An innovation by AFMA has been the establishment of independent Allocation Advisory Panels (AAPs) Under Section 7 of the *Fisheries Administration Act 1991* AFMA has the mandate to establish and allocate fishing concessions. In accordance with this function, the AFMA Board is responsible for determining the nature and amount of access permitted to a fishery. However, with the exception of Division 4A of Part 3, AFMA's supporting legislation, regulations and objectives provide no specific guidance on the allocation of fishing concessions. Of course, allocation decisions are subject to general administrative law principles such as fairness, natural justice, etc.

Evidence exists which suggests that operators will have greater confidence in allocation outcomes where they result from an independent assessment of the fishery and individual's circumstances. A central principle in the development of an allocation system which is, and is seen to be, fair and credible is receipt by the AFMA Board of advice which has been based on an independent assessment. To achieve this, both the recommended basis of the allocation and any exceptions that must be highlighted are undertaken at arms-length from the AFMA management and the AFMA Board.

Independent Allocation Advisory Panels (AAPs) have been established in relation to Commonwealth fisheries to provide advice to the AFMA Board on the most appropriate allocation system within a defined fishery, or between defined fisheries. An AAP is advisory in nature and ultimate decisions are made by the AFMA Board.

Panels have been established for a number of fisheries and typically membership comprises:

i. a retired judge as chairman
ii. an economist and
iii. an industry member without any connection to the particuliar fishery.

An important component in determining the most appropriate allocation system in a particular fishery is the consultative processes which are undertaken with operators and others with an interest in the fishery. While the level of consultation may vary according to the fishery or specific circumstances, as a general rule the AAP consults widely with relevant parties and any persons or organisations with appropriate knowledge, experience or expertise. Where necessary, the AAP obtains advice or input from relevant legal, economics or statistics experts.

To date the AFMA has used AAPs process to advise on allocation decisions in the Northern Prawn Fishery, Eastern Tuna and Billfish Fishery, Southern Shark Fishery, Bass Strait Scallop Fishery and the South East (Non-Trawl) Fishery. The approach has not prevented all appeals, but it has generally been well received by both managers and industry.

10.4.3 The role of management

Legal planning and the use of AAPs are only one aspect of the development of management arrangements. The arrangements are the responsibility of fisheries managers, with lawyers and AAPs being only additional tools to ensure the soundness of those arrangements.

As a general rule the AFMA has adopted a partnership approach and recognizes that a variety of people have an involvement or interest in the sustainable management of Commonwealth fisheries and in the marine resources and environment which sustain them. Co-operation is embodied in the partnership approach and the AFMA actively involves a range of interested parties, including fisheries managers, scientists, fishing operators, environmental/conservation and recreational fishing interests, the post-harvest sector and other interested stakeholders, in the process of developing and implementing fisheries management arrangements. Central to the partnership approach is the establishment and operation of Management Advisory Committees (MACs) or Consultative Committees (CCs) for each major Commonwealth fishery.

MACs and CCs are AFMA's main point of contact with stakeholder groups in each fishery and play a vital role in helping AFMA to fulfill its legislative functions and effectively pursue its objectives. MACs and CCs also provide advice to AFMA on issues such as fisheries management arrangements, research, compliance and management costs.

AFMA also consults with the Australian Seafood Industry Council (ASIC) which is declared under legislation as the representative industry body for Commonwealth fisheries. During the year, ASIC was consulted on the development and review of AFMA's Corporate Plan. A Liaison Committee, comprising ASIC, AFMA and the Fisheries and Aquaculture Branch (FAB) of the Department of Primary Industry and Energy (DPIE), meet on a quarterly basis to discuss broad policy and operational issues.

11. CONCLUSION

Managers and fishers have a common interest in stable management arrangements that achieve the goals of resource sustainability and economic efficiency. It appears that such goals are more likely to be achieved in a system in which fishers have effective property rights, but the introduction of such systems is likely, at best, to be unsettling, and, at worst, to result in chaos unless adequate planning has accompanied the change. Even challenges which are successfully defended will further delay implementation of new management arrangements, to the detriment of all.

The aim of management must be to take industry along with it in granting property rights and, recognising that change cannot please everyone, ensure that arrangements are legally sound and will withstand concerted challenge. However, any property right by definition implies some exclusivity and those excluded are unlikely to accept any allocation system that is not seen to be fair and equitable.

Appendix 1

The Australian Federal System and jurisdictional matters

Australia is a federation in which the states and the central government (the Commonwealth) share responsibilities for fisheries management. Unlike some other areas of government activity there need not be any overlap between the responsibilities of each level of government. The states (and the Northern Territory) have management responsibility from the low-water mark out to 3 nautical miles while the Commonwealth has responsibility from 3 miles to the outer limit of the Australian EEZ. But, by arrangement, the Commonwealth and States may exchange responsibilities so that in some cases the Commonwealth may manage fisheries under Commonwealth law into the low-water mark while in other cases a State may manage a fishery extending out into the EEZ. It makes sense that a fishery occurring in waters of both a State and the Commonwealth be managed by that State, while migratory species and straddling stocks be managed by the Commonwealth. The Australian Fisheries Management Authority is the Commonwealth statutory authority charged with the Commonwealth's fisheries management responsibilities.

The particular relevance of the federal system to acquisition of property issues is that the provision of the Constitution only relates to the Commonwealth and its agencies. State Constitutions do not have similar provisions and although some States may have laws which have a similar effect, these do not have the same force as a Constitutional guarantee.

Appendix 2
AFMA objectives

The *Management Act* provides:

> "3(1) The following objectives must be pursued by the Minister in the administration of this Act and by AFMA in the performance of its functions:
>
> (a) implementing efficient and cost-effective fisheries management on behalf of the Commonwealth; and
>
> (b) ensuring that the exploitation of fisheries resources and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development and the exercise of the precautionary principle, in particular the need to have regard to the impact of fishing activities on non-target species and the long term sustainability of the marine environment; and
>
> (c) maximising economic efficiency in the exploitation of fisheries resources; and
>
> (d) ensuring accountability to the fishing industry and to the Australian community in AFMA's management of fisheries resources; and
>
> (e) achieving government targets in relation to the recovery of the costs of AFMA.
>
> (2) In addition to the objectives mentioned in subsection (1), or in section 78 of this Act, the Minister, AFMA and Joint Authorities are to have regard to the objectives of:
>
> (a) ensuring, through proper conservation and management measures, that the living resources of the AFZ are not endangered by over-exploitation; and
>
> (b) achieving the optimum utilisation of the living resources of the AFZ;
> but must ensure, as far as practicable, that measures adopted in pursuit of those objectives must not be inconsistent with the preservation, conservation and protection of all species of whales."

Appendix 3
Nature of statutory fishing rights

Section 21 of the *Fisheries Management Act 1991* provides:

> 21(1) For the purposes of this Act, each of the following rights is a separate statutory fishing right:
>
> (a) a right to take a particular quantity of fish, or to take a particular quantity of fish of a particular species or type, from, or from a particular area, in a managed fishery;
>
> (b) a right to a particular proportion of the fishing capacity that is permitted, by or under a plan of management, for, or for a part of, a managed fishery;
>
> (c) a right to engage in fishing in a managed fishery at a particular time or times, on a particular number of days, during a particular number of weeks or months, or in accordance with any combination of the above, during a particular period or periods;
>
> (d) a right to use a boat in a managed fishery for purposes stated in a plan of management;
>
> (e) a right to use particular fishing equipment in a managed fishery;
>
> (f) a right to use, in a managed fishery, fishing equipment that is of a particular kind, of a particular size or of a particular quantity or is a combination of any of the above;
>
> (g) a right to use a particular type of boat in a managed fishery;
>
> (h) a right to use a boat of a particular size or having a particular engine power, or of a particular size and having a particular engine power, in a managed fishery;
>
> (i) other right in respect of fishing in a managed fishery.

Appendix 4

Types of statutory fishing rights (SFRs) granted or to be granted

i. *Great Australian Bight Trawl Fishery* - the right is for use of a boat for trawling in the area of the fishery.

ii. *Southern Bluefin Tuna* - the right is to take a proportion of an annual total allowable catch (TAC).

iii. *Northern Prawn Fishery* - a combination of two rights is required, one right is to use a boat in the fishery and the other is the right to use the requisite number of hull/engine power units applicable to the size of the boat. The management plan for this fishery has been amended to replace the hull /engine power units with "gear" rights under which each right is a right to use a specified length of net headrope in the fishery.

iv. *South East Trawl Fishery* - rights in this fishery are currently being granted. Rights are again a combination with a boat SFR which allows access to the fishery and the right to take non-quota species and quota rights which allow the take of a proportion of the TAC of quota species.

In addition to these fisheries, the AFMA has in draft a Bass Strait Management Plan in which the right will be a right to take a proportion of the TAC.

THE ADMINISTRATION OF FISHERIES MANAGED BY PROPERTY RIGHTS

M. Edwards
Ministry of Fisheries
PO Box 1020, Wellington, New Zealand
<Edwardsm@fish.govt.nz>

1. INTRODUCTION

This presentation reviews[1] some of the issues that arise in the implementation and operation of transferable quota systems and includes surprises, regrets, experiences and lessons. I draw largely on New Zealand's experience, but introduce some information from other jurisdictions. New Zealand is a useful model to examine because the system of transferable property rights is comprehensive and includes most major fisheries.

Experience gained through the observation of other regimes might lead administrators to take a different approach to some issues initially, but whatever the approach it needs to be tailored to the nature of the fishery, the social and economic characteristics of the region, and the objectives determined for fishery management. The implementation of a conceptually ideal regime is likely to be impeded by fiscal, political, management and practical issues.

Fisheries managers try to achieve a range of biological, economic and social objectives including:

i. the greatest sustainable yields from fishery resources
ii. maintenance of a healthy associated aquatic environments
iii. optimising economic return and efficiency in commercial fisheries and
iv. provision for good social and cultural outcomes.

New Zealand has a clear legislated purpose - to provide for efficient utilisation, constrained by ensuring sustainability - consistent with our Treaty and international obligations. These objectives are augmented by inclusion of environmental principles and the precautionary approach.

Property rights features such as perpetuity, security, exclusivity, and transferability increase the value of the right and influence behaviours that might be expected from the owner including positive husbandry, incentives to invest and improve return and compliance with obligations. These features also increase economic and social benefits by allowing for industry rationalisation, while providing returns, increase economic efficiency.

Fishery property rights can be attenuated for a variety of reasons – these can be grouped into two categories – those related to achieving sustainability and those concerned with utilisation or allocative issues (Table 1).

Table 1
Factors that attenuate property rights

Sustainability	Utilisation/allocation
Catch-limits	Tenure
Size limits	Aggregation limits
Area	Minimum quota holdings
Season	Foreign ownership
Methods and gear	Area
	Transferability

The presentation below groups issues related to transferable quota system into functional areas of implementation and administration as follows:

i. selling the concept
ii. sustainability
iii. enforcement
iv. administrative services
v. catch against quota
vi. allocation
vii. social and economic objectives
viii. integrating rights and
ix. rents and costs of management.

2. SELLING THE CONCEPT

Fishery managers considering introducing a property rights based system must first sell the concept. Successful implementation of an amended management system will be assisted by a good understanding and acceptance by those affected. The discussion and consultation process needs to include all individuals and groups with a stake in the management of fisheries. Fishery stakeholders include:

i. vessel owners
ii. crew
iii. processors
iv. fishing communities
v. fishery managers
vi. environmental groups
vii. recreational fishers and
viii. indigenous fishers.

Support for the implementation of the scheme from the fishing industry will be facilitated by drawing on information from jurisdictions that have implemented transferable quota schemes. Fishery participants have generally enjoyed increased profitability by being able to maximise the value of product landed, because of the security of access. Balance sheets are enhanced by the capital asset which also provides financial security for borrowing for vessel improvements, etc. For some, the advantage of being able to sell out with a return is the most important feature – and it also rationalises fishing capacity. There are some exceptions to the expectation

[1] The view expressed in this paper do not necessarily reflect those of the Ministry of Fisheries, New Zealand.

that fishers will be better off - the most successful and innovative fishers under a competitive regime may benefit less, unless the fishery is in dire trouble.

The benefits of Individual Transferable Quota - ITQ - type regimes, as seen by the fishing industry include:

i. reduced competition and ability to spread effort over the entire year with consequent market advantages
ii. predictability of income and reduced economic risk
iii. retirement security through ownership of an asset
iv. benefits for resource conservation and
v. revenue maximisation by optimising labour and gear configurations.

For commercial fishers, the advantages may be offset by features of the implementation or operation of a property rights based system, *e.g.*:

i. reduction in total catch
ii. rationalisation of participants
iii. increases in administrative charges and reporting obligations and
iv. partial charges for allocation or tendering of access.

From an administrator's perspective, ITQs were derived to address common fisheries management issues that other sorts of regimes had failed to address including the race for fish, stock depletion and over-capitalisation. Depending on the effectiveness of the incumbent regime, a government should be interested in addressing those concerns and achieving greater benefits including those of:

i. increased efficiency and economic return
ii. encouragement for investment
iii. better controls to ensure sustainability – ITQs help restrain catch within limits
iv. the longer term advantages of the incentive to improve stock husbandry
v. prospects for improved voluntary compliance
vi. incentives for collective action provided by the allocation of rights and
vii. the ability to explicitly provide for non-commercial stakeholders.

Some of these outcomes may be achieved by alternative measures, but all can be achieved by transferable catch entitlement regimes.

General economic circumstances may assist in achieving co-operation. ITQs were implemented in New Zealand because the domestic inshore fishery had reached a crisis with many species severely depleted, substantial fleet over-capitalisation and declining economic performance. Even though most fishers acknowledged the crisis it took perseverance through 2-3 years of intensive consultation by fishery administrators through working committees, public meetings, publications and articles to gain a reasonable consensus. Agreement within the government was assisted because the economic philosophy of the Quota Management System (QMS) was consistent with the government's public sector reform. Industry consensus was also assisted because an ITQ like system had been tried through the enterprise allocations in the deepwater species. This gave companies some experience with the benefits of owning quotas. But such consultations can be lengthy - reaching agreement on the long term management framework for the surf clam and quahog fishery on the United States' Atlantic coast took 12 years.

There are considerable benefits in developing the proposed regime in conjunction with stakeholders. They must be fully involved and obtain partial, if not, total "ownership". The advantages of doing this include:

i. better understanding of intent
ii. assistance with resolving issues
iii. higher levels of voluntary compliance and
iv. lower costs (for government and industry).

3. SUSTAINABILITY

3.1 Operational elements

The issue of sustainability includes the following sub-topics:

i. species to include
ii. definition of management areas
iii. setting catch-limits
iv. adjustment assistance
v. other sustainability objectives and
vi. what should be reported.

3.2 Species to include

A fundamental question is which species to include or exclude. New Zealand initially included 27 species which represented 83% by weight of commercial finfish taken in 1985. This total has subsequently increased to 40 species. The inclusion of economically important stocks and single species target fisheries is relatively obvious. However costs and administrative complexity rise for species that are components of a mixed fishery.

Economic issues arise in issuing quota for less important species taken, because of the high monitoring and enforcement costs, and of difficulties due to species variability and low profitability. However, it can be difficult to ensure sustainability of species outside quota. And there is a need to record accurate catch information - this has proved to be an advantage of the QMS as it enables analysis of likely yields in the absence of a fishery-independent stock assessment. This has been evident in recent introductions to quota management in New Zealand. As the catch data for species outside the QMS were poor - setting initial catch-limits was speculative.

This section examines one of the categories of species that administrators might consider for inclusion in a transferable quota system. Short lived, highly variable species provide a dilemma. They are difficult to set catch-limits for, because there is usually minimal relationship between catch and subsequent recruitment to the fishery. This calls into question the benefits of their introduction into the system. Arrow squid is an example in New Zealand. Catch has not been constrained by TACs set well in excess of harvests in most years. But fishermen have had some of the benefits of ITQs – allocation of an asset, security of access and reduced competition, and they have not sought the exclusion of the species.

Other examples in New Zealand are red cod and flatfish – both relatively short lived and fast growing. Their catch-limits were set initially at the highest recorded catch and most have not been altered. In retrospect, catch has been controlled to a great extent by the economics of fishing for these relatively low value species and the constraint of quota for other bycatch species in their catch mix. However, the high quotas have created problems through fishers attempting to take all the quota they own of these species and thereby taking other species in excess of the quota.

On balance, the benefits of inclusion in the QMS seem to have outweighed the disadvantages, but a restricted access regime for low value, low volume species without sustainability concerns may be adequate, provided disincentives are applied for catching associated quota species. Recent New Zealand legislation has introduced the ability to adjust TACs upward in-season. This allows more realistic long term TACs to be set, as upward adjustment can take into account the appearance of good year-classes.

3.3 Definition of management areas

The determination of management areas has economic and biological implications for managers and industry. A greater level of sub-division than is necessary increases administrative cost, particularly those associated with reporting and monitoring. However, it is important for resource sustainability to attempt to spatially manage different stocks of species, where this can be done. It is probably better to err on the conservative side for at least two reasons:

i. the prevention of serial depletion in very large QMAs which can have socio-economic as well as biological impacts and
ii. it is relatively easy to combine areas, but contentious with industry to sub-divide. As industry becomes more organised and acts collectively, voluntary subdivisions can be developed.

3.4 Catch-limits

It is critical that initial catch-limits are set carefully as they are one of most contentious issues in a quota management system. To achieve both biological and economic goals, catch-limits must be set prudently to avoid stock depletion. New Zealand's early exploitation of orange roughy fisheries provides an example of inadequate information due to insufficient research, overestimation of yield for a newly discovered offshore species and a subsequent slow management response to better information.

A related issue is the need to protect the government from liability for compensation for decisions on catch-limits and related issues necessary for sustainability, including protection of the environment. It is important that these decisions are not constrained by financial or litigatious considerations – without precluding review on reasonableness and fairness grounds.

Some of the features of New Zealand's catch-limit setting process that work well include:

i. an open and transparent stock assessment and TAC setting process with participation by all stakeholders that produces better science and increased acceptance of the outcomes
ii. specific environmental principles in the legislation that aid prudent TAC decisions and
iii. working with industry on a programme to adjust catch-limits in situations of limited information using additional industry-funded research and monitoring.

Although consultation on TAC setting in New Zealand is still noisy and contentious, observation over time does suggest a change in industry's approach - from consistent lobbying for increases and absolute opposition to any decrease - to a more responsible approach reflecting the husbandry incentives. The change in attitude is most evident in fisheries where industry is closely involved in management planning. In several recent circumstances industry has supported conservative action as part of the implementation of strategies and decision-rules in these plans.

Output controls are not the only mechanism that can ensure sustainability.The western Australian rock lobster fishery successfully uses effort-control in the form of pot limits to control harvests. Other mechanisms may work well for particular circumstances - such as territorial use rights, or TURFs, for sessile species.

3.5 Adjustment assistance

ITQs are often implemented because of resource depletion. This may raise related financial implementation issues by the mid-1980s. The primary stimuli for changes infisheries management in New Zealand were the depletion most inshore fisheries and overcapitalisation of the industry. This resulted in the need to rationalise catch-capacity upon the introduction of the QMS. In New Zealand major reductions in catch of up to 83% for some stocks were necessary. They were achieved by government purchase of initial allocations of quota at a fixed price – initially by voluntary sales by the industry. The goal was to ensure a reduction in catch that could not be eroded (for example by increased capacity of vessels if a vessel buyback scheme were implemented). The mechanism was effective and enabled individuals to decide to remain in the fishery near to historical levels of catch, sell out or restructure their operations. In circumstances where voluntary quota reductions were insufficient, *pro rata* administrative reductions were made across all quota holders. In the course of this restructuring in 1986 the government paid out about $NZ62 million (8% of the annual value of production of the fishery at that time!).

3.6 Other sustainability objectives

Although catch-limits can be successfully employed to ensure sustainable harvests of commercially sought species – in most cases further controls will be necessary to ensure the sustainability of future harvests. They may include:

i. gear restrictions to reduce environmental degradation

ii. mechanisms to minimise incidental catch of non-target species including rare and endangered species of mammals, birds, fish, invertebrates
iii. mechanisms to ensure sustainability of catch for stocks not in the quota system and
iv. protection of juvenile fish and spawning and nursery areas.

These issues need to be considered prior to allocation of quota and the establishment of management areas. For example, closures or reserves may be useful mechanisms to address some of these issues – but the exclusion of areas following establishment is contentious, it can adversely affect confidence and may be expensive for government.

Another output-control mechanism that works effectively is the imposition, supported by a high level of observer coverage of a limit on total sea lion incidental mortality in the New Zealand squid fishery. This is similar to the individual dolphin mortality limits applied in the eastern Pacific tuna fishery.

3.7 Reporting requirements

Reported information is the lynchpin of a quota system. Reporting requirements need to be carefully determined to fulfil management objectives, including those of enforcement, monitoring and biological information needs. Important components are likely to be areas, species taken, fishing methods, position and time of deployment plus other information needed for catch and effort analysis.

New Zealand is currently suffering the consequences of not requiring the reporting of all species taken, including those species outside the quota system. This information is critical in setting catch-limits where directed-research is prohibitively expensive. The burden of comprehensive reporting can be eased through user-friendly reporting mechanisms, whether paper based or, increasingly, electronic. These mechanisms should be evaluated carefully together with industry.

4. ENFORCEMENT

It is crucial that sufficient investment be made to establish adequate monitoring and enforcement programmes that have the confidence of industry. These programmes underpin the success of the scheme because non-compliance affects the attainment of biological, economic and social objectives. The enforcement arm of the management agency will also need to amend its function and possibly its structure. Iceland, for example, set up a specific enforcement agency, with registered weigh-stations in every harbour.

In a well-developed property rights based system the enforcement agency may have a more complex role than an open access regime with input controls because of the additional constraints on fishers, and the complexity-monitoring data. Enforcement difficulty increases with the geographic extent of the fishery, with larger numbers of fishing units, with the number of landing or sale points and with high-value markets for unprocessed products.

In New Zealand the quota management system (QMS) focuses on monitoring product flow, surveillance and targeted investigations, audit and enforcement operations to collect evidence where offences are detected. The approach taken was the same that other agencies use in cross-referencing catch-landing reports with licensed fish receivers, processors and distributors. This is analogous to the registered dealers who have the exclusive right to purchase fish, common in ITQ programmes. This enables enforcement to be largely land-based using accounting and auditing techniques. A similar shift to an emphasis on shoreside monitoring took place with the implementation of transferable quota in the surf clam and quahog programme on the United States' Atlantic coast.

Although the enforcement agency will have a changed role, in regimes where input controls are complex or difficult to enforce they are important for the efficacy of the regime, through compliance can be difficult and expensive. It is difficult to compare the relative costs of enforcement in open access management relative to ITQ regimes without careful comparison of the effort applied and the degree of compliance.

ITQs can facilitate self-compliance because fishers have an enhanced long term interest in the state of the resource. Compliance with the enforcement regime will be enhanced by fairness as well as equity and involvement of affected stakeholders in programme design. If the objectives of the regime are understood there will be a higher degree of compliance.

5. ADMINISTRATIVE SERVICES

5.1 Setting the framework

This section considers some of the issues needed in the implementation of an administrative system. A rights-based framework will involve more complex administrative and greater monitoring, which will need to be designed carefully to keep costs at tolerable levels.

5.2 Establishing the rules

To implement the operational framework needed for a transferable quota system, additional rules will need to be prescribed and the government will need funds to build the amended systems. Recent experience in New Zealand suggests that the benefits of specifying these rules as standards and specifications rather than a prescriptive legislation or regulations. The resulting flexibility reduces unnecessary costs to the government and industry from making minor adjustments as well as better providing for outsourcing of functions by government where appropriate.

5.3 Components of administration

The design of the administrative system needed to support a rights-based regime will depend on the features of the system, but there are common core components (Figure 1).

In the New Zealand model, the central component of the administrative system is the record of the participants in a fishery authorised by a license or permit. This registry can be expanded to provide for registration of the vessels

they use. Assuming the management system focuses on limiting catch to control total harvest, the registry can be linked to the system which records fishers' catch. The application of catch-limits at a collective level will require reporting mechanisms.

Transitional mechanisms will be needed for allocation of the entitlement. In order to limit catch by individual fishers to control total harvest, the registry can be linked to the system that records fishers' catches and matches them to the entitlement held, triggering enforcement action if necessary. The integrity of this system will require the tracking of fish, from catch at sea, to la nding point, and, as required, to a licensed receiver, processor, distributor, exporter or point of sale. This will require a comprehensive documentation system, and is a substantial cost in the administration of a property rights based system.

The registry of the entitlements can be extended to record transfers of quota between fishers, and mechanisms to administer constraints such as limits on aggregation, caveats or suspensions. These elements of the system will need to be integrated to respond to management decisions to amend TACs, for example. Revenue management forms a further functional group linked to quota holdings, catch and transactions undertaken.

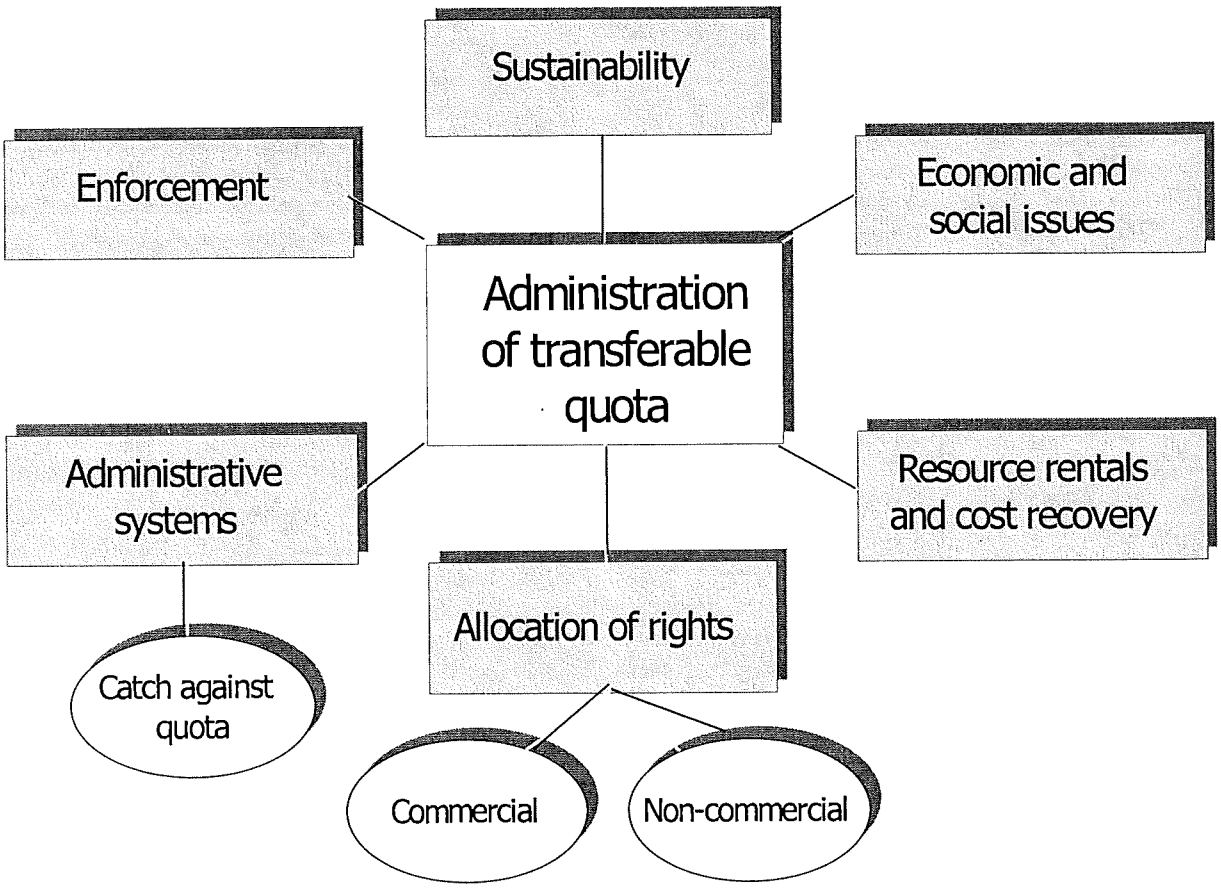
5.4 Staff and resources

The staff, budget and other resources involved in setting up a quota management system are highly dependent on the current regime and the system that is being implemented. Some points that arise from the New Zealand experience of implementing ITQs are discussed below.

Enforcement: The numbers of staff in the enforcement area (about 100) did not change despite the substantial increase in the scope and nature of their activities. This was achieved by restructuring their function dramatically - from a high level of contact with the fishing industry and a focus on reporting and regulatory issues - to a more centralised agency with a focus on audit, investigation, surveillance and use of information systems with a focus on fraud and serious offences while retaining capacity for direct enforcement activity against black-marketing and poaching.

Administrative services: The number of staff involved in administrative servicing and information technology increased markedly from less than ten to around 80 due to the increased complexity of the systems. Staff numbers remained at those levels until 1995 when a centralisation of staff reduced levels by 15%. One reason for continuing high staff-levels is the need to service an increasingly un-

Figure 1
Components of quota system



stable computer system, overdue for replacement, with consequent high overhead cost per transaction. The number of staff needed for the implementation of a similar administrative system today would be dramatically reduced by technology not available in the mid-1980s.

Research: Staff levels in research also increased, although not markedly. However, the focus of research altered significantly from a large proportion of pure research to a more direct service to the needs of a system that supported the setting of commercial catch-limits.

5.5 Organisational design

With the changes in organisation design from an input-based, or restricted access system, there will be an increase in complexity of administration and other major changes for the management agency to accommodate the change in its focus. Retraining is likely to be necessary along with redeployment of enforcement staff.

The establishment of quota management in New Zealand coincided with a period of public sector restructuring that separated functional components of organisations. This lead to the separation of policy, management and compliance from administration and research. This specialisation avoided potential conflicts of interest but has generally worked well with perhaps some issues of co-ordination between parts of the agency.

There is certainly value in separating management decisions on catch-limits, made on the basis of social, economic and biological considerations, from the science-based yield assessments which should be developed objectively in isolation from their commercial implications. The separation of the administration section in New Zealand has aided outsourcing of this function.

5.6 Input controls

ITQs are usually considered because current management is not achieving objectives. One would expect that with the implementation of ITQs, New Zealand would have found some input controls dating back decades to be largely irrelevant. But, some issues addressing allocation between sectors and environmental effects of fishing, for example, still need to be addressed. However, almost no regulatory input controls have been revoked. Iceland has experienced a similar problem with its bureaucratic process and regulations are not reduced under an ITQ system.

These regulations add to the cost of enforcement. Surprisingly, in New Zealand it is the industry that has resisted recent attempts at rationalisation of some input-control regulations. This appears to be because they are associated with the "social structure" of the industry and sunk-investment related to those controls. I believed that the incentives of cost recovery along with the rationalisation of management controls in fisheries plans may provide a long term solution. However, a better approach might be to revoke unnecessary input-controls simultaneously with the implementation of ITQs.

5.7 Catch against quota - multispecies fisheries

The basis of ITQ regimes is that catch should balance quota held and, therefore not exceed in total the sustainability limit. This is straightforward in single-species target fisheries. However in mixed-species fisheries, the ratio of quota held may not match species taken due to a range of factors such as variability in the marine ecosystem and poor quota portfolio selection. Other factors include changes in the abundance, rates of productivity and distribution of species.

The degree of unpredictability in catch can lead to overfishing, highgrading and dumping. Some suggest this means ITQs are not useable in mixed species fisheries. Thus, it is important to be pragmatic, and therefore flexible.

The regime in New Zealand includes a number of features to recognise the unpredictability in catch. These are:

i. retrospective monthly balancing with civil penalties
ii. an annual right to carry forward up to a 10% deficit or surplus
iii. quota transfers augmented by registered leases and 'fishing on behalf' arrangements
iv. catch outside quota could be surrendered to government for no financial return, but are not dumped and
v. bycatch trade-off schemes.

Other regimes have applied similar measures to provide for flexibility in mixed species fisheries. In the Alaskan halibut and sablefish fisheries "overage and underage" is allowed, adjustment of the next year's allocation, and there are graduated penalties for overcatch. Iceland allows 20% underfishing and 5% overage fishing without penalty.

Dumping of quota species is prohibited in New Zealand, except for certain circumstances of fish waste from processing at sea, discarding diseased fish, dumping to protect the safety of the vessel, or where required by regulations of undersize fish. Under quota management systems fishery operators have incentives to maximise returns where there are price differentials for size or quality of fish, or dump fish in order to continue fishing for a preferred species – high grading. This phenomenon is difficult to detect or prove. Some initial problems in New Zealand appear to have been reduced by high-profile enforcement and discussions with industry. Fishermen have expressed genuine concern about the damage to the resource (and their property right) and prefer to address the problem by improving handling and fishing techniques.

Reduced discards have been observed after the implementation of tradeable quota in other fisheries, such as the surf clam and ocean quahog programme and the Alaskan halibut and sablefish fisheries. One explanation is that the industry has a greater ability to time and target a catch of higher value. Conversely, Iceland has an ongoing problem with overcatch of TAC and discards at sea in its cod fishery. Governments, including New Zealand, have also established industry-funded observer programmes that can be used to help address problems.

To provide for trading, New Zealand allows a multiplicity of mechansims including trading of quota, leasing, sub-leases, and arrangements to fish against others' quota. These have created high administrative complexity and costs. It is hoped this will be resolved with the implementation of the Annual Catch Entitlement (ACE) concept. This will separate the quota share right in perpetuity from the entitlement to take catch annually. At the beginning of each fishing year, each tonne of quota owned permits one tonne of ACE for that species, valid for that year and freely transferable. This is analagous to the cage tags system used for annual allocations in the surf clam and ocean quahog programme on the United States' Atlantic coast and the yearly quota coupons used for South Atlantic wreckfish. The rationale is to increase willingness to vary the TAC by separating the catch entitlement from the long term quota right.

By the early 1990s, through various additions directed at creating a flexible but workable system, New Zealand had created a very complex and expensive set of administrative systems, including civil and criminal penalties. Trading of quota, probably the best mechanism to aid balancing, was impeded by:

i. a lack of transparency in the market
ii. an unwillingness to trade because of potential later exposure to prosecution and
iii. relatively high transaction charges for trading.

Two reviews have been undertaken to resolve these issues and the main solutions are as follows:

i. monthly retrospective balancing regime with modest civil penalties
ii. suspension of the permit for non-payment of ACE (beyond a minimum)
iii. end of the year additional, and higher, civil penalty for any outstanding overcatch
iv. 10% carryforward for uncaught ACE is provided
v. industry funded and
vi. public catch and ACE register aids trading by establishing who has available catching rights.

The key solutions of the ACE concept are facilitating transferability of catch entitlement with minimal restraint and reliance on civil disincentives. The new administrative and monitoring computer system, although yet to be implemented, is hoped to provide a simpler and more permissive regime that will encourage trading and resolve the remaining over and under catch issues.

Although multispecies fisheries create problems, these exist any regime where catch of a species is limited. ITQs highlight the problem by accurately recording catch by individuals. There is arguably a better way to manage these problems by providing for transferability and flexibility.

5.8 Quota busting

Quota busting is a problem for ITQ fisheries, and is evident in some high-value fisheries in New Zealand. The need to monitor catch of each quota holder adds to the difficulty for enforcement. The approach taken in New Zealand has been to cross-reference catch-landing reports from returns submitted by licensed fish receivers. Where discrepancies occur, investigations are done. Thus, enforcement is largely land-based using accounting and auditing techniques. The perception is that this has been largely successful assisted by flexibility in the balancing regime and a reasonable degree of industry support. In many, but not all rights-based regimes, catch-limits are exceeded less frequently after implementation of transferable quota regimes.

5.9 Misreporting

The key administrative component of managing catch is the database that records catch against quota for individual fishermen. The system must have a high degree of accuracy with errors minimised because the data forms the basis for enforcement. Major under-reporting or failure of the administrative system has not been an issue in New Zealand, but maintenance of an aging administrative computer has increased costs in recent years.

5.10 Underfishing

Underfishing was substantial in the early years of the QMS. There are a range of potential reasons, but it was most likely due to the constraining effect of possessing insufficient ITQ for another species in the catch mix. There has been much less under-catch in recent years as fishers developed improved strategies to take quota.

6. ALLOCATION

6.1 Basis for allocation

An initial and critical issue to administrators and fishers is the basis for allocation of the right. The most common approach is to allocate quota to those who have reported catch-history over a qualifying period. Other approaches include equal allocation, lotteries, priority ranking and auctions. In 1986 New Zealand used the average of the best two of three catch-history years so that all participants fished under the same conditions, and to take into account periods when a fisher may have been disadvantaged by illness or vessel repair, etc. While this is a common strategy, if one allows fishers to choose their best year, the total catch histories will exceed the average yield in any year and will need to be prorated.

For the 1986 introductions, New Zealand also allowed appeals on initial allocations, which were heard by a statutory authority. With the potential to get increased allocation of a valuable property rights, the cases developed to support appeals were varied and in some cases imaginative. Retrospectively, a number of faults in the process were identified:

i. difficulty of applying "commitment and dependence" criteria
ii. the statutory authority was expensive
iii. large number of appeals took years to hear
iv. fisheries administrators were tied up as expert witnesses
v. substantial inflation of some catch-limits and
vi. nullified government expenditure in buying out catch-history prior to allocation

If appeals are considered appropriate, any increase in allocations should be achieved by prorating all quota within the catch-limit; this introduced peer pressure for all to make claims. In recent introductions, the process has given limited time to appeal, and the grounds limited only to issues over-reported catch, rather than "commitment and dependence" on the fishery.

6.2 Elegibility

The most common approach is to allocate quota to fishers, individuals or companies, who have reported their catch-history. However, there are reasons to recognise that others are involved in the fishery. This has been a particular issue in some United States' fisheries. Allocations can also be made to skippers, crew or processors involved in the fishery, or communities rather than individuals. For example crew, often on catch-based remuneration, who have risked lives and incomes, although perhaps not their capital, could be considered to be disenfranchised by allocations to the permit or license holder or vessel owner.

Community quota can mitigate some unwanted effects of rationalisation – by ensuring local small scale fishermen have access to quota that can only be transferred within the community, or used for revenue generation. A potential foregone economic benefit from not allowing fuel rationalisation needs to be balanced against the benefits of providing economic activity for a community with potentially few alternatives.

6.3 Criteria period

One rule that needs to be set early after a decision to implement transferable quotas is the period that determines eligibility for allocations. This needs to be retrospective to avoid stimulating new entrants or additional fishing effort in an attempt to gain increased allocation. This activity was evident in New Zealand prior to the declaration of catch-history years in the mid 1980s and also prior to a moratorium on entry to non-QMS species and the declaring of the catch-history years that would be used for future introductions in 1992. An effective moratorium on entry during the planning period is commonly used to address these issues.

Once the decision is made to implement, the period between the catch-history period and allocation should be minimised. New Zealand now has the problem that because of the implementation of a 1992 moratorium on entry and declaration of catch-history years new introductions now mean using 8-year old catch data. Even with restricted access, the fisheries have changed over that period. However, any indication of an intent to change the criteria years will raise issues of equity and speculative entry.

6.4 Perpetuity

A related issue is whether quota should be issued in perpetuity as in New Zealand, which appears to be the exception to the rule. In the United States and Iceland, the allocation is of indefinite duration, and subject to government revocation. However, none have been significantly altered.

An approach to providing administrative flexibility, while providing sufficient security for investment has been suggested in New South Wales which is the "drop through" system. Entitlements would be offered for a lengthy, but finite period. Prior to expiration, they could be exchanged for a new entitlement that may confer a slightly different set of rights and obligations.

"Sunset" periods have also been considered, and were used temporarily in the rock lobster fishery in New Zealand. However, the concern, as with revocable allocation, is that the husbandry incentives may be affected along with a distortion of economic activity that might be planned with an allocation in perpetuity. Their use as collateral by financial institutions may also be inhibited.

6.5 Payment for allocation

Another issue that arises during the period allocation is whether fishers should receive their allocation of access to a common property resource for free. Options to be considered include a partial charge for allocations, or a tender. Although these have been widely discussed – the only one implemented was a limited tender in Chile. These mechanisms will no doubt be unpopular with fishers who consider, they have a right of continuing access which may be legally supportable. Charges for access may also cause unwanted social effects through precluding access by smaller fishers who do not have access to capital.

Charging for access may threaten support for implementation of ITQs. Other options to consider, at least to prevent windfall gain, is a "tax" to recover some of the gain created by allocation. Resource rentals were intended to fulfil this purpose in New Zealand.

6.6 Transitional gains

One further issue to consider is whether to limit or tax the first transfer after the initial allocation in order to recover some of the "transitional gains". This issue arises where initial allocations of what is regarded as a public resource, provided without charge, are quickly sold for capital gains. The initial holder gets a windfall profit and successive owners have reduced net benefits because their gross income is offset by the price paid for quota. This could be perceived as inequitable if the taxpayer funded compensation for a reduction in catch-history-based allocations for economic or sustainability purposes.

However, well developed property rights systems provide for the operation of a market and thereby efficient use of resources. Constraining transferability can impede achievement of efficiency. Side effects of a transitional gains charge might include preventing operation of the market - with less efficient operators remaining in the fishery. Any such charge needs to be considered with the related issues of any charge for allocations, ongoing resource rental, and capital gains tax if part of the financial regime in that country.

6.7 Proportional quota

When a quota is allocated a decision needs to be made as to whether it is proportional or 'fixed'. Most

other jurisdictions, sensibly, issued quota adjusted in proportion to the TAC. When New Zealand implemented ITQs in 1986, quotas were issued to fishers as a fixed tonnage. If the commercial catch-limit needed to be reduced, the government was to enter the market and purchase quota from fishers. Conversely, if the commercial catch-limit increased, the government was able to sell the additional quota. In 1990, the government acknowledged the problems of fixed tonnage quotas and amended the regime to proportional quotas, spurred by the high potential cost of large reductions needed in some relatively new deep water fisheries. This was a fraught and difficult process. The outcome was that government determined to compensate industry by effectively using the funds created by resource rental payment to compensate fishers for catch-limit reductions over a five year transition period.

With fixed tonnage quotas, as the government compensates owners for quota reductions, the taxpayer takes the risk of ill considered management decisions. This gives poor incentives for industry to support responsible and sustainable decisions, but security for industry from compulsory adjustments.

Theoretically, proportional quota provides better incentives for resource husbandry and development of fisheries, as well as keeping government out of the quota market. If fishers know that their quota may be reduced through imprudent catch-limits, they will support more cautious management. As New Zealand's industry has matured in an ITQ environment they favour stability of access over fluctuations. Similarly, why develop and explore fisheries when government accrues gains? New Zealand's enhanced scallop fishery provides a good example of the poor development incentives over the period when the government attempted to obtain a proportion of the benefit from enhancement.

7. SOCIAL AND ECONOMIC OBJECTIVES

7.1 Implications for efficiency

There is little doubt that transferable quotas can increase economic efficiency and (at least Iceland and New Zealand) report increased profitability. Many jurisdictions report increases in landed prices of fish. However, some of the social and structural changes to the fishing industry may make governments cautious about the implementation of rights-based management. In New Zealand, unfortunately, not much research has been undertaken on the social and economic impacts of transferable quotas as their implementation can result in changes in the number of vessels, employment and consequent impact on fishing communities.

Transferable quota programmes tend to reduce the number of vessels in the fishery. Table 2 shows some data from different jurisdictions. New Zealand appears to be an exception with minimal changes in the number and size of vessels operating in the zone. An increase in the size of vessels has been reported in Iceland and the Netherlands.

Table 2
The effect of transferable quotas on numbers of vessels

Fishery	% change in number of vessels	Time period (years)
Surf clams	- 74%	7
Ocean quahogs	- 40%	7
Alaskan halibut	- 42%	1.5
Alaskan sablefish	- 52%	1.5
Iceland herring	- 86%	26
Iceland (decked vessels)	- 18%	6

A decrease in crew employment has been reported in some transferable quota fisheries, because of the fewer vessels used and the less intensive demand for labour in peak periods. This occurred following implementation for the surf clams and ocean quahogs fishery, with a reduction in jobs at sea and on land – but increases in the number of working hours for those remaining in the industry. Again, New Zealand appears to be an exception; employment in the catching sector increased by 38% over the first ten years of the programme, and in processing by 16%. These figures were no doubt assisted by a 58% increase in total production over the period.

These changes can effect communities dependent on fishing. In the surf clams and ocean quahogs fisheries more of the smaller operators sold out and there was a decline of small fishing settlements. In Iceland, small fishing communities lost a greater relative share of quota, increasing financial problems and unemployment.

One of the key outcomes sought from transferable quota programmes is to reduce overcapitalisation and excess effort. However their implementation has different effects in fisheries with excess harvesting, and processing capacity. Where there are excess vessels, transferable quotas may lead to a lower number of vessels with crew loosing jobs, but crew on the remaining vessels may increase their periods of employment significantly. Where there is excess processing capacity, processors may require fewer workers, but processing is spread over a longer time

In both these cases, although some may perceive the outcome as negative, over-investment in labour and capital is addressed, consumers may benefit from a substantially longer period with fresh supply, and there are decreased costs and increased profitability for the fishing industry, which is of benefit to the nation. However, mechanisms can be implemented to mitigate some of these effects, to seek outcomes sought by the administrators.

7.2 Restrictions on transfer or trade of entitlements

Variations on completely transferable quota can be considered for economic, social and administrative objectives. With some exceptions discussed below, the New Zealand government has generally taken the position that its obligation is to provide a framework that provides for

the achievement of efficiency and generally avoids mechanisms that act as subsidies or protection and interfere with the operation of the market. However there are reasons to modify this approach.

Although transferability is important for operation of system and some economic benefits, other jurisdictions have restricted transferability to preventing loss of quota to regions or fishery dependent coastal communities, to types of fishers, such as owner operators, or preclude transfers to absentee owners, or even outside certain vessel classes.

In the Alaskan Pacific halibut and sablefish fisheries opportunity for quota lease/transfer was limited to achieve social objectives by restricting transfer across vessel sizes and capacities. Norway has a policy designed to retain its purse seine fleet in its historical base in the north. It operates by discouraging transfer of quota shares to the south by removing a proportion of the quota if there is such a transfer. Other regimes have tried to keep quota in fishing communities. In the Alaskan halibut and sablefish fisheries the owners are required to be on board vessels (with exceptions for corporate owners). Iceland addresses this issue by requiring owners to fish at least half of their quota every two years

One mechanism to address concerns about the impact of ITQ rationalisation on small quota holdings is to allocate some quota initially to a fishing community and prevent its trading away. An interesting example of this is the case of the Chatham Islands, 400 miles east of New Zealand, isolated, and dependent on government financial assistance. They had poorly developed fisheries at the time of the catch-history years and therefore received low initial allocations, with a subsequent allocation by government held by an authority that can only lease to Chatham Islands residents. They have regularly lobbied for further allocations however, all quota for the area is held by other quota holders who will not relinquish it. In retrospect it may have been better to compromise.

An allocation of a larger non-tradeable community quota initially would have provided ongoing income, it may have provided a basis for a higher degree of economic self-sufficiency and been more cost effective for government. In these regards, administrators need to consider objectives and balance potential costs and benefits for transferable quota systems that can be used to achieve social goals such preserving traditional fishing patterns, and providing independence and a more secure future for coastal fishing communities.

7.3 Aggregation limits

Aggregation limits constrain the total amount of entitlement that may be held by any entity; it is generally fishery specific - thereby limiting the rationalisation that may take place through efficiency and market forces. The purpose is to address social issues caused by loss of quota to owner operators and small fishing communities and to avoid risk of market domination.

An example of the latter is the United States surf clam and ocean quahog fishery, in which independent harvesters had problems finding markets as buyer-processors gained dominance in some areas. Some countries have regulated aggregation limits, while other have relied on non-fisheries commercial law such as federal antitrust laws in the United States. New Zealand started with a maximum limit of 20% of a species in any QMA, except rock lobster and paua (10%), and some deepwater species (35%). These limits were later increased to 45% for some deepwater and midwater species. The Alaskan halibut and sablefish fisheries have a limit of 0.5-1.0% by area

Substantial accumulation has occurred in some fisheries following implementation of transferable quotas as Table 3 shows. Iceland only recently set aggregation limits. Over ten years of their programme the amount of quota owned by their 24 biggest firms increased from 25% to 50%.

Table 3
Changes in the number of quota holders with the implementation of transferable quotas

Fishery	% change in number of quota holders	Period (years)
Alaskan halibut	24%	1.5
Alaskan sablefish	18%	1.5
New Zealand		
inshore	24%	10
mid–depths	26%	10
deep water	13%	10

Aggregation limits can be difficult to enforce because of the information needed on the financial and decision making structure of companies. And existing programmes suggest that substantial accumulation will occur even with limits in place. However, providing the disadvantages of limiting transfers to potentially more efficient operators are accepted, their use may achieve social objectives.

7.4 Foreign ownership

A limit on foreign involvement in domestic fisheries is a common restriction, generally controlled by specifying a maximum level of foreign ownership/control. Such limits are introduced with the intention to retain domestic control and prevent profits from being "expropriated" by foreign nations. This has the disadvantage of denying access to investment capital and are contrary to the global trend to liberalise direct foreign investment.

In New Zealand there is a legislated maximum on foreign ownership or control of quota-owning entities of 24.9%, with discretion to move to a maximum of 40% based on performance criteria and Ministerial approval. It has proved difficult to ensure compliance with this provision, because of the need for access to detailed information on financial and corporate structure. The fisheries management agency in New Zealand will transfer this responsibility to the government agency concerned with foreign investment in the economy overall. Other

jurisdictions that have considered this transition have doubts about the effectiveness of a centralised agency.

7.5 New entrants and high quota prices

A disadvantage of transferable quota systems relative to open access regimes is lack of access to new entrants because of the high cost of quota. New entrants may lack capital or collateral to obtain finance to purchase quota. Mechanisms exist to facilitate entry if this is considered a problem. A side effect of deciding to tax the economic rent created by allocation of quota is to lower the cost of quota. A central registry of quota holdings may assist by giving financial institutions more confidence in the security of the asset, and therefore be more likely to lend quota for purchases. A direct approach would be for the government to purchase quota for this purpose. If the government determines that quota needs to be obtained from existing participants, a compulsory zero revenue auction[2] to obtain a portion of the total quota offers a mechanism to ensure there is quota available for purchase with less adverse affects on the quota market than compulsory acquisition.

7.6 Data collection

The economic and social issues discussed above will present real challenges for the management agency. One problem in decision-making in this regard is the lack of data collected before and after implementation on the socio-economic status of the industry. New Zealand has a poor record in collecting quantitative data for this purpose. Better data would aid planning, evaluation and management decisions.

8. INTEGRATING RIGHTS

8.1 Indigenous rights

The allocation of ITQ gave the government in New Zealand the tools to effectively manage commercial fishers and provide a framework for achieving economic efficiency. However, New Zealand has found, to its cost, that the lack of integration with other rights has caused significant problems. But ITQs do provide a mechanism for settling indigenous claims and involving non-commercial stakeholders in the regime. Ideally, one should consider implementing a rights-based system across all extractive users at the start, at least by specifying or defining the relative extent of access. In theory, there is no need to limit allocation to extractive users. Some biologically sensitive areas could be protected, or set aside for non-extractive use.

In New Zealand, the Treaty of Waitangi, signed in 1840 with the indigenous people, Māori, guaranteed Māori ongoing access to their fisheries resources, and included a concept called *rangatiratanga* – synonymous with "management or ownership". However, ITQ was allocated in 1986 for 27 species despite those obligations, and the government found itself injuncted in 1987 and prevented from introducing further species into the scheme. In the legal action Māori sought to define their claims to commercial fisheries. The court ordered that the process of implementing ITQs to cease until those rights were finally resolved.

This moratorium extended until 1989 when a negotiated settlement and legislation by government led to the purchase for Māori of 10% of all quota at a cost of $NZ10 million. Having to buy back ITQ which had been allocated free of charge only a few years previously does not appear to have been sound planning. Commercial access issues were not finally resolved until the *Treaty of Waitangi Fisheries Claim Settlement Act 1992* in which the government purchased 50% of the Sealords Company for Māori and agreed that Māori should be provided 20% of all new species introduced to the quota system. This remains a contentious issue today as fishers with a long standing permits based on access rights argue that compensation should be paid if their potentially (free) ITQ allocation is reduced to provide the allocation for Māori. The impact of these events is that Māori directly and through a statutory authority own or control more than 50% of commercial fishing quota. Clearly it would be preferable to deal with these issues when establishing the right – it is expensive and divisive to deal with them later.

The government is making progress in better integrating non-commercial fishing rights with commercial quota. In New Zealand, legislative mechanisms now recognise Māori Treaty rights and provide for a large measure of autonomy in the management of areas that will be designated as important for customary, non-commercial use. In addition a specific provision is made within the total catch for non-commercial fishers and other fishing mortality prior to setting commercial catch-limits. Similarly, the Alaskan halibut fishery TAC includes allowances for commercial, sport, subsistence, treaty and bycatch mortality.

8.2 Recreational fishers

Recreational fishing is currently controlled by bag limits and gear restrictions in New Zealand. Their interests are also protected by a large number of inshore fishery closures. In some fisheries where recreational catch is significant there exist difficult allocation issues. New Zealand is now examining how to better specify recreational rights, and create mechanisms that will provide recreational fishers with the tools and incentives to better organise and assume more responsibility for managing the spatial and allocative issues that arise with commercial fishers.

However, future attempts to incorporate recreational fishers into the quota system will face difficulties. It is difficult to quantify their harvests accurately, but increasing harvests in some important inshore fisheries are affecting commercial allocated quota and sustainability. Making provision within a total catch-limit is contentious where it affects on existing catch-limits and raises issued in efficiency and equity allocating between interests. It is difficult for a government to determine where the maxi-

[2] After initial allocation of quota the Government could take back some percentage of the allocation every year for sale in an auction. Quota holders may get their quota back, but only if their bid is the highest. Revenue is returned to the holders of the auctioned quota shares.

mum net benefit in a fishery occurs. Studies to quantify non-commercial benefits are expensive.

There is long-term potential to extend the quota system to encompass a quantitative recreational right and allow quota markets to determine maximum net benefit – but initially there is a need to specify the amount of, and to control harvests. Our experience would suggest benefits in establishing rights across all sectors in parallel.

8.3 Sector conflict

New Zealand has recently introduced a dispute-resolution process in legislation to address spatial conflict issues that arise, particularly between commercial and recreational fishers. Its purpose is to reduce unnecessary regulation and lobbying of decision makers over allocative issues by prescribing a process that requires sector groups to attempt to resolve their differences, facilitated by the Ministry. If the parties are unsuccessful and there is a significant issue, the Minister may appoint a Commissioner to decide. The Minister may or may not accept his decision, but may not significantly adversely affect the rights of either party.

8.4 Integrating aquaculture with wild-catch fisheries

Aquaculture has a close relationship to wild fisheries management through market sales and broodstock, and italso needs certainty of tenure of site access. However, the major issues relate to the allocation and use of space in the coastal/inshore environment. There are often issues of imperfect integration with other statutory regimes. There is considerable benefit in attempting to resolve these issues simultaneously with the implementation of ITQs, or risk having to subsequently resolve allocation of space with coastal fisheries, non-commercial and non-extractive users and other community users of coastal space. New Zealand is in the early stages of finding a solution. An optimal solution would be to create a framework that provides for a better integration between the aquaculture and wild-harvest right. This framework should include mechanisms that allow the rights holders, to provide for the optimal use of space. However, this will be difficult because of the intense interest of other users of the coastal space and the overlapping jurisdictions between statutory authorities.

9. RENTS AND COSTS OF MANAGEMENT

9.1 Basis for levies

In no area is the lobbying of the fishing industry more focused and intense than that regarding the question of resource rentals and cost recovery. Is the taxpayer due a return from ongoing use of common property resource? Is the Crown entitled to a return for the cost of implementing a better management scheme? It is accepted in the literature as justifiable to capture reasonable additional rents generated under transferable quota type regimes, above the costs of management. There are precedents for this in the allocation of other resources by governments.

In New Zealand resource rentals, as initially imposed did not separate these rationales. Their intent was to provide for a return to the "owner", by extracting surplus value from quota and to cover management costs. They were initially set low with the stated intent of increasing until the annual traded value of quota approached zero. Government had the right to vary price by up to 20% a year. Rentals were charged on quota held to discourage quota purchase for speculation and encourage catching of quota.

The resource rentals failed to reach these objectives because of vigorous and successful industry resistance. Adjustments were also impeded by the lack of information on profitability in the industry and it was difficult to determine an appropriate charge. The industry asserted that their operations were unprofitable over some periods of recession and unfavourable exchange rate movement. However, quota prices have remained high. The rentals recovered, between $NZ17 and $NZ23 million, fell well short of even the costs of management and were never directed to fisheries management as first intended. If rents were returned to fisheries management, they might well provide better incentives for efficient operation than if directed to the Treasury.

In retrospect, the New Zealand industry probably did well out of the initial quota allocations and transfers. Other administrators might consider a more rigorous regime if this is the mechanism used to obtain a return for the allocation and use of common property rights. However, the exercise is likely to incur high transaction costs. It may be satisfactory only to accept the gains from general taxation, or capital gains tax on quota transactions. The collection of excessive rent could destroy incentives to invest and improve the return from harvesting and processing.

However, in New Zealand the argument about the basis for, and extent, of resource rentals was eventually determined by rights of the indigenous people, Māori – legal rulings cast doubt over the right of government to claim "ownership" of fisheries resources and therefore the right to extract a resource rent. Resource rentals were abolished, but the Act allowed recovery of the costs of management.

9.2 Cost recovery

Aside from the issue of resource rents, it is accepted as justifiable to charge the fishing industry an appropriate share of the costs for management, including administration, enforcement and research. Despite this, the only existing cost recovery regimes that recover a substantial proportion of costs are in New Zealand and Australia. However, transferable quota programmes in the United States now have mandate to recover up to 3% ex-vessel landing value of IFQ fisheries for administration and enforcement, and 0.5% of the value of quota transfer for registry operations. Iceland has a monitoring fee of 0.4% of value of quota. Australian policy requires 90% recovery of attributable management costs. In New Zealand the total revenue received from cost recovery since 1994 has been about 2.5% of export value of fisheries products.

A number of difficulties have arisen from the New Zealand experience with cost recovery and a book could be written on the related complex, contentious and vexa-

tious issues over the last five years alone! Cost recovery has created problems of economic viability for some marginal fishers as charges affect small players disproportionally. Charges are applied on the basis of transaction costs where possible – so that costs accrue to those responsible for creating them. Other costs are levied on the basis of the amount of quota held, or landed value for species outside the quota system. The cost of annual applications for renewal of fishing permits is negligible to a large company, but along with other charges is significant for a low-volume owner-operator. These cost recovery issues add to the economic advantages that accrue to large vertically integrated operations and provide another force for rationalisation.

Contentious policy debates have occurred over the relative Crown and industry contribution to some costs of fisheries management. The industry strongly objects to the application of the avoidable cost principle[3]. This was not helped in the situation that the Ministry is a sole provider of services; as it does not face competition over cost of supply of service.

Since implementation of cost recovery, the industry has suggested they should have greater say in how services are provided. This has led to considerable friction as the government has wanted to control the administrative system to ensure management outcomes, but has been hamstrung in being flexible because of unnecessarily prescriptive legislation and an antiquated computer system that is expensive to change. The recent transfer to industry of responsibility for day to day administration of the quota system may resolve these problems.

Industry argue that they already pay general taxation for policing to protect personal and property rights and that cost recovery for some enforcement functions is double taxation. Government has argued that action against poachers and black market operators in commercial fisheries directly enhances the value of the quota holders right. Another difficulty is under-recovery and over-recovery. These problems are exacerbated by that fact that the government financial cycle is 3 months out of phase with start of fishing year and supply of services.

Underlying many of the problems is that industry objects to paying increased charges without a real ability to influence the level or the services provided. Overall, cost recovery has significantly increased the administrative load on Ministry for reporting and accountability systems – now an appreciable component of costs.

A recent review of the basis for charging, along with the potential for contestibility in the provision of services, may lower costs to industry, and ease the contention in this issue. However, there have been benefits, other than fiscal, including:

i. increased transparency and accountability for Ministry operations with pressure for cost effectiveness
ii. more focussed discussions on Ministry function and
iii. industry interest in taking over responsibilities to control costs.

Overall, we believe robust cost recovery should be established from the start of rights-based systems – it has significantly changed the incentives and consequent behaviour of the commercial fishing industry.

10. FURTHER DEVELOPMENT OF THE REGIME

10.1 Stimulus for change

Some issues that may arise in the implementation of revised administrative systems managed by transferable quotas may spill over into the ongoing administration of the system. They may need adjustment with experience of their application in the circumstances of particular fisheries. In other areas, progress is only likely following the implementation of a rights-based scheme, which provides the framework and incentives for change. Once a transferable right has been allocated further progress is likely through increased co-operation by the entitlements holders to achieve benefits through collective action.

10.2 Increasing responsibility

Over time, rights based management provides for change in the relative roles of government and industry. Property rights provide incentives for rights-holders to develop collective arrangements. By 1997, 21 industry stakeholder organisations had formed and were looking to assure fisheries management responsibilities to a greater or lesser degree. This has been particularly evident in the development of management plans for species where the Ministry has worked collaboratively with quota holders and other stakeholders. These initiatives will become an increasing focus with recent legislation aimed at supporting their development.

There is typically a high level of government involvement initially in the administrative systems because industry is usually not sufficiently organised, or has not developed responsibility and collective organization. Over time, government can look to relinquish administration of all elements of the quota system and devolve roles that are not part of its core business. Core business includes ensuring sustainability and maintaining the integrity of rights-based system. Industry will increasingly want a greater role in exerting more control over their own destiny and to reduce costs.

The cost-recovery regime in New Zealand has had other important ramifications. It has significantly changed the incentives and consequent behaviour of the commercial fishing industry. Prior to cost recovery, they lobbied for increased research and compliance and had limited incentive to reduce the complexity of QMS administration. They often sought the addition of complex and expensive elements to the administrative system.

Cost-recovery has been an important stimulus for change. After government transferred almost full management costs to industry, industry lobbying changed emphasis from complaining about provision of services, to seeking to provide parts of services directly in an attempt

[3] Costs which arise because of the existence of a commercial fishery should be recovered from the industry.

to lower costs. This has led to a careful examination of the functions that is necessary for government to be involved in, and the identification of functions that might be better undertaking outside government.

10.3 Outsourcing

Because of the public sector reform in New Zealand, and the pressures arising from cost recovery, legislation has recently been amended to allow provision of services by agencies outside the Ministry. Until recently around 80 staff were involved in administration of the QMS in New Zealand. Three months ago that entire function was outsourced by way of management contract to the industry. The government has retained a small core of staff to set standards and specifications and monitor the function. This happened because the government acknowledged its core competency was not managing an administrative system, and the industry wished to have direct control over the function to achieve cost and service efficiencies.

10.4 Research contestability

Industry has paid 75% of costs for research in recent years. Both the government and the industry have sought cost efficiencies and in 1995 research was split from the fisheries management agency which then purchased the research under contract at around $NZ216 million/yr. More recently, contestability has been effected, although constrained by the size of New Zealand to offer sufficient qualified competitors in many areas. The lowering of research costs is also limited by the extra transaction costs of contracting and monitoring contestability. However, quota owning companies are now beginning to contract directly with research providers, with the Ministry responsible for monitoring.

10.5 Relinquishing enforcement

There is potential to relinquish elements of the compliance role, previously considered a core government responsibility. This can be achieved by shifting to an outcome-based system for some controls (excepting roles such as arrest, search, seizure, etc.), with the government monitoring performance of industry systems. If there is failure, those responsible can be fired. The outsourcing of government roles suggests building a system with this above evolution in mind. The objective should be to build a flexible agency so that incentives are created by allocation of rights to start to change the industry. The agency could change administrative procedures and approaches to assure greater degree of self regulation.

11. CONCLUSIONS

The experience of New Zealand and other states with transferable quotas suggests they are not a total, or the only solution, and may not be suitable for some fisheries. But lessons can be learned from where these regimes have been implemented, and problems can be avoided, or at least anticipated. It is important at the outset to spend time working through, and being clear about, the particular biological, economic and social objectives, as there are many trade-offs between achieving often conflicting objectives. Economic objectives may not be met if stocks decline because of imprudent catch-limits or inadequate compliance to deal with illegal activity; husbandry incentives may not develop if the right allocated can be substantially altered; economic objectives may not be met if transferability is excessively impeded.

However, transferable quota regimes, with appropriate modifications, can accommodate a number of social, economic and biological issues that have been mentioned as disadvantages. It is preferable to get the key components of the regime right at the beginning – it is more difficult and potentially destabilising to make changes later. An early common understanding of issues, and commitment to the programme, with fishing industry and other stakeholders is critical.

New Zealand's experience supports the view that secure property rights and cost recovery can change the incentives and consequent behaviour of the fishing industry. Over time, there is a greater degree of convergence between government and industry objectives for fisheries, enabling the government to transfer responsibility to industry and divest functions that are arguably better undertaken outside the bureaucracy. The most recent reforms in New Zealand, not yet implemented, are directed at facilitating this progression. The next steps are aimed at better integration of recreational and aquaculture rights with the quota system and developing the co-management concept. No doubt, progress will be fraught with difficulties as it has been over the last decade.

ADMINISTRATION OF ENFORCEMENT MECHANISMS FOR RIGHTS-BASED FISHERIES MANAGEMENT SYSTEMS

S. Crothers
New Zealand Ministry of Fisheries
PO Box 1020, Wellington, New Zealand
< Jenny.Wood@fish.govt.nz>

1. INTRODUCTION

This presentation is about the issue of fisheries compliance in the context of fisheries management. It outlines the basic theory of compliance behaviour, spells out the key elements of a compliance strategy and suggests ways to create and implement such a strategy. To illustrate the practice, I draw on some recent experiences in New Zealand in building a compliance strategy to support our pioneering and successful quota management system.

But I want to start with a story dating back to the mid-seventies when I was a young fishery officer carrying out frontline enforcement duties. In those days, I spent a lot of my time leaping on and off boats around the rugged coasts of the Chatham Islands catching bad guys. It came as a rude shock when I was summoned to Wellington, our capital city, to do a stint at head office and help set up our 200-mile Exclusive Economic Zone.

One day my boss called me to his office and during the course of our meeting, he declared in the frankest possible terms "Stan, there is one thing I want you to remember and remember well; biologists f*** fisheries". At the time I didn't really understand what he meant, but looking back I can see it was a lament about the general direction of world-wide fisheries management. He was talking about a preoccupation with fish to the exclusion of the fishers.

2. COMPLIANCE AND FISHERIES MANAGEMENT

It has been my experience over 25 years that many of the individuals and agencies involved in fisheries management are narrowly focused on fisheries science, research agendas, and the biological challenges facing fisheries management. Unfortunately, they rarely give serious consideration to the human dimension of managing fisheries.

The first point I want to make is that effective fisheries management is really about managing people. It is about influencing the behaviour of the people who have access to the fishery to help achieve society's sustainability and allocation goals for its fisheries. Put simply, the most brilliantly designed management system will fail on the water unless the fishers working with it endorse the spirit of the system and are prepared to obey the rules that support it.

I am not suggesting that we neglect biological and other problems - or the need to safeguard and enhance the fisheries resource - that is our common *raison d'être.* What I am saying is that the success - or otherwise - of a fisheries management regime depends on achieving the highest possible levels of compliance with the rules that underpin it. And I speak here from personal experience.

In New Zealand fisheries management, we have found that more than just enforcement is needed to achieve high levels of compliance. You must have the fisheries stakeholders with you, especially the fishers whose behaviour on the water is critical to achieving compliance and therefore your wider fisheries management goals.

This brings me to my second point - that people are far more likely to accept and participate in a system when they see it as having legitimacy in terms of outcome and process. The way to achieve this buy-in, or legitimacy, is through stakeholder participation in the development and operation of the whole fisheries management system. To work in practice, the rules of the management system and the services that support that system must be developed and operated in collaboration with the "regulated community" and other stakeholders.

In the New Zealand context, fisheries stakeholders include Māori, commercial fishers, recreationalists, environmentalists and the general public. Our strategy over the past 15 years has been to forge strong working relationships with all fisheries stakeholders. Emphasis has been given to the relationship with those who have the rights to harvest fish - the rights holders. It is the rights holders who have the incentive to protect the resource – their asset.

We have encouraged rights holders to participate in all fisheries management processes, including fisheries planning, research and compliance strategy development and the delivery of fisheries services such as operating the quota registry. We have found this strategy has achieved high levels of voluntary compliance.

My over-arching message is that achieving optimal levels of compliance is not possible without the legitimacy of the fisheries management system, its associated compliance regime and the services that support it. Legitimacy can only be achieved through meaningful stakeholder participation in the design and implementation of fisheries policies.

3. COMPLIANCE – THE THEORY

In my view, a major challenge for the 21st century will be the ecologically sustainable use of our oceans. To meet this challenge policy-makers will need to seek innovative ways to influence the behaviour of those who have access to fisheries.

The literature outlines two basic analytical frameworks that are available to influence behaviour to achieve high levels of compliance with the rules. These are:

i. instrumental and
ii. normative.

The instrumental perspective argues that people are driven by self-interest alone and that compliance is determined by the certainty and severity of punishment in the event of violation of the rules. This is the 'big stick' model, sometimes called the 'deterrence approach'. It is a feature of most centralised government fish management regimes, especially those that are open access systems. Regimes of this kind tend to be ineffective due to the low level of support by the regulated community and the high costs of enforcement in achieving an effective deterrent.

The normative perspective, on the other hand, stresses the morality and internalises social norms of individuals. It also includes a deterrent component. It is founded on a belief that people will comply with rules they believe are fair and reasonable, and that are being administered in a fair and reasonable manner.

The normative model is often called the 'voluntary compliance' approach as is the centrepiece of traditional community-based management systems and, more recently, rights-based co-management systems. Many of these fisheries management systems have endured in so-called developing countries over many centuries. Regrettably, many have collapsed due to such factors as the rise of the nation-state and over-capacity of the world's fishing fleet. Some might argue that the heat of the commercial blowtorch was just too much for them. But such systems can provide contemporary fisheries policy-makers with a useful template.

4. COMPLIANCE BEHAVIOUR

The aim of a compliance strategy is to have people obey the rules that underpin the management system, which is why we need to think deeply about the human factor. What causes one group of fishers to obey rules and regulations - and another group to break them?

If we look first at the individual fisher, we know that four key motivators operate here. The first, the amount of illegal gain or benefit, is the amount of cold hard cash that can be earned from breaking a rule. It is this lucrative illegal gain that usually tempts fishers to fish illegally, though sometimes it happens inadvertently or because of ignorance.

The second motivator, the expected penalty, seeks to deter individuals from breaking a rule. Policy-makers have long believed a big enough stick will offset the illegal gain and remove the incentive to break the rule. Experience tells us that this is rarely the case. Government cannot afford the costs of an adequate enforcement capacity and most courts are not willing to hand out sanctions seen as overly severe. The net result is that the 'deterrent model' inevitably fails.

Moral obligation, the third motivator, is based on a person believing that complying with the rules is the 'right thing to do'. An individual's moral obligation to comply is the result of interwoven forces. There is the individual's moral development and standards of personal morality, and then their perceptions of how just the rules are and what level of integrity their administration has. In other words – and this is a key point – the moral obligation to comply is based on an individual's perceptions of the fairness and appropriateness of the law and its institutions. This is a key factor to keep in mind when formulating and implementing a compliance regime.

The fourth motivator, social influence, recognises that most people's behaviour is influenced by their peers and the people who matter to them. Social influence or peer pressure in fisheries is often manifested in forms of verbal and physical abuse, such as fist fights and destruction of gear and vessels. A good example of this is the lobster fishery of Massachusetts (USA), in which strong forms of social influence called 'self enforcement' make up most of the enforcement in the fishery. Clearly, social influence and moral obligation are closely linked.

5. AGGREGATE COMPLIANCE BEHAVIOUR

Fishers are no different to other individuals in society when it comes to complying with rules. There are different behaviours among individuals and individuals' behaviour can differ depending on the circumstances. These different levels of compliance behaviour reflect variations in the size and nature of the four motivators of compliance behaviour. Some will invest in methods to avoid detection; others feel a stronger moral obligation to comply with the rules even when it is costly to do so. But we do know that in any typical population of fishers, a hard core of about 5-10% tends to break the rules chronically and flagrantly, even if the fisheries management system has the highest level of legitimacy.

Motivated by the short-term financial gains from illegal fishing, they are untouched by moral obligations and social influences. Only by changing the economic incentives, reducing the potential illegal gains, increasing detection rates, or by boosting the expected penalty can we hope to control this section of the regulated community. The only control mechanism for this hard core group is hard core enforcement.

For the other 90%, it is possible to put down the big stick and design a system in which people willingly cooperate. That is a strategy of 'maximising voluntary compliance'.

This raises my earlier point - in order to be successful, a fisheries management system must have legitimacy.

Legitimacy operates on three levels:

i. It starts with agreement on what a society wants to achieve from the use of its fisheries – that is, the vision and goals – and on the best management system to support this.

ii. It extends to the strategies, rules and services that support the goal.
iii. Last, it extends to the integrity of the agencies that administer the system.

If stakeholders do not see that system as giving them a fair go, they will turn their back on it.

6. COMPLIANCE STRATEGY DEVELOPMENT

Based on what we know about compliance behaviour theory, how should policy-makers set up a framework of rules that fishers in the real world will obey?

Before getting into the detail it will be useful to consider the context.

In respect of New Zealand's commercial fisheries, the goal is one of economic efficiency within the constraints of ecological sustainability and our Treaty of Waitangi and international obligations. This goal led to the development of the Quota Management System (QMS), the individual transferable quota based fisheries management system for commercial fisheries introduced in New Zealand in the mid 1980s.

Central to the success of the QMS was stakeholder involvement, especially from the commercial sector, in setting the goals and supporting the compliance regime for the system. When we began thinking about how best to achieve compliance under the QMS it soon became clear that a fresh approach was needed. We found that in a fast-changing operational environment affected by major shifts in technology, demographics, economics and regulatory policy, the old long-range planning approach driven by historical factors was outdated. We spent a lot of time thinking hard about 'what could be' rather than focussing on 'what is'. We came to realise that in a changing world any process for developing and implementing the compliance strategy needed to be tightly integrated in development and implementation of the QMS.

We came to the conclusion that the three building blocks of a compliance strategy to support the QMS should be:

i. a dynamic strategic architecture for planning and implementing the compliance regime
ii. long-term compliance goals supported by strategies with measurable milestones and
iii. extensive and meaningful participation by stakeholders in every part of the fisheries management system and supporting compliance strategy development, and where appropriate, its implementation.

To help set about imagining and building a future fisheries compliance strategy, we came to use the term 'strategic architecture'. We found it a useful way to envisage things not yet created and to construct a blueprint for turning them into reality. To do this, we used a strategic planning model similar to that developed by Hamel and Prahalad[1] based on figuring out where you want to be 10 or 15 years from now, then setting goals and strategies to get there. The cornerstone of this exciting and dynamic planning process is involving people at all levels in envisaging the future and in the early identification of potential problems and proposing creative solutions. It involves fresh and different ways of thinking about, and developing effective, fisheries management and supporting compliance strategies.

This approach encourages stakeholders and our organisation to develop a 'strategic mind-set'.

A strategic mind-set is a continuing process involving constantly studying trends and resolving fisheries management and compliance problems in the context of our goals.

This goal setting and systems development process took several years to reach a point of consensus. Added momentum was lent by the serious sustainability and profitability problems in the inshore fisheries and a rapidly developing deepwater fishery. In summary, we spent a lot of time and effort building legitimacy for the new system.

7. NEW ZEALAND'S COMPLIANCE STRATEGY – A FRAMEWORK

When designing the compliance strategy for our rights-based approach to fisheries management, we thought hard about practical ways to get fishers to follow the rules voluntarily. In theoretical terms we started the evolution from the traditional instrumental to the normative approach. Our strategic objective was "to achieve optimal levels of compliance". This objective is achieved through the two mutually supporting goals of:

i. maximising voluntary compliance and
ii. creating effective deterrence.

Specific strategies with associated milestones and work programmes to support these goals include:

i. maintaining good working relationships with fisheries stakeholders
ii. collaborating with fisheries stakeholders to develop fisheries policies, rules and supporting compliance services
iii. imposing the lowest possible business compliance costs on the regulated community
iv. ensuring that fisheries laws are administered and enforced fairly and cost-effectively
v. working with fisheries stakeholders to identify compliance risks and developing compliance strategies, systems and service specifications to manage those risks
vi. supporting the co-management of fisheries with fisheries rights-owners who can be held accountable for meeting the duties and obligations associated with their rights and
vii. delivering criminal enforcement services that inform fisheries stakeholders of their legal obligations and

[1] Hamel, G. and C.K. Prahalad 1994. Competing for the Future. Harvard Business School. Harvard, 327pp.

the consequences of not meeting them, and apprehend and when appropriate prosecute those operating outside the law.

8. THE QMS COMPLIANCE REGIME – A RISK-BASED APPROACH

From a compliance perspective, the QMS has not been as big a problem as was originally expected. This is essentially due to the system's legitimacy and our risk-based approach to establishing an effective deterrent to illegal activity.

When developing the QMS, a risk-based approach was taken in establishing the compliance regime (*i.e.* the rules and services to support those rules). First we analysed the potential risks of foreign vessels illegally fishing inside the New Zealand Exclusive Economic Zone. Here we saw the need for a traditional compliance approach of criminal laws and monitoring and surveillance relating to the specific risks and hard line enforcement. Monitoring, surveillance and enforcement services are delivered by New Zealand Defence Forces and the Ministry of Fisheries.

Second, we thought about the serious problem of local non-rights owners illegally taking (poaching) fish and selling it on the black market. The issue of haves and have-nots remains a serious challenge for any property rights-based regime. We acknowledged the need to develop an enforcement capacity to detect poaching and black market operations that often include other kinds of criminal offenses, such as dealing in drugs and stolen property. As these activities are driven by people operating completely outside the system we had little alternative to traditional hard line enforcement, backed up by a range of strong penalties including high monetary fines, forfeiture of property and imprisonment. The support of the commercial sector and the general public is critical to the success of this strategy.

Third, we looked at the compliance risks relating to our traditional fisheries rules. The QMS is complemented by a range of effort/input controls such as size limits, time and area closures and gear restrictions. Here, we decided on the traditional compliance approach, however, an emphasis is placed on the rules relating to sustainability and not on the rules relating to allocation. It was in the complex areas of mis-reporting driven by quota busting and high grading/dumping that we took a completely new tack.

An important point we kept in mind was that the commercial fisheries sector are part of the country's business taxation system and are required to keep detailed business records. We designed a fisheries record and return system that was consistent with the business record/tax system. In essence, if you are defrauding the fisheries system, you are defrauding the tax system. And we know the old story that it was the IRS, not the FBI, that finally caught Al Capone.

9. DOCUMENTARY PRODUCT FLOW SYSTEM

The fisheries record and return system is known as *the documentary product flow system*. It creates a paper trail relating to the movement of fish and fish products through the marketing chain. The aim of the system is to provide valuable fisheries management information and allow for the detection of mis-reporting/quota busting. The system tracks all paperwork associated with the flow of fish and related financial transactions from harvester to first point of sale and to other dealers and retailers.

Quota owners have to authorise harvesters to catch fish against their quota, keep business records, submit monthly catch-against-quota returns and register the purchase and sale of quota. Harvesters must have permits to land their fish at designated New Zealand ports, keep records of catch, fishing effort and landings and submit monthly returns. The main control point in this system is the first point of sale of the fish from the harvester. This first point of sale, or fish receiver, must be licensed, keep business records, submit monthly purchase and sale returns.

Dealers in fish and retailers (second or subsequent points of sale) are required to purchase fish only from licensed fish receivers and keep business records. The compliance monitoring system is based on carefully matching the catch and landing returns supplied by harvesters, the returns of fish purchases and sales by licensed fish receivers, and the catch against quota returns and quota trading documentation supplied by quota owners. The compliance monitoring system also includes a satellite-based vessel monitoring system, an observer programme, a licensed fish receiver system audit programme and a harvester/licensed fish receiver/dealer fish inspection programme.

A multi disciplinary enforcement capacity to detect fraud underpins the QMS documentary product flow system. This includes surveillance, inspection, intelligence/ information analysis, forensic accounting, investigation, legal and prosecution competencies.

10. OFFENCES AND PENALTIES

Despite the high level of legitimacy the QMS enjoys with all stakeholders and particularly the commercial sector, we have learned that there will always be a small percentage of people who try to beat the system. The aim of New Zealand's deterrence strategy is to make it clear to people that if they cheat:

i. there is a reasonable chance of getting caught
ii. there is a high probability of being successfully prosecuted and
iii. the costs of cheating outweigh the benefits.

The maximum penalty open to the New Zealand courts for each breach of a serious fisheries law is a fine of $NZ250 000, the forfeiture of property used in com-

mitting the offence (*e.g.* vessels, gear, cars, etc), and the forfeiture of illegal fish and quota. In practice, most monetary penalties have been relatively low, however, the 'true' penalty has been the forfeiture of the vessel and quota. We have found that the potential loss of vessels and quota has, along with tough enforcement action, been the primary factor in establishing an effective deterrent.

11. QMS COMPLIANCE SERVICE DELIVERY

The most important factors that determine how QMS compliance services are delivered are effectiveness, efficiency and the strategy to devolve responsibilities and hold rights-owners accountable for the services that underpin their rights. The three constraints to this approach are (a) the maintenance of service quality standards; (b) limiting the risks to the system's integrity; and (c) constitutional arrangements limiting the contracting out and devolution of the coercive state enforcement powers such as stopping, searching, seizing property, arresting culprits, etc. The Ministry of Fisheries' future core compliance role will be based around managing these constraints.

The Ministry provides services relating to developing rules within the QMS framework. This rule development is carried out in consultation with all fisheries stakeholders including the commercial sector. Quota owners are now starting to act collectively by establishing quota owner associations, with the objective of taking a more active role in the rule making process by developing their own fisheries management plans.

Education services designed to promote high levels of understanding and acceptance of fisheries rules is an important part of our compliance strategy. All education services targeted at the commercial sector are now determined by the industry and delivered by the private sector.

The central component of the QMS compliance regime is the suite of compliance monitoring systems. When we set up the QMS in the mid 1980s, the Ministry designed, built and operated all compliance monitoring systems. In 1997 the industry took responsibility for the direct purchase of a licensed fish receiver systems audit programme. In 1999, a company owned by quota holders took over the responsibility for running large parts of the compliance monitoring systems. The industry now operates the quota and vessel registries and the catch balance against quota registry and the catch, effort and landing reporting systems.

Other parts of the compliance monitoring system are still operated by the Ministry. These include a satellite based vessel monitoring system and the observer programme.

The Ministry still has the statutory role of delivering criminal law enforcement services. These services require the use of the coercive enforcement power of the state for their effective and efficient delivery.

The single biggest influence on the way all fisheries services are designed and delivered has been our policy of cost recovery. The commercial sector pays the full cost of all the compliance services from which they benefit.

12. ORGANISATIONAL ISSUES

Since the time of the introduction of the QMS the Ministry has been in a state of constant change. At that time, we predicted there would be three phases to this change process. I still think this will be the case, but it has taken a lot longer than I then thought.

The first phase was to build the infrastructure to support the QMS. The first task was to develop new and productive working relationships with the commercial sector; it has been the most difficult to maintain. We had to focus fisheries research on stock assessments to establish robust total allowable commercial catch limits – the basis for the size of total individual quota.

Building a compliance monitoring capacity from scratch was a huge job. It included the design, build and operation of a complex computer system supported by approximately 80 people. Our enforcement capacity had to be transformed. We built on our existing surveillance and inspection competencies and recruited intelligence and analysts, forensic accounting, fraud investigation and legal prosecution skills. This was done within existing budget levels and as a result more than 50% of enforcement staff were made redundant and replaced by people with other required skills. This infrastructural development phase was a 10 year (1985-95) period of growth for the Ministry.

The second phase started with the introduction of the cost recovery policy in 1994-95. This policy provided for the Government to recover from the commercial sector the full costs of fisheries services such as research, compliance monitoring, and enforcement, that were the result of the commercial sector activities or requirements. The focus of this period has, and will be, the cost-effective delivery of fisheries services.

Other changes have included establishing a stand-alone Ministry of Fisheries (previously the Ministry of Agriculture and Fisheries), contracting out all fisheries research, devolving or contracting out of many non-core government compliance services and quota owners taking collective action in respect of fisheries management rule-making through the development of their own fisheries plans. I predict this second phase still has another five years to run.

The third phase of the predicted change is just starting. It is anticipated that quota-owner organisations will focus on efficient resource use (rather than the present focus of efficient fisheries service delivery) with the aim of maximising profits and quota value. The Ministry's long-term role will centre on ensuring ecological sustainability, satisfying the requirements of the Crown's Treaty of Waitangi and international obligations, ensuring efficient use of fisheries resources and maintaining the integrity of the fisheries management system.

13. CONCLUSION AND FUTURE DEVELOPMENT

The beginning of a new century seems an appropriate moment to look at the way fisheries management agencies worldwide run their businesses. As you can probably tell from what I have said today, I am proud of our achievements in New Zealand. In truth, our successes with the QMS have been due and in part to good luck; in part to good management. And the process is an evolving one.

I am not suggesting that the strategies we have developed to support our rights-based fisheries management system should be picked up and directly applied in other countries. But I would like to think some of the core principles we have successfully used over the past 15 years could be investigated by other fisheries management agencies. Here, I am talking about properly integrating compliance into all fisheries management processes and maximising stakeholder participation in every aspect of fisheries management.

When I look around the world, there are few legal frameworks and institutional arrangements that are likely to result in high levels of compliance. Is this the root cause of the collapse of many of the world's fisheries? If so, the challenge for the new century is to start looking at ways to turn that around.

FISHER PARTICIPATION IN RIGHTS-BASED FISHERIES MANAGEMENT: THE NEW ZEALAND EXPERIENCE

M. Harte
New Zealand Seafood Industry Council
Private Bag 24-901, Wellington, New Zealand
<michael@seafood.co.nz>

1. INTRODUCTION

The management of the world's fisheries has reached a turning point. Government-centred management of fisheries resources is, by and large, a failure (Jentoft *et al.* 1998, McGoodwin 1990, Sharp 1997, Townsend 1995). Behind its failure is ignorance or denial by regulatory agencies of the importance of property rights. Compounding the failure is their reluctance to acknowledge the potential of fishers to manage fisheries resources under decentralised or devolved management regimes.

New Zealand's fisheries management system is arguably an exception. In 1986 New Zealand was one of the first countries to adopt a comprehensive property rights-based quota management system (QMS) in which catch limits for each fish stock are set by government and allocated to fishers through individual transferable quotas (ITQs). An ITQ is a perpetual harvest right. It permits the holder to catch a proportion of the total allowable commercial catch for a fish stock. ITQs can be bought, sold or leased in the same way that property is bought, sold or leased.

The government has also implemented far-reaching reforms that provide for:

i. devolution of fisheries management functions to rights-holder associations and
ii. approval of fisheries management plans developed by representative and accountable rights-holder associations.

The government, customary Māori, recreational and commercial fishers and other stakeholders have worked together to meet many challenges in the rights-based management of New Zealand's fisheries. The way in which government, fishers and other interest groups choose to do so in the future will determine whether New Zealand remains at the forefront of international fisheries policy and management.

This paper argues that successful fisheries management is dependent on stakeholder participation. It explores in the New Zealand context the role and importance of participation by rights-holders in property rights-based fisheries management. First, a case study of New Zealand's southern scallop fishery demonstrates how property rights systems can provide incentives for rights-holders to develop sophisticated governance and management institutions in order to exercise collective responsibility for fisheries management. The subsequent three sections build on the southern scallop fishery case study by:

i. placing the southern scallop fishery within the historical context of New Zealand's fishery management systems
ii. describing from a social and institutional perspective why fisher-based management is a logical extension of rights-based fisheries management and emphasising the necessity and benefit of involving rights-holders in fisheries management and
iii. exploring the implications of the southern scallop fishery model for the evolution of rights-based management in New Zealand, in particular the changing role of government and fishers in fisheries management.

2. NEW ZEALAND'S SOUTHERN SCALLOP FISHERY: A MODEL FOR RIGHTS-HOLDER PARTICIPATION IN FISHERIES MANAGEMENT

2.1 Incentive for devolution

The allocation of individual transferable quota in New Zealand's commercial fisheries provides a strong incentive for the devolution of fisheries management to fisheries rights-holders organisations. Scott (1993) argues, in particular, that the allocation of ITQ overcomes many of the obstacles to devolved management approaches:

> *"In many fisheries the ITQ will be less a new instrument of regulation, less a kind of individual property right, than a membership card in a self-governing fishery group. Compared to the old scattered voluntary inshore groups, this new type will have access to information, will indeed produce it itself. It need not be homogenous, for its distributional problems will be largely resolved by the prior distribution of ITQs."*

These characteristics are well illustrated in the management of New Zealand's southern scallop fishery. The material in the following section is drawn from Harte *et al.* 1998.

2.2 Background of the southern scallop fishery

The southern scallop fishery is located at the top of New Zealand's South Island. A fleet of up to 70 scallop vessels ranging in length from 12 to 20m utilises as much as 850km^2 of seabed during annual harvests. Scallop beds are located within two large relatively sheltered bays as well as the area of New Zealand known as the Marlborough Sounds. Fishing is carried out on a seasonal basis between August and December.

Annual yields in scallop fisheries vary considerably between years. The southern scallop fishery is no exception and annual catches have ranged from a high of 1246t (meat-weight) in 1975 to zero six years later in 1981 and 1982. A enhancement programme has supplemented yields of scallops in the southern scallop fishery over recent years. In some years as much as 80% of the stock available is estimated to be of seeded origin.

By world and New Zealand standards this fishery is of minor stature. Nonetheless, industry participation in the management of this fishery is highly developed. Industry investment in the enhancement of the fishery has reached 20% of the total landed value of scallops taken. Just as significantly, it is one of the few fisheries where industry has invested in self-governance, including the employment of officials and inspectors to develop and enforce management rules.

The southern scallop fishery operates under the quota management system which controls the level of commercial catch. Catch limits are set by the government for each fish stock. Fishers acquire individual transferable rights to harvest fish by purchasing or leasing quota from the government. There are approximately 38 quota holders in the scallop fishery and quota trades for around $NZ60 000/t. Annual value of the catch is approximately $NZ20 million.

The main factors behind the establishment of Challenger Scallop Enhancement Company (CSEC) in 1994 were the ability to manage the fishery privately under the QMS in order to capture benefits and minimise free-riding by non-quota fishers, and significantly, to establish an ownership structure for collective capital investments in the management of the fishery. For example, the quota owners wished to collectively purchase (at a cost of about $NZ1 million) a vessel purpose-designed for enhancement activities including spat collection and reseeding of scallop beds.

Nonetheless, the CSEC is not a sole owner of the southern scallop fishery. Fisheries laws in New Zealand prevent the aggregation of quota within any individual fishery into the hands of one individual. The CSEC has, however, instigated civil contracts and regulations for fishers who might otherwise not pay levies.

2.3 Management and decision sharing arrangements in the southern scallop fishery

The Challenger Scallop Enhancement Company records its relationship with government through two agreements:

i. an enhancement plan approved by the government that sets objectives for enhancement specifications for where to seed and maximum seeding densities, and reporting audit requirements and
ii. an agreement with the New Zealand Ministry of Fisheries (the Ministry) to provide information that the Ministry examines to determine whether the company's activities result in sustainable outcomes for the fishery and conservation of the wider aquatic environment.

There is provision in this latter agreement for the Ministry to approve specifications and standards for research and to audit the data collection and analysis process. Further, the CSEC must consult with recreational fishers, customary Māori fishers and environmental interests before providing to the Minister a set of annual harvest recommendations based on the information collected. These recommendations aim at reducing conflicts with recreational fishers over local depletion and access problems.

The Challenger Scallop Enhancement Company records its relationship with all southern scallop industry participants including the quota owner, lessees, and vessel skippers through a civil contract administered by the the CSEC outlining the harvest rules and agreed damages that must be paid in the event of non-compliance. Contract provisions are agreed by consensus at the general meeting of the company.

Although the company's annual harvesting plan relies on some government regulation, the CSEC is steadily reducing the need for direct government involvement. For example, the CSEC sets the total allowable commercial catch for the scallop fishery at an arbitrary level and manages lower actual catches each year by getting quota owners to lease a defined percentage of their quota to the CSEC. The company holds these rights in trust not to be fished unless scallop availability warrants the release of some or all of the quota.

The main research programme carried out by the CSEC (done according to standards approved by the Ministry), and to meet the government's information requirements for the scallop fishery, is an annual abundance survey of stocks. The CSEC has improved the precision of this survey at least three fold since taking over responsibility from government for information delivery, as a result of standards demanded by the shareholders and fishers. The company needs the information for its business plan and to set levies, as well as to provide the scallop fleet with accurate data about the location of scallops. The CSEC runs it own geographic information system for this purpose. In addition, the company commissions independent researchers to provide information on the possible environmental impacts of its scallop harvesting and the company's enhancement activities.

CSEC is still going through a period of development that incurs high transactions costs. Nevertheless the company has found that, despite the reporting obligations and information requirements, devolved management with its targeted management framework is still more cost effective for the company than having centralised government directing the management role.

2.4 Compliance and enforcement in the southern scallop fishery

Within the compliance and enforcement framework, the fishery distinguishes between:

i. sanctions that are applied to individual industry participants (*e.g.* vessel operators) for non-compliance with rules, whether they be regulations or contract rules and
ii. sanctions that apply to the CSEC for failing to provide reports to government to an agreed standard, or for failing to ensure compliance with agreed management rules.

The former sanction is specified in law or in the CSEC contract with scallop fishery participants. The latter sanctions are more complex. Ultimately, the government has the power to assume management of southern scallop fishery in its entirety or in part. For example, in the event of gross mismanagement by the company, the government can impose a total allowable commercial catch reduction or area closure.

Fisheries management activities are funded according to a business plan that is agreed to at the CSEC's general meeting and is aligned with principles set out in its agreement with government. The matter of performance is therefore an organisational issue that is audited by the shareholders in line with government requirements. The CSEC operates in all respects like a government regulatory agency, the difference being its approach. Rights-holder management in the southern scallop fishery works in principle and practice, the key factor being clear specification of responsibilities that can be independently audited.

2.5 Managing competing fisheries in the southern scallop fishery

A one challenge to co-management in the southern scallop fishery, and inshore fisheries in general, is the competition between users for fisheries resources. At the moment commercial quota rights-holders or permit-holders (permits qualify people for ITQ) have a right to fish almost anywhere in the relevant fisheries management area. Current solutions available under fisheries legislation for dealing with conflict, such as individual area closures, are extremely blunt and almost always result in win-lose or lose-lose outcomes. Moreover, they fail to provide any incentive for co-operation and usually result in an intensification of antagonistic relationships between government and fishers and between stakeholder groups.

The CSEC is turning its attention to resolving conflicts with other fishers (such as dredge oysters and fish trawling) operating in its fisheries management area. It has taken steps to rationalise harvesting between scallop dredging and oyster dredging because oyster dredging kills baby scallops, and has structured its involvement to ensure that it makes appropriate economic trade-offs between these fisheries. The CSEC is seeking to manage its fishery area and its productive capacity by integrating the management of various fisheries.

The success of the management arrangements in New Zealand's southern scallop fishery has been a catalyst for recent ground-breaking fisheries reforms that for the first time enable devolution and decentralisation to be a genuine alternative to centralised control by government. The corporate management regime and the institutional arrangements between fisheries put in place by the CSEC provide a blueprint for the wider devolution of responsibility for fisheries management to fishers in New Zealand and world-wide.

3. THE EVOLUTION OF FISHERIES MANAGEMENT IN NEW ZEALAND

3.1 Different fishers, different management regimes

Although this paper focuses on the property rights framework for commercial fisheries management, it is beneficial to briefly characterise the separate management systems that exist for commercial, customary Māori and recreational fisheries.

i. *Commercial marine fisheries* operate for the most part under an individual transferable quota system. The quota management system covers 85% of New Zealand's commercial fish landings and reduces the impacts that commercial fishers may have on one another and limits their stock depletion effects. The remaining 15% of landings are regulated by a restricted entry permit system with a mix of input controls and catch limits.
ii. *Marine aquaculture fisheries* operate as occupiers of small areas of seabed granted under the *Resource Management Act 1991* and associated legislation and are licensed to harvest marine resources under fisheries legislation.
iii. *Indigenous customary marine fisheries* have a territorial use rights-based fisheries management regime. Territorial rights are held by particular *iwi* (tribe) or *hapu* (subtribe) occupying adjoining land, and have rules (*rahui, taiapure*) developed by the owners and observed by them.
iv. *Recreational marine fisheries* operate as open access fisheries subject to lightly enforced regulations. Recreational regulations include daily bag limits, minimum fish sizes, method and gear restrictions, closed areas and closed seasons. Rights to the recreational fisheries are held in common.

The existence of four different management regimes ranging in character from near open access to near private management creates a far from equitable basis for moving to a devolved fisheries management regime across all fisheries. In particular, recreational fisheries and many *iwi* and *hapu* lack the financial, technical and human resources to participate effectively in the decentralised or devolved management of fisheries. Without these resources, recreational fishers and customary stakeholder roles in policy formulation, development of harvesting rules, monitoring and enforcement, will default automatically to the government. Recent initiatives by the government and recreational and customary fishers are starting to address these issues but there is a long way to go before these groups reach an equal footing with commercial fishers.

Near parity in funding, and compatible rights-based management systems, would do much to foster collective rights holder-based management approaches that focus on:

i. the common interest that all fishers have in fishery resources
ii. creating and empowering representative bodies for all fishery stakeholders
iii. negotiation and trade between fishers based on win-win solutions
iv. developing and implementing binding agreements between fishers and
v. the feasibility of binding newcomers to existing fisheries management arrangements.

3.2 Commercial fisheries management in New Zealand 1908 - 1999

Although commercial fisheries have 15 years of experience of rights-based management since the introduction of the QMS in 1986, opportunities for devolved and/or decentralised management of commercial fisheries are a recent feature of New Zealand's fisheries policy. The southern scallop fishery represents potentially the start of a new chapter in the history of the country's fisheries. This section describes three previous phases of commercial fisheries management in New Zealand and aims at demonstrating why the concept of decentralisation and devolution has become a practical management option only with the maturing of the rights-based quota management system. A more detailed description of the history of New Zealand's fishery management can be found in Batstone and Sharp (1999), Sharp (1997) and Gaffney (1997).

3.3 Limited entry 1908 - 1963

Fisheries management has its legislative origins in the *Oyster Fisheries Act 1866* and the *Fisheries Act 1908*. The 1908 Act provided statutory authority until 1983 for regulations aimed at the purpose of biological protection of the resources. During this period most fisheries were largely a small inshore domestic industry. Overexploitation of inshore stocks led to the introduction of a limited entry management system in the late 1930s.

A Royal Commission examination of the fisheries in the late 1950s concluded that the regulatory environment was detrimental to the development of the fisheries in that there was little or no technological advancement, no competition among fishers, and that a range of resources were not being exploited.

3.4 Regulated open entry 1963 - 1986

In 1963 the system of limited entry was dropped in favour of open entry development under a permit system. The system provided for a range of regulatory measures restricting gear, the size of harvests and the areas where fishing could occur. Economic ends, rather than conservation, shaped the management of the fisheries. The government sought to encourage investment in the fishing industry through investment incentives, capital grants, allowances and tax breaks.

However, the government's desire to facilitate economic gain was unfocused and its policies encouraged the natural tendency of commercial activity towards overcapitalisation. Citing economic and biological objectives, the government took measures to correct this beginning in the late 1970s when a moratorium was placed on issuing of new fishing permits. The moratoria and regulatory environment compromised economic efficiency. Restricting new entrants dampened competitive pressures. Restrictions on inputs, such as boat size and net size and activity merely increased the cost of fishing.

These measures never got to the heart of the problem. Fishers were left with a common access stock and no constraints on how much fish they could catch. A significant and unintended effect of the regulatory environment was to encourage investment in extracting as much fish as was commercially profitable, when and where fishers could fish, using allowable fishing techniques.

3.5 Evolution of a property rights-based system 1978 - 1999

The government expanded the range of fish and stocks under national control by declaring a 200-mile exclusive economic zone (EEZ) in 1978. Deep-sea fisheries were previously exploited by foreign operators with few controls placed on their harvest. The government had to develop policies to manage the fish resource of a large and unfamiliar area. Initially, the EEZ and inshore fisheries were managed separately. Subsequently, the government applied a policy of limited domestic expansion, joint venture arrangements and licensing access of foreign fleets in the zone beyond the 12 miles limit.

In 1983 the government introduced an economically oriented management system based on individual transferable quota for seven species in the new 200-mile zone. This quota management system served later as a model for inshore stocks, and its existence offshore made it easier to persuade fishers of the effectiveness of such a system.

Also in 1983 the government passed the first new *Fisheries Act* since 1908. The Act introduced the concept of fisheries management plans. And, significantly, for the first time in New Zealand fishing history, the government gave legislative recognition not only to biological objectives but to the goal of encouraging an optimal return from the fisheries. However, the Act did not address the fundamental question of how these biological and economic goals could be linked.

The potential for the advancement of both goals was provided by a 1986 amendment to the 1983 Act. The amendment recognised economic goals more comprehensively by introducing the quota management system for 21 inshore species and providing for its broader application to the offshore fisheries. The offshore fisheries quota granted in 1983 were transformed, along with the newly introduced individual transferable quota, to tradeable entitlements in perpetuity.

The seven founding aims of the quota management system (Luxton 1997) were to:

i. rebuild inshore fisheries where required
ii. ensure that catches were limited to levels that can be sustained over the long term
iii. ensure that catches were harvested efficiently with maximum benefit to the industry and to New Zealand
iv. allocate catch entitlements equitably based on an individual permit-holder's commitment to the fishery
v. integrate management of inshore and offshore fisheries
vi. develop a management system that can be applied both nationally and regionally and
vii. enhance the recreational fishery.

In 1990 individual transferable quota were changed from a specified tonnage of a total allowable commercial catch, which could be repurchased by government, to a proportion of the total allowable commercial catch that varies as the total allowable commercial catch varies. The change reflected the reality that the process of government buying and selling quota to change levels of total allowable commercial catch was cumbersome and costly.

There is recognition that the quota management system has played a significant role in improving the biological status of the fisheries resource and commercial return to fishers (Annala 1996). Further discussion of New Zealand's quota management system can be found in Clark *et al.* (1988), Dewees (1989), Memon and Cullen (1992), and Sissenwine and Mace (1992).

Today there are over 250 fish stocks present in New Zealand's QMS covering 40 species (out of 100 species caught commercially). This represents over 85% of the total fish catch in the EEZ. Owners of individual transferable quota have a large incentive to invest resources in promoting the sustainability of their fishery because any lowering of catch limits reduces the value of their investment in the fishery. As Jentoft *et al.* (1998) suggest, the private nature of QMS rights has given a more accurate indication of who the users are than under previous management regimes. Importantly, a clearly defined set of holders of exclusive rights makes it easier to assign responsibility for devolved and, or, decentralised management of a fishery.

New Zealand's quota owners and leasees are responding to the productive incentive structures of the quota management system and increasingly following the example of the southern scallop fishery by organising themselves into management associations based on functional and, or, territorial communities. Depending on the fishery, these associations have a number of purposes but, at this stage, they appear to have several key functions:

i. to facilitate the collection of funds to finance fisheries management activities such as research or stock enhancement and to manage the delivery of such services
ii. to make fisheries management rules and to impose sanctions on non-compliance by company shareholders
iii. to represent the interests of shareholders in government processes that involve consultation such as determining (government required) fisheries management services and the setting of total allowable commercial catches and
iv. to defend harvesting rights against erosion of the quality of their rights and to promote the expansion and development of management rights.

4. FISHERIES MANAGEMENT AND INSTITUTIONS AS SOCIAL CONSTRUCTIONS

4.1 Institutional background

Property rights are only one management dimension, albeit an important one, for facilitating sustainable fisheries. Developing appropriate institutions and practices for the management of fisheries requires an understanding of the many dimensions of fishing. These include biological processes, harvesting practices, and the social and institutional factors that help shape environmental and economic outcomes.

4.2 The nature of fisheries management

Fisheries management will always have multiple objectives and require flexibility in the way stakeholders are engaged in day-to-day fisheries administration. Fisheries management must be about people. Little can be done about natural causes of change in reproduction, growth and mortality of fish. It is fishers who are subject to, and must live with the consequences of management measures. This fisher-centred nature of fisheries management has several implications for decision-making and consultation (Jentoft and McCay 1995):

i. There are no simple technical fixes to management problems. What looks good on paper may not work in practice. What is efficient at the macro level may not be useful at the local level. What makes biological sense may be unwise in cultural and economic terms.
ii. Fisheries management is a political issue that must respect and provide avenues for expressing and resolving conflicting interests, values and world views. Current fisheries management, where there is a disparity between commercing and customary and recreational fishers interests, tends to divide stakeholder groups, resulting in conflicts with the government. This forces government into the role of referee and arbitror of disputes. Stakeholders almost always agree on the need for sustainable management of fisheries, but will at times disagree on its form and means.
iii. The knowledge required for fisheries management is multi-faceted. Biological knowledge must be matched by socio-economic understanding. Fish harvesting is the focus of management efforts, it is only one of many causes of variation in fish abundance

and fishing behaviour. Therefore it is hard to predict the outcomes of management efforts on natural and social environments.

iv. Fisheries management is heavily dependent on the cooperation of commercial fishers. As the stakeholder generally harvesting the greatest share of the fisheries resource, and who are most affected by regulation, industry is traditionally consulted before political decisions are made. The complexity of fisheries management also requires the co-operation of industry both as a source of information about the effectiveness of management initiatives and for compliance with the management regime. In other words, the success of fishery management depends on the nature of the response from fishers.

4.3 Fisheries policy, ambiguity and uncertainty

Addressing the different dimensions of fisheries management would be difficult enough even if fisheries managers had a reasonable degree of certainty about the likely biological, social and economic outcomes of management actions. Unfortunately, diverse and complex biological systems complicate fisheries management problems while differing fishing practices and varied social and institutional factors compound the problem. As a consequence, uncertainty rather than certainty is the norm in all but the most trivial of fisheries issues. Making effective policy decisions in the face of uncertainty requires that policy-makers focus not just on the bio-physical environment, but also on the institutions and processes that form the policy environment in which the sustainability issue is debated and initiatives are developed.

The problems created by such ambiguity are heightened by the need for policy-makers to be accountable to the public. Policy is judged by its performance in the 'real world'. Few people are willing to accept uncertainty as an excuse for failed policy. It is expected that analysts and decision-makers will already have factored in relevant considerations. But eventual policy outcomes are influenced by a multitude of factors, many of them uncertain or indeterminate.

Therefore, although policy-makers ought to provide for the utilisation of fisheries resources while ensuring sustainability is the legislated goal for the management of New Zealand's fisheries resources, putting these concepts into practice is difficult and contentious. A recent review of fisheries management in New Zealand commissioned by the government (Hartevelt 1998:31) noted:

> *"Fisheries management remains controversial. Opinions as to the specific aims of management, and how various concerns should be ranked, vary between stakeholders. Consequently, disputes between fisher* rights-holders *and Government, between* rights-holders, *and between* rights-holders *and other stakeholders, characterise fisheries management."*

Without an understanding of the social dimension of fisheries management, government is unlikely to structure policy to promote fisheries management in a way that is ecologically sound, socially acceptable and politically supported. For example, many individuals and organisations are unconvinced by the economic and environmental arguments and still distrust the government's motives for recent reform of fisheries management that were intended to devolve more responsibility to fisheries rights-holders. As a result these groups are reluctant to be involved in the policy development process. Thus, paradoxically an attempt to remedy one aspect of a fisheries issue may, if it ignores the social context of the issue, reduce the likelihood of achieving its desired outcome.

When dealing with fisheries problems policy-makers often introduce both particular social meanings of sustainability (such as obligations to future generations) and particular policy models with which to analyse sustainable management problems (such as property-rights approaches to fisheries management problems). These policy models often abstract the problem analysis from the social context in which it occurs, yet policy-makers rarely examine the dependency of the analysis on the original social context. This means that policy recommendations are often divorced from the social and institutional dimensions of the original problem.

The imposition of meanings and models on fisheries by experts and related institutions in turn creates a social threat to the fishery stakeholders, and thus may intensify fisheries management problems. This tends to avoid the constructive, self-critical development of processes that foster broad-based discourse about meanings and approaches relevant to sustainable fisheries management. For example, many of the social anxieties and tensions associated with fisheries issues tend to be represented by policy-makers as symptoms of ignorance, irrationality or naïve expectations of sustainable management of fisheries. This approach denigrates and marginalises many individuals and groups with an interest in the sustainable management of fisheries. It may further enhance their feelings of being threatened by institutions that do not respect their identity, rationales and standing with respect to the issue in question. Without the support of rights-holders it is unlikely sustainable fisheries management can be achieved.

4.4 A social and institutional approach to fisheries management

Greater acceptance by policy-makers of a *social and institutional* approach to fisheries management could break a long tradition of issue polarisation. It encourages a greater awareness of the need to understand the social contexts in which the challenges of utilising fisheries sustainably are debated. In practice this means adopting a more open participatory process for deciding appropriate policy action. The knowledge held by all stakeholders needs to be recognised as an essential element of sustainable management of fisheries. Most pressing fisheries problems cannot be solved by an abstract biological model or in government offices, only through real-world

trial and error. The process of fisheries management necessarily involves many diverse participants whose status as stakeholders is derived from having knowledge relevant to the problems being studied, being part of the problem, and, or, being an individual or community affected by the wider implications of fisheries management.

Rights-based fisheries management is more than defining and enforcing rights and responsibilities. It is also about establishing institutions and management approaches that establish communicative and collaborative processes that:

i. contribute to widely supported sustainability measures
ii. identify who participates and in what way
iii. establish how debate is to be structured
iv. consider how conflicts of interest are to be addressed and
v. establish mechanisms for reaching agreement between fisheries management collaborators.

4.5 Degrees of participation: lessons from New Zealand

A range of participatory arrangements between government and stakeholders should be available to be adapted to address, explicitly or implicitly, the social and institutional dimensions of fisheries management. The spectrum of arrangements includes (Sen and Neilsen 1996).

i. *Instructive*: there is only minimal exchange of information between government and stakeholders. Mechanisms exist for dialogue with stakeholders and interest groups, but the reality itself tends to be government informing stakeholders on the decisions it plans to make.
ii. *Co-operative*: mechanisms exist for the government to consult with stakeholders regarding management options available, but all decisions are made by government.
iii. *Collaborative*: government and stakeholders co-operate as partners in decision-making.
iv. *Advisory*: stakeholders advise government of decisions to be taken and government, as appropriate, endorses such decisions.
v. *Informative*: government has delegated authority for decision-making to stakeholders who are then responsible for informing government about such decisions.

In New Zealand, participatory processes range from instructive to collaborative. Underpinning participation is a legal and/or policy requirement for the Minister responsible for fisheries, or for officials from the Ministry of Fisheries, to consult with persons or organisations that are considered to be representative of those interested in the utilisation of fisheries resources while ensuring sustainability. Commercial, customary Māori and recreational fishers and environmental organisations all qualify as representative. The form of consultation is not specified in the Act and is determined by the Ministry of Fisheries and implemented according to the Ministry's administrative processes.

At the *instructive level*, there is consultation on the nature and extent of fisheries services to be provided each year by the Ministry of Fisheries. These services include:

i. the management of fisheries resources, fishing and fish farming
ii. the enforcement of the provisions relating to fisheries resources, fishing and fish farming and
iii. research relating to fisheries resources, fishing and fish farming.

Consultations about the nature and extent of fisheries services have become detailed, prolonged and often acrimonious. Consultation has not improved the quality of fisheries service provided nor has it reduced compliance costs for industry. A recent Primary Production Select Committee (1998) report on fisheries cost-recovery stated:

> "*We concur with the view that the consultation process has not achieved its aims, despite the effort the ministry has put into providing information to stakeholders. Consultation requires having an open mind during the consultation process, but, as budgets are linked to the Governmentís appropriations process, the ability to change initial proposals through consultation is constrained.*"

The Select Committee went on to recommend that the focus of consultation should be in the context of management outcomes: *"This should lead to an improvement in the understanding of all parties about the strategic direction of fisheries management and how strategic goals are to be attained"*. Responding to the Select Committee, commercial rights-holders and the government are working together to improve the quality of consultation over the nature and extent of fishery services.

An example of stakeholder participation at the *co-operative level* is the review of sustainability measures and other management controls for the next fishing year. Sustainability measures include the government's setting of TACs, area closures, and fishing method restrictions. Over a period of six months, starting 1 April, there are meetings, briefings, submissions, discussions, reviews, proposals and counter-proposals before management controls, such as TAC and total allowable commercial catch become effective from October. The final advisory paper for sustainability measures for the 1998-99 fishing year ran to over 800 pages. Several hundred supplementary pages were produced before the Minister made a final decision on the measures to be implemented. The outcome of six months of extensive, detailed and costly consultations are often measures only slightly changed from one year to the next.

The Ministry of Fisheries operates two research-related consultation processes that are good examples of

stakeholder participation at the *collaborative level*. These non-statutory processes are linked to the consultation processes described previously about the nature of fisheries services and sustainability measures. The process is structured around research planning groups. Some of the groups focus on individual species or species groups and others focus on general issues such as recreational fishing, marine environmental research and socio-economic research. Each group discusses, evaluates, and makes recommendations about, research activities. Membership of the groups includes Ministry of Fisheries staff, research providers, environmental organisations, customary Māori, recreational and commercial fishing interests.

The second research-related consultation process focuses on stock assessment working groups. The main task of these groups is to estimate the level of sustainable harvest for each fish stock and to determine whether or not the current TACs and total allowable commercial catches are sustainable. The groups assemble the information available and prepare a fishery assessment for each stock in the quota management system. If new information indicates a change in the stock status and a need to change harvest levels, this is referred to the fishery assessment plenary for consideration and consultation. If further research is required, this is referred to the research planning groups. The outcome of the fishery assessment plenary is an advice paper to the Minister and Ministry of Fisheries and forms the basis for adjusting harvest levels through the sustainability measures process described previously. The stock assessment recommendations are augmented during consultations on sustainability measures by social, economic, cultural and environmental considerations.

Research planning and stock assessment consultations tend to be less contentious than consultation about sustainability measures and the nature and extent of fisheries services. Moreover, they are characterised by a significant degree of collaboration between Ministry of Fisheries staff, fishing sector representatives and other interests. Although the success of these consultations deserves more detailed analysis, several general observations can be made (Harte 1999):

i. Analyses of research needs and the health of fish stocks have both clear purposes that are not disputed by participants.
ii. They are based on scientific assessment or the need for scientific assessment and hence tend to be objective, independent and free of stakeholder bias. All stakeholders have a commitment to the scientific basis of fisheries management.
iii. Participants in both processes tend to be experts, or well versed, in the science of fisheries management. They share similar backgrounds and training and hence have a common understanding of issues being debated and the range of solutions available.
iv. The outcomes of both consultation processes are subject to further consultation. Disputes between stakeholders can be put off to a subsequent stage of consultation. For example, issues or positions that do not find general support in the stock assessment working groups or at the stock assessment plenary can be raised again during consultation on sustainability measures. Because the Minister makes the final decisions on sustainability and nature and extent of services both processes tend to be political and subject to lobbying by all stakeholders.

The southern scallop fishery is an example of stakeholder participation operating at the advisory level. There is little doubt that the success of fisheries management practices measured in terms of stakeholder support, fisher compliance and economic and ecological outcome increases as participation moves from the instructive to the collaborative level. This is not to say that consultation at other levels is not effective or appropriate for particular fishery management purposes. Few stakeholders, for example, believe that they should be consulting on strategic and business plans of the Ministry of Fisheries at the advisory or even collaborative level since many of the Ministry's functions are statutory functions or associated with criminal compliance. In this instance informative consultation is appropriate.

Nevertheless, if the intention is to influence fisher behaviour to secure positive management outcomes, the New Zealand experience demonstrates that stakeholder participation is best at the collaborative level or a higher consultative form. Stakeholders, especially fishers, possess knowledge based on experience that can add to fisheries science and produce more effective solutions to fisheries management challenges. Also, rights-holders' participation enhances the legitimacy of a management regime. Compliance is enhanced because fishers are more knowledgeable about, and more committed to, management measures they have had a say in developing.

5. CO-MANAGING FISHERIES: THE FUTURE FOR NEW ZEALAND

Although New Zealand's fisheries management system has successfully devolved management responsibility to rights-holders in the southern scallop fishery, it has yet to fulfil its potential to provide profitable and sustainable fisheries (Harte and Bess, in review). There needs to be a change in attitude towards fisheries management by many in government, some ITQ owners and other fishery stakeholders if the potential of New Zealand's marine resources is to be realised. Although many ITQ owners are critical of government, not many are prepared, like the CSEC, to take on additional responsibility for the management of fisheries.

Nevertheless, the success of the southern scallop fishery, and other fisheries with more limited assumption of management functions such as the rock lobster fishery, has increased awareness that the management of New Zealand's fishery resources needs to move away from a centralised regime. To facilitate an increasingly positive relationship between property rights-holders and government, that leads to mutually beneficial outcomes, the

government must devolve additional rights, responsibility and authority for fisheries management to resource users and local and regional communities.

Advocates of less government control and more resource users' say in management alternatives believe co-management is the model with the greatest likelihood of resolving fisheries problems. Jentoft *et al.* (1998 p426) wrote:

> *"It [co-management] is a social system that changes the nature of the game, the relationships between players and what each of them strives for. Co-management means an ongoing collaborative and communicative process, where resource users and other actors are in an entrepreneurial and creative role."*

5.1 Co-management and the reshaping of government's role

The government's role in co-management is to define power-sharing and decision-making arrangements through legislative and policy instruments. Only government can legally establish and defend user-rights and security of tenure (Pomeroy and Berkes 1997). In addition, the government may address issues beyond the scope of stakeholder arrangements to support the sustainability of stakeholder organisations. It may also undertake a co-ordinating role to enable various parties in a co-managed fisheries environment to interact.

The New Zealand Fisheries Act 1996 outlines the role of government in New Zealand as providing for the "utilisation of fisheries resources while ensuring sustainability". In practice this means:

i. establishing the rules and regulations that enable successful and sustainable fishing activity
ii. ensuring that fisheries harvesting rights are clear, appropriate and enforceable
iii. transferring management responsibilities to fisheries rights-holders
iv. co-ordinating the collection and provision of information to fisheries stakeholders
v. ensuring the effectiveness of management frameworks and systems, including: (a) setting standards for fisheries management plans, (b) monitoring and auditing the performance of fisheries management plans, and
vi. prosecuting offenders who break the law.

5.2 Co-management and devolution of management roles to fisher associations

Pomeroy and Berkes (1997) emphasise that unless government and its officials can be convinced of the desire and ability of fishers to manage themselves, little progress can be made on devolution and co-management. New Zealand's fishers have a responsibility to demonstrate a high level of organisational and management ability. The role of commercial, recreational and customary rights-holder groups in fisheries management is to develop management frameworks that provide for, and deliver, the utilisation of fishery resources while ensuring sustainability.

In the near future, rights-holders and the Ministry of Fisheries see rights-holder associations becoming increasingly responsible for developing fisheries plans that:

i. set management objectives and performance measures
ii. specify rules for management and governance
iii. define necessary services including (a) research (b) administration (c) monitoring and compliance and (d) establishing funding arrangements.

After developing a fisheries plan, rights-holders associations must implement them by:

i. managing decision-making processes
ii. purchasing research services
iii. administering access
iv. monitoring fishing activity
v. providing information and, or, education services
vi. enforcing non-criminal rules and
vii. collecting levies to fund management activities.

All rights-holders, stakeholders, government officials and scientists will need to continue to work together to evaluate fisheries management performance. The government needs assurance that such management systems provide for sustainability, and rights-holders need a clear framework in which to formulate the details of sustainable harvesting and management practices. This approach will increase innovation, reduce conflict between alternative stakeholder groups, reduce transactions costs and provide for the utilisation of fisheries resources while ensuring sustainability.

Other stakeholders, such as environmental groups and coastal communities, also have a major role in fisheries co-management decision-making in:

i. determining the government's social, cultural, environmental and economic goals for the fisheries
ii. setting the environmental and other performance standards for managing the fisheries and
iii. evaluating how well fisheries rights-holders meet the goals for sustainability set by the government.

Rights-holder groups and government should jointly decide how to devolute decision-making based on the capabilities of rights-holder associations to handle management functions. Commercial fishers are already a long way to achieving this capacity in New Zealand, closely followed by some *iwi* and more distantly by recreational fishers.

6. CONCLUSION

Effective stakeholder participation in the management of New Zealand's fisheries will result from consultation, property rights and, as the success of the southern scallop fishery demonstrates, effective institutions. Fisheries management based on property rights provides the incentives for creating these institutions.

Most fisheries issues will not find resolution in scientists' computers or in policy-makers' offices. They will be solved by the collective actions of fishers who are willing to listen and learn and are ready to change in response to the management needs of fisheries.

Despite the challenges ahead, the New Zealand seafood industry has confidence in the future. At every challenge the property rights-based fisheries management system has emerged stronger and better specified. The door is opening for co-management, devolution and the decentralisation of fisheries management to rights-holder associations. It remains to be seen how far it opens and who is prepared to pass through it. At best many rights-holders will seize the opportunities offered at worse rights-holders must ensure the door is not slammed shut by those who wish to protect their own standing conferred by a centralised management regime.

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MOVING THROUGH THE NARROWS : FROM OPEN ACCESS TO ITQS AND SELF-GOVERNMENT

A. Scott
Department of Economics, University of British Columbia
Vancouver, B.C., Canada V6T 1Z1
<adscott@interchange.ubc.ca>

1. INTRODUCTION

I am honoured to have been invited to lead off the speeches for the next tthree days. It was an excellent idea for the FAO and Fisheries Western Australia, along with ICLARM, the Commonwealth, South Australia, New Zealand, Canada, Iceland and South Africa to have sponsored and organized a conference to explore national experiences in the formulation and implementation of rights-based fisheries management. The arrangements they have made for the formal and the informal parts of the conference are very promising.

It is gratifying that the first descriptions of the potential of rights-based fishing, only about 25 years ago, were not altogether wrong. While Iceland and New Zealand were actually putting quota rights schemes into effect, as a kind of regulation, academic and other prophets were debating how they might stack up as a new variety of property right. When I say gratifying, I refer to the more or less continuous emergence of the realm within which quotas are taken for granted.

But this rapid adoption of a rights-based approach has been typical of the speed at which the management of fisheries has been altered. For centuries ideas did not change. Four hundred years ago Grotius declared that offshore fisheries were inexhaustible and needed no ownership nor management, and none disagreed with him. Three hundred years later that view was repeated by Huxley, speaking of much the same fisheries.

It is true that at that time, in the mid-19th century, some jurisdictions did already have laws in place to protect a fishery or to keep it for themselves. And, it seems, many of the traditional systems of control over aboriginal fisheries were already thriving (although the sources I have consulted do not follow "tradition" far into the past (see Ostrom *et al.* 1988). In any event, among the western countries, Huxley's hopeful words were soon being ignored. Biologically-rationalised regulatory regimes were being set up within and between western countries. There was no more talk of inexhaustibility. There had been in the 1920s and 1930s a cascade of regulatory innovations, offshore, inshore and in the shallows, interrupted by the world wars.

These were followed in the 1960s with individual trap limits, fixed-net licences, and offshore-limited licensing. These salt-water systems were the forerunners of the arrangements to which no one dared to attached such labels as "private property." Roughly speaking, from 1600 to 1900, those who thought at all about the public right of fishing and the freedom of the seas felt secure in taking no action to conserve the fisheries of the high seas. But in less than the century since 1900, all that has changed. First there came intense regulation, then quasi-exclusive rights, then the present variety of property rights over the catch and, soon perhaps, over the fish.

In what follows I will deal with the evolution of regulation, then turn to the kinds of property right that were fitted into the various regulatory systems. This will be followed by a discussion of the characteristics that turn a permissive piece of paper into a deed of property. The kind of property right I talk about will be the emerging ITQ, and what we might expect to follow in the rapidly changing word of fishery protection and husbandry.

When ITQs were introduced twenty years ago, those who were interested knew the historical background in their own countries, and there was not yet much information about the newly-introduced systems, except the way they were being introduced: the transition as it were. Today many people do not know much about the eras of open access. They are familiar, mostly, with a world of limited licensing or similar limitation and exclusivity. To put this into a historical context; to project that context into the future; and to survey how ITQs are working now that the transitional period is past, takes much time and paper.

Luckily this presentation is followed by that of my colleague Francis Christy, a pioneer of the idea of right-based fishing, whose paper will put some of my material into a better focus. For the most part however, he will remind you that there are others kinds of property in the ocean fishery than ITQs, such as TURFs, and will be discussing them. We will be followed, today and tomorrow by other speakers who will give a clearer view of slices of the large canvas on which I will be sketching.

2. SOME EARLY HISTORY

2.1 Why regulate?

Ever more rapidly we are learning about the diversity, and also the similarities, of fishery management regimes as they occur in different places. We can see groupings of approaches to management by communities or governments. For the most part we realize that the groupings result because the law-makers in one country have copied the laws and rules in another. And each original fishery rule or law was tacked onto local law, perhaps on quite different subjects. But because, as far as I know, no-one has yet been inspired to trace these groupings back to their common feudal, customary, or

legal origins, we cannot yet explain why some systems of management have their particular patterns. The danger is that, because we cannot explain how they got there, we will not know all about the good, or harm, we may do by changing them.

In the case of those modern regimes that have emerged from medieval Europe and the English common law, we can see back to about the time of Magna Carta, in 1215. We know that the fisheries in salt water were unimportant relative to those in ponds, rivers and lakes or in the estuaries of a few of the larger rivers. We guess that most fish were taken with fixed gear of some kind, with weirs and kiddles[1] in the rivers and with traps playing a large part close inshore. Not surprisingly, therefore, the laws and rules governing fishing largely dealt with extensions of property law on land. Some kinds of fishing were entirely within one feudal manor and customs appeared saying who should have access to the fishery. Some were on larger rivers and questions arose about one lord interfering with the fishing rights of another. Customs and laws arose to deal with these conflicts.

When the time came to make a decision about fisheries in salt water, as it did under King John in 1215, we find that the issue was not inshore or ocean fishing, but in a tidal river. Like the earlier land-based fishing questions, it concerned blocking the river against navigation just as much as setting traps or kiddles. It concerned a new application of property law: who, the king or the nobles, might issue permits for fishermen to set their traps in the main tidal rivers? The king and his rebellious barons could not agree on this question, but to keep on their good side he undertook not to grant more rights to set these traps. As a result, as time went on, there were fewer and fewer such rights outstanding. The public acted as though an informal public right of fishing (supposed to have existed under the Saxon kings before the Normans) had been reinstated. Indeed, within a century, the courts were beginning to confirm that private rights in the ocean could no longer be created and granted, and soon after that the common law courts recognised a general public right of fishing in tidal waters.

At the same time, that part of ordinary property law referred to as the " law of capture" governing wild animals, freshwater and ground water, was also applied to ocean fisheries. It resulted in the doctrine that no one could own the swimming fish until they had been caught *i.e.* taken into possession. These two doctrines were important for the public. But they were not derived from, and they did not contribute to the husbandry of the fishstocks, with the possible exception that a person who prevented the free passage of fish into and upstream a river was liable to be sued.

I have not been able to discover when or why France and Spain and the other continental maritime nations, having property rights based on Roman law, also in their own ways, developed a public right of fishing. They were slow to do so and certainly they never had a great event like Magna Carta to mark the transition. Indeed for centuries great nobles with land rights along the coast and over the port towns, also claimed rights over the adjacent ocean fishery. But, how far to sea?

The monographs on the law of the sea do say that the heads of the great European states began to recognise that their sovereignty was limited to a so-called territorial sea, later the three-mile limit. But the writers are vague about the extent of the rights of the coastal landowners. By the end of the 17th century such rights were on the wane, although there were still countries where some great nobles claimed exclusive rights far to sea. Probably they were unable to enforce them, except in the ports. With this long transition and uncertainty, little attention could be given to managing the fishstocks either off the British or the European shores.

For centuries there were few changes in the rules of individual access to ocean waters and to the fish therein. Most of the changes were, in the 17th century, new ideas in the law of nations - changes that led to the doctrine of the freedom of the seas.

It is noteworthy that, in the rigorous debate about the freedom of the seas, all parties seem to have agreed that fish stocks were inexhaustible. The same belief showed up when various pressure groups lobbied their governments to exclude "foreigners" from "their" fisheries. Their motive, it seems, was not that there were not enough fish for everyone. It was to deny the foreigners the rights of access to a nearby market, or to landing rights on a stretch of coast where fish might be dried or salted, or boats repaired and wintered. (See Cushing 1988 p. 88). In brief, apart from sturgeon, whales, salmon, dolphins and other extremely vulnerable species, the fish stocks of the ocean were regarded, complacently, as incapable of being over-fished. Thus, there was no need to manage the fishery.

2.2 Why fishing rights were not created

In the long period just considered, new common law property rights arose in the courts rather than in the legislature. When, for example, disputes arose about who owned some land or water, the parties would enter into litigation. Typically, the decision, recorded and cited repeatedly affected the interpretation of the existing doctrine, and contributed to a gradual and steady revision of the property-law branch of the common law. To revise the law of property is, substantially, to change the content of a person's interest in land. In the common law world this was happening continuously in connection with farm land, miners' rights, and so on.

But there had "never" been, at least since about 1300, property rights in sea fish. There was no occasion for litigation about rights, because neither party could suffer from a "trespass." Neither could there be a parcel of oceanic property to suffer a "nuisance" (another frequent source of lawsuits regarding land). Thus, as no

[1] A dam, weir or barrier having an opening in it for catching fish.

body of case law accumulated, fishery property rights were neither defined nor changed until 19th century legislatures took a hand.

2.3 The coming of regulation in the 19th and 20th centuries

This complacency about the offshore fishstocks continued well into the 19th century. There had been few events to disturb the industry. True, in Europe the industry had long been aware of large-scale shifts in the location of herring, and perhaps other species. And there were worries about the impacts of more efficient (sail) trawlers and seiners (Cushing 1988). But the general belief was that in the northeast and northwest Atlantic the offshore fishstocks were resilient and their yields unaffected by fishing. For example, in the 1890s and 1900s, to write about fish preservation and conservation was exclusively taken to refer to canning, salting and pickling.

In the 1880s and 1890s, fishermen grumbled that on certain grounds, full-sized fish were becoming hard to find and their grumbles coincided with the coming of the steam-powered Danish or otter trawler, in the 1890s. The ability of these gears to scrape the bottom to great depths soon converted many to the view that the NE Atlantic, at any rate, was not inexhaustible. This possibility was officially recognised in Britain in 1893. But fishermen could still get a full net if they tried long enough, evidence of exactly what was happening was not available, and the authorities had little experience or notion about what to do.

It was not until the end of the great war that governments and industry began to understand that many of the world's fisheries were already being "over-fished". During the war, European fishing had almost stopped. When it began again there was a striking increase in the catch. Here was the evidence that scientists needed and it was confirmed by new studies of the Pacific halibut. Between the first and second world wars, fisheries science came of age, and with it some quantitative understanding of the rationale for regulation and closure. By some, a fishstock was being likened to a herd of livestock: heavy harvesting effort depleted the stock and changed its average age and size.

Such comparisons with farm livestock herds supported champions of two kinds of regulation: of gear and of open seasons. Although no historian has yet tried to assess how widespread fishing gear regulation actually was, it seems to have been adopted in many countries, in dozens of forms, ranging from control of the minimum mesh of nets to restrictions on the size or power of the vessel, though it was true some of these were merely designed to exclude rival groups of "outsiders". Others were more science-based, designed to save younger fish to allow them to grow to a more valuable size.

The second regulation, of seasonal openings and closings, was apparently borrowed from widespread "seasons" for sport fishing, shellfisheries, and game hunting. These familiar rules were aspects of fishery management that many politicians could understand. Soon, biologists were being challenged to provide estimates of the TAC for each fishstock, and closures were being proposed, and perhaps implemented, to keep the catches down to that amount.

There were two problems. First, the governments were not equipped to enforce either kind of regulation, or to monitor their effectiveness. Second, many of the offshore fishstocks for which regulation was proposed were outside, or straddled, national maritime borders. Solving both problems was impossible without international agreements. The first world war delayed these agreements in the North Sea and the Sound, and in the northeast Pacific and not till the 1930s had many European or North American governments imposed offshore regulations.

After the second world war, each country's fishing industry expanded, with larger, faster and cheaper vessels; wider markets; new gear types; distant-water fishing; and the outward extension of fishing limits to 12, then 50, then 200 miles. The need for regulation became clearer, the marine experts had some science on which to base it, and the means of enforcement, both by licensing and by surveillance, became available. This is the modern fishing world with which we are all familiar.

3. BIOLOGICAL AND ECONOMIC EVILS : THE CONTINUATION OF OPEN ACCESS

It is not clear what kinds of regulation most of the worlds' fishing vessels were subject to, but it is clear that the number of vessels, and the effort to which they were exposing the fishstocks, were increasing rapidly. In the 1960s Francis Christy estimated that the world catch, especially those of clupeoids, would soon top out at 70 million t/year. But this number soon looked modest.

This fishing explosion can be seen from two aspects. First, all the stocks were reduced, their size and age structure changed, and their survival, in some cases, endangered. Second, the degree of competition between vessels for the catch greatly increased. This meant that fishing costs spiralled upward as vessels raced each other to find the fish, catch them and deliver them to ports. Soon, ports were being moved toward the fishing ground.

How then did the new kinds of regulation affect these two results of expanded fishing? As far as stock reduction is concerned, the results were not too promising. The new measures did work in the right direction. But they were soon overwhelmed by expanded entry and fishing effort. As far as rising fishing costs are concerned, the results were not even promising.

Owners acted as though the new closure regulations, designed to reduce fishing mortality, were a challenge to be overcome by new strategies. Their new strategies were effective - vessels were given more power and more storage space so that every seasonal opening became like the opening of a marathon, until the closure was called. Seasons became shorter, inducing each owner to invest still

more in the capital goods that would enable them to lead the pack when the season was opened.

This was pretty evident by the mid-70s. As I wrote later, in 1979: "Overfishing" regulations that reduce one component of fishing effort induce further controls to suppress increases in other components. Also, because it is becoming obvious that the setting of an overall quota [TAC] encourages private investment to outwit or anticipate competitors, rather than to attempt to increase the quality, value or amount of the catch, administrators are tempted to regulate or forbid these investments as well." (Scott 1979 p. 728)

4. LIMITED LICENSING AND ITS EFFECTS

4.1 Limited licensing as a right of entry

As with other topics in this review, I have been unable to find a good chronology of the introduction of limited licensing. In Canada it was being phased in under new legislation in the 1960s and maybe other jurisdictions had started earlier.(Wilen 1989 p. 250) Today limited licensing is widespread, especially, I believe, where fishstocks are migratory or straddle jurisdictional boundaries.

It was perceived that gear limitations and closures were inadequate to deal with the problems mentioned. Therefore there was a search for a system that would reduce the amount of effort (rather than limit its form and timing). The answer seemed to be to reduce the number of vessels, and this was done by focussing on the licence. Previously the licence in itself had played no part in regulation, as a driver's licence is not important for dealing with traffic congestion. The innovation was to reinterpret the licence as a kind of ticket of entry. Every vessel had to have one.

4.2 Transition by grandfathering

Seen in retrospect, a limited-licensing regime was not very different from what had preceeded it. But the transition caused a great deal of upset, so different did it seem from free and open access. It was introduced when there was already over-fishing. To be sold politically as a system that would benefit already hard-pressed fishermen, the new scheme had to be based on the existing fleet and their crews. It was infeasible to start all over again, perhaps allocating a limited number of licences by a lottery, by tendering bids, or by an open auction sale. True, there was sometimes a reservation of a number of licences to be held for particular classes: foreigners, or aborigines, or owners of particular kinds of vessel or gear, and so on. Apart from these reservations, the new licenses were simply handed out to those who claimed to have recently been fishing. This was the now-familiar "grandfathering" approach.

4.3 Getting to the right number of licences

Limited licensing puts no limit on a vessel's catch (apart from that already imposed by existing gear and closure regulations). So, by itself, it could not bring the fleets' catch down to the TAC. So the governments had to think of supplements to limit licensing. They came up with quite a variety. One was to do nothing, allowing fisherman retirement or death to gradually reduce the number of licences. A second was to make the licences transferable, allow a market to develop, and buy some back at the market, or at a "fair" price. A third way was to buy back some vessels, with the licences attached.

4.4 Success?

Limited licensing has not been a great success. For one thing, fleet sizes were rarely reduced to the "right" level. When these schemes were still being discussed, fishermen made sure they would be eligible, so that in the transition period the number of active vessels actually increased. In the early months of buy-back schemes, the prices of the remaining licences increased. Naturally, the remaining fishermen began to speculate on how high the increases would go. As a result most vessel owners held on, refusing to sell at the "fair" offer prices.

The schemes did not reinforce the regulations in place for other reasons. Fish stocks were subject to increasing fishing effort exerted by a slowly-decreasing number of vessels. The catches increasingly consisted of young fish. Neither total catch nor catch-per-unit-effort increased significantly.

Third, the cost of fishing continued to increase. The remaining vessels had still to compete with each other for the catch. The open periods continued to shorten and the gear regulations continued to increase the time and equipment needed to fill up a vessel. To these private costs must be added the increasing public costs of enforcing the TAC.

4.5 Significance

In spite of this near-failure to accomplish what was hoped for it, limited licensing had very significant features, some accidental and some by design, that prepared the regulators and the fishermen for what was to come next.

It created a sort of marriage between the fleet and the stock. In large and offshore fisheries, a group of vessels and their owners were directly associated with a single species, or stock, or fishing ground. Those who wanted to lower costs and improve efficiency had to think about the specific fish stock being exploited; while those concerned about a fishstock had to consider the distinct part of the industry that was harvesting it. It created an incentive for the fishermen to assist the administrators in enforcing the regulations, for there was no doubt about who was hurt when the regulations were flouted.

It also created an incentive for the fishermen to develop a helpful relationship between themselves and the regulators. It became obvious there were insiders who held licences, and outsiders who could now be ignored. The insiders had in common an interest in conserving and improving the stock. The previous fierce, perpetual, wrangling, in which the regulators were regarded as stupid policemen to be defied and evaded could now be seen in need of replacement by joint consultation and collection of information.

Indeed these opportunities and incentives were evident, but they were eclipsed by rivalrous, competitive, fishing behaviour. It was clear to many fishermen that they could individually do better by getting a larger part of the TAC for their own class, port or group of vessels than by helping to increase the stock to be fished for by everyone. This involved devoting one's time to fighting the system rather than using it. The incentives to work together created by limited licensing were overwhelmed by incentives to conceal, evade, discourage and free-ride separately. Hostility, distrust and obstruction were words used to describe the atmosphere in some important fisheries into which a system of limited licensing had been introduced.

4.6 Focus on the licence

Finally, by being limited, fishing licences became important in themselves. They had come into existence as convenient cogs in a registration and administration system, having what outsiders may call "bureaucratic" functions. Until the 1960s it would have been possible to abolish ocean fishing licences, and vessel licences, and many other kinds of paperwork, without plunging the regulatory system into complete chaos.

To my mind, the forward-looking importance of limited licensing lies in the word *licensing*. The license had became a permit, a certificate, that showed one had had a right to fish in a specified place and time. Those who had no licence had no such right, and if they did fish they were in a fundamental sense committing trespass. It was no longer just for the convenience of the administrator but was a control against other fishermen. Further, the group of licence holders was seen by certain courts to have rights, not only to hold a public right to fish, but of something like ownership: in early cases of oil pollution, and in the 1960s, the local licence holders did, as a group, win damages or settlements against leaking tankers that had damaged "their" fishery.

One can see that the licence now gave its holders rights with new attributes:

i. *Quality of title and security.* Licences were no longer free, a casual privilege to be handed out and withdrawn at the whim of the state. Many fishermen had to argue or pay for them. Having forced the fishermen to take the licence seriously, the state had now to do the same. It had to resist the temptation to cancel them, take them back or reduce their content, but rather to honour them. And, it had to protect the holder against those who claimed they had a better right to a holder's licence than the holder himself in order to protect the quality of title.

ii. *Exclusivity.* There was no longer open access. As I said, some people might fish but others might not. As the latter were now excluded, the rights of those who might fish were far from being perfectly exclusive, but they were more exclusive.

iii. *Transferability.* Some of the early systems had licences that were not transferable. Those who had them could use them till they died, but they then reverted to the state. Whatever their initial feelings, this non-transferability became unpopular with the fishermen. Their licence had some value, but they could not cash in on it or pass it to their heirs, or use it as security for a loan. They agitated to have licences made transferable, and found ways to evade the prohibition. Soon, nearly every type of limited licence had become transferable, or marketable.

These three attributes, or characteristics, partial as they were, complemented each other. For example, transferability was more valuable if the licences were more secure, and also if they had a longer *duration* (yet another characteristic.) A good title and security were worthwhile obtaining if the right had some exclusivity. And so on. Those who acted politically to get more of one attribute in their local limited-licence scheme found themselves promoting the inclusion of all three.

5. PROPERTY

5.1 Characteristics of property rights

This account now jumps from this history of regulation to a short survey of what property is. In doing so the issues that have to do with personal property, with movable assets are disregarded and focus on "real property" in soil, minerals, water and other natural resources. We start with a piece of land. The person with ownership rights over it has powers to use and cultivate the land; to sell or rent it to others and to receive and keep its rent or yield.

What is it that gives the rights holder these powers? It is the collection of *characteristics* of the particular property right he owns. It's a mistake to think that one either has a property right or has not. Most systems of law make provision for a variety of rights. All standard or well-known property rights have some of each of the six important characteristics, but in different amounts. If the right has too little of the relevant characteristics, it is still a property right but it does not enable the holder to fully exercise certain powers - some, but not all.

Before turning to rights over a fishery, consider a simple example. To serve those attending a fair or festival in the country a farmer's field has been turned into a parking lot. When a driver enters the lot he receives a ticket. The driver "owns" the ticket and whatever it entitles him to. The ticket represents a feeble kind of property right usually known as a licence. A licence can be issued by a private property owner like a farmer, or by the government in the form of a variety of licences and permits to do things that would otherwise be trespasses or illegal. The parking licence gives our driver very few powers: he cannot transfer it to someone else, nor change or manage his part of the parking lot, nor get income from it. He cannot do these things because, although his licence has some of all the essential characteristics, it has not enough.

This is as true of a fishing licence as it is of a ticket in a parking lot. Consider the following six characteristics:

i. The first is *exclusivity,* the right to use and manage a resource without interference. The more sources of potential interference, the less the exclusivity. Every kind of property right has *some* exclusivity, and the fee-simple ownership held by some farmers comes close to putting the owners on isolated desert islands, nearly 100 percent exclusive. Now consider a right to use a fishery. To what extent can the right-holder exclude others from the powers of ownership (to use and manage the fishery, to sell the fishery, and to take income from it)? If the right is over an isolated fish-pond in the country, the right is nearly 100 percent exclusive. But if is merely an entitlement to fish for a pelagic species in the high seas, it has close to zero percent exclusivity.

ii. The second characteristic is *duration.* This is the period the holder is entitled to exercise the powers of ownership. Property rights range from a term of a few hours to a number of years. Some kinds of right that are short of exclusivity can nevertheless have a long duration. The ordinary fishing right has a duration of one year, renewable. If it is expected to be automatically renewed, then its effective duration is much longer.

iii. *Security*, or *quality of title*, is the third characteristic. If an outsider can successfully eject a possessor because his title is difficult to prove or wrongly based, the right is not secure. If the original owner can, at will, take back possession from a person to whom he granted a lease, the lease is not secure. If the government can interfere with the fisherman without notice and reduce his powers or the size of the estate, the fisherman's right is insecure.

iv. The fourth characteristic is *transferability.* In the countryside, farm land has long been bought, sold and bequeathed. In fisheries waters, however, the licence was at first not transferable. Why should it be? Anyone who wanted a licence could get it free from the government. But when fishing rights began to acquire more of the *exclusivity* characteristic, there emerged a demand for the right to be transferable.

There are two other property-rights characteristics, *divisibility* and *flexibility*; they are sometimes treated as a subset of the characteristic of *transferability.*

i. The fifth characteristic is divisibility. When a fishing right is divisible its holder has powers to change the scale of his/her enterprise. The ownership can be made joint or single. The size or quantify of the thing owned, such as hours of fishing, a territory or a quota, can be split. If the holder's right is also transferable, the holder can *assemble* parts of rights to match the scale of the resource or the fishing vessel. Divisibility is increased by adding to the permissible number of joint owners, or the number of units into which the thing owned, may be split.

ii. A right can gain *flexibility* in many ways. Typically Rights have conditions or stipulations. The more easily these can be relaxed in special circumstances, such as an unexpected change in fish migration or population, or in the seasonality of the market, the more flexible the Right is. Payments obligations can also be made more flexible, *e.g.* when holders may pay for the right by a royalty instead of by a set rental (when the royalty is based on net revenue instead of on weight of catch). Typically, flexibility transfers risk of unexpected events from the user/holder of the right to the leassor.

These characteristics are not abstract. One can think of ways of measuring each of them. In addition to their conceptual measurability, they are valuable. The more of a characteristic a Right has over a piece of land or water, the more valuable it is to its owner. This is because having more of these characteristics enables the holder to catch fish at lower costs, to improve the size or the quality of the catch and the stock, to sell his catch at the best going prices, to reduce his transactions costs with other fishers, and to reduce the risk of being ejected or dispossessed of some of the powers that traditionally go with ownership of a natural resource.

Security and duration, if they increase together, justify the holder in looking ahead, to husband the stock by adjusting present catches with respect to total amount, age, gender, size and season, to buy durable vessels and equipment, to eject trespassers, and improve, or protect, habitat. In such ways, having more of the characteristics in one's ownership rights not only allows one to do more things, but it creates incentives to do them. The incentives are current and expected future income, and, if there is transferability, a higher payment to be received when the holder retires or dies. If rights are widely transferable, then an exchange or market in them will develop. If so, those who can find better things to do with their time and capital can leave, and those better suited or having more time, a closer location, a better vessel, more risk-taking propensity, etc. can buy in. Their trades may be permanent, or for a few days or months.

5.2 The standard property rights

Of course, if one wants to hold rights over a particular piece of land, or a fishery, one cannot just acquire it with whatever blend of the six characteristics one wants. Usually one must accept one of a few standard interests or tenures: allodial title (or variants with names like freehold, fee simple, free and common socage, or patent); leasehold (with a variety of characteristics added or taken away with conditions or covenants written in the bargaining); easements; "profits"; and some special ones with names like mining claim; appropriative water right; tree-cutting licence; pollution right; and so on.

At the end of the scale there are standard rights having very little exclusivity. Under the common law there are: individual licences; co-ownerships (including joint ownership and ownership in common;) and free-and-open-access (in Roman law called *res nullius*) of which most fisheries may be examples, especially a fishery on the high seas. There are really not many of these

standard blends or categories. Very rarely, the legislature or the courts re-defines one of them, in effect changing its mix of characteristics.

5.3 Who holds the right?

5.3.1 Which government may grant a fishery property right?

One of the unsettled questions about fishery-rights systems is whether the government is prepared to admit that the right that it distributes qualifies as a standard property right under the local law of property. Here are two reasons, good and bad, why it may not.

i. A legalistic/constitutional reason is that, in some states the fisheries are under government control, but the government has never acquired a property-like interest over them. There is a legal maxim to the effect that a person/government cannot grant to another what it does not hold itself. This may also happen in a federal country. It may also happen because a fishery is outside national waters. If so a government may have sovereign rights as against another, but cannot, according to the maxim above, grant property rights in fisheries to individuals.

ii. A bureaucratic reason is that fishery administrative agencies, accustomed to making and enforcing regulations, are unwilling to share their powers with property owners.

5.3.2 Who may hold a right?

To whom may the government grant an individual fishing right ? In the old days, in an open-access fishery on the high seas with large vessels, the licence to fish was usually, I believe, issued to the vessel - the vessel had a licence attached. However, as fishery regulation has moved in the direction of a system of individual rights, there is a tendency to vest the right in a person.

Doing so still leaves a choice. Should the person be the vessel owner - possibly a business corporation? Should it be a group of such individuals, a sort of co-ownership? Or should it be all the owners of all the vessels, in effect creating a co-operative or communal proprietorship or leasehold or licence over all the fishery?

Some experts raise objections to making the vessel owner or owners the units of fishery right-holder. They suggest that this system tends to unfairly exclude the hired captain and the crew. In many fisheries - but by no means all - the crews are paid in the form of percentage shares of the receipts from sale of the catch. These experts suggest that the individual property rights in the fishery should be further divided according to the crew-shares on each vessel. Sometimes this idea seems rather visionary and theoretical, but it has been a political issue in Iceland.

5.3.3 A property right over what?

In all situations where there are private property rights over natural resources, there is some uncertainty under the local system of law about the subject of the right. Exactly what is it that the right-holder owns? Take the owner of an exclusive mining right. From what may he exclude other miners? All the land, rock and minerals below the surface? All the minerals, or just those that are valuable? When half the minerals have been removed, does the holder of the right still own the rockwall and roof making up the chamber around them? May he exclude a neighbour who wants to use the chamber as a tunnel or a drainage pipe? These varieties of exclusivity have been worked over in local courts, and all are possible, in special circumstances.

There is a similar range of possible subjects of water rights on a river. If a farmer has an exclusive right to divert water to his land, does the exclusivity apply to the water itself, or just to the right to divert it? Does the exclusivity prevent a farmer upstream from diverting the flow? Does he own the flow he might divert but does not?

Similar questions to these are found in fisheries. Usually in older systems of law swimming fish cannot be anyone's property. Only when they have been caught and reduced to possession by being brought on deck, say, does anyone own them. But there are exceptions. The old laws do also allow swimming fish that are in a lake or a private pond to be privately owned, even though they have not been caught. Sometimes the owner of inland fishing rights can rent his rights by the hour, another type of ownership. And, under the old customary laws of whaling, certain whales that a vessel had failed to capture, but had escaped, could still "belong" to that vessel even though it was later caught and brought alongside by another vessel.

What will be the usual subject for modern fisheries rights is not yet clear. Take the variety of *inshore* property rights. The owner of rights over an inshore fishery could hold exclusive rights to set up fixed gear - as in Japan. Or, as in other countries, the holder could own a right to use any gear or even, own the fish that have not yet been caught in a bay, fjord or lagoon. As for offshore fisheries within the EEZ, it is too early to say over what thing the right holder is going to have exclusive rights.

The economic and legal decisions are still being made. Francis Christy will be talking about the advantages and difficulties of exclusive territorial or area rights. To many it seems reasonable that, even on the high seas, one holder should have a monopoly of an area that is delimited on a map. South Africa has used this approach. Economists have long discussed setting up a private sole ownership of a particular stock of a particular species in a particular location, but there are no real-world examples, onshore or offshore water. What did emerge, in the 1960s and 1970s, and what I will be talking about, is the modern development of the limited-licensing fisheries regime: the exclusive individual *property* right to land a certain *number* of fish, in a certain location, of a certain species, during a certain period. This is the individual or vessel quota, to which I now turn.

6. INDIVIDUAL TRANSFERABLE QUOTAS - ITQs

6.1 The innovation: the quota as a development of existing licensing schemes

The ITQ, as it emerged in Iceland and New Zealand in the 1960s and 1970s was the latest development of the fishing nation progression from open access to regulated fishery to limited licensing. The administrators who introduced it were trying to improve the existing managerial regime. They looked for a scheme with greater enforceability, more revenue for government and a smaller need for a costly government presence. Its introduction was perhaps made easier because in both countries the fishermen were in the process of expanding into the widened territorial sea. Probably in neither country did the official innovators think in terms of the creation of property rights. That is also true of fisheries elsewhere that have more recently come under individual quota management systems. Indeed, many governments have discouraged their fisheries agencies from using the word property.

6.2 Characteristics of ITQs

In nearly all cases, ITQs were introduced to replace an earlier "exclusive" system such as limited licences. There were exceptions, such as that for the northern tuna in Australia and some offshore stocks in New Zealand neither of which had yet been under any kind of exclusive regulation. The holder acquired a numerical quota, denominated in pieces or by weight.

These schemes distinguished between two types of quota. One was the absolute *amount* that a vessel might take from the TAC in a season; the other was the ongoing percentage *share* of the TAC to which the quota holder was entitled every season. The initial distribution might be in terms of absolute quotas, but was implicitly in terms of a percentage share. In most quota fisheries the ongoing share percentage was based on the holder's share on the catch in previous years under licensing. In some new fisheries - without a history - the holders were given, or were sold, equal shares.

In most places a politically-motivated attempt was made to steer the quotas to individuals. In the case of Canada's "Enterprise Allocation Scheme", the quotas were distributed, from the beginning, to a few large companies. There are probably other exceptions to the "individual" orientation. In most schemes, except those in New Zealand, there was no intention of charging an initial price, rental, royalty or tax.

The administrators started off many schemes nervously, giving the quota rights or licences a limited duration. However, this feature has usually been relaxed, perhaps by making renewal more-or-less automatic. Likewise, administrators initially refused to make most schemes transferable or marketable, or achieved the same effect by limiting the amount of quota that any holder could sell, or acquire. Fishermen soon expressed a demand for transferability, and/or evaded the limitations. Most laws were changed, and the IQ or IVQ became an ITQ.

6.3 Not a new kind of title to resources

The quantitative feature of the quota licence was a novelty in ocean fisheries, but the general idea had long been familiar to participants in other natural-resource sectors. Government disposes of the resources from public land in quantitative terms, and old and new holders of the resources trade all or parts of the amounts they have acquired. For example, in agriculture, farmers buy and sell livestock by the head or the pound, not attached to or confused with the land on which the stock is located. Farmers also acquire, rent and sell water for irrigation. In the power production industry it is not unusual for the trade to be in terms of cubic feet of river flow, or even in terms of horsepower.

In the petroleum and natural gas industries, ownership is in volume terms, and firms trade underground units with each other. In the lumber industry on private lands, milling firms acquire rights from landlords to cut certain lengths or volumes of timber. In all these cases, the deed may specify the place where the resource is located, but those who are trading are less interested in the location than in the amount of ore, lumber, oil, trees, water, etc. to be removed. This was also the ITQ approach to natural-resource trade: the individual does not acquire a right to a minutely-defined area, but to a minutely-defined amount within a general neighbourhood.

7. THE PROPERTY RIGHT CHARACTERISTICS OF ITQs

7.1 Listing the characteristics

Governments protest that according to their intentions, an ITQ is not a piece of property. Nevertheless, at this stage the evidence is that the fishery quota, or quota-licence, is a form of standard individual property right, with its own blend of characteristics (Scott 1989 pp. 11-38; Devlin and Grafton 1998 pp. 68-100). It is descended from the historic ocean freedom to fish, a liberty or licence that had almost none of the characteristics of property. It has emerged from reforms to the limited licence, a simple licence with added exclusivity and transferability.

It has features strikingly like those of quantitative water rights, oil rights and other real interests in land, long known to the common law, all having well-established property-like features. What is more, it has more than trivial amounts of the essential characteristics of a property right, *e.g.*:

i. *Duration*: All quota shares have a life of more than one season. Some seem to be permanent. All can be renewed.

ii. *Exclusivity*: A quota licence is much more exclusive than what went before it which is a great change. But the holder's right is merely in co-ownership with other holders; and is merely a right over the catch and not over the stock. Neither the swimming

fish, nor fish yet to be born, nor the fish habitat have been exclusively assigned to any individual or collectivity. However, in most instances, an individual's right to a share of the catch is equivalent to a right to a share of the stock. That is, to have a 1% share in a TAC is implicitly to have a 1% share in the fishstock from which it is caught. Every other possible shareholder is accounted for by the initial distribution of the quotas and subsequent transfers. Further, because of the long duration of quota rights, to have a 1% share in the catch implies having a 1% share in future catches, and this, given stock dynamics, is equivalent to having a 1% share in the fishstock.

This is an important result: because the quota allots a share in the collective right to catch fish, it must implicitly allot the same share of the of ownership right over the stock. But a percentage share of the stock is *not* exclusive ownership. The person going fishing with an ITQ has impressively more exclusivity than his ancestors with their inherited open access to the fishery. But his share gives him little or no power over the management of what he owns. Managerial powers are diffused and dissipated among the fishermen and the administrators.

iii. *Transferability* (and *divisibility*): Like limited licences, quotas have become marketable. Private brokers, groups of fishermen and governments have established exchanges on which they can be traded. They acquire present values, related to the share of the net present value of the catch in future years. These present values are affected by speculation and hedging which can add to, or reduce, the fluctuations, uncertainty and risk in their values. In these respects their transferability is like that of certain well-established types of property value in land or natural resources. Further, in, perhaps most, ITQ systems, the quotas are highly transferable in the very short run - rights to catch and land fish can be rented by the trip, by the week and by the season.

iv. *Security* and *quality of title*: There is nothing in the ITQ rules that makes the quota right more secure than the older licences that went before it. There can still be disputes about who owns a quota, and there can still be inconstant governments that unexpectedly revise the system, depriving the holders of some of their quota. Nevertheless, the marketability and bankability of quotas, similar to that of other kinds of real property, seems to have heightened the reluctance of administrators or politicians to reduce the value of the system by casual changes in the law that govern the powers of a quota-holder.

To summarise, in the introduction of the ITQ, especially in offshore fisheries, the fishermen were transported from holding the individual powers inherent in an ordinary transferable license, with a little inherent exclusivity, to holding a property right with enforceable characteristics, in positive amounts, of long duration, transferability, exclusivity and security.

7.2 Fishermen acting like a property owner

Proprietary behaviour by fishermen was a major step with widespread effects. For example, take husbandry. The fishermens' sometimes shrill, negative, obstruction of policies about the amount, and especially the distribution, of the *catch* has given way to paying serious attention to the biologists' proposals for increases or decreases in the *stock*. Where once the individuals' right to fish was a thing to be battled for; their collectively-owned stock had become a natural asset to be enhanced.

Or, take enforcement. ITQs did not cure some fishermen's incurable addiction to getting around the rules, to catching and landing more than their entitlement, and to free-riding on the efforts of others. Indeed, preventing their cheating has now become more complicated and costly. On the other hand, once the group of fishermen saw themselves as the *owners* of valuable rights to the fishstock, they began to disapprove of cheating. They no longer indulgently ignored or covered up the infractions of others, for they now saw the others as thieves. It became worthwhile to obey the rules oneself, if doing so discouraged cheating by others. This has led to a new helpful attitude, born of ownership, that has prevented sky-rocketing official enforcement costs.

Finally, take competitive behaviour and uniform behaviour. Fishermen whose rights had been grandfathered in from older forms of fishing licences still tended to act as though they were in a contest. Who could find the fish first? Who could get the largest load on their vessels? Whose vessels had the greatest speed, capacity and versatility? Under ITQs however each soon learnt that the other vessels were not his antagonists. As long as each respected their quota limits, there was a greatly-reduced need to behave uniformly and rivalrously. Like a property-owning farmer, each could bring in his harvest without worrying about whether his neighbour had forestalled him. Some could perhaps stretch their fishing to a year-round activity while others could make the opposite decision: taking their share of the harvest when it suited them, fitting in the harvest of one species in one season with that of other species in other seasons. Some could fish slowly, with modest vessels, others could speed on super-vessels with larger crews and versatile gear.

8. ECONOMIC RESULTS OF INTRODUCING ITQs

8.1 Effects on the efficiency of the economy as a whole

There is no doubt that, compared with the previous systems of fisheries regulation and entry limitation, the ITQ system improves the allocation of resources. This is an economist's notion. The economist thinks of an economy as having a limited amount of resources: workers, thinkers, capital goods, land, natural resources, and so on. The ultimate economic question is how to allocate these resources among the different industries and activities. One danger is that too many resources will be allocated to some activities, and not enough too others. In the past,

with open-access, non-exclusive, fishing rights, too many resources were drawn into fishing. Some labour and capital could have withdrawn from fishing with little or no reduction in production. If this withdrawn labour and capital were used in other sectors, their production there would have been more valuable to the economy as a whole than it had been in the fishery. In the jargon of economics, the allocation of these resources would have been made more efficient.

That is why many economists, who admit they know little about fisheries and the lives of fishermen, greatly favour property in general, and ITQs in particular. When fishing rights are quantitative, their holders have an incentive to reduce the costs of landing their quota by using less labour and capital per fish landed. Some vessels, with their equipment, are made less capital-intensive. Some operators sell out, and their quotas are added to those who stayed. When all vessel owners behave this way, the result is a withdrawal of labour and capital; to others the fishery becomes a lower-cost sector, and the economy as a whole better re-allocated its resources to other sectors.

8.2 Private, social and community effects

Fishermen, or any other kind of producer concerned are not expected to be concerned about the economy as a whole: efficient allocation between sectors is not their problem. So, how do ITQs affect fishing costs, the price received, security, safety, working conditions, and the community where they live?

i. *More haste, less income.* Fishermen where ITQ have been adapted have been surprised by the effect on their style of work: especially the reduction of the need for speed to make the most of season openings. This change affects almost every aspect of fishing. They are so numerous that I can only allude to them here.

ii. *Vessels can be simpler without loss of catch.* Equipment for instant discovery of the fish is less essential. Crews can be smaller. Storage needs are less. Bycatches can be avoided or landed with less loss of the main species.

iii. *Trips to fishing grounds can be longer without loss of catch.* Ports need not be small nor need they be located close to particular fishing grounds.

iv. *Crews' work can be safer*, they can take days or weekends off without loss of catch. The active season can be spread over more weeks, or months.

v. *Fish can be landed as dictated by market price* as the market need not be flooded when the fishery is opened. Vessels can time their landings for periods when the supplies are short or demand is high. Under management by closures, fish were often stored which reduces their quality and the price received. Fish often had to be processed after storage. Under ITQs more fish are sold fresh, storage is reduced and preservative is reduced. Total employment is not necessarily reduced, as fresh fish may be transported by air to distant markets.

9. DISTRIBUTIVE EFFECTS – WHO GAINS AND WHO LOSES?

ITQs can change processes, locations, jobs, incomes, and lifestyles. They can make the allocation of resources in the entire economy more efficient. But not everyone gains, and there may be losers. These have been mentioned in the technical literature, but not intensively researched. What follows is a list of probable influences on the fishery, large or small. They may be painful enough to induce policy-makers to abandon the idea of ITQs.

At first, the transition will be painful to some. Some communities may become ghost towns and property values fall and homes and shops become empty. Some people will have to leave the fishery permanently. Crews will become smaller and processing plants idle. But other communities will grow, and new jobs will be created there.

In the longer run, after the transition, other distributional effects will be observable.

i. *Government revenues.* In some communities, as some fishermen accumulate more quota, the government will be tempted to siphon off part of the unearned rent or surplus. This is the cash counterpart of the extra costs and waste of fishing before ITQs came in. From the beginning the New Zealand government planned to take a healthy portion of this surplus. In Iceland, there was no price or tax on quotas, but today Iceland's politicians are debating whether to impose one.

ii. *Crew shares.* In communities where the rent or surplus is left with the industry, there will be debates as to the extent to which crews members, especially on vessels where it is traditional to divide the trip profits, ought to share in the increase in the value of their quota.

iii. *Rich companies versus poor individual fishermen.* It is often suggested that as quotas become transferable, and more valuable, it will be increasingly difficult for those from low-income fishing families to acquire them. For this, and other, reasons, those in the industry will be polarised between a few wealthy fishermen or vessel owners, and a larger number of holders of small quotas. Those who are pessimistic about the benefits of ITQs arising may predict that eventually all quota will have been concentrated in the ownership of large companies, perhaps processing companies. This is possible, although data on the first years of today's ITQ systems show no major trends. There are fewer vessels, so fewer owners, there are not much evidence of large or wealthy owners buying quotas in order to own a whole fleet of vessels.

Much could be written about the history and future of vertical integration (processing-company ownership) in the natural-resource industries in fishing just as much as

in mining and logging. Today, for instance, critics are debating whether ITQs cause an increase in vertical integration from the wholesaler or processor back to the vessel; and whether it is a good or bad thing. Two points must be made. First, long before ITQs there were some food-company ownership of vessels or licences. Second, in theory at least, there is no reason for large companies to find ITQs more attractive to hold than the earlier licences.

10. BEYOND INDIVIDUAL PROPERTY RIGHTS

10.1 Deficiencies of ITQs

The sections above have shown that ordinary fishery regulations developed into emphasis on licensing, that licensing grew into limited licensing, and this was transformed into the ITQ. Each new form has had more property characteristics than its predecessor. Nevertheless the evolution has been constrained, because each new form has had to be similar to what went before. That means that a fishery-management regime based on ITQs is good but not yet great. There is room for improvement. Here is a list of the gaps and deficiencies.

i. *Racing and capital-stuffing*: Few fishstocks remain available in one habitat all year waiting to be caught. Some are migratory; access to some stocks may be closed to protect spawners, or to prevent the catching of fish in a season when their value is low. These closures mean that, even under ITQs, fishermen will race each other to bring in the catch, and will acquire vessels suitable for competitive fishing. As well, in some fisheries, ITQs do not altogether prevent wastefully rapid adoption of new techniques.

ii. *Public goods: providing information*: Some goods and services that are inputs into fishing are in a category called public goods. When they exist they are valued by, and available, to everyone. They cannot be divided into individual units. Many services traditionally provided by governments are of this type: examples are law and order; national defence; prevention of contagious disease; a clean environment. In a fishery this is also true of certain activities that benefit all the fishermen and there is no way that any fisherman can be excluded from enjoying it equally with all the others.

   One of these is information about the fishstock. We have seen that older forms of management, such as closures, gear regulations and limited licensing, led to antipathy between groups of fishermen and those who were making and enforcing the regulations. When ITQs were introduced, fishermen began to see more point in the information that biologists and regulators produce. Indeed, in some fisheries the vessel owners agreed to pay for biological studies and surveys. Nevertheless, because information is a public good, the inducement is weak for any ITQ holder to provide it, as he can just as easily free ride on information provided by others.

iii. *Another public good: enforcement*: The attitude of ITQ holders to the problems of poaching has already been discussed. Seeing themselves as owners of a share of the stock, they begin to resent the failure of other fishermen to stay within their quota entitlements. They may actually help the administrators to enforce the rules. However, enforcement is also a public good. Any fisherman may be glad that enforcement, monitoring, observation services, and auditing are provided, but may rationally try to evade the rules cheating himself. He is free-riding, a kind of behaviour that ITQs do little to prevent.

iv. *Another public good: retaining bycatches*: Nearly all stocks of fish are mixed. Most of them mix adults and juveniles of the same species. Fishing for the adults therefore typically leads to the inadvertent catching of low-value fish. These fish fill up the vessel's storage. If the vessel is in a hurry, perhaps because of an impending closure, it discards the low-value fish. This is one reason why, long before ITQs had been invented, vessels discarded fish at sea.

When juvenile fish are caught and discarded, they do not survive to spawn or to be caught again as adults. Their mortality reduces the stock and future TACs. Hence a discard is an undivided loss for all the fleet, and the prevention of a catch-and-discard is a public good.

ITQs changed this. There were no longer closures, so vessels had more time to take the juvenile bycatch to port. However, there was a new reason for discards at sea. The juveniles used up the vessel's quota. Captains would have to pay for more quota to legally land them along with the adults he caught. If the juveniles were worth less than the price of the quota, it paid to dump them which is why, when ITQs were introduced, the system was accused of creating a bycatch problem.

This was correct, but whether the new bycatch problem was worse than the old depended on how long the openings were in the old days, and on how much quota cost under modern ITQs. Nevertheless the new problem itself would not exist if the captain was not required to show quota for all the fish he landed, so we must add it to the free-public-good type defects of the ITQ system that I have already mentioned.

10.2 Summary

As a property right in a share of the fishcatch, ITQs give the vessel owner the exclusivity and security he needs to cut his competitive investment in vessel and equipment and to abandon his racing behaviour. They therefore cut costs. They also allow him to get a better price. But there is a contradiction. ITQs are individually exclusive property rights in an asset that is essentially collective *i.e.* exclusive property rights in a fishstock that cannot be divided into individual parts. The right-holder cannot protect and improve "his" property, and, because of public-good features, he has only a limited desire to try to do so. The implication is that the ITQ must be seen as the next step, but not the final step in realising the six characteristics of property at sea.

11. COLLECTIVE ORGANIZATION AND FISHERMAN SELF-GOVERNMENT

11.1 Introduction

Just as the centuries-long improvement in fisheries management waited for the addition of the characteristics of property, so I believe that in the next improvement these same property characteristics will be essential. But they will play a different role. Today in the property characteristics of ITQs, each individual has acquired useless management powers in a collectively-used stock. For the ITQ holders to exert these management powers, the fishery - the fishstock - must be managed and exploited as an entirety. This will be done by forming organization (company, firm, club or co-operative) of which the fishermen are members[2].

I have predicted before that there will be another step in making the traditional laws of property, contract, and incorporation applicable to offshore fisheries. Much of what I wrote then was speculative, but we now have tangible examples. With differing points of departure, with or without government support, many vessel owners who take their catches from a given stock (or place) have united. Some provide services that no one provided before; some take over roles from governments. Some raise money for various purposes connected with research, information, enforcement, storage, and so on. Organizations of fishing in New Zealand, Alaska, and British Columbia provide many examples.

The state's willingness to provide services for fishermen is definitely on the wane. Its only official recourse is to use taxation and compulsion, to pay for what it previously did for nothing. This means that the management of "private" fish will be steered by state taxation and police regulations (an anomalous way to achieve government objectives). This has alerted fishermen to the argument that, if they are to pay for the services government provide, they might as well choose them, and if their fishing is to be controlled by rules, they might as well make them.

11.2 Problems of organization

11.2.1 What we don't know

There has not yet been study of the collective action of high-sea fishermen to match the many studies of fisheries regulation and of small coastal fishing groups. So it is not known which problems are likely, but will be insignificant in practice. Game theory may be enlightening though it is usually concerned with initial contracting, bargaining and strategy about taking a single action or providing a particular good, as opposed to bargaining in the continuing process of management. (We do however, know more about the co-management and self-management of small in-shore fisheries by communal groups, see Pinkerton [ed.] 1989).

11.2.2 Management

In thinking about the best conditions for collective action and contracting, David Hume wrote: "Two neighbours may agree to drain a meadow, which they possess in common because 'tis easy of them to know each others mind; and each must perceive, that the immediate consequence of his failing in his part [his own part], is, the abandoning of the whole project. But 'tis very difficult, indeed impossible, that a thousand persons shou'd agree in any such action; it being difficult for them to concert so complicated a design, and still more for them to execute it; while each seeks a pretext to free himself of the trouble and expence, and wou'd lay the whole burden on others." (Hume 1739 Bk 3,2,7, p.538, cited by Hardin 1982 p. 40).

The "action" that would be most contentious in a fisheries organization is the setting of the TAC. This involves obtaining consensus on the ultimate goal of stock management and how to get there without imposing unacceptably small catches on the way. As Hume said, doing so will be difficult because the group will be very large and very heterogeneous. Hume predicted that a member would fear that the others would free-ride *i.e.* not play their roles. In the case of a fishery, the analogous problem would be that each vessel-owner would fear that the others would make rules that would reduce his advantage from working together to a level lower than if the group did not make rules and left him to fish on his own. (Olson 1965). This fear would lead him to oppose the idea of co-operation in the first place, and to impede it working in the second place.

As it happens, almost by coincidence, an ITQ regime automatically provides the fixed (percentage) sharing needed to win fishers' support for co-operative management. I have already conceded that the introduction of ITQs has not met every problem of an ocean fishery. But, in the formation of the ITQ regime there was resolved an exclusivity problem that could have caused many kinds of collective organization to fail: the assignment of permanent agreed shares to vessels or persons. It follows therefore that when the fishery administrators arrange to set up an ITQ regime, they have *already* taken two giant steps toward exclusive membership closed to outsiders (no free-riding); and fixed permanent sharing of the catch in ITQ percentages, untouchable by the day-to-day decisions of the organization.

Almost miraculously, fishers who move on from ITQs to a self-regulatory-regime are likely to succeed. One the other hand, fishers who form a co-operative among a large number of offshore fishermen to develop a previously unregulated fishery, are likely to fail. This prediction stems from the general historical rule, that wherever property rights exist, their right-holders are able and likely to use it to form more complex organizations for self-government, protection, and production.

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[2] Economic theorists may observe that the formation of a producers' co-operative has elements usefully similar to those in the formation of a "club" as analysed by James Buchanan (1965). But there are significant differences between consumers' and producers' "club goods". Probably greater insight can be gained from the analysis of farmers' irrigation and marketing co-operatives by Elinor Ostrom *et al.* (1994) and by authors in the farm-economics literature.

12. CONCLUSION

One of this paper's main themes is that to understand the evolution of property rights in the ocean fishery one must understand why it was slow. The fishery is one of the few natural resources where, until recently, there was neither property nor government regulation. The two are inter-dependent causes. The official reason for the prolonged absence of property rights is that a public right of fishing was affirmed in the thirteenth century and maintained for five hundred years. But property rights can be changed. A more scientific reason is that there was no demand for a property right. It was recognised that the ocean fishstocks were not threatened with extinction or even serious depletion. For the same reason, there was scarcely any government regulation of fishing.

When fishstocks seemed endangered, no-one had the property rights to look after them. Open access and freedom of the seas continued. Governments took the lead, inventing and adapting ever more invasive forms of stock and catch regulation. In the last fifty years, the various characteristics of property rights in land, have been loaded onto regulation, mostly by increasingly regarding the ordinary regulatory licence as a property certificate or deed. The characteristics that really made a difference were exclusivity and transferability, and metered amounts of these turned the limited licence into the ITQ.

It seems, however, that the small scale of the individual licence can never put a fishstock under exclusive ownership and management. To approach this ideal, organizations having property characteristics, but on the same scales or extent as the fishstocks, will be needed. Now, one finds that some ITQ systems are already moving in this direction. In my presentation I have emphasised one reason: the sharing of the catch that has been grandfathered into the ITQ has provided a pattern of sharing that allows fishermen to work together without serious fear or jealously that they will become worse off.

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COMMON PROPERTY RIGHTS: AN ALTERNATIVE TO ITQS

F.T. Christy
IMARIBA, 2853 Ontario Road NW#619
Washington DC 0009, USA
<imariba@sprynet.com>

I. INTRODUCTION

Individual Transferable Quotas (ITQs) can be extraordinarily effective in many fisheries and can lead to eventual self-management with attendant benefits to society as a whole. However, there are certain situations where ITQs cannot be used and where other approaches must be adopted.

These other approaches, which might be considered within the framework of property rights, include: a licence limitation scheme that provides exclusive rights to the holders of the licences; a territorial use right in fisheries (or TURF) providing exclusive access to a community, or to a group of fishermen over a certain area; and a stock-use right in fisheries (or SURF) which would provide exclusive access to a group of fishermen over a particular stock of fish (Townsend 1995). The latter two cases constitute essentially a devolution of management authority, rather than a management system as such. They create a form of property right for the community, or user-groups, allowing them to determine the management system, which might take several forms (*e.g.* ITQ, licence limit, rent extraction or others).

Property is an extraordinarily complex concept, which may contain numerous entitlements and expectations, such as: a right of exclusive access to the resource; a right to dispose of the resource through sale or lease; the ability to preclude actions by others which may damage the resource; the ability to grant easements or covenants controlling future use; *etc.* Each of the various approaches to management has the attribute of exclusivity and, on this basis, falls within the concept of property. Other property rights may, or may not, be associated with the various approaches.

For this paper, management is defined as those measures that are designed to lead to an increase in net benefits from the resources. Benefits are broadly defined within the context of human welfare. That is, measures that serve to increase biological yield from stocks are not herein considered management unless they also produce human benefits such as increased net economic yields, improved employment, increased community welfare or reduced conflict.

It is essential to note that some form of exclusive use rights, and therefore property rights, is necessary in order to achieve effective management. The paper begins with a brief discussion of the difficulties governments face in moving towards more effective management of fishery resources. Although these difficulties generally apply to all forms of management, there are different implications for the different approaches that can be taken. This is followed by an examination of the situations creating special and intractable difficulties for the use of ITQs, both with regard to small-scale and large-scale fisheries.

The paper concentrates to a large extent on common property rights or the use of community TURFs as a means for management. It does so for four major reasons. First, it is my belief that the most urgent and intransigent problems of fisheries management are those relating to small-scale fisheries in developing countries. Second, I suggest that community TURFs are essential for dealing with these problems. Third, the question of property rights for community TURFs is both complex in detail and broad in scope. It raises issues of determining the nature of ownership, both in terms of the character of the owners and with regard to the exercise of the property rights. And finally, although there is an abundant literature on community management of common-property resources, there is a significant lack of information regarding the incentives and conditions that foster the development of community management systems. It would be useful to know how the difficulties in the way of self-government have been removed, but this strictly historical question is not often answerable from present sources (Scott 1993). If community TURFs are to be used for fisheries management, the problems and opportunities associated with their creation must be examined.

Communities have found, and are able to invent, an infinite variety of ways to cope with problems of common property, shaped by the traditions and character of the communities and the nature of the resources. General conclusions are, therefore, difficult to reach. Nevertheless, there are certain activities and measures that can be taken to establish conditions, and provide incentives, that will facilitate the development of community TURFs. This paper concludes with suggestions that might be considered.

2. IMPEDIMENTS TO THE ADOPTION OF PROPERTY RIGHTS SYSTEMS

Creating property rights where none existed before is inevitably fraught with difficulty. It should not be surprising, therefore, that many governments have thus far failed to take the necessary steps to create them and that those that have (with a few notable exceptions, *viz.* Iceland) tend to be in countries without long histories in fishing and without strongly vested interests.

There are several kinds of difficulties associated with such a change. The chief one is that such moves require decisions on the distribution of wealth. Whatever

system is considered (ITQ licence limit or TURF), it provides rights to some users while excluding others. Those excluded may be present users of different gears, from different areas, fishing for inter-related stocks, or potential future users. Decisions concerning the allocation of wealth are generally not within the mandate of fishery administrators but must be made within a political context. Politicians do not generally get involved in fishery matters until a crisis has emerged and the politicians constituents are hurting sufficiently to force politicians to act. Unfortunately, action under crisis is frequently subject to severe constraints so that the resulting decisions are often marked by imperfections.

A particularly difficult aspect of wealth-distribution occurs when non-monetary values are at stake. Such values are held by recreational fishermen, environmental groups, those who believe that fishing should be preserved as a way of life (*i.e.* those seeking MSA or Maximum Sustainable Anachronisms), animal lovers, and those who fear the take-over by 'big business'. Although all such values may be real, some are more trivial than others. They nevertheless compound the difficulties of making distribution decisions. A prevalent problem of particular significance to developing countries is that of maintaining employment opportunities in areas where there are few, if any, alternatives.

Several other kinds of difficulties are present. In some situations, government administrators are unwilling to relinquish their authority or, perhaps, their jobs. If the characteristics of individual and collective rights can be substituted for bureaucratic decision-making and enforcement, the demand for specialized administrators should decline (Scott 1988). A corollary is the view that governments know what is best for fishermen and that fishermen do not have the understanding or the will to exercise management authority effectively. I have been told by administrators that my task was to convince the fishermen that they should adopt the government's regulations because the government was right.

Some administrators may also be more concerned about the status of the stocks than the status of the fishery. On two different occasions, United States' administrators told me that the US Pacific halibut fishery was the best managed fishery in the world and this was when the season was down to a few days. Such predominance of biological dogma on fishery management decisions has long been a major impediment to improved management and, unfortunately, continues today.

In addition to these kinds of socio-psychological aspects, there are also various impediments relating to the fugitive nature of the resources; the complexity of the ecosystems; and the inter-relatedness among the stocks and between the stocks and the environment. However, although information is incomplete about most fisheries, there is generally sufficient knowledge about economic characteristics to be able to adopt and implement management measures that will significantly improve net benefits. The search for the best of all possible solutions is a chimera that attracts model-builders but which has little practical application. It is neither possible, nor necessary, to acquire full information. Many of the pleas for additional information are uttered by those opposed to the measures being considered, in the hopes that they will be delayed or even defeated.

3. INAPPLICABILITY OF ITQs

3.1 Relevant conditions

Under the right conditions, ITQs provide an exceptional means for effective fisheries management. Chief among these conditions is the ability to determine the amount of fish taken by each quota-holder. This may be a count of the number of fish, weight of fish or, perhaps, value of fish. Preferably the measurement should take place at point of capture but since this is generally costly, landings tend to be used as a surrogate. The count needs to include not only the target species but also the bycatch species where these are important. Size of individual fish may also be important if there are price differentials or minimum-size restrictions. Basically, for an ITQ system to work there must be credible and reliable data on the amounts taken by each quota-holder. In addition, there should be relative uniformity in the availability of the stock during the season. If there are significant differentials in the costs of catching the fish at certain times of the year or in certain locations, due to variability in concentration or to other factors, an ITQ system will not prevent excessive fishing effort.

3.2 Large-scale fisheries

For many large-scale fisheries in developed countries, the required conditions for successful ITQ management are generally available. Most developed countries face temperate-zone waters where there are relatively large populations of individual species and relatively few species. Fisheries tend to focus on individual stocks. Observation of landings is facilitated in that there are relatively few landing points capable of handling large vessels. Observation on board is also feasible in many cases. In short, in most of these situations, the problems of counting the fish are not intractable. There may, however, be other problems that impede the adoption and implementation of ITQ systems in these areas, such as high amounts of bycatch of related species (Scott 2000).

Opposition to the creation of ITQs occurs in some countries for reasons not associated with the technical aspects. These include: (a) possible inequities associated with the initial allocation of the quotas; (b) effects of the system on related industries and activities; (c) high value accruing to the quotas and (d) high costs of entry by newcomers; (e) fear that big business will take over the fisheries (Greer 1995); (fi) the related fear that the ITQs will foster monopolies; (g) concern about the "giveaway" of a public resource to private individuals; and (viii) others.

But these issues are not unique to ITQ management-systems and apply equally to all forms of property rights, including licence limits and TURFs. Furthermore,

although not all limitations can be overcome, there are techniques for dealing with them or for alleviating the difficulties.

Certain large-scale fisheries do not lend themselves readily to the use of ITQs. The North Pacific salmon fisheries represent a gauntlet fishery, following migrations along the coastline and into the rivers. A major complicating factor is that the stocks consist of many different strains related to the various rivers in which they were spawned. They are managed, not on the basis of a Total Allowable Catch (TAC) (largely because of the difficulties associated with stock assessment) but on an escapement basis in order to ensure the viability of the spawning stocks of the various strains. Because of this, the managers must adjust the catch levels at each stage of the gauntlet on the basis of the information acquired with regard to the size of the runs during the season insuring the reservation of sufficient stock at the spawning rivers. Thus, it is extremely difficult to estimate an appropriate level of catch at each of the stages in the gauntlet and, therefore, to set appropriate ITQs[1].

In addition, there is likely to be significant variability in harvesting-costs in different sections of the gauntlet, depending upon the concentration of fish. There would be an incentive to apply excessive effort at the points where the costs of catching the quota is lowest. As congestion occurs at these points, effort would shift to earlier points in the runs. The results would likely include excess effort, congestion and the loss of control over individual runs to prevent depletion of some of the strains. Although it might be possible to deal with these consequences by breaking up the overall quotas into separate area quotas, this would be difficult because of the problem of assessing the different sub-stocks, as noted above. But even if it were feasible it would exacerbate the problems of initial allocations. The disputes between Canada and the US over the allocation of Fraser River salmon stocks is indicative of such allocation problems. The application of ITQs might also be difficult for other anadromous and coastal pelagic migratory stocks such as shads, sardinellas, jack mackerels, oil sardines, *etc.* For these kinds of fisheries other techniques than ITQs may have to be used for management.

3.3 Small-scale fisheries in developing countries

The coastline of the State of Kerala in India stretches for about 600km. Along this coast there are over 200 recognized beach-landing spots used by 22 different combinations of gear and vessels, only two of which are mechanized (Kurien and Willmann 1982). The fishermen land dozens of different species during the year. Similar situations are found throughout South and Southeast Asia and along the coasts of Africa where the tropical waters sometimes contain large numbers of different species of fish, with relatively small populations.

Clearly, there would be major, and perhaps insurmountable, problems in attempting to count the landings of the individual species by each of the fishermen over such a distance at so many landing spots. It is conceivable that ITQs might be used for sedentary, or highly localized stocks, such as reef fisheries, but not for the majority of fisheries along the coasts.

A notable exception among developing countries is the tuna fishery in the Maldives, although relative to other fisheries of the Indian Ocean, this should be considered large rather than small-scale. Almost all tunas caught are destined for export and are sold through the State Trading Organization (Christy *et al.* 1981). Formerly, the STO extracted a significant economic-rent from the fishery by paying the fishermen about half of the price it received at the export level. Unfortunately, that system has now been dropped. Nevertheless, the present system provides an exceptional basis for counting the fish landed and determining the source of the landings. It also provides an exceptional opportunity for the establishment of management TURFs, based on the use of Fish Aggregation Devices (Christy 2000).

There may be a few other specialized situations in developing countries where the use of ITQs would be practical and effective but, for the most part, other management measures must be used.

4. ALTERNATIVE APPROACHES: LICENCE LIMIT SCHEMES

Where ITQ systems do not work, other means must be found to manage fisheries within the framework of property rights. Simplistically, the most direct way to avoid or reduce excessive fishing effort is to limit the number of fishing vessels.

Problems

There are, however, a number of difficulties, as has been found in various fisheries where the technique has been adopted. The most serious problem is that of defining what should be limited. A limit placed on the number of vessels induces fishermen to replace their vessels with larger ones. Limits on vessel number and size induces the adoption of larger engines or other factors that make up fishing effort. As long as there are possibilities for substituting factor inputs for those that are limited, these "seepage effects" will occur. The end result, as shown in the Alaska salmon fishery, is a set of highly complex limits on different types of gear in different areas.

Perhaps a more damaging result is that these systems seriously skew the incentive for technological innovation. Such innovations as emerge are those that will increase an individual's profit within the regulatory constraints. If effective in increasing catch, they will be tend to be prohibited. Or, they may well lead to increased wasteful capital-investment and orderly and desirable technological growth will not be possible.

[1] I am indebted to Captain Dave Fraser, Port Townsend, Washington, USA for these points.

Some attempts have been made to combine a licence-limit scheme with a buy-back operation designed to reduce the amount of fishing effort. There are several reasons why such systems have been ineffective. One is that they do nothing to prevent the seepage effect from taking place among the remaining vessels. Another is that the vessels that are bought out of one fishery may enter other fisheries and add to problems of over-capitalization there. Perhaps more important is that most fisheries are marked by a wide disparity among fishermen in catch-per-vessel, for a small number of fishermen tend to take the bulk of the catch. It may be necessary to buy-out more than half of the vessels before there will be a significant reduction of total catch.

These various problems have deterred most managers away from the use of licence-limit schemes. But, where the alternative of an ITQ system is not feasible and where the conditions are right, licence-limits may offer a second best solution. One advantage is that they tend to be easier and less costly to enforce since it is generally easier to count vessels or gear than to count fish. Also, certain fisheries are better suited to management by limits on input rather than on outputs.

Opportunities

Effectiveness of a licence-limit scheme depends upon the degree to which an individual licence-holder can increase his catch by substituting other inputs for the one that is limited. The less the opportunity for substitution, the more effective the system will be. Limits on the total number of fishing traps, or on the total- length of long lines, may be, at least partially, effective in controlling total catch and restraining increased capital-investment. The incentive to acquire a more powerful, or larger, vessel may not be great if it can only marginally increase the amount of fish that can be taken. In addition, where a non-substitutable input is limited, buy-back mechanisms can be used to reduce excess effort.

The conditions under which a licence-limit scheme can be effective need to be identified and, where feasible, such conditions might be fostered by government action. All the elements involved in the process of fishing, including the gear, vessel, engine, searching devices, *etc.*, need to be examined to determine if there is one element that can be limited or that can be changed to one that can be limited in such a way as to discourage substitution. This might mean, for example, the development and encouragement in the substitution of fish traps against trawls. No limited-input system will be perfect but it nevertheless may be preferable, in some cases, to a limited-output approach. The Alaska system of limited-entry for salmon is fraught with imperfections but it has, nevertheless, served to produce economic-rents, which were formerly dissipated.

5. ALTERNATIVE APPROACHES

5.1 Common property rights

Licence-limit schemes may be useful in certain situations but it is unlikely that they could be used at national, or even regional, levels for small-scale fisheries in most developing countries. It would be just as impossible to licence and place limits on hundreds or thousands of kattamurams (log rafts) operating from the various Indian beach landing places as it would be to use an ITQ mechanism. The alternatives for achieving effective fisheries management in these situations are limited.

One approach is to establish a Teritorial Use Right in Fisheries (TURF) and grant it to a community or user-group. This is essentially a devolution of management authority to the local level. Traditionally such systems of self-government existed in many areas throughout the world, having arisen as a means for ensuring community stability. Some of them continue today. These systems of customary marine tenure have received considerable study in recent years.

Traditional systems

The cases where traditional systems of community control of resources exist provide an important lesson for management. They indicate that, where satisfactory exclusive use-rights are in place, the community will often work out effective use-patterns and behaviour. However, these traditional systems are fragile (particularly where they are not supported by government) and tend to break down under pressures of various kinds. These pressures include: intrusion of large-scale operations into inshore waters; depletion of stocks; entry into communities of displaced land-labour; population growth within communities; shift from subsistence to market-economies; and environmental degradation.

A major cause of administration breakdown can result from the intrusion of large-scale vessels into areas used by small-scale fishermen. This competition is a major source of conflict between the two sectors, sometimes resulting in violence. In some cases, both groups fish the same stocks, or they may fish stocks that are interrelated, either as competitors, or in predator/prey relationships. In other cases, conflict arises from incompatible gears. Small-scale fishermen generally lack mobility and are highly vulnerable to these forms of competition. A serious source of such conflict are industrial shrimp-trawlers that operate inshore. There is direct conflict with the gear and vessels used by small-scale fishermen, such as drift nets, which may be destroyed by the trawlers.

In some areas of Southeast Asia, the rapid increase in culture production of shrimp is leading to efforts by the producers to target small fish for use as feed. This form of "biomass fishing" is particularly destructive of the resources and the environment. Although most countries have regulations against trawlers operating in inshore waters, these have proved to be extremely difficult to enforce.

Large-scale purse-seine operations are also moving into the inshore waters of the small-scale fishing communities. In India, for example, oil sardines were once taken by small-scale fishermen for local consumption. But as demand for fish continued to outstrip supply, prices for

the oil sardines increased, attracting large-scale operations.

Once these forms of intrusion take place, the small-scale fishing communities suffer from depleted stocks and conflict. The perceptions and traditions of community use-rights in fisheries weaken, or may even disappear and new forms of management are required.

Movement of workers into the community itself may also be a problem for traditional systems. In some cases, displaced farming communities may move into fishing in competition with existing fishing communities. In addition, rules governing membership in a community may not be strong, so entry by outsiders into a fishing community occurs and add pressure to the stocks. Even where membership is tightly controlled, population-growth within the community itself can add significantly to fishing pressure and create problems for management.

The shift from subsistence to market fisheries brings in economic forces that may weaken traditional management measures. In subsistence fisheries there is no incentive for individuals to catch more than can be consumed by the community. But when a market-economy develops, individuals are motivated to maximize their catch, which may threaten customs and traditions with regard to community sharing of the resources. There are, however, many communities whose traditions have survived the transition from subsistence to market-economies or, rather, have modified their traditions to accommodate the new pressures.

Finally, the degradation of the environment of the coastal zones, rivers and lakes from a wide range of sources has led to damaged fisheries and fishing-grounds and has reduced the opportunities and earnings of small-scale fishing communities. The weakened resource-base also weakens community traditions and controls.

These various developments have tended to undermine many communities' belief that the adjacent fishery resources belong to them and that they have an exclusive use-right to the resources. With the diminished concept of a traditional TURF, the customs and traditions that regulated a community's use of the fishery resources have also been weakened. This has led to an increase in the condition of open-access and, with it, to further depletion of the resource base. This, in itself, generates increased fishing pressure as the fishermen work ever harder to maintain their meager incomes and sources of protein. Small-scale fishing communities throughout the world face increased poverty and deprivation of basic needs.

5.2 TURF concepts

5.2.1 Property within TURFs

Although the history of traditional community-based fisheries management indicates that the systems are fragile and subject to breakdown, it does not necessarily mean that this approach cannot be used in the future. One of the main causes for their failure has been the lack of recognition by national governments of the benefits of such systems and, therefore, a significant lack of protection for them. With the strengthened awareness of the need for better management and of the role of self-regulation in achieving that goal, there are opportunities to re-establish community-based management through the use of TURFs.

Considerable effort has been spent in the past organizing fishermen into cooperatives or associations. The record of success of these efforts is not particularly good. The reasons for this are generally that the fishermen had no meaningful authority over the means of production; the attempts to establish the associations were made by government from the top down and the organization imposed on the community did not recognize or accommodate the informal organizational rules already in existence (Hviding and Jul-Larsen 1993; Platteau 1988). And, the incentives for cooperation (*e.g.* provision of credit or access to markets) have generally been too weak to attract the fishermen and induce them to change their patterns of behaviour.

The basic element underlying community-based management of fisheries is the provision of exclusive rights over the resources in the area adjacent to the community. This fundamental exclusive use-right, or TURF, distinguishes community-based management from fishermen's cooperatives or associations that are not based on community-control over its resource base.

Whether this right can be used to achieve effective community-management of the fisheries depends on a number of factors. It is not a foregone conclusion that the acquisition of a TURF will lead automatically to self-regulation among the TURF-holders. The factors and conditions that will facilitate, or impede, community-based management need to be examined in detail. Basic to this examination are questions as to the meaning of the property right: who owns the right and what are the powers associated with it.

5.2.2 Community characteristics and membership in the community and fishery

There are various characteristics of small-scale fishing communities that are particularly important with regard to the possible adoption and exercise of local management authority. These relate to the membership in the community and the conditions of becoming members; the kinds and degree of authority available; the decision-making rules and arrangements; and the external forces and factors which have influence on the community.

One of the basic questions facing a decision to create a TURF and to facilitate a community-approach to management is that of defining the community that is to receive the rights and responsibilities. In some cases, the decision may be easy, for example, where the community is isolated, made up of a relatively small number of members; relatively self-contained and homogeneous. In most cases, however, defining the community is more difficult.

Community boundaries may not be clearly defined, either physically or in terms of external economic and social relationships; there may be widely varied activities,

both within the fishery and the community as a whole; ethnic or religious differences may be significant; disparate and incompatible gears may be in use and it may be difficult to establish effective control over the range of fish stocks that migrate along coastlines. In some cases, residents within a fishing village may perceive themselves as members of different communities within the village.

In examining the problems of defining a community, it is important to distinguish between two basic elements. One concerns the participation in the sharing and distribution of the benefits. The other concerns the participation in the fishing-activity and production of benefits. Although these two elements may be difficult to separate in many situations, the distinction is important with regard to the ability of the community to manage the fisheries. With regard to the objectives of reducing, or preventing, depletion and of producing satisfactory economic benefits, management requires controls over the number of people engaged in harvesting the resources, *i.e.* those who fish. Those engaged in subsequent activities, such as processing, marketing, net- making, *etc.*, have an influence on the number of harvesters since they affect the earnings of the fishermen. But, the problem usually lies in direct access to the fishery and the fact that there are generally too many fishermen, or too much gear, working a limited resource. Where the objective is economic, the necessity for controls on the number of fishermen or amount of gear makes it important to distinguish between actual fishermen and those engaged in related activities.

A basic element in examining community-membership a as a whole relates to the ways in which benefits produced from fishing are shared and who participates in the benefits. For a subsistence-fishery, these will be in the form of food, generally shared with all members of the community. For a market-economy, the benefits will, at the minimum, accrue to the fishermen themselves together with those who provide gear, supplies and capital and those who purchase, process and market the products. Beneficiaries will also include, less directly, those who participate in the community's economy since the profits (presuming there are any) will be used for the purchase of goods and services such as food, clothing, shelter, *etc.*

Benefits may be distributed more broadly and may include social welfare, such as the provision of shares of the catch to widows and orphans; contributions to religious festivities or educational institutions; participation in infrastructure development, *etc.* Profits may also be transferred out of the community to relatives who have moved to other areas.

The distribution of benefits is not, of course, equally shared by all participants. Differences in the levels of benefits result from differences in skills, social and occupational position, activities, family relationships, ownership of capital and gear, health, age, education, *etc.* In a study of present traditional systems, Hviding and Jul-Larsen (1993) noted that "customary tenure may serve first of all as a means for those who have power to consolidate it, and exclude competitors, whether these are other families, villages, or ethnic groups". However, to say that customary tenure reflects power relations and the struggle for resources in no way means that those in power and control of the system achieve all rights while those not in control are being marginalized to the extent that they do not achieve anything.

Patterns of distribution in wealth and power change over time and in response to internal and external developments. With regard to traditional arrangements, "they are dynamic systems that are being continuously modified according to ever-changing power relations among individuals and groups. One group who has had control of a territory may lose it to others in a process through which the system persists, but the personnel involved changes. In other cases new persons coming into power may have other interests than their predecessors. Not only may they substitute the old right-holders, but they may even change the principles of the system to make it more adapted to their interests. In this way, not only does the customary tenure system change continuously in terms of personnel; indeed the system as such with all its rules and norms changes too, introducing new types of rights and prohibitions for new groups of people" (*ibid.*).

In communities where customary tenure does not exist, the existing relationships among members, in terms of power and wealth, will be profoundly affected by the establishment of a TURF. The acquisition of a property right where none exists (or where its existence is weak) will cause a major perturbation in relationships and behaviour. It may strengthen the authority of those presently in power - or weaken it. The outcome will be difficult to predict and will depend upon the particular situation and the rule-changes adopted within the TURF. But, in any case, there are likely to be significant ramifications throughout the community, which suggests the importance of caution in the establishment of TURFs and community-based management.

The second aspect of membership is that of participation in fishing. Since this has a significant effect on the status of the stocks, it is a critical issue. In small-scale fishing communities, there may be many different kinds of fishermen. In some cases, they may use different gear for the same stocks. In Sri Lanka, for example, certain small pelagics are taken simultaneously in the same area by beach seines, kattamurams, mechanized and non-mechanized purse-seines, and stake fishermen. In other cases, different groups of fishermen may fish different stocks with different gears. In a few situations, all fishermen may fish the same stocks, perhaps shifting from one to another during different seasons.

The definition of a fisherman is also complicated by the fact that fishing may be a part-time activity for some and full-time for others. In some cases, participation in fishing may be seasonal, in combination with other

activities or be dependent upon seasonal variations in the availability of the stocks. In other cases, certain kinds of gear may use casual labour. For example, when beach-seines are hauled, people not generally engaged in fishing may be recruited to help pull in the nets.

There may be wide variations in the degree to which any individual fishermen identifies with a particular group and also in perceptions of relationships with other groups. In part, identification with a user-group depends upon whether the individual is the owner of the craft or of the gear, or is a crew member. Identification is also influenced by kinship, ethnicity, religious affiliation and other factors relating to membership in the community as a whole. Relationships among groups may be strong where there are common interests (such as getting good prices) or weak where interests are disparate or incompatible. The quality of leadership is also important in determining group identification. These wide variations in different situations have a critical influence on how user-groups will cooperate in the management of the fisheries if they are provided with exclusive use-rights to an area.

5.2.3 Conditions of entry into the community and into the fishery

In considering the establishment of a community TURF it is essential to examine the conditions and rules under which someone can join the community, or user-group, since limits on entry are necessary to prevent an open-access condition. Traditionally, small-scale fishing communities have rules governing membership. These rules may vary widely, depending upon how the community perceives itself. Residence and kinship will certainly be important elements in all communities, but there can be variations in terms of length of residence, degree of commitment or involvement in the community and kind of kinship (such as differences in matriarchal and patriarchal cultures). In many situations, ethnicity, caste and religious affiliation will be important. It is likely that membership in a community can also be bought, perhaps through contributions to social or religious activities (or to the community's leaders)[2]. Indeed, where a community is highly successful, it is likely that payments of one sort or another will be made to obtain membership. Unfortunately, there is little information available on the conditions of membership in communities.

There also tend to be rules governing entry into the occupation of fishing. Membership in the community is generally required of those who seek to become fishermen. But, in addition, the prospective entrant may have to be from a fisherman family, member of a certain caste, or religious group. The kind and degree of participation may also depend upon experience, gained through apprenticeship or age. That is, to own, or be captain, of a craft, or use a certain kind of gear, a period of training may be required and appropriate skills must be demonstrated[3].

These traditional rules governing membership in a community and the fishery are likely to be subjected to considerable pressure in communities that receive a territorial use-right. Given the exclusive rights, the fishery is likely to produce surplus earnings which will generate pressures to join the community either as a basis for participating directly in the fishery or for sharing in the benefits produced. If successful, the newcomers to the community may bring in desirable skills, services and capital; or they may simply increase the number claiming a share in the distribution of benefits - this may result in a dissipation of the benefits. If the pressures to enter the fishery are successful, this is likely to result in open-access and a collapse of the management system. "When collective or cooperative entities accept too many members, they are exposed to the problem of incentive dilution: the larger the size of the group, the more diluted are the shares accruing to each member and the greater the incentive problem for any one of them, that is, the stronger their inclination to free-ride" (Platteau 1988). This was also noted by Hirasawa (1992, quoted in Christy 1993) in a discussion of Japanese systems. "This is a problem which never fails to happen in any area or fisheries where there has been successful fisheries-management... The fact is that the more successful fisheries-management cases appear, the more intractable question as to whom the fisheries resources belong arises."

The whole subject of mobility in and out of communities (as well as in and out of fisheries) has received negligible attention. Indeed, most studies of fisheries communities assume that the population of fishermen is static and made up of "traditional" or "*bona fide*" fishermen who have a certain "way of life" that is important to maintain. Little attention has been paid to movement into or out of fisheries and to the fact that most communities are subject to change. The only study of which I am aware was done in Thailand (Panayotou and Panayotou 1986). There is a strong need for more research on this

[2] Scudder and Connelly (1985) document a case in which the community chief auctions the rights to participate in a fishery. It is not clear if outsiders can participate in the bidding.

[3] In Chilaw, Sri Lanka, a fisheries organization was created in 1985 to manage the trawl fishery for shrimp. "An active fisherman from a traditional fishing family in Chilaw can operate up to two 3.5t motorized craft for shrimp trawling. An active fisherman not descending from a traditional fishing family in Chilaw, but resident in Chilaw town, can operate one 3.5t motorized boat for shrimp trawling" (Atapattu and Dayaratne 1993). In a village in Japan, "membership (in the Fisheries Co-operative Association) is not open to all residents. New residents must live there for one generation (or about 30 years) before they become eligible to apply for membership and fishing rights. Further, when a branch family is established by a son of a stem family of this village the new family must wait ten years before it can apply for membership and rights" (Ruddle 1987).

subject to better prepare for the introduction of community-based management systems.

5.3 External relationships

Small-scale fishing communities, although sometimes isolated geographically, are subject to external influences. Relationships are important in terms of labour-mobility, markets for inputs and products, environmental aspects, resource-sharing and government rules and regulations. There is a "requirement to develop an understanding, on the one hand, of the resource/fisherman/distribution continuum and, on the other hand, of the linkages among fisheries, fishing communities, and other rural sectors and institutions including government. The former is a vertical concept and the latter a horizontal concept, which taken together imply the necessity for a holistic perspective of fisheries and fishing communities" (Smith 1979).

Mobility of labour into and out of communities and fisheries depends upon the relative opportunities for employment in the community and elsewhere. In a study of Thai fisheries Panayotou and Panayotou (1986) note:

> "It is found that fishermen are responsive to economic incentives and do move between occupations to take advantage of earning differentials. This mobility, however, is tempered by non-economic factors such as age, location-religion, isolation and occupational preference. Labour appears to be quite mobile between occupations but less so between locations.
>
> Fishermen do not admit having emotional attachment to fishing but they do admit certain attachment to their area of residence and a distrust for unknown far-away places. Given a choice, they prefer other rural areas over the big city, and crop or fish farming over factory employment. Both religion and distance appear to constrain geographical mobility with Muslims being more mobile than Buddhists.
>
> Mobility in and out of fishing, though considerable, is lower than mobility in and out of non-fishing occupations. Mobility out of fishing is, if anything, greater than mobility into fishing... Out-migration is temporary and usually in response to economic incentives, especially in fishing activities elsewhere; in-migration, on the other hand, is more permanent but less significant and it is socially rather than economically induced.
>
> Thus, both the extreme positions of perfect mobility assumed by the open-access theory and of total immobility advanced by small-scale fisheries studies, should be rejected in favour of imperfect, but substantial, mobility constrained by location, occupation and household-specific factors. In the light of this finding, government efforts to upgrade small-scale fisheries will be successful provided the right incentives are given. However, the only way that allocation of additional resources to small-scale fisheries could benefit them in the long run is if fishing effort is controlled to prevent dissipation of resource rents and if alternative employment opportunities are developed to raise fishermen's opportunity costs."

In view of the lack of studies on the subject of mobility there is no way of knowing whether the factors mentioned above have universal application. However, it is likely that mobility will be strongly affected by differentials in earnings between the fishing and other enterprises. This implies that success in establishing and maintaining a community-based TURF will depend, to a large extent, on the degree to which perceived alternative employment opportunities are available.

The welfare of small-scale fishing communities is also affected by markets for its products and by the purchase of inputs. The size of the effect depends upon the kind and degree of the community's relationship with outside buyers and sellers. Where there are strong and varied relationships there is likely to be more awareness of alternative opportunities for employment; more access to capital at competitive costs, and more possibilities for competitive pricing of catches. On the other hand, there is likely to be greater heterogeneity within the community and less cohesiveness. For isolated communities, the opposite factors are true.

The possibility of achieving mutual benefits from collective action in markets is important. Many fisheries cooperatives have been created to achieve better prices and economies of scale in the purchase of capital, goods and materials. As noted, many of these cooperatives have been imposed on the communities and failed to induce effective collective action. However, when the fishermen themselves initiate the arrangements and the situation is appropriate, the chances of success improve.

Where the quantity of fish produced by a group of fishermen has a significant affect on the prices received, there is a strong incentive to cooperate in controlling output. One example existed for a time in New Jersey. "As the seining fleet increased in size, the captains developed an overall fleet quota on how much menhaden and porgies could be caught. The size of the quota was determined through the cooperative's manager by what the market would bear without depressing prices. In addition, they developed a boat quota program" (McCay 1989). The system fell apart when another fishery was closed, due to pollution, and those fishermen entered the seining fleet.

In Japan, there are several such, somewhat more durable, systems. In the Suruga Bay shrimp fishery, the fishermen adopted a "pooling system" under which profits from the sales are distributed equally among them. At one point the pooling system broke down but "was restored when the fishermen realized that without it the shrimp market collapsed" (Stardust Shrimp Fishery

Management Cooperative Association 1993). In a fishery for mantis shrimp in Yokohama, "successive fall in prices associated with oversupply after 1975 prompted the Shiba small trawl fishermen to ask the Cooperative to devise better marketing mechanisms. Representatives of the Cooperative negotiated with consignees in Tokyo and it was agreed that daily shipments from the Cooperative to the market would be limited. This meant that the Cooperative had to introduce a landing quota and shipment limits. Thus, these limitations were introduced in Shiba from May 1977. (Production/shipment limits have been set for different size vessels, ranging from 75-125kg per vessel per day). This production/shipment limitation worked effectively: there was no drastic increase in the catches after 1977" (Shiba Branch: Yokohama City Fishermen's Cooperative Association 1993).

In these cases, the groups of fishermen were able to adopt these kinds of individual quota, and other controls, not only because they were relatively homogenous groups but also because they were the major suppliers to their particular markets.

In addition to markets for products, a community is tied to its fisheries through the purchase of goods and services. Most notably, these include outboard motors, fuel, nets and materials for building fishing craft. Fishermen's cooperatives have sometimes been formed to facilitate purchase of inputs and to obtain better prices. International and multilateral aid agencies, as well as non-governmental organizations, are also sometimes involved in providing vessels and gear to groups of fishermen.

Although the provision of inputs fosters cooperation within a fishing community, it does not appear to produce any particular inducement to take collective action with regard to the management of the fisheries. Indeed, it may be counter to effective management in that it tends to increase fishing effort by reducing costs and providing improved technology.

There is a growing number of situations where small-scale fishing communities are affected by external sources of pollution and environmental change. Such communities are particularly vulnerable to environmental degradation since coastal areas, rivers and lakes are frequently the end-depository of the effluents carrying the pollutants and because the fishermen's craft have limited range and little ability to escape the harm.

To deal with these problems effectively requires cooperation among the fishermen to develop the political strength to force decision-makers to establish controls on upstream sources. However, although the need for such cooperation is important in many situations, there is little evidence of successful organization of fishing communities for this purpose. But, this may eventually result from efforts presently underway in a number of countries[4].

An important related aspect is that of the sharing of fish stocks among fishing communities. In some cases, the stocks are restricted to a relatively fixed area, which greatly facilitates management. This is particularly true of coral-reef areas of South Pacific Islands where a large number of traditional systems of community management still exist and where many studies have been made. In most situations, however, there is likely to be a mixture of stocks, some of which may be sedentary while others may migrate over great distances. In Japan, it appears that most, though not all, of the self-regulatory systems relate to sedentary stocks: to reefs, some of which are artificial; or to fixed-gear fisheries. In the latter two instances, some of the stocks, such as horse mackerel, are migratory. In one prefecture in Japan, in 1983, 15 separate fishermen's cooperatives organized an overall body to deal with migratory fish, This covered such varied gear as small trawlers, fixed nets and drift nets. "The history of the KFDTS (Kagawa Fisheries Development Thinking Society) is short and therefore early assessments are not possible. However, this approach is worthy of attention as a means of establishing fishery management of migratory fish from within, rather than from pressure of the government bodies" (The Kagawa Fisheries Development Thinking Society 1993).

National and regional governments can, but not always, have a strong influence on fishing communities in several regards: social, political, economic and legal. There are various aspects of social influence including support (or lack thereof) for education and training, investment, or support, of religious activities, protection (or lack thereof) of civil rights, *etc.* Politically, communities interact with governments in elections and in expression of their interests. The ability of communities to express their interests may be particularly important in acquiring TURFs.

Economically, communities are affected by taxes and subsidies and by government provision of infrastructure such as ports, roads, ice plants, *etc.* Legal influence on communities can be strong with regard to fishery and other regulations and the resolution of conflict. The role and attitudes of national fishery administrations are critically important with regard to the establishment of community-based management systems. Many of the various relationships between a community and its economic, political, social and environmental surroundings have important implications for the degree to which property rights can be granted to communities as well as for the kinds of rights that might be employed and the various aspects that must be considered if community TURFs are to facilitate fisheries management.

[4] The Fisheries Department of the Food and Agriculture Organization had a UNDP-supported programme for this purpose. There are also a number of coastal zone management projects underway. Although these do not focus on fishing communities, they may facilitate organization of the communities.

5.4 Fisheries management aspects

5.4.1 Management functions

The characteristics of a community provide one dimension in the evaluation of the use of TURFs for community-based fisheries management systems. A second critical dimension is that of the characteristics of the management functions. When a community has been granted, or acquired, responsibility and rights for the management of its fisheries there are two aspects of the management that are important: (a) the degree and kind of authority required for management; and (b) the decision-making arrangements.

5.4.2 Degree and kind of management authority

By definition, community TURFs must have some kind of authority to manage the fisheries that relates to the management functions to be fulfilled. The fishery-management functions are basically the same as the functions that are fulfilled by a sole owner of a private natural resource, such as a farm. However, a community, being a social and political body, will also be influenced by factors affecting its welfare and may fulfill the functions in different ways.

A landowner's basic objective is generally to maximize his net income from the land. To do this, he may choose to farm crops, raise trees, or use the land for industrial or other purposes, subject to any constraints that government may impose, such as zoning against a particular use. Likewise, a community may choose to maximize the net revenues it can achieve from its resources. However, its objective may also be influenced by social and political forces. Subsistence economies may wish to ensure provision of adequate food supplies. A community in a market-economy may wish to ensure community stability and value the provision of employment opportunities as well as incomes.

A significant difference between an individual resource-owner and a community-owner is that, for a community, such decisions as the choice of objectives will generally be made collectively. This requires that the community must have acquired, or be granted, the right to make such decisions. In some cases, there may be constraints or external conditions, affecting the degree to which there is freedom of choice among management objectives.

5.4.3 Acquisition of information

A farmer requires information on costs of inputs; price of products; access to markets; techniques for cultivation; costs of labour; *etc.* Similarly, a fishing community will need information on prices and costs, fishing and processing techniques, status and location of the stocks, *etc.* More particularly, in a fishing community, there will be a need for information on the behaviour and catches of individual fishermen to ensure that all participants cooperate appropriately.

With regard to information on the stocks, it is sometimes stated that local fishermen have a high degree of knowledge about the resources, *e.g.* Hviding and Jul-Larsen (1993): "local people often have much more detailed and elaborate knowledge about fish behaviour and its relations to environmental processes than Western scientists". It is quite likely that there is a high degree of knowledge about the location and seasonality of individual stocks within a community's fishing area, but it is not necessarily true that this knowledge comprehends the relationship between fishing effort and yield. Indeed, the same authors cite an example of a group of fishermen in the Niger central delta who believe that the fish come from the sky at the beginning of the rainy season. With such a belief, declining harvests are likely to be blamed on the gods rather than on overfishing. Although many fishing communities are more sophisticated, there is still a requirement for access to knowledge on the scientific aspects of a fishery, whether "Western" or not. In this regard, the function of acquiring information on stock yields cannot always be fulfilled solely by the community.

A different requirement for information is the need to be aware of the behaviour of individual fishermen in the community. For community management to be effective, it is necessary to monitor individual behaviour to ensure that community rules are followed. This may present many difficulties. In a discussion of self regulatory mechanisms, Scott (1993) makes a distinction between controls on methods and location of fishing and controls on quantity of catch. In citing an analysis by Schlager (1990), Scott states that "she finds that when cooperating groups do exist, the information they can pool or collect is not equally useful for all kinds of regulated behaviour. They find a vessel's gear and fishing location easier to monitor than the amount of its fishing or the number of pieces it landed". Scott concludes that "for a large group to monitor the amount taken requires more than cooperation: it requires investment in some kind of government: mostly the employment of inspectors and watermasters and other full-time and part-time officials".

Although I disagree somewhat and believe that there are situations (cited above) where self-regulation does control amounts of catch by individuals, the point is important and indicates that the availability of satisfactory information on catches by individuals within a community is an essential requirement for an effective community TURF.

In summary, although the function of acquiring information is essential for management for both a sole-owner, and a community-owner, of a fishery, there are different requirements for its fulfillment and differences in the distribution of authority between the government and the resource owners.

5.5 Allocation of capital and labour

Both a farmer and a fishing community must determine the amount and kind of capital and labour required to produce the product or desired objective. For the farmer, the task is relatively simple. Given the objective of maximizing his net revenues and information on the

relative costs of the inputs of capital and labour, he can determine the appropriate mix of inputs and invest at the most profitable level.

Although the same kind of decisions must be made by a fishing community, the problems are more difficult. In fisheries where TURFs do not exist, it is likely that the open-access condition have led to excessive amounts of capital and labour, with consequent low yields from the stocks and low economic returns to the fishermen. The granting of an exclusive right provides the opportunity, but does not necessarily diminish the difficulty of controlling the amount of capital and labour. A second difficulty is that of the importance of the community's social objectives. Where a community has few employment opportunities outside of the fishery, it will be difficult to limit access to the fishery through controls on the amount of fishing effort. In addition, limits on access to a fishery provide fishing privileges to some and may exclude existing or potential fishermen. Such controls require agreement on the distribution of wealth, which may be extremely difficult. This may be one of the major impediments to the establishment of community-based management.

These kinds of difficulties can be dealt over time. With a TURF, the community can, at least, prevent continued influx of surplus labour and remove, or limit, competitive, or conflicting uses, by large-scale operations. The community can also alleviate some of the congestion and allow for stock rehabilitation by sharing access through systems of rotation. It can use its rights to protect nursery areas and prohibit the use of damaging techniques and gear. Traditional systems of community-based management are known to employ a wide variety of such techniques. Eventually, the community may reach a point where the opportunity to allocate capital and labour will be taken.

5.6 Monitoring, enforcement and conflict resolution

Private landowners monitor the use of their land and generally have protection in law of their exclusive rights. The other functions of enforcement (arrest, trial, punishment and reporting) are usually done by government. The resolution of conflicts between landowners and other parties are generally undertaken by the courts or through arbitration or mediation procedures.

The fulfillment of these functions by a fishing community are generally similar with regard to non-members of the community. That is, it can monitor the use of its TURF and must rely on government for the other functions of enforcement. However, for the internal aspects of a community there are other requirements that must be met. Controls over community members must be in effect to ensure that all participants comply with the community's rules so that the arrangements do not fail. As noted above, where the rules relate to season, time and place of fishing or to kinds of gear, monitoring the behaviour of the individuals is not particularly difficult in comparison with rules governing individual quantities of catch.

The functions of arrest, trial, punishment and reporting can often be fulfilled within a community through the use of peer-pressure and traditional conflict-resolution mechanisms. As in all matters, this depends upon the strength of the shared communal interest in managing the resources and the perception of the individual members that they are better off by complying with the rules than by violating them. Here again, full information on the system and how it operates is a vital requirement for a community TURF.

5.7 Distribution of benefits

A distinctly different function between a private-landowner and a community is needed for determining and monitoring the distribution of benefits among the members. A private-landowner appropriates all benefits from his production (except for taxes). Where there is common ownership of a TURF, however, specific decisions are needed on the distribution of benefits among the community members; whether these are in the form of fishing privileges or quotas, distribution of surplus catch for food, or distribution of economic revenues.

This requirement lies at the heart of community-based systems and poses the greatest challenge to their development and maintenance. There are arguments that agreement on the distribution of benefits can only be achieved through outside intervention. "These practices of today's groups show that the distributional obstacles in the way of self-control of individual fishing pressures cannot be solved endogenously" (Scott 1993). I do not fully accept that this conclusion always relates to small-scale fishing communities or even to groups of large-scale fishermen. Given the right incentives, institutions and conditions, groups of fishermen have made decisions on sharing in the benefits from their fishing activities. The function of making such decisions is, admittedly, the most difficult of the functions of fisheries management for a small-scale fishing community, but it can be fulfilled effectively.

5.8 Summary

In any examination of the property rights that a community must have to manage its fisheries it is necessary to consider the different functions that are required and to determine the kind and amount of authority necessary for their fulfillment. The devolution of authority to local levels is likely to be constrained in certain regards, for several reasons. One is that national governments may be unwilling to concede the full range of authority. Another is that certain functions, such as negotiating agreements among neighboring communities on shared stocks, cannot be fulfilled without some sharing of authority. A third is that some functions, such as the acquisition of information on stock yields, is most effectively fulfilled by central governments because of economies of scale. Finally, the communities themselves may be unwilling to take on some of the responsibilities, such as the distribution of benefits among heterogeneous user groups within the community. Each situation will be unique so that each

may require different degrees and kinds of management authority.

A community-based fisheries management system, intrinsically, requires collective decision-making. Where collective action is not taken and individual choice is dominant, the fishery resources are, in effect, open-access resources, with all of the damaging consequences. "The basic pattern of interaction on which successful joint use of the commons depends is reciprocity... If reciprocity among users is fully abandoned [or does not exist], what follows is some pattern of mutually destructive competition and/or conflict. Users may try to drive one another out to preclude mutually subtractive use. Or they may engage in a competitive race to exploit the commons without regard to an optimal rate of use. Relevant patterns of interaction may include concealment, deceit, intimidation, threats, and violence" (Oakerson 1986).

The last sentence of this citation refers to systems where collective action has recently been abandoned. The use of terms such as "concealment" and "deceit" reflects the understanding that the members of the community perceive these patterns of behaviour to be contrary to group norms. However, in many situations, where collective action does not exist or has long been abandoned, the relevant patterns of interaction would not be described in such pejorative terms. Instead, the individual participants would be considered to be acting in their individual rational interest. Where there is a history of open-access, the damaging consequences are due to the absence of satisfactory institutions for collective organization, not to the failure of an existing organization of the community. The distinction is important since our present concern is primarily with the establishment of collective behaviour and only secondarily with its maintenance.

All communities have rules for making decisions. Some of these rules may have developed endogenously while others are exogenously determined (*e.g.* sets of national laws and regulations). In some isolated communities, such as those in many small Pacific islands, the rules have emerged within the community and may not be significantly influenced by outside institutions. In other communities the local organization may be weak and the rules may be entirely imposed by governments. Generally, in the former case, the rules are designed to regulate collective behaviour within the community whereas in the latter the rules tend to focus on individualistic behaviour.

Most communities fall in the range between these two extremes. The difference in balance between endogenously and exogenously-generated rules is important for the community's receptivity to the creation of a community TURF. "Rules that establish the ability of some group to act collectively (to make decisions common to the group), are especially relevant to the management of common property. Obstacles to collective choice are at the same time opportunities for individualistic choice - decisions that individuals can make on their own without the consent of the others. When a group is unable to act collectively, individual members are left free to act separately" (Oakerson 1986).

There are various points of view in the literature on the ways in which collective decision-making arrangements are formed.

> "Common sense would suggest that people who perceive a joint interest will join together to pursue this interest, and hence that a perceived common interest is a basic element in explaining collective action. The public-choice theorists say that common sense is misleading. The rational individual, they say, will not voluntarily contribute to a common goal if the group is large and if he or she cannot be excluded from enjoying the benefit. The individual will, instead, seek a free ride. As a result, any collective action (in other than very small groups) that is not based on coercion or on the availability of selective incentives tends to be fragile. Certainly, the literature describes many violations of rules of restrained use of common pool resources... that deplete the resources. But the literature also contains many cases of local groups that have been able to agree upon rules of restrained use and have enforced the rules using authority from within the group rather than from outside (*e.g.* government). In these cases, we can talk of a 'public realm' within the group, which consists of the rules and roles involved in common pool resource management" (Wade 1986).

Arrangements for rule-making require some form of organization. Most communities will already have some form of organization, both formally (legislatively) and, or, more informally through custom or tradition. The organization may, or may not, concern fisheries. In communities with customary resource tenure, fisheries are governed by a wide variety of informal arrangements. These include autocratic systems dominated by an hereditary chief or by a council of elders; representational systems governed by elected officials; and even systems where decisions are made by judicial bodies (Scudder and Connelly 1985). Combinations of these approaches are common.

Where resource-tenure is non-existent, the informal community organization may relate to fisheries but is unlikely to be effective in undertaking fisheries management. In India, for example, there are numerous fishermen's associations formed on the basis of kind of fishing gear or craft, location and religion. In the absence of a TURF, however, they have limited ability to manage the fisheries. The question is whether, and how, the existing organizational structure can be adapted to achieve management.

In summary, there are important possibilities for facilitating the establishment of collective choice systems in small-scale fishing communities. There are, however,

many complexities due to the wide variations in the make up of the communities and the characteristics of their fisheries and the resources. The challenge for governments wishing to take this approach is to carefully identify the salient elements of each situation and to proceed cautiously. Certain facilitating steps, however, can be taken at an early stage. The most important of these is the identification of the conditions and incentives that will help the members of a community to take collective fisheries-management decisions. Governments can then attempt to provide the conditions and offer the appropriate incentives so that the communities are encouraged to take them regularly. Some of these incentives and discussions are discussed below.

6. INCENTIVES AND CONDITIONS FOR THE ESTABLISHMENT OF COMMUNITY PROPERTY RIGHTS

6.1 Conditions required

In general, the search for incentives and conditions to facilitate establishing community property rights can be divided into: (a) those dealing with the difficulties associated with the devolution of management authority to the community; and (b) those dealing with the tasks of the community and government in the monitoring and enforcement of the systems (the problems of information gathering and dissemination).

6.2 The devolution of management authority

The previous discussion identified the major impediments faced by national governments in the devolution of fisheries-management authority to communities. They relate to the problems of making and enforcing decisions on the distribution of wealth; the reluctance of some administrations to relinquish their authority; and the difficulties of establishing community TURFs. In addition to those, opposition to the creation of TURF's may also be due to the difficulties perceived in the implementation of the systems and by a lack of awareness of the potential for harnessing a community's incentives for self-regulation.

In some situations, not all the various impediments may be fully overcome and establishment of a community TURF may not be feasible. However, the approaches suggested below will be of value in all situations and may facilitate eventual adoption of such systems in the difficult situations. There are basically two kinds of approaches: those that relate to the decision-making process within the central government; and those that relate to the incentives for communities to adopt self-regulatory mechanisms.

It is common that fisheries-management issues are not addressed until a crisis develops; such as severe conflict between user-groups or significant declines in economic returns. Faced by crisis, fishery managers tend to adopt palliative measures. They do what they can to minimize the protests or they attempt to provide some forms of economic relief, such as low-cost loans. These kinds of measures do little to address the fundamental problems of open-access and may even exacerbate the problems.

The basic difficulty is the unwillingness, or incapability, of administrators to make the necessary decisions on the distribution of wealth. Such decisions must be made at the political level and it is essential to involve politicians in such issues. To do this, two tasks are necessary: (a) improve the politician's understanding of the problems of open-access and (b), build constituencies which will support elected representatives in making desirable decisions.

The first task requires education of politicians. In many countries, the problems of conflict, depleted stocks and low earnings are already receiving attention. There is not, however, a general understanding that the condition of open-access is the fundamental source of the problems. This is due, in part, to the conventional "western" approaches to fisheries management that emphasizes the welfare of the fish rather than the fishermen and which seeks to preserve catch levels rather than economic returns. International and multilateral aid programmes have tended to support the conventional approach, both in the advice given and in the encouragement of greater investment. Although aid programmes have been changing their approach, much more needs to be done. In particular there is a need for more studies of the consequences of open-access in specific fisheries and of the benefits to be gained by providing exclusive use-rights. Such studies would illustrate the often large amounts of economic waste associated with the excessive costs resulting from open- access. And they would show that conflict will become increasingly pervasive and severe if appropriate actions are not taken. Aid programmes have an important role to play in the support of such studies and in their dissemination.

A related approach is to mobilize and strengthen the political constituencies which support community-based management. Non-governmental organizations (NGOs) are actively working with communities in many developing countries. Few of them, however, have adequate understanding of the special characteristics of fisheries and the need for management through exclusive use rights[5].

6.3 A programme for training NGOs on the needs and options for fisheries

An important requirement the adoption of community TURFs is to create the conditions and incentives that encourage communities to regulate themselves. Generally, traditional marine-tenure systems have emerged from three different motivations: equity, efficiency and enhancement (Christy 1993).

One motivation for traditional community self-regulation is the desire to maintain community stability.

[5] A notable exception is the International Collective in Support of Fishworkers, based in Brussels and Madras.

This is based upon a perception among the members that there is a satisfactory degree of equity in the sharing of the benefits. This does not necessarily mean that all members receive equal shares but that an individual's efforts are sufficiently well rewarded so that they feel better-off being part of the system than by breaking it. When this is not the case, the community fails. Community regulation in the use of a scarce resource provides a means for achieving a sense of equity.

The role of governments in preventing significant inequities in the distribution of community benefits is generally limited to such measures as taxes, welfare payments, education, *etc.* Although it is important to ensure that community-based systems do not contribute to inequities, there is little that governments can do to make use of the equity-motivation as a means for fostering the systems.

The second general incentive for community self-regulation is that of increasing net benefits from the resources. In traditional systems, this occurs most directly when a group of users perceive the opportunity to derive benefits from the resources by allowing use subject to taxes, user-fees or shares in the catch, either from community members or outsiders. An example is that of the revenues collected by communities in the Solomon Islands who charge user-fees to the tuna bait boats fishing within their TURFs. Another example are the municipal fry-fisheries in the Philippines where the municipalities auctions off the rights to harvest the fry (Smith and Panayotou 1984). The revenues that are collected provide a substantial share of the municipalities' incomes.

The motivation can also lead to community cooperation when there is an opportunity to influence prices. For example, the Mar del Plata fishery in Argentina is the major provider of fresh fish to the Buenos Aires market and limits its production to ensure that high prices are received (Gumy, FIPP, FAO, Rome, pers. comm.).

In these examples, the groups of fishermen have adopted controls over their own catches and regulate the fishery. In these cases, there is a presumptive exclusive-right which the fishermen claim and enforce through various means. They do so because they perceive that the benefits of the measures will accrue to them and that the benefits outweigh the economic and social costs of asserting and protecting their claims. In the case of the efficiency-motivation, as in the case of the equity-motivation, there is little that governments can do to use these incentives to foster the establishment of the systems, except to permit the groups to adopt the measures. This may be important as many governments have legislation prohibiting collusion among producers such as that designed to restrict output in order to achieve high prices. For resources that are not subject to open-access, this may be entirely appropriate. But in fisheries, the costs to the economy of maintaining open- access are likely to be much greater than the costs associated with price-fixing.

The third motivation for self-regulation is that of resource-enhancement and it offers considerably more opportunity than the other two motivations for a governmental role in facilitating self-regulation. Enhancement of the resource can be achieved by stocking of juveniles; protecting nursery grounds; and providing attractant or aggregating systems such as artificial reefs and fish aggregation devices. These techniques require investment, either direct or through restraint on harvesting. Such investments are unlikely to be made by a group unless there is assurance that the user group will achieve a satisfactory return; *i.e.*, unless it has an exclusive right to harvest the fruits of their investment. Where such a right exists, there is an incentive to make the investment and to control the catch from the stock to ensure satisfactory returns.

Governments could provide such rights to communities and also provide monetary or other support, for the investment. For example, a community could be granted a TURF in its adjacent waters for the purpose of constructing artificial reefs or implanting fish-aggregation devices with the proviso that it assume the responsibility of managing the resources[6]. Construction money could be made available and aid provided for training community members in management methods. The community should be free to harvest the resources with its own fishermen or to lease rights to certain fisheries to outsiders.

The use of fixed-gear, such as stake-nets, traps and pots are other approaches that can be taken that, while not related to enhancement, will facilitate development of TURFs. Where these are in use they have frequently served as a basis for customary tenure. Unfortunately, there seems to be a tendency for governments to prohibit the use of such gear. This may be due to political opposition by users of mobile-gear who want freedom of movement through the area. Or it may be due to apprehensions within the community that the techniques could lead to exclusivity by a few individuals. Governments, however, could encourage the use of fixed-gear and grant the communities the right to allocate the use[7].

The provision of a TURF to a community should provide a powerful inducement to regulate the use of its own resources. The exclusion of outsiders means that the gains of management accrue to the members of the community. If the gains of management (or the losses from non-management) are perceived to be high, it is likely that the community will adopt self-regulatory measures.

> "The central conclusion is that village-wide institutions are only likely to be formed and sustained when the risks of loss are relatively high... That is, the relationship between risk

[6] A proposal for the establishment of a property-rights system for FADs was made to the Maldives Government with regard to its tuna fisheries. See Christy *et al.* (1981).

[7] This idea is discussed more fully in Christy (2000).

and social response seems to an almost sufficient one (risk and social organization are almost always related to one another in the predicted way). The conclusion is thus in line with the argument of several economists writing about induced institutional innovation who have tended to argue that when the benefits of institutional change exceed the costs, change will occur" (Wade 1986).

"In the supply-and-demand model, the demand for institutional change arises when some gain cannot be captured under existing institutional arrangements. Changes in relative factor or product prices, changes in the size of markets, changes in technology, and changes in fundamental decision rules of government, are among the important variables that create disequilibrium in the existing institutional arrangements. Whether the demand for change will be met, however, depends on the supply of institutional change - the willingness and capability of the fundamental institutions of government to provide and/or permit and/or prevent new arrangements. The capability depends in part on the cost of institutional innovation, which in turn depends in part on the stock of existing knowledge about the design and operation of institutions. The willingness to provide new arrangements also importantly depends on the private benefits and costs of providing change to the agents who are in a position to do so, the elite decision-makers of government. Thus, the existing set of institutions and initial distribution of power will have an important impact on the kinds of new institutional arrangements that are supplied" (Thomson *et al.* 1986).

The provision of a TURF to a community constitutes a change in the fundamental decision-rules of the community and creates the disequilibrium necessary to induce new arrangements. The capability of the community to adopt the new institutions depends upon the community's knowledge about the operation of the new institutions and the likely effects of change on the community's power elite. This knowledge can be influenced by educational programs provided by governmental and non-governmental organizations.

6.4 Fulfilling the functions of monitoring and enforcement

Enforcement involves several functions. In governmental systems, these functions of monitoring and enforcement are generally distinct. The first function is the surveillance and monitoring of the measures to determine whether there is non-compliance. The second is that of the arrest of violators, followed by trial, the imposition of penalties and reporting of the outcome. Different agencies of government may be responsible for each function.

In informal community-systems, although the functions must still be performed, they are not always separated and they tend to be fulfilled by the community itself generally through the agency of the community leaders. Arrest and trial, for example, may be subsumed within the system as whole and sanctions may be imposed through peer pressure. The approaches to the tasks of the monitoring and enforcement of community TURFs depend upon the measures to be enforced. For some measures, the national governments will have responsibility and for others, the communities will be responsible although they may benefit from national government assistance.

Central government issues

A primary responsibility for national governments is to enforce exclusive territorial use-right granted to the community to ensure that there are no unauthorized intruders. To some extent, the community can conduct surveillance of its borders. But the central government will generally have full responsibility for arrest, trial and punishment of the violators.

Experience has shown that prohibitions against large-scale fishing within a certain distance from shore are difficult to enforce. However, there may be a significant difference between generalized bans and the systems that provide a coastal community with a specific TURF. In this case, the decision to redistribute wealth to the community has been made and there is an obligation to protect the community's rights. Further, the area to be enforced is likely to be relatively small. Nevertheless, the task may be difficult and require that national governments invest in adequate enforcement equipment and personnel.

The task will be facilitated by having clear-cut, easily-identified boundaries to the TURF and by giving full publicity to its establishment. Those who are to be excluded might be more willing to respect the boundaries if they are provided with some benefit in lieu of access. This might be an exclusive right to an area in deeper water, or, it might be payments to large-scale operators for selling their vessels and relinquishing their rights to fish. Funding in the decommissioning of large-scale operations may produce large economic returns to national economies in some situations (Christy 1987). An additional task for central governments will be to provide mechanisms for settling disputes between the community and outsiders and, where needed, within the community itself.

Central governments also have a role to play in facilitating the monitoring of the community systems. Where a system uses controls on total and individual catches, accurate and credible information on catch quantities is extremely important. Governments can provide central marketing-places for communities which do not have them. They can also provide independent personnel to monitor the catches.

Community issues

There are several elements to the tasks of community-enforcement. These include control over entry into

the community as well as entry into the fisheries: compliance with community regulations such as gear, season and area-prohibitions and quantities of individual and total catches by species; and assurances that the distribution of benefits is acceptable to community members. If these tasks are not fulfilled adequately there will be incentives for behaviour which may undermine the management systems. "When people do not have the assurance that other participants will cooperate or will be punished if they do not comply with the group's rules or code of good conduct, the 'morale' of all the membership is gradually eroded, opportunistic behaviour spreads itself and economic cooperative performances become more and more disappointing, breeding new manifestations of free riding and adding to the people's frustrations" (Platteau 1988).

Major issues in this regard are the degree to which the enforcement tasks are undertaken by the community other than the central government and how these tasks are fulfilled. Platteau has pointed out that these issues present a central dilemma (which would apply to community regulations though not to the protection of a TURF): "either the monitoring and sanctioning functions are performed by the cooperative membership and, under these conditions, there is serious risk that sanctions are inequitable or ineffective; or, these functions are entrusted to an external agency... in which case the danger is great that the cooperative organization degenerates to a bureaucratized form with the result that incentive problems become more serious than they were at the beginning" (*ibid.*)

Platteau identifies two different cases of cooperative organization. In the first, the members are relatively equal in status. Such a case might be a user-group where fishermen use the same kind of gear. In these situations, there may be difficulties in imposing sanctions since the system may be subject to the code that "a person of a given status is not entitled to judge another person belonging to the same status category. The breach of the customary norms would be especially serious if a member would have to be expelled from the cooperative group... Under such conditions, it is not surprising that so many cooperative organizations are characterized by lax discipline and morals, and are overwhelmed with all-pervasive incentive problems which in the end render them non viable". It is perhaps this kind of case that Scott has in mind when he states "that the distributional obstacles in the way of self-control of individual fishing pressures cannot be solved endogenously" (Scott 1993).

In the second case, the cooperative members have different status, as is likely in many fishing communities. In these situations, "rule-breaking behaviour and manifestations of opportunism can be effectively monitored and sanctioned using the social prestige of the customary power structure" (Platteau 1988). The difficulty here is that "the functioning of the cooperative group is highly likely to be nondemocratic: in other words, the price to be paid for achieving efficiency would be high since it would involve giving up the fundamental cooperative ideal of human equality" (*ibid.*). Wade (1986) supports this view. "The second principle is that the generation of authority (the right to decide for others) is likely to be problematic within such common interest organizations, and if the organization is to be sustained it should draw on existing structures of authority. In practice, this means that the council will be dominated by the local elite, which is a disturbing conclusion for democrats and egalitarians".

If there is sufficient inequality in the imposition of penalties, the system is likely to break down. But this need not be the case. As noted above, one motivation for cooperative community action is the desire to maintain community stability through equitable distribution of benefits. "If traditional chiefs, patrons or landlords act as enlightened... leaders, associations can develop which, even though they are not actually obeying democratic rules of functioning, turn out to be effective enough to improve the lot of the poorer members" (Platteau 1988). Further, "the robustness of the organization depends on its councillors all having a substantial private interest in seeing that it works... By including on the council only those who have a substantial private interest in seeing that the collective good is provided, the council itself comes close to becoming the minimum coalition whose members find it in their private interest to bear the transition costs of organizing others to share in the costs of providing the collective good... This effect is then greatly reinforced by the greater power of the elite councillors versus the mass of the population; the tendency of the non-elite to cheat, hoping that because of large numbers, no one else will notice, can be checked by sanctions contained in the wider order of property and stratification. Without these wider sanctions, the formal penalty mechanisms would in all likelihood constitute an inadequate barrier to cheating" (Wade 1986).

This discussion suggests that approaches to the task of establishing community TURFs should consider several elements with regard to the problems of enforcement. The community should have primary responsibility for enforcing the rules that it establishes for management, leaving to the central government the task of excluding non-members. The system should be established for the fishing community rather than for a specific group of fishermen to allow a broad range of penalties to be imposed. It should be based on the existing authority within the community and should not attempt to impose a different structure. What may be sacrificed in terms of egalitarian ideals will be more than counterbalanced by ensuring viability of the regime. If the inequalities become excessive, it is likely that the community will become destabilized and cease to function. However, the government might reserve the option of removing the exclusive use-rights in situations that persist in serious inequality.

7. SUMMARY

Effective management of fishery resources is a fairly recent phenomenon. Although there have been instances of well-managed fisheries in the past (notably the North Pacific fur seal fishery), management within national boundaries had to await the extension of national jurisdiction. This acquisition of a national property right subsequently allowed individual governments to adopt property-rights systems for fisheries. One of the most effective of these is the Individual Transferable Quota which is increasingly being adopted for large-scale fisheries in developed countries. This system sets the basis for self regulation by fishermen and reduces the onus and cost of governmental involvement.

There are, however, situations where government imposed ITQs cannot be used. Small-scale fisheries in many developing countries are marked by a multiplicity of gear, craft, species and landing areas. In these situations the only apparent solution is to devolve management authority and let communities or groups of fishermen assume the responsibility. Such community-based TURFs would permit fishermen to adopt those measures most suitable for their particular situation and reduce the conflict and waste that is prevalent at present.

Common-property management-systems have received thorough study in the past several years. But common property does not exist unless there is property, *i.e.* unless the community has some form of property rights. In most cases such rights do not exist and must be established. This is not an easy task. It raises significant questions as to both the ownership of the rights and the content of the rights; questions as to the definition of the community and the kind and degree of authority of the management. The immense variety in situations among fishing communities makes it difficult to generalize about approaches and outcomes. But, governments can provide conditions and incentives that facilitate the assumption of management responsibility by communities. These include deliberate decisions on the distribution of wealth and the establishment of territorial rights; enforcement of the rights; encouraging community investment in enhancement techniques and technologies; supervision of the systems; provision of information on the fisheries; support of NGO involvement in the community; and the willingness to relinquish administrative power and authority.

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A MINISTER'S PERSPECTIVE ON MANAGING NEW ZEALAND FISHERIES

D. Kidd
Speaker of the New Zealand House of Representatives
New Zealand Minister of Fisheries 1990-1996
Parliament House, Wellington, New Zealand

My political involvement in fisheries began with my appointment as opposition spokesman in 1984. I continued in that role for five of the following six years until I was appointed Minister in late 1990. I held the fisheries portfolio, amongst others, for six years until I became Speaker and I have maintained my interest since.

Prior to 1984 I had had a brief period of involvement when the Government consolidated the *Fisheries Act* which had been largely unchanged since 1910. The *1983 Act* made little significant change other than to propose a system of fisheries management plans which contemplated a move to a prescriptive system which owed more to the planning developed for the new towns of England than anything to do with fisheries management. I am pleased to say the system was never implemented.

In the latter part of the 1970s, including my first term in Parliament, I was a partner in three Greenshell™ mussel farms in the sheltered seaways of the Marlborough Sounds at the northern end of the South Island. Whilst not one of the original pioneers, there were less than 50 farms at that time. There are now nearly 500. From nothing in the early 1970s, Greenshell™ mussel exports are now our second largest seafood export species.

My professional background as a partner in a provincial law firm brought me in contact with the rudimentary fishery law of the time but it was not a significant item of business. Perhaps more relevant to much of what will unfold in this address was my upbringing and personal involvement in dairy farming, plantation forestry, the wine industry and marine farming.

It is worth recalling that the phrase 'sustainable management' was not in common usage in the early 1970s. We were still a frontier society in terms of our engagement with natural resources. Whether it was in terms of wool, meat, dairy products, timber or fish, the nation's salvation was seen in terms of producing, or extracting, more.

New Zealand has gone through all the experiences, including the worst, that other nations have experienced as part of their engagement with fisheries. Over-extraction, over-capitalisation, ever-increasing input controls and ever-declining stocks were as much a part of our experience as any other country.

I can say that as a result of changes over the last 15 years we have largely turned that around. The process has been painful, fraught with fear and conflict but in the end successful almost beyond imagination, if viewed from the early 1980s. More than a few mistakes were made on the way; most have been corrected and above all valuable lessons can be learnt.

I read widely among fishery publications and while I see encouraging signs and progress in a number of countries, the outlook for the world's fisheries must be one of profound concern. I am not here to offer the New Zealand model as a panacea for all the world's problems. I am the first to acknowledge that our system is not yet perfect. My hope is to stimulate thinking and acceptance of the notion that there can be, indeed must be, a better future for the world's fisheries.

After several years of skirmishing, the government of the day introduced the Quota Management System (QMS) in 1986. At its heart was the concept that fisheries might better be managed by output-controls in contrast to the purely input-control system which preceded it. The core feature of the QMS was the total allowable catch (TAC), fixed each year by a scientifically-based assessment process which limited the tonnage of any individual species which could be harvested in any particular management area. That TAC was in turn subdivided into individual transferable quotas (ITQs) held by individual fishers and companies. The original allocation of ITQ's was based on eligible catch-histories coming through from the old system. It was a very untidy and litigious process, but it got the system underway. At the time I became Minister 33 species were being managed in the QMS. They constituted the great bulk of fish landed, both in tonnage and value. The great failing of the system was in the definition of the property right - it was not clearly defined. Perhaps more importantly it was not proportional. This led to TACs being blown out by the granting of absolute ITQs under the catch-history appeal system. A considerable element of the conservation and sustainability-gains hoped for by the system were not initially achieved.

In order to obtain a measure of acceptance for the initial move, the law provided that if TACs were to be reduced the Government would compensate fishers for the reduction of their ITQ and on the other side, if the TAC was increased fishers would pay for the additional ITQs. When TACs had to be reduced the Government baulked at paying out and sought change.

The system did enable an important objective to be progressed and that was the restructuring of the industry. Under the old regulatory system when a fisher died or retired they had nothing to sell other than their boat. With the advent of ITQs a fisher could sell their catching right

in a market, which had quickly developed, and exit the industry. Many did so and in some fisheries the over-capitalisation problem was resolved or reduced. Today the Government has no role in deciding who goes fishing except in respect of foreigners. All that is needed is the catching right which is obtained in the quota market. Nor does the Government have any role in what size, or power, of boat is used, although a few restricted areas are closed to large vessels. A few minimum sizes remain for crayfish[1], some molluscs and a few fin-fish. Seasons are still regulated for a few species. All these controls have at least some biological purpose. Over time some will become obsolete.

By 1990, when I took office, a series of problems with the initial system had come to a head. The industry and Government were locked in litigation. My initial goal was to get fisheries management out of the Courts, which were not equipped to discharge that role. The breakdown of working relationships between the industry and Government were so complete that no progress was possible in the urgent task of sustainably managing our fish stocks. The essential requirement was to rebuild relationships and get people back around the table. This was no easy task.

I sought to get industry to own the problems and commit to solutions. I sought to mobilise their self-interest. Despite all the evidence, I retained my belief that people will act reasonably if an environment is created in which the parties can work things out. I fell back on one of my grandmother's adages that "the longest way round is often the shortest way home".

I was faced with the Ministry locked into the 'we must manage' attitude and industry dug in on 'we should manage'. Māori (New Zealand's indigenous people), who were also in a litigious mood, sought to strike down the whole management system as a breach of the Treaty of Waitangi which had provided the basis for European settlement when it was signed in 1840. Conservationists sought to virtually lock up the fisheries. The very substantial recreational lobby (around a million New Zealanders fish at least once in the sea each year) were up in arms, asserting that their fundamental citizenship right was being brought to nought by the actions of the Ministry and the efforts of the industry.

It seemed to me that the authoritarian 'only Government can manage' attitude would maintain a state of rebellion and litigation even where the Government view was soundly based. I took the view that flexibility rather than rigid authority, and working towards newly found shared goals, was the path forward. Clearly change was required to the legislative and regulatory environment but massive and sudden change clearly would not succeed. Incremental change consistent with the goal of biological sustainability started to see progress made.

An important element in building relationships and making progress was a truly enormous amount of consultation and listening – involving both the great and the small all around the nation and not just at the seat of Government. An important early realisation was that one must not promise more than one can deliver and one must deliver everything that one promises. Making progress on one topic increasingly built confidence to enable progress to be made on other unrelated topics. Intense focussing, issue by issue, and attention to detail built the way forward.

An important early example related to our very important Orange Roughy fishery. This fishery was the cash cow of the New Zealand industry and it provided the basis for New Zealanders to move into fishing the deep-water stocks of our economic zone. Initial catches were huge, based on the scantiest of scientific knowledge of the stock. By the time I became Minister the fishery was clearly heading into serious trouble. Industry was dug in against further quota reductions and my Ministry advisers were emphatic that they must be put in place. Litigation clearly would not resolve the future of the fishery. Amidst all the uncertainties surrounding the stock I had to make decisions. Clearly one needed alternative incentives. In the end I agreed to leave the TAC in place but secured agreement to informally subdivide the critical management area and distribute the catch in new ways. The most intensively fished area over the previous decade was closed and a vast unexplored area was allocated a significant part of the quota. This responded to the industry's view that there was huge untapped potential in the management area. That was the basis of their argument against reducing the TAC. On the other hand, by adopting their argument, I put them to the test to prove up the fishery. The quota-holders organised themselves into the Orange Roughy Management Company and entered into agreements between themselves as to how the exploratory area was to be fished. Over succeeding years huge quantities of information were obtained as to the nature and extent of the fishery, new grounds were identified, the original hard-hit core stock was protected and there was no litigation. The management company got into the business of sidescan sonar charting of the seabed to identify likely fishing grounds and the hydrographical knowledge of our large EEZ leapt ahead in a few years.

The shifting of incentives, and move to ever greater self-management almost certainly saved this fishery though there remain risks around it due to the uncertainty of the life expectancy of Orange Roughy. That argument has not yet been conclusively settled but what we did was address the requirement that decisions had to be taken despite the uncertainties and having got everyone committed to a vision for the fishery, to adjust it as we moved forward building on the step by step accumulation of knowledge and confidence. The whole experience has had another enormous gain. New Zealand companies acquired knowledge and perfected skills which have enabled them to venture thousands of kilometres beyond our EEZ to discover and operate Orange Roughy and other deep water fisheries to the point where I think I can

[1] The common New Zealand name for rock lobster.

safely assert that New Zealanders are world leaders in deep-water fisheries techniques and operations, especially deep-water pinnacle fishing.

Let me now move to the opposite extreme and relate the experience with the inshore scallop fishery in Tasman Bay at the north end of the South Island. When it was first discovered something of a goldrush took place. At its peak there were up to 300 small vessels dredging the fishery. You would not be surprised to know that it collapsed. A very prescriptive input-control system centred on licensing of fishermen and even the daily take was put in place. The fishery rebuilt slowly and catches settled way below what some thought was its optimum capacity. Not long before my time we were the happy recipients of a little foreign aid and technology transfer from Japan which introduced the notion of enhancing and managing the fishery by collecting spat and seeding areas which would then be closed until the scallops were grown and the whole fishery might be farmed on a rotational basis. But the whole exercise was just too difficult to make progress. To break out of the inflexible regulatory system, clearly we needed to get all interests to sign up to a shared vision for the fishery. The licence holders had great difficulty in making progress, recreationalists saw any change as a plot to deprive them of their citizenship rights to harvest scallops and by this time Māori were in assertive mode and capable of preventing any progress unless their interests were accommodated. I set out to sell a vision of a much bigger fishery capable of meeting the reasonable needs of all participants and one in which they all were directly involved in its organisation and management, within the QMS.

I started meetings with individual groups and gradually walked them together. At this point I realised that my own Ministry was part of the problem and for a host of reasons what I wanted was unlikely to happen. However, there was a solution at hand. As a result of radical reform of our public service we have a system whereby the Minister enters into a performance contract with the Chief Executive of each Ministry each year. I insisted on the successful inclusion of what we by then were calling the Challenger Scallop Fishery in the QMS as a term of the contract. Given that pay and future job prospects were now on the line, the impossible became possible.

The Challenger Scallop Company is now effectively managing that fishery within the QMS. Māori tribes are substantial shareholders; recreationalists enjoy a 50 scallops per day bag-limit without fee or licence; the company has its own special-purpose vessel for collectively organising the spat-catching and bed-seeding operation and the Ministry's role is essentially to keep an eye on things. Mike Arbuckle, Manager of the Scallop enhancement company provides a paper on this fishery.

But these triumphs need to be tempered by the fact that not every initiative has been so successful. In the northern part of New Zealand (to the east of our major city of Auckland) lies the major Snapper (*Chrysophrys auratus*) fishery of the country. It is by far the longest intensively-fished fishery in New Zealand. With over half of New Zealand's population seeking access to the fishery for recreation and being in an area with the highest Māori population in the country, and a very old culture and traditional fishery who knew nothing other than input-controls, the fishery was heading for trouble. My scientific advisors recommended a substantial reduction in quotas. I was convinced that this most researched of all our fisheries had to be scaled back. I acted boldly and ended up in court. How did I go wrong? There was no doubt the fishery had declined over the many years before my administration. Clearly the scientific evidence pointed to a fishery that had the potential to collapse quite quickly. The vast Auckland and surrounding population and Māori interests were hugely frustrated that their expectations of the fishery were not being met and as they saw it being defeated by commercial interests. Being a politician one knows that in the end people will have their way if sufficient of them are of a particular point of view. The *status quo* did not seem to me to be an option.

I challenged the industry, recreationalists and Māori to come up with an agreed plan to restore the fishery, but they could not make progress. As I saw it, the old conflicts could not be resolved so I took action to reduce the catch significantly to the level I thought prudent in light of the scientific advice. I broke my own rules, not having secured ownership of the problem by the participants and had not moved incrementally believing I could not wait any longer before acting.

Here also is a lesson for Ministers and other decision-makers. Even in fisheries where there is a long history of good catch data and scientific surveys, there is a danger in focussing too narrowly on the science. It appeared to me that there was something important missing in the advice I received. To cut a long story short, it boiled down to this: when Snapper eggs hatch they have very tiny mouths and are only able to eat a limited range of algae in the first critical days before they move on to the likes of brine shrimps and that particular algae only bloom in a 2°C water temperature range. Enter my early acquaintance with the impact of El Nino/Southern Oscillation on fish stocks. I sought advice linking water temperatures at spawning with recruitment to legal size several years later. There was nothing of any use. We set out to fill the gaps. However, by the time my decisions were in court we did not have the information to prove my hypothesis. My successor has subsequently been able to put modest quota reductions in place and I can only hope that they are sufficient to secure the future of the fishery.

There is a post-script to that experience in that scientific effort has led to a huge increase in understanding of the connection between spawning and recruitment success and changes in ocean temperatures however driven. It was with great pleasure that I recently sat in on a scientific symposium to hear the Chief Fisheries Scientist pronounce with certainty, what several years ago were

merely the intuitive prognostications of a Minister, that the oceanic conditions which lead to successful spawning of Snapper are bad for Hoki and Gemfish and vice versa. This example confirms my view that we must take a more holistic, multi-disciplinary and ecosystem-approach to fisheries management. Such is now required by our *1996 Fisheries Act.*

Nearly my last word on Snapper fisheries relates to a smaller fishery than the one I have described. I had before me a paper from officials recommending some new regulatory measures to support the QMS. My antennae vibrated, so I picked up the phone to a long-established fisher operating out of a tiny fishing port. The lass who answered the telephone could not believe it was the Minister and ran shouting down the wharf that the Minister was on the line. He thought a prank was being played on him and came sceptically to the phone. After I convinced him it was the Minister I asked him a number of questions, thanked him and sent the paper back marked 'No'. Experience counts. Knowing who really knows is as important as knowing yourself.

But occasionally you just have to find out for yourself. For a number of years industry had argued for a quota increase in the blue cod fishery east of Wellington. Recreationalists opposed every move. Unable to resolve the matter I decided to do a bit of stock assessment myself. I agreed industry could choose the day and the location. My final decision would depend on the result. Come the day, we launched from the open beach and were soon fishing. Despite moving from position to position along the coast hardly a blue cod did we catch. The subject was never raised with me again.

I now mention briefly the explanation for the considerable success of our number one fishery, Hoki. Although the fishery has been heavily fished within the quota management system and its predecessor for nearly 20 years, the fish stocks are considered to be at least as large as when the fishery was first taken up. A number of incredibly favourable spawning years led to my scientific advisers recommending large increases in quotas and the industry opposing them. The tendency towards increasing intensification and frequency of El Nino/Southern Oscillation events has been hugely beneficial to these fish stocks. Here again, industry came together in what is now the Hoki Management Company comprising all, or nearly all, the quota holders and this fishery is now largely self-managed and, among other things, has moved from being largely a surimi operation using foreign chartered vessels to a white fillet fishery largely fished by modern New Zealand owned vessels. It is a classic case of a property rights based fishery providing the right incentives to take a long term view of fish stocks and providing the confidence to invest enormously in the catching, processing and marketing sectors.

Here I want, on behalf of New Zealand, to express our profound thanks to the several northern hemisphere governments whose destructive fisheries policies have been instrumental in developing our fishing industry. In order to keep their shipyards in work they subsidised the building of vessels to fish further their ever-depleting fish stocks. Then, confronted by the parlous state of their fish stocks they have had to subsidise the removal of vessels to reduce effort. This has brought to the international market over the last decade what is now the New Zealand-owned mid and deep-water fleet. In some years our companies have been the only buyers. Needless to say, prices have been attractive, made more so, in some cases, by the governments where the vessels were flagged with subsiding loans to our companies to buy them. The taxpayers of such governments paid twice for bad policies! In other cases shipyard and loan subsidies have led to fine new vessels being built for our companies.

We do not offer subsidies, grants or incentives to our fishing, nor any other industry. Indeed, fishing is a user-pay industry but that is a story in itself. For a brief period, about 25 years ago, we did encourage expansion of our fleet to fish out of sight of land and to encourage local shipyards. That programme was directly responsible for depleting a number of our fisheries and helped create the pressure for change which led eventually to the introduction of the QMS.

Ministers and managers have to squarely face the fact if fish stocks are not healthy the communities dependant on them cannot be either. In short, the fish came first, the people second. But people have votes, fish do not. Those simple but profound statements mean that Ministers are subject to fearsome pressures. No fishery in its natural state needs any management. What we are all trying to do is manage the people in relation to their impact on their fisheries.

I now describe a fishery which is of great interest in Western Australia. One of our oldest commercial fisheries around the New Zealand coast has been the Spiny Red Rock Lobster. Historically it was fished for the tails which were frozen and earned premium prices in the United States' market. It was surrounded by a surfeit of regulations but over the decades the fishery declined from boom periods, now 30 years ago. As is the case with all declining fisheries a huge effort was made by the industry to try and maintain the right to catch and even greater effort to actually take the catch. The species had just been brought into the quota management system as I took office. There had been significant reductions in the catch limit but these gains were eroded by appeals. After a huge amount of consultation and in the process getting to understand better the dynamics of the fishery I made a series of major decisions. On the coast adjoining my own electoral district I put in place the biggest catch reductions, which were so severe as to force some people out of the fishery. Industry leaders had recognised that something had to be done and the process of building support for the vision of a better fishery was already established.

One of the measures put into effect was a move from tail-length measure to tail-width. Previously fishers

had squashed down lobsters on their measuring boards to try and make them reach the legal length and of course in the process severed the spinal cord, of many which were undersized which were either thrown back dead or went into the illegal trade. The use of the tail-width measure with callipers which is incapable of being exaggerated became an important conservation measure but it meant that many of the fish, which had previously been taken, were now under-size.

Around the various management areas the industry worked many issues through including enlarging and standardising escape-gap sizes in pots, recruiting and paying for technicians to monitor and research the fishery over and above the research undertaken by Government and generally taking ownership of the fishery and its future. The rock lobster fishing is now increasingly self-managed.

I can best summarise the changes between the early 1990s and today with this story. Some of the fishers on my coast argued to me at length that the rock lobster in their area had always been small – it was just the nature of the fishery. I had enormous pleasure recently to have the same fishers come and acknowledge with big grins that they had been wrong and I was right and the fishery was now in wonderful condition. The fish indeed will grow if given a chance.

What these measures and the quota management system has done is a textbook case of the benefits of a property rights-based system. With confidence in the fish stock, fishers moved to optimise their harvest to obtain maximum market prices. In effect this meant moving to a winter fishery to get the highest prices in key export markets. Under the old system, with the stock under stress, fishers typically had huge numbers of pots and worked the fishery most months of the year. Now most fishers catch their quota in a period of two months or so, securing optimum prices with typically half or less of the pots used under the old system. One of the great advantages of this response to market signals driven by property rights is that there are few fishers operating over the summer months when New Zealanders descend on the coast with the few pots they are allowed and they too are enjoying far more successful fishing. One of the great conservation gains of the new system is that there is not the endless hauling up and throwing back of undersized fish and the accompanying substantial mortalities. We now have a fishery much better attuned to nature, various participating interests and the marketplace. Over the same period dramatic progress has been made to move from an essentially frozen-tail fishery to one where close to three quarters are exported live to increasingly more distant markets. The magnitude of the change is rather like the change in the hoki fishery from surimi to prime white fillet.

I well remember a number of discussions at meetings on both sides of the Tasman Sea arguing the case between managing a fishery by pot-limits against managing it by a property-rights output-control system. I am here today to assert the success, the almost brilliant success of the path we have followed. How are you getting on here in Western Australia?

When I took up the matter of seeking a vision for the rock lobster fishery one thing leapt out at me as being the fundamental requirement. We needed more eggs in the water. We have always had regulations prohibiting the taking of berried females and stripping had been a long-established type of offending. The combination of actions and the response to correct incentives has led to a huge decline in the catching of lobster that have not bred and the fishery being operated at a time of year when females are not in berry.

On the same theme, one good thing at least seems likely to come out of the problems I described earlier with the northern snapper fishing. I met a man who believed we could eliminate the substantial mortality of undersized fish in both the recreational and commercial sector with a new kind of hook he was developing. I directed my Ministry to give him a little money to develop his work, the only time I ever did so, and have recently helped persuade my successor to do likewise. Extensive trials now up to full longline scale are showing dramatic results. Millions of fish might be saved to recruit at legal size and reproduce to support the biomass. This is but a variation on my "more eggs in the water" philosophy. It is also another example of my view that there is a place for supplementary measures to support and enhance the property rights based system. The Paul Barnes hook may yet become world famous.

All this goes back to a concept which I had been developing by observation across the whole natural resource based sector prior to becoming Minister, that a better environment and a sounder economy are compatible. We have a strong tradition of environmental activism feeding off our previous extractive, almost mining approach to natural resources and it was as soundly based as it was irritating to those whom these actions came to bear upon. A key success of our system has been to increasingly reduce, and in some cases end, that tension and conflict. It is to the great credit of our fishing industry that they have moved further and faster than their opponents who in some cases are unable to accept the enormity of the shifts and gains which have been made in the last 15 years. In a few fisheries they still have a point, but in large measure it is time to move on from the entrenched positions of the 1970s and 1980s.

Mentioning the imperative to have more eggs in the water leads me to another one of those instinctive propositions which drove my approach to fisheries management. It is that if there are to be truly sustainable fisheries then the fish stocks must be able to enjoy a successful sex life. Nowhere was this better illustrated than in our Foveaux Strait dredge oyster fishery. What are known as Bluff oysters are something of a national icon. Some years ago they were overwhelmed by the Bonamia

virus. If you think of it in human terms it is a mortifying thing. What it does is, right at the point where an oyster matures sexually, it attacks and destroys the gonads. Why it struck our fishery remains a matter of speculation but here again there is some suggestion that it may have been due to changes in the environment and/or nutrient supply. Old timers in the fishery pointed to earlier collapses which may have been due to the same or a similar virus.

Fishers argued to me all sorts of reasons why they should be able to continue fishing in what was at that time a licensed fishery, rather like the scallop example I mentioned earlier. They pointed to there being unfished beds to the west of the Strait and here again, like the Orange Roughy case, I put them to the test, subdividing the fishery into a series of paddocks and sending them off to catch those fish which they claimed would be their salvation. The reality was rather different and soon we were back confronting a biologically- collapsing fishery. Straining all my scientific advice and background, I decided to make decisions based on the hope that some of the oysters would be immune and we must close the fishery to allow them to multiply. The town of Bluff was thrown into economic decline and this weighed very heavily on me. Here again I can report a wonderful success story. The fishery has recovered, it has been introduced to the quota management system and all seems well.

One of the things which has been at the centre of controversy in New Zealand since the mid-1980s when we took to massive economic restructuring has been whether the pain was worth the gain. I am certain that what was done had to be done. All that could be argued was the sequencing and timing of the changes. In fisheries management, coming out of the old politically-dominated input-controlled systems, the pain has been considerable but the gains have been huge. Before the gains could be achieved a vision of what the fishery might be had to be developed and agreed upon. Those involved had, in large part, to take ownership of the problems and build the solutions, with the Minister and officials being facilitators and encouragers but leaving no doubt that the *status quo* was no longer an option and that everyone had to move forward. I can vouch for the truth of the adage that managing change is as important as the changes themselves.

Our fishery law has long been written around the Minister having a very big stick. Increasingly it is not so much behind the Minister's back as in the cupboard. The protection of the balance sheet value of the property right, the sense of ownership and commitment to the fishery have led us largely from an industry of hunter gatherers seeking to beat each other for the last fish to an industry of seagoing farmers. The instincts I brought from my farming and forestry background of sustaining the land, applying science and passing it on in better condition to the next generation is becoming the culture of our seafood industry.

In all this enormous change and transition we have achieved something that few other similar nations have managed. That has been to bring our indigenous people, Māori, into our fishing industry both as major participants in the commercial fisheries and in terms of giving meaning and effect to the customary fishing right for non-commercial purposes. Like everything else it started with monumental litigation in our courts, strengthened by landmark reports from the Waitangi Tribunal set up to investigate historic Treaty grievances, and culminated in massive negotiations leading to the Māori Fisheries Settlement of 1992. Today, Māori through the Treaty of Waitangi Fisheries Commission (Te Ohu Kai Moana) own, or control, or direct nearly half the commercial fishing quota of the country. Their representatives are in place in all the structures and organisations of the industry on a fully inclusive and participating basis and they play a leading role in the industry.

But despite the settlement having been achieved nearly eight years ago Māori have yet to settle upon the basis for allocating the quota amongst their tribes. This has been a new source of endless litigation between tribal groups seeking the property right in their own name on the one hand, and representatives of urban Māori on the other seeking greater provision for the benefit of their people. What is all too often overlooked in these cases is that what the Government settled were claims relating to issues in the nature of property rights, settled (as lawyers use the word) virtually on the courthouse steps. Whilst the settlement was for the benefit of all Māori, it proceeded, and could only have proceeded, on the basis of being Treaty-based with Māori able to benefit and develop through Iwi (tribal) ownership and use of fishing quotas to create jobs and build investment.

At the very heart of the quota management system is this concept of an ownership stake in the fishery and its future, shown now to be absolutely fundamental to securing the commitment of all participants to sustainable management, which I prefer to express in simpler terms: we must leave better fisheries for our grandchildren.

Whatever the short comings of my administration, I get a real thrill as I go around New Zealand to be told by individuals and groups in the industry that they would be happy to have me back as their Minister. After some of the things I did to some of them and after some of the things I persuaded them to do to themselves I am both humbled and proud to hear such expressions. But one cannot return to the well. What I could be tempted to do is to help turn around someone else's fisheries. Maybe, somewhere out there in the world of depleting fisheries there are managers so desperate that they might be interested in our approach. Whatever its faults, it has one thing going for it – it works.

MANAGING FISHERIES WITH RIGHTS IN NAMIBIA: A MINISTER'S PERSPECTIVE

A. Iyambo
Minister of Fisheries and Marine Resources
P. O. Box 13355, Windhoek, Namibia
<lclark@mfmr.gov.na>

1. INTRODUCTION

Fishing rights are a central element in the Namibian fisheries management regime. The new Sea Fisheries Bill puts it simply, in this way:

"No person shall in Namibia or in Namibian waters harvest marine biological resources for commercial purposes except in terms of a right,"

The purposes of this paper are to trace how and why Namibia arrived at this point, and to discuss some of the implications and results of rights-based management in Namibia, as seen from an explicitly political perspective.

2. BACKGROUND

2.1 Pre-Independence fishing

Before Namibia's Independence in 1990, the inshore resources off Namibia were managed by the South African illegal occupation regime; and the offshore resources were supposed to be managed through international collaboration under the International Commission for South East Atlantic Fisheries (ICSEAF). In practice, neither of these regimes was effective and Namibia found itself at Independence with a heritage of systematically depleted fish stocks. In addition, these stocks were exploited by fishing fleets that were heavily dominated by foreign interests thus providing relatively little economic benefit to Namibia; and the little participation of Namibians was dominated by a small group whose position had been established under a system of racist privilege.

2.2 The economic and social setting

In 1990, the new Namibian Government faced the challenge of promoting socio-economic development in a land in which people were deeply divided by the practices of apartheid and the effects of a long and bitter struggle for liberation. The 5% of the Namibian population that was white accounted for over 70% of national income; and 55% of the population in rural areas accounted for less than 5% of national income. Access to social services was just as skewed. Unemployment was in the range of 35-40%.

3. BUILDING A FISHERIES MANAGEMENT REGIME

3.1 Policy goals And strategies

Fisheries policy formulation in Namibia had literally to begin from scratch in 1990. The first step was to lay out policy goals and broad strategies for achieving those goals. A 1991 White Paper on Fisheries Policy (Government of Namibia 1991) laid out the goals of sustainable utilization and development of Namibia's fisheries resources. The policy is based on four main strategies:

i. rebuilding stocks
ii. building a national industry
iii. Namibianization, to ensure that the benefits of rebuilding stocks and building a fishing industry in Namibia accrue substantially to Namibians and
iv. empowerment, to ensure an equitable balance of participation among Namibians, particularly by those previously excluded.

3.2 The role of rights

From the start, it was planned that the new fisheries-management regime should be based on a system of fishing-rights. This drew both on previous experience in the management of Namibia's inshore fisheries, and emerging international trends and experience. The rights-system would have to address several major objectives. As a starting point, there had to be effective limits to the amount of exploitation of fish stocks.

Against the background of the systematic destruction of Namibia's fish stocks before Independence, there was no argument about the need to limit fishing mortality. The stocks had been depleted by over-fishing - that had to be stopped; and catches had to be lowered in order to rebuild stocks to levels that would sustain higher levels of yields in the long-term. This meant there would have to be long-term arrangements for limiting fishing mortality.

Nor was there any argument about the need to limit entry. On the one hand, the destructive effects of unlimited entry were clear – unlimited entry led to excess capacity, which undermined the economic sustainability of the fishery and increased tendencies to irresponsible fishing. On the other hand, the government also had clear ideas about the directions in which it wanted to restructure the ownership, control and pattern of operations of fishing in ways which could not be achieved if anyone could fish.

The system also had to address several other objectives:

i. it had to avoid encouraging over-capacity
ii. it had to extract revenues
iii. it had to be cost effective and
iv. it had to be simple.

4. KEY ELEMENTS IN RIGHTS-BASED FISHERIES MANAGEMENT IN NAMIBIA

4.1 Scope

The application of rights in marine fisheries in Namibia is comprehensive. Rights apply to all commercial harvesting. No person can take fish, or other marine resources for commercial purposes from the wild except under the terms of an explicitly-granted right. To do otherwise is an offence. Rights to exploit apply to all living marine resources – including seaweed, seals and guano. There are no exemptions for small-scale fishing, but the

system of rights does not apply to subsistence and recreational fishing where catches are not traded.

4.2 Levels of fishing

Rights limit the number of participants in commercial fishing, but levels of fishing are managed by output-controls (TACs/quotas) or input-controls (vessel numbers and capacities). Output-controls by TACs and quotas are the major method, covering over 90% of landings. With one exception, quotas are allocated to individual enterprises or persons holding rights, so that the system is essentially an Individual Quota (IQ) system.

4.3 Duration

The duration of rights is generally a major issue in the establishment of any rights-based system. There are broadly two points of view on this issue. The first is that rights should have the longest possible term in order to strengthen the incentive within a rights-system for fishers to take a long-term view especially in relation to stock sustainability, and to provide the security needed to support large investments. Following this approach rights might be granted in perpetuity or for relatively long-terms such as 25 or 50 years.

The alternative approach is to grant rights for shorter periods, largely for the purpose of providing the opportunity to measure the performance of right-holders against broader policy objectives.

The position taken on this issue will often depend on three critical factors:

i. *The feeling in the community about the validity of the claims of rights-holders.* If a rights-scheme is being applied in a mature, fully-developed fishery where the pattern of participation has been fairly stable over a long period, a community might reasonably feel that the fishing opportunities form part of the heritage of those who have been involved, and there might also be a general concensus about the basis for the granting of rights and connected fishing opportunities. In other cases, the community involved might be broadly indifferent about who the rights are granted to – for example in a new fishery, especially a high-technology fishery where there are few potential participants, there might be broad acceptance that rights can be tendered to the highest bidder for long-terms. Or, in a rights-scheme where rights are fully transferable, there might reasonably be a view that anyone can participate on the same basis as the next person by bidding to buy rights. In these cases, there is a strong case for rights to be granted for long-terms, mirroring as far as possible the same kinds of rights that might be in place in many societies for land or other forms of private property rights over natural resources. But often these conditions will not hold, and there will be controversy about the basis for granting rights. In these cases, these is a basis for looking to shorter-term rights, not just because this gives an opportunity for others to press a case for participation at some point, but because without the safety valve of a structured, periodic review of the pattern of participation, simmering discontent over the pattern of participation can lead to pressure at the political level to undermine the whole rights-system;

ii. *The importance of external values in assessing right-holder performance.* In some cases, there might be an acceptance that the pursuit of self-interest by the right holder is also socially optimal, and that right-holders can be left to exercise their rights as they see fit and for relatively long-terms. But in other cases, there might be important external values in terms of investment, or employment, or involvement in the fishing operations, which as a matter of policy are expected of rights-holders. In particular, communities have often had trouble with the idea that an individual or business could be granted a right, and simply rent that right out, without any direct involvement in fishing operations; and as a consequence that the right-holder should be held to account for their actual level of participation in the fishery. Shorter-terms of rights provide explicit opportunities for judgement of rights-holder performance against such standards.

iii. *Economic viability, including the level of capital that needs to be committed, and the rates of return.* At a minimum the terms of rights need to provide sufficient time for investors to recover their investments with reasonable returns. This pay-back period will vary widely between fisheries. For a fishery that requires no onshore investment and where vessels can easily be transferred to other fisheries, an annual right may be sufficient for this purpose; but where there are committed investments longer terms will be necessary. The pay-back period will also vary with the rates of return. Where there is a 50% rate of return, the period of rights that may be needed to secure investment will be a lot less than if annually returns are only 10%.

In Namibia, rights are granted for fixed-terms of 4, 7 and 10 years, which are relatively short terms by the standards of other rights-based systems. Four year rights are granted to all new companies, many of whom initially might not have vessels or other investments. When an investment is made, rights are granted for 7 years to joint ventures with foreign participation and for 10 years to wholly owned Namibian ventures.

The key issues in deciding on these terms were the problems associated with deciding on who should exercise the rights; and the related problem of measuring the performance of rights-holders. The position in which the Namibian Government found itself at Independence was that there was no historical basis for the granting of rights. Most rights-based systems elsewhere have been able to start with an assumption that those previously involved had some claim to participating in any rights that might be established. But most Namibians would have regarded those involved in fishing before Independence as having the least right to participate in a new rights-regime; because they were either foreign interests who should never have been there in the first place; or they were whites whose opportunities for participation in the past had been

granted by the racist occupation regime that excluded most Namibians from participating. Basing the allocation of rights on historical patterns of participation would have perpetuated the exclusion of the majority from economic opportunities that was a cornerstone of the apartheid regime; and would have denied opportunities to the new participants that most Namibians wanted to see taking part in the fisheries sector.

The identification of participants in rights in Namibia therefore, had to be based on a set of criteria related to the contribution that a particular party might make to Namibia's social and economic development. In practice, that meant the granting of rights was based on an administrative selection process in which the public was invited to apply, and all applications were judged against criteria. It followed that in order to be able to sustain this approach there had to be a process of evaluating over time the performance of right-holders against the criteria on which they were awarded rights.

Initially, there were some fairly strong expressions of concern that the relatively short terms would discourage investment and encourage operators to take a short-term view and fish irresponsibly. In practice, the results have been satisfactory. There has been more than $150 million invested in the sector in the last seven years, and there continues to be a strong interest from others to enter. Probably, there is relatively little real beneficial impact from extending rights beyond 10 years because even the far-sighted businesses appear to attach little weight to events beyond such a term. Of course, having shorter terms does raise complications at a later point, in that a business does have real concerns about its future when it is the eighth year of a ten-year right, and managing these transition periods becomes an issue at that point.

As for the impact of shorter terms on responsible fishing and compliance, the Namibian fishing industry even with its shorter-term rights does not appear to be any less responsible or compliant than industries operating with longer terms of right. There are at times healthy differences between the industry, government scientists and managers about stock productivity and status, and desirable TAC levels, but they also do not seem to be any more prevalent in Namibia than where rights are granted for longer terms. As for compliance, there is by all accounts, a high degree of compliance with fishing laws in Namibia. Indeed, the certainty that compliance records will be taken into account when rights expire and are reallocated, seems to have, not surprisingly, a highly positive effect on compliance.

4.4 Transferability

4.4.1 Namibian policies and practices

The option to make rights transferable has become important following the successful introduction of Individual Transferable Quota (ITQ) systems in countries such as Iceland and New Zealand. The benefits of transferability are well known. They include the efficiency gains that follow from the competitive transfer- process favouring more productive operators; the better use of capital provided by allowing capacities to be better adjusted to the fishing opportunities available; and the increased incentives to operators to maintain and enhance the productivity of the resources because they know that a share of the benefits from a higher value resource will accrue to them in the form of higher catch values, higher rents for their quotas or capital gains that can be made if they sell their rights.

But, to be comfortable with the outcome of full transferability of rights, a community or a government has to be broadly indifferent to who holds the rights. That may not seem like a major limit, but even the strongest systems of transferability all seem to have limits, for example on right-holding by foreign interests. In other cases, the holding of rights is limited to vessel owners or to particular communities, or to participants in particular sectors of a fishing industry. An alternative to specifically limiting who can hold rights is to provide some form of preferential arrangements that allow particular communities or businesses preferences in the acquisition of rights that are available for transfer. Establishing limits or preferences for transfers can be attractive options, but can also make the system complex to implement and monitor.

In Namibia, rights and quotas are not transferable - at least not in the sense that rights can be freely sold or leased as in systems like Iceland or New Zealand. To this extent, the system might be considered to be an INTQ (Individual Non-Transferable Quota) system.

The reasons for the decision to make rights non-transferable are that transferability might seriously undermine the progress made in the goals of Namibianization, and especially national empowerment. It made at the time little sense to have gone through a somewhat painful restructuring of the industry in the direction of Namibian control and broader participation only to see rights and quotas revert to the previous holders through trading. More specifically, setting up a transferable system where new participants could only enter by buying rights would have closed off opportunities for new entrants from previously disadvantaged groups who generally lacked the capital to be real competitors in bidding for rights.

Despite the characterisation of the Namibian system as an INTQ, there are some elements of transferability, since:

i. new rights-holders without vessels are able to charter vessels to catch their annual quotas for up to three years, while they accumulate capital to make a significant investment. The nature of these transactions is generally such that the rights-holders effectively earn an annual rent
ii. all right-holders are able to charter vessels to catch some of their quota if necessary, and again the nature of many of these transactions is that other boat-owners simply pay a rent for the quota used and
iii. most rights in Namibia are held by equity companies, in which shares are traded. The trading in these company shares is not directly controlled but may have implications on the terms of rights, and levels of quotas and quota fees. Share prices reflect the value of rights and quotas held by the company and thus involve an element of transferability.

One comment about Namibia's attitude to transferability might be interesting. In taking the decision in 1993 to maintain non-transferable quotas, it was recognised by those involved that, in terms of economic efficiency, Namibia was opting for a theoretically less-efficient system and that this might constrain the Namibian industry in competing in international markets with businesses operating within an ITQ system, such as those in Iceland and New Zealand. One key question in this respect was how rapidly other states might also adopt ITQ systems. The judgement made at the time was that full ITQ systems were unlikely to develop rapidly, especially in multi-species demersal fisheries – six years later that judgement seems to have been reasonably accurate.

Even with the perception that competitive ITQ systems would not develop rapidly, the Namibian authorities were still concerned to look for ways to make Namibia's INTQ system more competitive – and one starting point was to identify apparent areas of weakness in the existing competing ITQ systems. Three were identified – openness to foreign participation, its simplicity and/or complexity; and the extent of concentration and competition.

4.4.2 Openness

It seems that an almost inevitable result of introducing a transferable quota system is that there will be tight limits on participation by foreign interests in rights-holding companies. This will be necessary to overcome the concern that without such a limit, all the quotas will be bought up by foreigners. Indeed, it is a matter of irony that some of the states with ITQS and who in other economic sectors are the keenest to promote liberalising trade and investment flows under the banner of globalization, are at the same time the keenest states to apply tight limits to foreign participation in fisheries. In many fisheries, excluding foreign participation may not have any real impact. If local operators are the most efficient ventures in a fishery, as they might well be in a local lobster or shallow-water trawl fishery, then it is likely that excluding foreign participation in an ITQ scheme does not make any real difference. But that is not likely to be the case in industrial offshore fisheries. To the extent that limiting foreign participation takes out potentially efficient participants, it clearly reduces the efficiency gains from transferability

Namibia's fisheries management regime is relatively open to foreign participation, in that there is no maximum limit on the level of foreign participation in a right-holding venture. But there is a price, in that the terms of rights and levels of quotas and fees are less favourable when ventures are not Namibian-controlled. This approach has been sufficient to ensure a high degree of Namibian control while allowing foreign participation where foreign investment can contribute to improving efficiency. Of course, Namibia's position in respect of foreign investment is different to many countries because there is an open investment code set out in the *Foreign Investment Act*; and there was a relatively great need when the fishing industry was initially developing for capital, skills, technology and market access. But it is also likely that the relative openness to foreign investment is one of the reasons why the Namibian non-transferable quota system seems to have performed relatively well, even in comparison with systems involving greater transferability.

4.4.3 Simplicity/complexity

Having a simple fisheries management system was a necessity for Namibia because of its institutional and human-resource constraints. But it was also designed to be a virtue. Theoretically, rights should be as complete as possible to be fully effective. In fisheries, this has been taken to mean that rights should cover as many components of the catch as possible, especially in terms of species; and some rights-systems have gone a long way in applying rights and quotas to a large range of stocks. In Namibia, we have gone in the opposite direction. Seeking to avoid the complexities that arise when there is more than quota required to fish, quotas are applied only to the one major target-species in each fishery; and catches of other less important species in the catch are managed by taxes only. This system has been very effective. But the success in part reflects Namibian conditions where there are few significant species in the catches; and it would also not work without the full observer coverage of the Namibian system.

4.4.4 Concentration and competition

Managing concentration and maintaining competition may also be an area in which there can be advantages in non-transferable systems. In almost all discussion of transferable rights systems, the potential for, and effect of, greater concentration is a major topic. Greater concentration, as reflected in a smaller number of participants in a fishery, will usually be part of achieving the economic gains from rights-based management, especially where there is transferability, since an essential part of addressing over-capitalization is to reduce vessel capacity – and to that extent is a desirable outcome. The danger is that transferability might create new, artificial effects favouring scale. Managing rights and quotas may become so demanding that a company's success in acquiring the right quota-mix might become a more important determinant of its success than the efficiency of its fishing operations; or larger and more diverse quota-holdings might reduce the risk of severe penalties or costs associated with having to adjust quota-holdings to changes in the pattern of fish availability that also introduce a new advantage for scale. If these effects become major and reduce competition, then there can be real economic losses. Concentration limits can avoid extreme concentration developing, but there might be reduced competition well before the limits are reached. In Namibia, we attach great importance to maintaining strong competition; and we deliberately manage rights and quota-allocations to maintain a highly competitive setting. While it is difficult to measure the real benefits of enhanced levels of competition, we are encouraged by the successes that have resulted from the vigorous, outward looking attitude of the Namibian industry to continue with this commitment to strong competition.

4.5 Security

To be effective, rights have to be secure, both in the sense that right-holders meet responsibilities associated with the exercise of their rights; and that those without rights are not able to exercise the opportunities that belong to right-holders.

There are a number of approaches to ensuring the security of rights and the scope for alternative approaches is increasing with gains in technology, especially in information handling. In Namibia, a very high priority is attached to surveillance and enforcement of the rights-regime. There are dedicated air and sea fisheries patrol services; there is 100% observer coverage (except on a few smaller vessels); and there is 100% physical monitoring of landings and transhipments. This system seems to have worked well in securing rights both by deterring illegal fishing by unlicensed vessels, and by achieving a high degree of compliance by vessels licensed to rights-holders.

5. OTHER ISSUES ASSOCIATED WITH RIGHTS-BASED MANAGEMENT

5.1 Equity

Surely, the most basic question that has to be faced in any rights-based approach is that of fairness. The issue of fairness arises at two main levels. First, there have to be limits on who can participate. But, is that fair in itself, and what is a fair basis for deciding on who can participate in fishing? And second, to the extent that there are different levels of access through quotas, or some other form of process of allocating, there are questions about the fairness of the relative allocations among participants.

These questions are always difficult to deal with. Even in the simplest cases where there might be a stable mature fishery with clearly defined patterns of participation over time which might be taken as a basis for establishing rights, there will still be a range of difficult questions. Will rights be allocated only to the vessel owners – what about crew; or processors, or those employed in processing? What about the interests of others dependent on the exercise of the rights – in a particular community or sector of the industry? Recalling that many offshore fisheries conducted in the EEZ do not have long histories of stable operations, since they have only been in place in their present form for 20 or 30 years during which time many have gone through major restructuring, it will often, and perhaps usually, be the case that there will not be a clear basis for determining a historical pattern for participation in rights.

5.2 Wealth

Related to fairness is the issue of high earnings in the form of profits, income and wealth. Well-managed fisheries, (and rights-based management is one way to secure a well-managed fishery) can generate extraordinary profits, and therefore individual incomes and wealth, that can be sustained over long periods. This can be apparent at a local level within communities heavily dependent on fisheries; or at a regional or national level in regions or countries where fisheries is important. Certainly, in Namibia, at present, the high level of earnings of individuals associated with the industry is reshaping attitudes to wealth. The new wealthy are not, as before, those with major investments in mining, farming or trade, but now increasingly include those with investments in fishing. The perception of high earnings is not tied only to the owners of the businesses; skippers of even relatively small boats have earnings that make fishing a serious alternative as a career to (for instance) law.

These high earnings have many positive impacts apart from the benefits of increased investment and spending in the economy. They attract both capital and people. Indeed one of the most satisfying features of Namibia's fisheries development is the way the industry is mobilising domestic capital both from institutions and private individuals, whereas in its early days it was heavily dependent on foreign sources. The sector is also attracting some of Namibia's most capable people to work in it.

But these high earnings also bring problems in several ways, especially at the political level, and especially if, as in Namibia, the income distribution across the community is already highly and inequitably skewed. First, they bring increased pressure for access. When the pie is fat, more people want a share; and there is inevitably more force to the arguments for allowing large participation, and more vigour to the efforts of individuals and businesses to secure rights to participate. Second, the higher returns increase the attractions of non-compliance. Third, the higher returns can lead to huge disparities in earnings between those in the private and public sectors. Among other effects, this can lead to problems in retaining capable staff in the administration, and maintaining the integrity of surveillance and enforcement services.

The effect of high earnings is clearly strengthened where there have been problems in defining the basis for the pattern of participation. Indeed, the combination of high earnings, alongside widespread, deeply-felt concerns about the fairness of the pattern of participation is perhaps the most serious threat to the successful operation of a rights-based management system.

The appropriate response will vary widely. In Namibia, there are three important elements to coping with the pressures caused by high earnings.

The first is to extract some of the earnings for State Revenue. Making rights-holders pay a significant price for the exercise of their right and using those clearly-measurable revenues for public purposes (which in Namibia largely means the health and education services which are a major focus of public spending) can in the Namibian experience go a long way towards addressing the pressures caused by high earnings accruing to rights-holders.

The second important element in Namibia is to secure contributions to broader development-goals from individual companies. High earnings are more acceptable when the public perceives that the earners are creating jobs for others.

And the third is to see the benefits widely distributed. Policies which encourage job creation; and labour

market conditions which see a fair share of increased earnings passed on to workers both in earnings and working conditions also contribute towards increasing acceptance of high earnings.

5.3 Compliance

The effectiveness of rights-based management depends on securing a high level of compliance. The effect of a rights-based approach on attitudes towards compliance is mixed, but from the Namibian experience, generally positive. First, with a rights-based system, there is a real incentive to rights-holders to be self-regulating and to be particularly cooperative in deterring non-compliant behaviour by others since that behaviour will generally be seen as damaging the value of the right. In Namibian experience, high levels of fees for fishing seem to have had a particularly positive effect on self-regulation – no fishing company wants to see a competitor taking for free, outside a rights regime, catches that a right-holder has a stake in, and is having to pay dearly for.

5.4 Discarding/dumping/highgrading

A particular problem with quota-systems is dumping or high-grading. This happens because a quota-holder might be able to maximise profits by discarding some of the lower value forms of catch covered by quotas in order to maximise landings of higher value forms. Namibia has two particular problems in this area. One is the dumping of large purse-seine catches where catches are made up of a mix of pilchard (caught under quotas) and other pelagic species, in such a way that the catch is only good for processing into fishmeal, rather than canning, for which pilchard landings are much more valuable. The other is the dumping of small hake, in order to maximise landings of larger, more valuable hake. There are various options for dealing with these problems. The Namibian approach is a total ban on discards of marketable fish, including all quota species. In Namibian experience however, this can only be effectively enforced with full observer-coverage, and was initially the main reason for the establishment of the observer programme in Namibia.

There are reasonable grounds for arguing that some measure of discarding/dumping/high-grading are in fact optimal – that it does not pay in economic terms to go to the expense of retaining and landing some lower- value components of the catch; and that an efficient fisheries management system should allow this to take place. That may be true – but it seems just as true that with public, and especially consumer-attitudes to responsible fishing developing as they are, fisheries management systems that create incentives for dumping and allow it, are going to come under increased scrutiny and pressure for change. Certainly in Namibia, we are not contemplating any change to our "no discards" rule.

5.5 Overcapacity

From the beginning, the Namibian Government was concerned about the potential problem of overcapacity. While one of the strengths of a rights-based system is that it should not promote overcapacity, there was still a deep concern that in the position where the Namibian fleet was small to begin with, some explicit effort should be made to avoid excess capacity developing. This concern was enhanced by a rush of investment in vessels in the period before the introduction of the new system of rights and by a concern that the introduction of many new small businesses might also lead to over-investment in vessels. In response, the 1991 White Paper proposed to tie rights and quotas to vessels, with principles that were taken up in the introduction of a vessel-quota system in the demersal fishery in 1994, which was proposed to be extended to other fisheries. In fact, the vessel-quota system in the demersal fishery was later scrapped for the reason that it was cumbersome, and the Ministry lacked the administrative capacity to sustain it. Today, there is almost no direct regulation of capacity in the Namibian fisheries sector; and no plans to introduce it. Nor is there any evidence of major problems with the development of long-term excess capacity – although there are pockets of long-term excess capacity associated with two fisheries (rock lobster and pilchard purse-seining) which remain at historically depressed levels.

5.6 Subsidies or taxation

In Namibia, the fishing industry is not subsidized and Namibia is opposed strongly to the subsidy policies of other nations, both on the grounds that subsidies cause over-capitalization which leads to over-fishing, and because subsidies distort trade unfairly. Some say that our differential quota-fees are a form of subsidy to some components of the fishing industry such as the Namibian-controlled companies and those that process onshore. That might be a matter of definition, but what is clear is that the Namibian fishing industry as a whole is not subsidized. Instead it is taxed, especially through the quota-fees. This must be one of the real attractions of a rights-based system. On the one hand, the application of a rights-based management should lead to healthier stocks, improved compliance and a more efficient industry that can earn healthy profits. And on the other hand, the limiting of access and definition of defined levels of fishing for each participant provide a basis for extracting some of the profits.

How high should the profits be? This will vary with the productivity of the resources, the efficiency of the technologies used and the market values. But, it seems that today if one takes the prevailing and increasing high prices for fish, (especially demersals and crustaceans, but increasingly also for pelagics), and the increasingly cost-efficient harvesting and processing technologies, then it should be possible in any well-managed fishery to generate profits in the range of 20 to 50% of revenues.

How much should the government extract? This can vary widely. At one extreme, some argue that the Government can extract rents until profits fall to "normal" levels that are attracting only the level of capital needed to harvest the allowable catches, while at the other extreme is the view that since the profits are the result of the exercise of property rights, profits from fisheries should not be subject to any greater extraction of revenues than in other sectors. Between these limits there is a wide range of opportunities for extracting revenues for the government. In Namibia, we were initially extracting over 15% of landed value in fees and charges. Over time we have not adjusted

the fees and charges vigorously, in part because of the difficult conditions faced by the Namibian industry in 1996 and 1997 because of adverse environmental conditions. So, at present, fees and charges amount to around 8% of landed value. Certainly, in most substantial modern fisheries, there should not be any real problem in extracting through rights-based arrangements, at least 10% of the landed values, whether for management costs or additional revenues.

5.7 Industry/Government relations

Industry and government relations are an important component of rights-based management systems. By definition, if one moves to rights-based management, one encourages a serious strengthening of interest among participants in the fishery in the way the fishery develops and is managed. By limiting and defining who can participate in a fishery and what the pattern of participation will be, rights-based management both encourages those in the fishery to work more closely together among themselves, and encourages a closer working relationship between government and industry. We have found that this has led to the emergence of a well-organized structure of consultative bodies within the fishing industry. In Namibia, this is based largely on formal Industry Associations for each fishery with a looser industry-wide umbrella committee.

Of course, this is not always comfortable for a Government. It is one thing to have the benefit of an effective, and sometimes almost cosy, relationship with the industry to discuss issues of common interest and to get the inevitable benefits that come from getting a better understanding of each other's experience, interests and points of view. It is another thing to be faced with industry structures that are well-funded and have the resources to present highly effective opposition to ideas and decisions that it does not perceive to be in its interests. Without opening up the whole discussion on co-management, Namibian experience suggests however that there are major gains from working within more cooperative arrangements between industry and government.

6. PERFORMANCE OF THE NAMIBIAN FISHERIES MANAGEMENT SYSTEM

6.1 Responsibility and efficiency

Arguments for rights-based management usually depend on two major benefits – responsibility and efficiency:

i. responsibility, in the sense that creating a feeling of ownership by those fishing encourages fishing practices which are more sensitive to the impact of fishing on fish resources and
ii. efficiency, especially in the sense of reducing over-capitalisation or the risk of over-capitalisation, and thus creating higher profits and economic rents.

In Namibia's case, we also placed great importance on the achievement of wider socio-economic objectives through rights-based management, notably Namibianization and empowerment. Is the Namibian fishing industry and fisheries sector generally more responsible and more efficient generally because of rights-based management? And have the broader socio-economic objectives been achieved? Some measures of the performance in these terms are discussed below.

6.2 Stocks

Perhaps, the key measure of whether rights-based management has led to more responsible fishing is the impact on fish stocks. At this point, there are limits to the measurement of the performance of the Namibian fisheries-management system in terms its effect on stocks because of limitations in the available scientific information. In addition, the assessment of the impact on stocks of fisheries since Independence is complicated by the occurrence of major environmental changes during this period, particularly a sustained period of adverse conditions that led to reductions in TACs in most stocks from 1994 to 1997 causing a decline in landings over that period (Figure 1).

Generally however, it seems that most of the major stocks are now in a stage of strong growth. More specifically, we consider that of the six major stocks on which our research efforts are focused since Independence;

i. horse mackerel and monk are now in a healthy condition
ii. hake and rock lobster are apparently recovering strongly, but are not yet fully recovered
iii. deepwater crab, remains uncertain after a long-term decline
iv. pilchard, is clearly still at a low level.

Overall, the performance of the stocks has been encouraging with clear signs that the stocks are responding positively to the management regime that has been put in place.

6.3 Namibianization and empowerment

Relating rights, quotas and quota fees to achievement of broader policy objectives such as Namibianization and empowerment has proven to be highly successful in achieving these objectives. Table 1 sets out some indicators of performance in Namibianization.

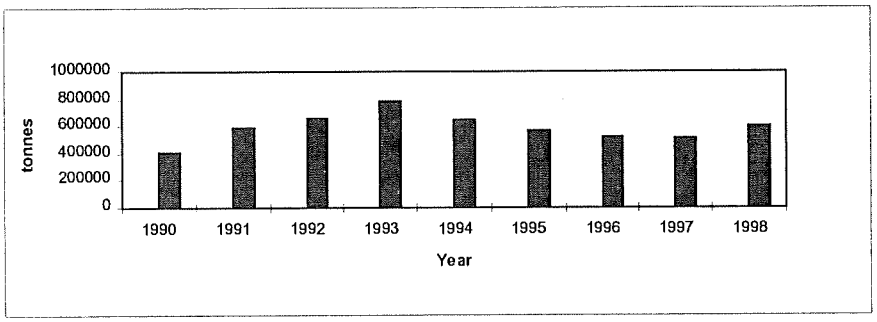
Table 1
Some indicators of namibianization performance

Quotas	**Effective Namibian share of control of quotas**	
	(1989)	**(1999)**
Hake	16.5%	71.7%
Horse mackerel	13.7% (1990)	72.6%
Pilchard	37.2%	82.2%
Vessels	**Namibian vessels as proportion of licensed fleet**	
	(1991)	**(1998)**
	50.5%	83.8%
Crew	**Proportion of Namibian crew**	
	(1994)	**(1998)**
	41.5%	66.0%

6.4 Financial performance

With the Namibian fisheries policies having been in place for a relatively short period, it is not completely clear how successful the building of a really viable industry has been, but the signs are encouraging. The adverse

Figure 1
Landings (1990-1998)



fishing conditions in 1996 and 1997 were reflected in poor returns for the industry in those years so that in 1997, for example, the annual rate of return on assets before interest and quota fees was only 19.9 %. There was a strong recovery in 1998 for which provisional stimates across the industry as a whole show that rate of return on the value of fixed assets before interest and quota fees to be around 40% despite continuing losses in the small pelagic sector. After quota-fees and interest this left net profits of around 24% before tax, which is still lower than is desired. However, a substantial further improvement is expected in 1999 to a level of earnings that should represent annual rates of return on fixed assets before interest and quota fees in the range of 50-60%. If this can be sustained in the longer term, this will be deemed satisfactory.

6.5 Stability

One measure of the performance of a policy is its stability. While it is important that policies should be flexible enough to be refined as conditions change, it is also important that the broad policy-framework should be fairly stable over long periods, especially where it affects investment. In this respect, the Namibian policy has been successful. There is a healthy ongoing debate in Namibia about major aspects of the fisheries-management regime, but the essential elements of the system have been little changed since they were introduced over a two year period from 1991 to 1993 and there is no real pressure for basic changes.

6.6 Cost-effectiveness

Limiting access and fishing mortality is inevitably an expensive exercise because of the additional effort needed to provide a credible scientific basis, more rigorous monitoring, surveillance and control and more full developed processes of consultation with the fishing industry. There are a number of ways to reduce these costs. But whatever approach is used, it is important to avoid dissipating the potential benefits of rights-based fishing in administrative costs to the government, or in the cost burden on the fishing industry. At present, the full cost to the Namibian government of fisheries management, including the full cost of all fisheries and aquatic science, and all maritime surveillance control and including the cost of full observer coverage and full monitoring of landings and transhipments represents 6.1% of landed value, and 4.3% of the final value of fish production. We believe this is within reasonable limits by comparison with the costs of other comprehensive fisheries-management regimes.

6.7 Economics

The economic performance of the sector is summarised in Table 2.

The economic gains for Namibia from its fisheries management system have been encouraging. Since 1990, the value of fisheries output including processing has grown from $N500 million to $N2,2 billion. (Currently US$1=$N6.1). Following this growth, the contribution of fisheries to GDP has grown from 5.4% in 1990 to 10.0% in 1998, making fisheries the second largest economy-sector, about 20% below mining. Fisheries products earn around 20% of export receipts. On current trends, fisheries might reach a level broadly equal to mining in 3 or 4 years. Interestingly, the contribution to GDP of fish processing is higher than that of fishing, with Namibia currently creating more jobs and earning more income from processing fish than from catching it. With a lot of scope still for increased value adding this margin is likely to increase further.

Within the total value of production, the demersal fishery mainly based on hake, makes up nearly half of the total output of the sector. Looking ahead, with scope for moderate increases in catches, an outlook for firm prices in main markets, scope for further value adding, and further Namibianization, the value of sector-output and the contribution to GDP could roughly double over the next five years. This pattern offers the prospect of substantial improvements in the economic welfare on many Namibians. However, the table also shows the effects of changes in environmental conditions, especially the adverse effect on earnings in 1996 because of low pilchard-landings.

7. CONCLUSIONS

In Namibia, we have concluded that rights-based fisheries-management is the right way to manage fisheries. There are a number of very difficult problems associated with rights-based fisheries-management, and therefore the appropriate form of rights-based management may vary widely, but any rights-based management system must have the essential elements of effectively limiting the fish that are taken, and who may take them.

Table 2
Fisheries contribution to the economy (1990-1998)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Catch (t)	407 901	591 658	654 006	789 133	647 996	568 634	524 007	511 412	605 854
Value of production ($Nm)									
Landed Value	329.9	519.8	617.3	708.9	881.8	937.3	1220.7	1292.6	1558.0
Final value	500.0	643.9	853.1	1086.7	1364.9	1453.0	1509.2	1706.2	2226.6
Contribution to GDP ($Nm current prices)									
Fishing	128.5	182.6	243.0	291.2	349.0	376.4	476.5	491.1	616.1
Processing	167.8	130.2	229.8	350.0	493.9	550.2	354.2	525.4	861.2
Total fisheries	296.3	312.8	472.8	641.2	842.9	926.7	830.7	1016.5	1477.3
Total GDP	5479	6223	7215	7612	9381	10278	11861	13136	14845
Contribution to GDP (%)									
Fishing	2.3	2.9	3.4	3.8	3.7	3.7	4.0	3.7	4.2
Processing	3.1	2.1	3.2	4.6	5.3	5.4	3.0	4.0	5.8
Total fisheries	5.4	5.0	6.6	8.4	9.0	9.0	7.0	7.7	10.0
Value of exports (Nm)									
Fish products	394.9	446.6	674.3	900.8	1184.6	1280.1	1237.4	1461.7	2033.8
Total exports of goods and services	3157	3656	4224	4971	5608	6288	7485	7942	8875
Contribution to exports (%)									
Total fish	12.5	12.2	16.0	18.1	21.1	20.4	16.5	18.4	22.9

In Namibia's case, we think that we are achieving in large measure the gains that we were looking for from rights-based management, especially in the following respects:

i. we have a responsible industry – and stocks are improving
ii. we have a profitable industry – and it is investing and creating jobs and increasing incomes and
iii. we have an industry that is developing in ways that meet our objectives of Namibianization and empowerment.

8. LITERATURE CITED

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CANADIAN EXPERIENCE WITH INDIVIDUAL TRANSFERABLE QUOTAS

D.L. Burke and G.L. Brander
Policy & Economics Branch, Dept. of Fisheries & Oceans, P.O. Box 1035
Dartmouth, NS, Canada B2Y 4T3
<BurkeL@mar.dfo-mpo.gc.ca>

1. INTRODUCTION

The appearance and growth in use of individual quotas (IQs) in Canadian fisheries has not been the result of a formal national policy to move fisheries in that direction. Rather, the early programmes were experimental in nature and cautious in the freedom given to holders of fishing licences who participated in the programmes. Although IQs have been in use for 25 years, and are currently in place in over 40 fisheries or fishing fleets, there is no government plan to expand their use into the remaining fisheries. When new IQ fisheries develop, it will be at the instigation of the licence holders. The policy on IQs has been to permit them to develop as extensions of the fishing licence, where a significant proportion of licence holders in a fishing fleet requests to have IQs and where they can reach agreement on a sharing arrangement and a fishing plan.

There has been an *ad hoc* development of IQ programmes and the design and even the nomenclature used reflects this development. The following terms are commonly used in Canada to describe variations on individual quotas. The term IQ in this paper refers to any, or all, of these variants:

- IQ individual quota
- ITQ individual transferable quota
- IVQ individual vessel quota
- EA enterprise allocation (a quota allocated to a company to use on any of its licensed vessels)
- QE quota entitlements (Lake Winnipeg).

One by one, groups of fishermen numbering from a few dozen to a few hundred have opted for individual quota management for their fleets. Every programme is different in its origins, its allocation base, and its rules of operation. The birth rate of new IQ programmes has accelerated from the 1970s to the present. This paper attempts to briefly explain the success of IQs in Canada.

Individual quota programmes have not generally been put in place because they were deemed to be superior to some functioning alternative. They have replaced dysfunctional fisheries management systems, or systems which could no longer be afforded. Fishermen, or fisheries managers, have sought relief from overfishing, endless quota or catch allocation disputes, overcapitalisation, low incomes, non-competitiveness in markets and so on. One or more of these conditions frequently preceded the introduction of an IQ programme in a specific fishing fleet, and the IQ has been expected to play a remedial role. These are not the ideal conditions for developing a whole new management regime in a fishery, but the IQ programmes have proven resilient[1].

2. CANADIAN LEGAL AND POLICY CONTEXT

The federal government has jurisdiction over the management of marine and inland fisheries resources. The provinces have jurisdiction over property rights and all matters of a private or local nature. The federal *Fisheries Act* assigns the powers to issue licences and to make allocations to the Minister of Fisheries and Oceans. The Act does not prescribe how fish or licences are to be allocated, nor does it prevent a considerable degree of variation, experimentation and adaptation to changing circumstances. As a result, fisheries access and allocation have largely been issues of administrative policy.

The term "fishing rights" is not legally accurate in commercial fisheries in Canada. The licence is considered a means of controlling fisheries, not a grant of fishing rights. The term "fishing privilege" is used by management authorities in formal documents. There are no significant differences in law between a licence with various conditions attached (*e.g.* regarding gear or seasons), and a licence that, in addition, proscribes an upper limit on catch.

Both non-IQ and IQ fisheries, however, share some characteristics of property rights[2] despite the lack of recognition of such rights in legislation. There is a degree of *exclusivity* in the licences which is enhanced by the issuance of an individual quota. Virtually all Canadian commercial fishing licences are limited in number, effectively barring the vast majority of citizens from commercial fishing. Although the Minister has authority to issue new licences, that authority is not used except where new effort is justified in a new fishery (*e.g.* sea urchins) or when a broader distribution of income is deemed desirable in an expanding fishery (*e.g.* shrimp, crab). By the nature of the resource, no fisherman can be insulated from the effects of others fishing the same stocks.

There is implicit *security of tenure* for licence holders in the fisheries. Licences may be suspended for

[1] Fisheries closures have put some IQ programmes on hold pending stock recovery. In addition to closed groundfish fisheries in Newfoundland, the Gulf of St. Lawrence, and eastern Scotian Shelf waters on the Atlantic coast, the Pacific abalone fishery has been closed to harvesting since 1990. Abalone fisheries in the U.S. Pacific without IQ management have also been closed.

[2] For a discussion of the characteristics of a property right, see Scott (1996).

fishing infractions but are rarely revoked even for serious cause. The government has further reinforced this non-guaranteed security by occasionally intervening to buy back licences (*e.g.* lobster, salmon, groundfish) from fishermen when it wished to reduce fishing capacity or improve average incomes. To avoid the legal inconsistency of "buying" what it does not recognize as property, the government achieves the same result by offering compensation for voluntary retirement of licences.

Another property-like characteristic is the transferability of licences and of quota. Formally and legally, a fisher planning to get out of a fishery must surrender his licence to the government which then has the option to retire the licence or reissue it to a qualified recipient. However, policy also provides that the licencing authority will abide by the advice of the departing fisher as to who should benefit from the reissue of his licence or quota – assuming qualifications stated in policy are met. Thus a directed transfer may occur where no sale is legally possible.

This example of how transferability works in the fisheries is illustrative of the environment in which Canadian fisheries policy has developed. Real property rights in fishing have not been granted through legislation. However, formal administrative rules have been systematically applied through licencing policy and management plans. In a later section of this paper, other property-like characteristics will be discussed as specific design features of certain IQ programmes.

3. EVOLUTION OF IQs IN CANADA

3.1 Context

Canada is a large federation with fisheries on three oceans and in inland waters. There is a wide diversity of economic and social circumstances among and within fishing communities. There is an equal diversity of views on how to manage fisheries. Fisheries have evolved in different directions with regulations best suited to each set of circumstances. In this environment, it would be difficult to prescribe a management regime suitable to all fisheries. The policy on IQs, therefore, has been to allow them to develop in fisheries where a clear majority of licensed fishers support such a change. IQ programmes have been dealt with case-by-case, usually in response to serious fish management, or incomes, problems. There are now more than 40 IQ programmes in Canada (Appendix 1) of various sorts, accounting for over half of the value of fish landings. Most quota-managed fisheries have moved to IQs. The major non-IQ fisheries currently are Pacific salmon and Atlantic lobster, neither of which is managed by a Total Allowable Catch (TAC) or quotas.

There were some tools of fisheries management used in many fisheries that have gradually paved the way for the transition to individual quotas. In most cases, IQ schemes evolved from limited access competitive quota fisheries. This, and the experience with the licensing system, gave fishermen a degree of comfort in entering IQ management that would have been absent if the base management regime had been more sudden and unrestricted.

3.2 Limited entry

Limited entry began to be imposed on commercial fisheries in the 1960s. Up to that point access was relatively unrestricted to anyone wishing to pay a nominal fee for a licence. This began to change when the ease of entry brought too much fishing power into the industry and low incomes began to stand in stark contrast to other post-war Canadian industries. Beginning in 1967 with lobster fisheries on the Atlantic Coast, followed closely by Pacific salmon fisheries and eventually in all important fisheries, the number of licences permitted in the fishery was frozen.

Limiting the number of licences meant that commercial access to the more lucrative elements of the public fisheries resources would only be available to a small part of the population. Initially the licences were non-transferable, although with special rules governing transfer of the licence to sons and daughters of licence holders. Over time, the practice emerged that DFO would reissue licences from one fisher to another upon request of the two parties involved – a retiring fisher and a new entrant – providing the new fisher met the qualifications for entry. There inevitably developed a market for these privileges. In fisheries where a licence could earn a significant income, the payment for a licence might be well over $100 000, even in inshore fisheries. Once a fisherman had paid a substantial sum for a licence, he had a great interest in maintaining the value of his investment. While this created financial barriers to entry in some fisheries, the value was derived from the earnings power of the licence. This market allocation process was and still is generally preferred by fishers over an alternative which might involve transfers through selection by a committee or board, or simply by lottery (which is often used to select entrants to new fisheries).

3.3 Catch quotas

Total Allowable Catches in many fisheries are set at the species-stock level as a conservation measure. The TAC is then broken into fleet quotas primarily for allocation purposes. The first quotas in major fisheries in Canada were instituted through ICNAF (International Commission for the Northwest Atlantic Fisheries) in the 1960s as a means of allocating groundfish fishing effort to the many nations fishing the banks along the Atlantic Coast. Over time, Canada began to divide out the domestic allocations among the domestic fleets: first simply by inshore-offshore; later by vessel-length class, gear-type and geographic area. The fleet shares were broken down more and more over time, to resolve various disputes or to remedy imbalances among groups as a result of fishing power, or proximity to resource or ability to fish in bad weather. Most recently, in one management region, the groundfish quota allocated to the large group of inshore fixed-gear fishers has been broken into community quotas based on counties along the coast.

Long annual debates over fleet shares have abated over time. The DFO has been less willing in recent years to revisit fleet allocations in response to pressure from fishermen or other interest groups. The resulting stability has led fishermen in most fleets to focus on management problems within the fleets rather than to seek solutions through larger shares of the TAC. This experience of Canadian fishermen with the incremental breaking down of stock-based TACs into manageable fleet quotas has meant that the additional step into individual quotas has been a relatively minor one. This transition has been further facilitated by the acceptance of historical catch as one of the major determinants of individual shares.

3.4 Industry participation in management

Industry's role in management has evolved since the 1960s. When formal management plans were first introduced, licence holders organised for consultation. Annual fishing plans provided an important forum where licence holders, managers and researchers met and discussed allocation and management measures. Fishermen could influence the direction of management, provided consensus could be reached. Consensus developed most quickly in fisheries with relatively few participants or where the participants were like minded. In fisheries where the geographical scale, or number and diversity of interests of participants prevented consensus, they tended to stratify over time into more homogenous groups. If the fishery was controlled by catch limits, each group would receive a sub-allocation of the TAC or be assigned specific stocks. These decisions were reflected in subsequent management plans.

Once a fishery reached the stage where a like-minded group was formed, the licence holders could pursue changes to the management system that would benefit them. Many advocated use of IQ systems. A new IQ fishery could be introduced once a consensus was reached and appropriate management controls were in place.

IQ systems often demanded a greater level of management attention than the fishery was receiving. This required that the participants augment certain management functions, either through paying for them or through the direct participation in the function. The most common functions provided by licenceholders included monitoring, enforcement, and research along with a greater involvement in management planning. Co-management agreements were developed to formalise industry participation. The level of licence holder participation in the management of IQ programmes is generally greater than in non-IQ programmes.

3.5 Summary of key steps

The following were all important factors in the gradual strengthening of interest in quasi-property rights in Canadian fisheries:

i. Fishermen and the public had become accustomed to the exclusivity of fishing privileges through the limited entry licence and of the value of this near-property as an investment.
ii. The industry had learned the advantages of letting a market develop to handle the distribution of licences after the initial issue.
iii. TACs in fisheries, together with fleet and sometimes community quotas and associated monitoring systems, had familiarised fishermen with the idea of stable catch shares and with the basic controls necessary for IQs.
iv. Fishermen and managers had learned that parts of fisheries, parts of fleets could develop different rules and regulations that did not necessarily negatively affect other fishers.

4. IMPLEMENTING INDIVIDUAL QUOTAS IN CANADA

4.1 Initial allocation

The initial allocation of IQ shares in most programmes was time-consuming and difficult, but in no case did it present an impossible hurdle. Many fisheries, as stated before, were well on the way to IQ allocation as a result of TACs, established fleet shares, and limited entry licences. The limited licences set the boundaries for whom was to be considered for quota shares. When an IQ programme was proposed by licence holders in a fishery, the Canadian approach was to allow these licence holders, or a representative group of them, to devise a sharing system which would be acceptable to all or almost all members of the group. This has proven to be a highly successful means of achieving agreement, and well worth the time and effort involved in reaching a compromise. The DFO offered services such as data analysis and other support.

There was widespread use of historical catch (by vessel, by licence, or by fisherman) as one major factor for allocation of IQs, though often tempered by other criteria as well. Use of catch history was intended to allow fishing patterns in the immediate future to proceed more or less as they would have in the absence of IQs, although this is not always acceptable to everyone. Other factors such as level of investment (capital or vessel size) or equal shares per licence were sometimes factored in with a specific weight along with the catch history. In all cases, a well-defined formula was applied to all eligible licence holders to determine individual shares of the fleet's quota. Provision of a minimum share to inactive licence holders in at least one IQ case helped secure their agreement with the programmes. A benefit of having relatively small numbers of fishers entering any one of these programmes at a time is that there was a certain amount of peer pressure within the fleet to develop a satisfactory formula and set of rules and then to accept them.

4.2 Characteristics of the shares

One major programme design issue was whether shares were to be tradable or not. This is often an important point to persons outside the IQ group and even outside the fisheries. There continues to be a fear that independent fishers will be swallowed up by 'corporate interests' in a transferable system. Occasionally this fear has

been felt strongly enough within a new IQ group that the programme has been established with non-transferability as a key feature. In many cases, the restriction has been removed after a couple of years of operating with non-transferable quotas. A common transitional move has been to allow temporary transfers within the fishing year only, so that the next year's allocation of quota will revert to the original quota holders. The realisation has tended to develop quickly among fishermen that many of the benefits of IQs cannot be achieved without some transferability. Among the programmes listed in Appendix 1, half currently have permanent transferability of quota, although often with many conditions attached. Interestingly, even where non-transferable quotas are preferred, no Canadian IQ fishery has ever sought to prevent transferability of *licences*, which means that a fisher can transfer quota so long as he transfers the licence as well.

The Enterprise Allocation programmes on the Atlantic Coast in offshore groundfish, shrimp, scallop and clam fisheries represent a unique application of IQ principles. Companies (not individuals) were allocated EAs (quotas) to be harvested with their own licensed vessels. Thus transferability could be achieved within the company if it owned more than one fishing vessel. Inter-company transfers of quota are either prohibited or extremely limited. The EA programmes were among the earliest IQ initiatives in Canada, and were largely responsible for resolving major economic adjustment problems in the offshore groundfish and scallop fisheries in the 1980s.

Divisibility of shares has developed in various ways across IQ programmes. In some cases, *e.g.* the multi-species Scotia Fundy groundfish mobile-gear and the Pacific groundfish trawl IVQ programmes, there is near-infinite divisibility down to small fractions of percentages of the fleet quota for any of the groundfish species involved. This facilitates very small trades, which are frequently used to cover accidental bycatches or over-runs when the fisher has insufficient quota. Such post-trip trading is permitted in these fleets to reduce the incentive to discard. In other cases (*e.g.* Pacific Geoduck, Sea urchins), there is no divisibility of quota and "stacking" is the only way of accumulating quota. This means that another fisher's entire quota and licence must be acquired and added to the buyer's quota.

There are other characteristics of shares that are less controversial and generally do not vary greatly among Canadian programmes. Many of these have already been discussed in Section 2 Legal and Policy Context above. The IQ shares are essentially catch limits which are specified in licences, hence the durability of the shares is the same as the durability of the licences. Licences authorising the individual quota must be issued by the Minister for a limited term up to nine years[3], although to date the term has usually been just one year. Even licences issued for one year are automatically renewed giving them an indeterminate lifespan, although they may be suspended at the Minister's discretion at any time.

Security and exclusivity of IQ shares is based largely on precedents within the particular fishery – whether or not it has been common practice to reallocate shares within that fishery. This has happened from time to time. For the most part, IQ holders have not been seriously affected by such reallocations.

The various characteristics of IQ shares in Canadian fisheries have grown out of the country's very limited legal recognition of fish harvesting privileges, out of the management practices that preceded IQs, and out of the accepted norms of the fishers themselves. Although revision of the terms of an IQ programme would be relatively easy with consent of the relevant licence holders, in fact the rules in most programmes have been quite stable over the years they have been in existence.

5. IMPACTS OF CANADIAN IQs

5.1 Large scale resource changes

Generally, there has been such dramatic change in so many Canadian fisheries in the past ten years that it is impossible to isolate the effects on resources of a change in management practices such as IQs represent. While the offshore EA fleet has been accused of hastening the collapse of the northern cod fishery, similar declines have occurred in some Pacific salmon stocks where there has been no quota management at all. There is no consensus in the scientific community on the causes of the stock collapses, but there is mounting evidence that changes in the environment have drastically impacted productivity and survival of groundfish and salmon stocks. On the positive side, East Coast shrimp and crab stocks have experienced unimagined growth in recent years. Both species are under IQ management. Where there were identifiable gaps in research, in catch monitoring or compliance with gear regulations, or any other observable weaknesses in management related to conservation or the sustainable use of the resource, IQ fleets have shown initiative and a willingness to co-operate to resolve problems.

5.2 Catch monitoring and enforcement of regulations

The most dramatic change in enforcement under IQ management has been the result of mandatory dockside monitoring of catches. Some of the earlier IQ fisheries did not set up accurate catch monitoring systems, choosing instead to keep the traditional voluntary reporting systems supplemented with purchase data from buyers. This was soon recognised to be inadequate. Since about 1990, most if not all of the IQ fisheries have implemented dockside monitoring systems to weigh catches and identify species at the point of landing. The monitoring is performed by independent companies and paid for by fishermen. In addition, in many fisheries, hails (radio reports) from vessels at sea are required to enable more complete monitoring of fishing activities. The DFO enforcement staff

[3] *Fisheries Act of Canada*, Sec. 7(2).

are improving their skills in forensic auditing and related data-tracking activities.

It is believed that the level of compliance with dockside monitoring is high, but enforcement staff acknowledge that dockside control of landings does not address at-sea violations such as discarding or highgrading. This has been resolved to varying degrees in the different fleets by use of on-board observers. Technologies such as on-board cameras have been developed, but are not in widespread use to date. GPS positioning technology is in use in the offshore scallop fishery on the Scotian Shelf and Georges Bank to help enforce a system of fishery bank-specific IQs. The satellite reporting system gives precise location information on each vessel in the fishery. It is a reasonable alternative to observers in cases where confirmation of area of catch is required.

It has been difficult to track the impacts of IQs on the cost of fisheries enforcement. It would require an accounting system capable of distinguishing enforcement costs on a fleet-by-fleet basis, due to the complicating reality of fisheries being partially IQ and partially non-IQ. There are still substantial inshore fisheries on both east and west coasts that are outside the IQ domain. Many enforcement activities (including land, sea, air patrols) are multi-tasked, covering a number of fisheries at once and are also intertwined with search and rescue and international boundary patrols.

Frequently, in Canada, IQs have replaced more complex and more expensive management schemes, which sometimes involved catch limits by species and by area for each fishing trip. IQs in other situations have created more difficult enforcement problems than they replaced. In general, there is no evidence that IQ management has led to increased enforcement costs compared to the cost of managing previous competitive-quota regimes.

5.3 Economic impacts

5.3.1 Capacity rationalisation

Normally a reduction in numbers of active fishing vessels is expected some time after the introduction of individual quota management with a quota transferability feature. This is often one of the primary purposes of implementing IQs in fisheries with excess capacity. Most transferable IQ fisheries in Canada have experienced such an effort reduction. Where TACs have been dramatically reduced for conservation reasons, as in Atlantic groundfish, the capacity adjustments by the IQ fleets have been swift and required no government intervention to determine which licences (if any) could continue to fish.

The IQ fisheries which have shown the least adaptation of fleet capacity to resource levels have been those where there were serious constraints on adjustments. The well-documented case of the Scotia-Fundy herring purse seine fleet (Stephenson *et al.* 1993) may be the best example of a poorly-designed IQ plan. Quota in the initial ten-year herring IQ plan was not tradable except where the seller was exiting the fishery permanently. Further, this fishery had a defined ten-year lifespan with no plan for what would occur at the end of its term. Another key element was the lack of adequate monitoring of catches. Under these conditions, few licence holders were willing to leave the industry and few fishers were prepared to buy quota if catch limits would not be enforced. At the end of the ten-year plan, there was still excess capacity in the fishery. In the absence of a new long-term agreement, some modifications were made in the IQ shares and the fishery has operated by 'rolling over' the old plan on a year to year basis.

There have also been cases where fleet reduction was not necessary, such as the Quebec North Shore scallop fishery (Nadeau 1994), with only nine licence holders. A non-transferable IQ, or a plan limiting transferability, can work well in such circumstances, providing it allows participants the flexibility they need.

There has been some adjustment of the size of vessels used in the IQ fisheries. This effect is not always easy to isolate as quotas are usually allocated to fleets based on the size of vessels in the fleet (*e.g.* 45-65ft groundfish fixed-gear). The vessel replacement rules that restricted licence holders in competitive fisheries have been slow to change with the introduction of IQs. There is some evidence that inshore and offshore groundfish IQ holders are converging on what may be the most efficient vessel size for their fisheries.

5.3.2 Market impacts

Over time, there has been a general improvement in handling procedures on fishing vessels. There is a trend in all fisheries to the delivery of fresh product and this market demands higher quality. Vertical integration - by fishermen moving into marketing as well as processors establishing contractual links with fishermen - has spurred the use of refrigeration and better on-board fish handling. Integration of harvesting, processing and marketing and the growth of IQs have been complementary developments. IQs have created a fishing environment which rewards planning and organization, and integrated firms are more likely to recognise these benefits of IQs and to promote their use in fisheries.

Even IQs without transferability have been effective in relaxing the race for catch. Seasonal price differences and catch rates obviously enter the decision-making process, so there has not been a total smoothing of monthly catches over the year on any particular stock. When IQs were introduced in the Atlantic offshore groundfish fishery in the 1980s, there were immediate changes to monthly fishing patterns, yet overall some seasonal differences remained (Gardner 1988). One great benefit of IQs for this fleet was the elimination of "gluts" of cod in offshore plants early in the quota year, when, coincidentally, catch rates were high.

In the Pacific halibut fishery, the independence of timing which the individual quota programme provides, enables fishermen to supply the more lucrative fresh fish market over a longer part of the year. Previously the

competition for catch resulted in large volumes of halibut being frozen because of the short duration of the fishery opening. And, due to higher prices, the IVQ provides greatly improved earnings to fishermen (Turris and Sporer 1994).

5.3.3 Employment and community impacts

Where there have been too many boats in a fishery prior to IQs, that number has decreased in cases where the programme rules have permitted quota transfers. With the decline in vessels, fewer individuals are employed although those that remain tend to be employed for longer periods of time, and earn better incomes. There have been no compensation for crewmen who lose jobs as a result of such changes.

Fleet rationalization is sometimes accompanied by changes in landing ports and of processing establishments. This can cause the displacement of processing workers, although it is presumed to be a dislocation of employment and not an overall loss. The national Employment Insurance (EI) programme supports seasonal workers when they are not working. For this reason, community leaders often promote "jobs" in fishing or processing over full-time employment. From this viewpoint, there can be a loss of jobs even when the amount of work is the same.

5.3.4 Concentration

Critics of IQs have observed a tendency for tradeable quota to become concentrated in the hands of a few companies. Where there is excess harvesting capacity in a fleet, introducing transferable IQs can quickly reduce capacity. A degree of concentration of ownership of IQs is the natural result of this fleet-capacity reduction. With fewer vessels fishing, fewer licence holders harvesting the quota. There is also evidence that processing companies have invested in IQs to a greater extent than they previously invested in licences. They are presumably attracted by the better profit-earning potential of IQ fisheries, by the security of supply for processing and marketing, and by the ease of matching capacity to quota through trades.

Licensing policy in Atlantic Canada prohibits the acquisition of licences for fishing vessels under 65ft in length by processing companies. But, the policy is difficult to enforce. It can be circumvented when a company has a private contract with a licence holder that may dictate how he manages his licence and quota. Obviously there may be many variations on such an arrangement, from a simple fish-delivery contract, to loans or assistance with collateral, to more complete control of the operation. These contracts among fishermen and others are private and outside DFO's jurisdiction. There is no evidence that quota concentration has led to price-fixing in dockside markets[4].

Several IQ programmes place limits on the shares of quota held by one licence holder. The letter of the law is enforced, but as noted above, it is difficult to establish with certainty whether the licence holder of record truly controls the fishing enterprise.

5.3.5 Licence fees

In 1996, Canada introduced a much larger licence fee for access to commercial and recreational fisheries. Compared to the competitive fisheries, fees on the IQ fleets proved to be relatively simple to determine. Each licence holder's fee was based on his allocation and was weighted by the landed price of the species. The rate was set at 5% of the average landed value of the species over a period of years though later modified somewhat at the lower end of the earnings scale.

5.3.6 Resource rent and profitability

The initial allocation of individual quotas has been free to those who received the quota. This may have resulted in a missed opportunity to seize some of the resource rent for the Canadian public, which owns the resource. However, the transition from common-pool fisheries to IQs would not likely have been achieved if the quotas had been offered on tender. Fishermen had held their licences since the 1960s/1970s, and were in many cases already financially insecure at the time IQs were introduced[5]. Realistically, there was no opportunity for rent collection at that point. There may have been an exception in new fisheries such as the sea urchin fishery in the Bay of Fundy. However, the current view of fishermen is that the licence fee more than compensates the public for its ownership of the resource.

Individual quota programmes currently show signs of prosperity, with notable exceptions in the closed groundfish fisheries on the East Coast, and the closed abalone fishery on the Pacific. There have been dramatic increases in abundance and in the distribution of crab and shrimp under IQ management on the Atlantic Coast. These developments have raised concerns about excess profits in these fisheries. Pressures for access have come from groundfish fishers excluded from fishing opportunities, and from socially concerned community activists who want to see a broader distribution of incomes from the fisheries.

In response, temporary licences and IQs have been issued to fishermen in a number of crab and shrimp fisheries. The TAC is divided such that original IQ participants receive a quota based on historic shares up to a set threshold. Above the threshold, the original participants receive a small share with the balance allocated to the temporary IQ participants. There were fears among quota holders that, once in the fishery, the temporary

[4] While the offshore lobster fishery has only two quota holders, this is a small part of the whole lobster fishery, which is highly competitive in both buying and selling.

[5] Original licence holders had received their licences for a nominal fee, but after limited entry began, fishermen acquiring licences from other licence holders sometimes paid substantial amounts.

participants would refuse to leave. However, temporary participants were removed from the Gulf of St. Lawrence crab fishery when stocks fell below the threshold in 1999.

5.3.7 Reduction in other forms of regulation

Much of the "micro-management" or minute levels of control on sea fisheries prior to IQs was in the form of conditions on licences, which varied by fishery as well as from year to year. Many of these have become unnecessary. Many IQ fisheries have seen a reduction in this type of control. For example, trap limits were dropped in the offshore lobster fishery once the IQs were established. There has been a virtual end to seasonal closures in groundfish fisheries where IQs are used.

One form of regulation which has been slow to disappear is the vessel replacement rules, which govern the size of boats permitted in various fisheries. With permanent IQ rights, such regulation should be unnecessary. These rules have been relaxed in some fisheries. However, because Canadian IQs do not enjoy any long-term guarantees, the changes have been slow in coming.

6. CURRENT DEVELOPMENTS IN THE FISHERIES

6.1 Emerging IQ programmes

IQ regimes are now often used whenever species are brought under management for the first time, *e.g.* sea urchins on both Atlantic and Pacific coasts. Where limited information is available to set a TAC, a low cautionary limit is set and the participants get access guarantees for a period in exchange for participation in the stock assessment process.

As time passes, the creation of new IQ programmes becomes less and less a significant event. The division (1998) of inshore Scotian Shelf groundfish quotas into *community quotas*[6] allowed relatively small groups of fishermen to form management boards and to design their own fishing plans. Some boards opted for individual quotas. These were set up and administered by the community management group (*i.e.* the fishermen) with minimal input from DFO.

When the groundfish fishery resumed in 1998 in southern Newfoundland following several years of closure, inshore fishermen in some of the region's large bays chose individual quotas as a conservationally safe and equitable way to allocate the limited quota. Similarly, new temporary shrimp and crab licences issued to harvest the growing resources of eastern Newfoundland are individual quota licences. While these new IQs are not all established as formally or permanently as others in the country, they represent positive steps in management of these resources. Some of the benefits of IQs can be achieved with very simple allocations and rules. Many of these new programmes will progress to more sophisticated IQs if, and when, the fishermen are ready to change them.

6.2 Fishery of the future

A new "vision" has been adopted to guide Canada's 'Fishery of the Future'. It places conservation and environmental sustainability as the paramount priority. Next, aboriginal and treaty rights are to be satisfied, and the importance of recreational fishing is acknowledged. The vision calls for a commercial fishery that is economically viable, self-reliant and self-adjusting, and for resource users to take greater responsibility for managing the resource. The vision is broadly consistent with the emerging international agenda for managing oceans and living marine resources, an agenda that Canada supports. The results obtained in IQ fisheries can be used to develop the vision.

6.3 Legal and policy developments

Legal and policy developments in Canada relevant to the fishery include the passage of the *Oceans Act (1997)*. This Act provides the legislative framework to apply the principles of sustainable development, the Precautionary Approach, and the integrated management of ocean and coastal activities and resources. The Act raises the standard for fisheries conservation and requires the inclusion of ecosystem considerations and objectives in fisheries management. It broadens the scope of issues that have to be considered in the planning process and extends the stakeholder base to include other ocean resource users, environmentalists, and the general public. There are widely differing levels of support among these groups for the creation of secure property rights in fisheries as a way of improving the management of oceans use.

A Bill to revise the *Fisheries Act* was advanced in 1999. It contained provisions to authorise the Minister of Fisheries to enter into long-term legally-binding partnering agreements with groups of commercial, aboriginal, recreational fishers, and other users. These agreements were presented as the logical next step in the evolution of fisheries co-management. They are to offer longer term security of access to groups willing to accept responsibility for management. They would not create property rights in the resource. Most IQ license holders supported the Bill, but other stakeholders were suspicious that this was an indirect way to privatise the resource and the Bill did not proceed.

Policy reviews are underway on both coasts. On the Pacific, a recently released allocation paper reinforces the position that the salmon fishery will be managed as a common property resource. A review of Atlantic fisheries is also underway with a report due next year. It aims to clarify current policies, particularly those related to economic and social goals and includes public hearings. The advantages and disadvantages of IQs and property rights are also discussed.

[6] These community quotas are allocations of groundfish to fleets based firstly on the coastal region in which they reside. In one such region, groups have split out, based essentially on their preferred method of management.

Thus, IQs have established themselves and enjoy strong support among the groups that hold them. However, there is little likelihood that the policy and legal changes now under consideration will elevate IQs to the status of property rights as in New Zealand or Iceland.

6.4 Opposition to IQs

There are a number of people both inside and outside the fishing industry who oppose the development of individual quotas. Much of the concern arises from the transferability aspect of IQ programmes. And, there are broader concerns about changes in direction in the fisheries:

i. 'Privatisation' of the common property fisheries
ii. Vertical integration of fishing and processing
iii. Concentration of ownership of licences
iv. Accumulation of wealth (relative to others in the community).

Others who oppose IQs focus more on direct impacts on community life:

i. Concern about the consolidation of seasonal jobs into fewer year-round jobs
ii. Concern about depopulation of small communities.

Many of these issues are not unique to individual quotas. The IQ has attracted attention because it enables and therefore accelerates change, which may have been hindered for generations due to the lack of property rights. An idealised view of the traditional coastal fishery backs the anti-IQ sentiment in many cases. This viewpoint is reinforced by Canada's generous employment insurance (EI) safety net, which provides year-round income to the seasonally employed. However, there are legitimate concerns about employment and the impacts of change. While opponents lobby government to stop the drift into IQs, fishermen in small fleet groups are opting over time to set up IQ programmes for their fisheries. The momentum in this battle currently seems to be with the fishermen who want individual quotas.

6.5 Advantages and disadvantages of the Canadian approach to IQ management

The cautiously permissive approach towards IQs has had both advantages and disadvantages compared to alternative policies. These points are summarised below.

Advantages:

i. The approach matches the diverse nature of Canadian fisheries and the varying systems of management in use. The approach allows a natural outgrowth of previous management experience.
ii. Fishermen have gradually come to recognise the benefits of IQs, often from observing the results in fisheries that have them. Fishing groups have been able to adopt some of the features of IQs and to use them for awhile before opting (or not) for a more complete package.
iii. The initiative to implement IQs in most instances has come from the licence holders.
iv. Many of the fisheries have converted to IQs without the need for a major political battle to achieve an all-or-nothing resolution. Those who want IQs are generally able to.
v. Many of the benefits of full property rights have been achieved without the upheaval associated with trying to change laws to permit property rights in fishing.

Disadvantages

i. The diversity in approaches results in more complexity and higher management costs.
ii. It has complicated the production of a clear policy framework and legal certainty for licence holders.
iii. Quota licence holders want more security for their allocations. Without that, fishermen's long-term decisions must always include an element of speculation which results in some inefficiency and sub-optimal behaviour.
iv. Without permanent allocations and the closure that would bring, the government is still vulnerable to lobbying for new, or greater, shares in some situations.

7. CONCLUSIONS

Many of Canada's IQ programmes arose in situations where a solution to a pressing economic, catch allocation or conservation problem had to be found. In most cases, IQ programmes were introduced with the agreement of the majority of fishermen involved. Twenty years after the initial IQs, many fishermen now perceive these programmes as a sensible starting point for new fisheries or a logical way to improve incomes and reduce capacity in established fisheries where no crisis exists. Many lessons about implementing IQs were learned over the years.

There is abundant evidence in Canada that IQs can be developed piecemeal, *e.g.* parts of fisheries, parts of fleets at a time. Within a fishery, some licences can operate with IQs without unduly hampering the affairs of the others providing there is a TAC with fleet shares. IQs for species in mixed assemblages is possible, preferably with provisions for allowing (and reporting) accidental catch. There are examples where IQ programmes have added features over time, *e.g.* including new fish stocks. Transferability of quota can be introduced years after the programme begins and some benefits can be achieved without transferability. IQs are possible without enabling legislation, so long as there is no legislation specifically prohibiting such development.

For simplicity of adjustment to changing resource levels, percentage shares of a TAC or fleet quota are essential – not guaranteed tonnages. This has been confirmed by experience in other countries. A quota allocation must recognise the inherent variability of fish populations over time. Another lesson is the importance of involving the affected licence holders at all levels of design and implementation of the programme. This brings a level of acceptance without which few IQ management programmes could function.

In setting up an IQ programme, an effective enforcement and monitoring plan must be developed before implementation. New requirements should not be loaded on top of existing regulations.

Where it is a controversial issue, there is no need to focus on the private property aspects of IQs. An individual quota is essentially a level of division of the TAC among users. Legal security of tenure is a desirable but not an essential feature of a successful IQ programme, provided there is confidence in the practice of not undermining the shares held. The licence and its associated allocation of quota must be renewed at regular intervals in Canadian fisheries, though there is no guarantee that it will be.

It has been observed that fleets with IQs are more willing and better able to participate in management and to pay for science, monitoring and other management functions.

There are some weaknesses of IQ programmes that do not have solutions. To some critics, the incentive to high-grade catch is a critical flaw in IQs and reason enough to abolish them. All catch-limiting management plans have to deal with discarding of fish caused by fishermen trying to maximise incomes or simply to comply with the fishing regulations. The problem would not be resolved by getting rid of IQs.

It is difficult to say whether the long evolution from open fisheries to IQs, which worked quite well in Canada, might be a path worth considering elsewhere. Catch limits and licence limits were steps along the way. Subdividing large fleet groups into smaller ones and forcing a degree of self-management upon them seems to be constructive. The interpretation and application of these lessons to a particular situation in another part of the world is best left to those on the scene.

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APPENDIX 1

Individual Quota/Enterprise Allocation Programmes existing in Canada

Area / Species	Fleet or fishery	Year adopted	Permanent transfers
Atlantic			
Groundfish	Mobile gear <65 ft 4T (Gulf/Laurentian.)	1989	Yes
	Mobile gear <65 ft 4VWX+5 (Scotia-Fundy)	1991	Yes
	Fixed gear 45-65 ft (Scotia-Fundy)	1997	Yes
	Fixed gear cod <65 ft, 3Ps Area 10	1998	No
	Fixed gear cod <65 ft, 2J3KL	1999	No
	Mobile gear <65 ft 4RS3Pn (Nfld)	1984	Yes
	Mobile gear cod <65 ft, 3Ps	1998	No
	Offshore Groundfish EA	1982	No[a]
	Midshore Groundfish EA	1987	No[a]
Pelagic	Herring Seiners >65ft 4RSTVn (Gulf, Nfld)	1983	Yes
	Herring Seiners 4WX+5 (Scotia-Fundy)	1976	Yes
Shellfish	Snow Crab Areas 18/19, 25/26 (Gulf)	1979	Yes
	Offshore Clam EA	1987	No[a]
	Midshore Snow Crab – Zone 12 (Gulf/Laur)	1990	No
	Snow Crab Area 13-17 (Laur/Nfld)	1992	No
	Snow Crab (Nfld)		No
	Snow Crab Areas 20-24 (Sco-Fundy)	1994	No
	Offshore Scallop EA (Sco-Fundy)	1986	No[a]
	Scallop Mid. N.Shore (Laurentian)	1991	No
	Bay of Fundy Scallop	1998	Yes
	Offshore Lobster (Scotia-Fundy)	1977	Yes
	Shrimp 4RST (Gulf/Laurentian)	1991	Yes
	Northern Shrimp EA	1987	No
	Shrimp 4VWX (Scotia-Fundy)	1996	Yes
	Shrimp 4R (Nfld/Laurentian)		No
	Sea Urchin (Scotia-Fundy)	1995	No
Lake Fisheries	All commercial freshwater fisheries in Ontario	1984	Yes
	Lake Winnipeg Quota Entitlement	1972	Yes
	Cedar Lake IQ	1982	
Pacific			
Groundfish	Sablefish IVQ	1990	No
	Halibut IVQ	1991	Yes
	Groundfish Trawl IVQ	1997	Yes
Pelagic	Herring Spawn on Kelp IQ	1975	No
Shellfish	Geoduck IVQ	1989	Yes[b]
	Red Sea Urchin IQ	1994	Yes[b]
	Green Sea Urchin IQ	1996	Yes[b]
	Sea Cucumber IQ	1996	Yes[b]
	Abalone IQ Programme (closed)	1980	No

[a] EA quota may be fished by any vessel within a company, but is not transferable between companies. In-season temporary trades between companies are permitted in some EA programmes.

[b] Quota is not transferable, but licences may be "stacked" on a single vessel.

FISHING RIGHTS IN SOUTH AFRICA

M. Mayekiso, R. Tilney and J. de Swardt
Marine and Coastal Management
Private Bag X2, Roggebaai, Cape Town, 8012 South Africa
<jdswardt@sfri.wcape.gov.za>

1. BACKGROUND

The passage of South Africa from an authoritarian system of government to one that embodies liberal democracy is widely hailed as one of the great events in the annals of negotiated transitional pacts. However, since our first truly democratic elections in early 1994, it has become increasingly evident that the country confronts formidable challenges in its rehabilitation in a world where international relations have been altered fundamentally, or are themselves in transition.

It is against this background of global and national change that a number of policy-reform processes have been undertaken in South Africa. One of the areas of tension and extensive debate is that of macro-economic policy involving *the Reconstruction and Development Programme (RDP - ANC 1994), a policy that emphasizes redistribution,* and *the Growth Employment and Redistribution Policy (GEAR - ANC 1996)* that emphasizes economic growth.

This tension is linked directly to difficulties in first formulating and second effectively implementing the new marine fisheries policy of South Africa. For instance, the former distribution of rights of access gave the upper hand in fisheries to relatively few organizations, almost all of which were dominated by the formerly advantaged sector of the population. Tensions were created by the need to create (demographic) equity in distribution while still allowing for some of the industrial stability that had allowed markets to be developed so effectively over the years.

The process of formulating a new marine fisheries policy was initiated by the Minister of Environmental Affairs and Tourism in October 1994 (Cochrane and Payne 1998). The immediate background was unrest over prevailing policy, which was widely considered to be insensitive to the requirements of South Africans previously marginalized by the policy of apartheid. In December 1994 the idea of establishing a Fisheries Policy Development Committee (FPDC) to develop a Green Paper for the fisheries was mooted.

On 4 June 1996 the FPDC presented the Green Paper to the Minister. The White Paper (Anon 1997), and the *Marine Living Resources Act* (Anon 1998) which became operational from 1 September 1998, were developed from that same Green Paper. During the policy-development process three issues were not contested. They were *sustainability* of utilization of marine resources, the need to maintain *stability* in the industry, and the need to broaden access to include previously excluded population groups (*equity*). On the other hand there were some issues on which consensus was difficult. These included:

i. the nature of access rights, where the key issue is the balance between the rights of the individual rights-holder and those of the State and
ii. the position of the user-group versus the State where the issue is the balance between user-group interest and Ministerial discretion.

2. THE NATURE AND ALLOCATION OF ACCESS RIGHTS, AND STAKE-HOLDER INFLUENCE IN FISHERIES MANAGEMENT

Until 1994 (in reality, until the new Act was promulgated in September 1998), access to resources was granted by the State in the form of annual quotas. During the FPDC process, the dominant concept was that of a long-term property right. The recommendation handed to the Minister by the FPDC was essentially for an ITQ system with relatively modest scope for government intervention (FPDC 1996). The rationale behind this recommendation was that long-term rights should be granted because they would result in an increase in the stability of the labour force and in economic efficiency, while encouraging investment and sustainable resource utilization.

The Ministry in its White Paper on Marine Fisheries (Anon 1997) also supported the ITQ concept, but with rights to be sold for a maximum period of 50 years, during which period they would revert to the State. The same document recommended that the transfer of rights would be regulated by the State to prevent concentration of rights in the hands of the economically powerful. This regulation was considered necessary to achieve the broadening of the participation ideal. The legislature finally reduced the maximum period of holding rights to 15 years, and the principle of State ownership of the resources was underlined by a decision that rights would only be leased to participants, rather than actually sold.

The centralizing of power with the Minister also took place with regard to allocation of access rights. Prior to promulgation of the new Act, quotas were allocated by an independent statutory body, the Quota Board, and the Minister could not influence the process once he/she had handed the Total Allowable Catch (*TAC*) over to it. Although, not surprisingly, the Quota Board was unpopular with most fishers themselves, the FPDC supported the general idea of an independent statutory body, which they named an Allocation Board (FPDC 1996). The position in the White Paper (Anon 1997) was that the allocation of scarce resources fell in the domain of politics and hence

should be the prerogative of the Minister. This position was upheld by the legislature.

The previous resource management advisory authority to the Minister was called the Sea Fisheries Advisory Committee (SFAC). The FPDC recommended that the structure be retained with largely similar functions and renamed the Consultative Advisory Forum (CAF). It recommended that the CAF be given a stronger position than the SFAC in relation to the Minister, in other words limiting the Minister's decision-making power to some degree. In the White Paper, however, the Forum's position was weakened again. The legislature effected some modest changes without changing in any significant manner the status of the CAF relative to the Minister.

From this brief analysis, it is clear that there was divergence in thought between stake-holders, the executive and the legislature. The stake-holders sought regulation in the marketplace, so diminishing the role of the executive. The executive, on the other hand, attempted to introduce a market-regulated system that allowed for intervention. The legislature finally settled for a system in which the market would play a minimal role in the distribution of access rights. The reluctance to leave matters with markets both on the part of the executive and the legislature was clearly related to their consideration of the level of inequality in the fishing industry. However, it did broaden the definition of stability beyond the concept of industrial stability mentioned earlier as a cornerstone of the new policy. It also moved stability into the sphere of politics while retaining some level of industrial stability.

3. HISTORICAL DEVELOPMENTS REGARDING ACCESS RIGHTS IN THE SOUTH AFRICAN FISHERIES SECTOR – THE HAKE TRAWL FISHERY

South Africa has a coastline of some 3000km, extending from the border of Namibia in the west to Ponta do Ouro in the east, adjacent to Mocambique. The western coastal shelf is highly productive, in common with other upwelling ecosystems around the world, while the east coast is considerably less productive but has a high species diversity including both endemic and Indo-Pacific species. The living marine resources of South Africa have been exploited for many centuries. Industrial fisheries, however, started just after the turn of the 20th century with the commencement of the hake trawl fishery.

The hake trawl fishery is the mainstay of South Africa's fishing industry. The two hake species are harvested, primarily off the western Agulhas Bank and the annual total allowable catch (TAC) for the two species combined is currently just over 155 000t. A conservative management strategy has been adopted for the stocks, in a highly successful endeavour to rebuild the resource after a period of severe over-fishing by distant- water fleets during the 1960s and 1970s. The hake fishery is dominated by two large companies and as a result there are high expectations for transformation within this sector.

The fishery originated in 1904 when vessels and capital were introduced by a wealthy British fishing family. The fishery was a modern one from the outset, backed by experience and a great deal of capital – this enabled the company to survive two early insolvencies within six years of its origin. Significantly, a great deal of emphasis was placed on marketing and the establishment of a distribution network to the interior. Insulated railway trucks enabled the product to be marketed to the mines 1500km inland, and by 1910 a bi-weekly "fish train" was in operation between Cape Town and Johannesburg. Complete control over the marketing and distribution of fish resulted in the pioneer company, Irvin & Johnson, dominating the South African trawling industry for over 60 years. Many new entrants came and went during this period as a result of liquidations, amalgamations and take-overs. Apart from I&J's stranglehold over the distributive network, new entrants were typically confronted by problems such as the lack of berthing space and access to sufficient capital (Bross 1999).

The hake fishery underwent unprecedented growth during the early 1960s when foreign fleets discovered the rich grounds of the south-eastern Atlantic. Catches were uncontrolled and escalated rapidly, peaking at over one million tonnes per annum. The hake stocks were decimated within 15 years and by 1977 the fleet was landing primarily juvenile fish. Due to the open-access nature of the fishery and the absence of any form of access-rights, catches in several South African fisheries started to exceed sustainable yields by the 1960 and this over-exploitation led to sharp declines in some important stocks. Concerns over the sustainability of the open-access fisheries led the authorities to impose regulations such as total allowable catches (TACs), limited seasons and area restrictions. These regulations only partially succeeded in controlling over-fishing.

At this time, a clause in the draft Convention on the Law of the Sea indicated that if host nations did not have the vessel capacity to harvest their stocks at MSY, foreign vessels could not be excluded. The South African government saw this as an opportunity to encourage large-scale new entrants into the fishing industry in an attempt to expand local fishing capacity. However, due to the parlous state of the resource, potential investors were hesitant and it was left to the existing participants to invest further in order to acquire the necessary capacity. Once this had been achieved, the authorities promulgated an Exclusive Fishing Zone out to 200nm in November 1977 and the fishery was effectively South Africanised once more. During the boom period, open-access market forces had broken I&J's stranglehold on the fishery and two major new companies had emerged. During the late seventies it became clear that the existing regulations were inadequate to address the problem of economic over-fishing and the excess effort that occurred led the authorities to introduce individual company allocated quotas in 1979. These quotas were awarded annually by the Minister responsible for fisheries and fell mostly into

the hands of companies with a proven past performance. With the industry having been afforded a degree of security, they negotiated the introduction of a stock-rebuilding strategy with the Government, which saw a 22% reduction in the TAC over a five-year period. During this time, concentration in the industry occurred again, when the second largest company, Sea Harvest, purchased the third largest company, leaving 92% of the TAC in the hands of two companies.

After introducing the individual quota system, the Government once again attempted to broaden participation in the hake fishery by allocating quotas to new entrants. This was done by defining a quota as a quantum rather than as a proportion of the TAC, which meant that any increases in the TAC would facilitate new entrants.

Following the inception of the quota system, stakeholders argued that the granting of annual quotas caused uncertainty which hampered financing and investment and retarded development. Although there was no assurance that quotas would not arbitrarily be reduced or cancelled, it never happened in practice as long as stakeholders complied with the regulations. This matter was investigated for the first time in 1980 by the Treurnicht Commission of inquiry into certain aspects of the living marine resources of South Africa. They recommended that quotas be granted for a revolving term of seven years provided that applications giving grounds for such quotas were made annually. This recommendation referred only to concessions (exploitation rights), since quotas, *i.e.* the physical quantity, were reconsidered and granted annually in accordance with the status of the resource concerned. The concept was, however, rejected in a Parliamentary White Paper on the grounds that the Government should always have the right to withdraw any allocation at any time, and the system whereby quotas were awarded annually therefore continued.

In 1985 the fishing industry once again challenged the legality of the Minister's actions, resulting in the appointment of a Commission of inquiry (the Diemont Commission 1986) whose mandate was to report on a range of issues pertaining to fishing rights.

During this inquiry the stake-holders again argued strongly that the practice whereby the right to utilize a specific mass of fish was granted on an annual basis did not grant sufficient security of tenure specifically in those sectors where long-term planning was a prerequisite for a rational programme of investment and market development. Second they argued that it was necessary and desirable for the right to participate in the fishery to be established indefinitely. The Diemont Commission did not accept the second argument on the grounds that there were too many uncertain factors for the State to give a stamp of permanency to any quota. They also pointed out that some quota-holders had acted irresponsibly towards the resource in the past and did not deserve to be granted permanent rights. The South African common law had also never recognised that the sea or its resources could be the subject of ownership. The Commission did, however, accept the first argument and recommended that tenure should be for a long term.

In the White Paper the Government indicated that it was of the opinion that some of the evidence overemphasized the need for greater security and stability and pointed out that, in practice, quotas or fishing rights were perpetuated provided the holder complied with prescribed requirements. It accepted the Commission's recommendations in this regard, but pointed out that the quantum of the quota would vary each year according to fluctuations in the TAC.

The Legislator eventually introduced a system whereby an independent statutory body, the Quota Board, granted exploitation rights for a specific period to stakeholders, as well as annual quotas (it also recommended that the "specific period" differ for the different sectors of the industry). In practice, exploitation rights were awarded to all existing stake-holders for a period of 10 years and for five years to new entrants. This system meant that stake-holders had more security than before, but were still not guaranteed that their quotas would be renewed from year to year. In anticipation of a stock recovery, the Government decreed that 20% of all TAC increases were to be reserved for distribution to new entrants. These measures resulted in the erosion of founding company quota holdings by 28% over the 20-year period following quota introduction. The Government therefore used the quota-management system as a tool to manipulate market share.

The guidelines of the Quota Board provided that the quotas could be reduced or withdrawn in certain specified situations. Examples of such instances were:

i. a reduction in the TAC.
ii. the Board being of the opinion that a redistribution of quotas was desirable.
iii. the quota-holder gave preference to employment of foreigners.
iv. non-compliance with statutory, regulatory or other requirements stipulated by the Board or Department.

This system did not prove to be popular and especially the Quota Board was widely criticized. Although the Board made its allocations according to a set of criteria, the quotas were generally perceived to have been allocated arbitrarily and often unfairly. Consequently, the industry became steeped in uncertainty and insecurity prevailed amongst most of the stake-holders. A paradox was that although the new *Sea Fishery Act (1988)* endorsed the conditional marketability of quotas, it failed to allow for divisibility of rights. This meant that while small companies could be bought up, the larger companies were not able to downsize and diversify (Bross 1999).

4. WHY THE PRE-DEMOCRACY MANAGEMENT REGIME WAS SUCCESSFUL

Quotas in the hake fishery were introduced at a time when stocks were in need of rebuilding. The small number of role-players meant that agreement between Government and industry was easily reached and management action could be implemented quickly. Individual relationships between personnel within the fisheries management authority and those of the fishing companies were comfortable in the sense that in most instances, a common culture was shared (educational background, language, value systems, etc.). This homogeneity meant that a spirit of co-operation was easily engendered between the two groups, enabling a high degree of co-management with respect to stock assessment and management procedures adopted and at the level of the Sea Fisheries Advisory Committee (the advisory body to the Minister).

Although South Africa was politically isolated and subject to international economic sanctions as a result of its apartheid policy, the Government's fisheries research component managed to stay abreast with international fisheries management trends and to maintain a high level of expertise. The Sea Fisheries Research Institute covered the fields of fisheries biology, physical, chemical and biological oceanography and stock assessment, was backed up by a fleet of modern research and patrol vessels, large compliance and administrative components and had a healthy annual budget.

South Africa's geographical isolation at the southern tip of Africa meant that the country enjoyed a high degree of ownership over the hake stocks, significantly boosting the chances of successfully rebuilding the resource. Indeed, the recovery was a major success and served to promote industry stability.

In spite of the reluctance on the part of the Government to introduce long-term rights, the oligopoly was so entrenched that for all intents and purposes the companies involved enjoyed a high degree of security of tenure. This promoted a culture of custodianship over the resource, which has survived through to the present day.

5. GOVERNMENT FISHERIES POLICY INITIATIVES

As stated earlier the Marine Fisheries Policy White Paper (May 1997), proposed that rights should be allocated for a period not exceeding 50 years, and should revert back to the State during the course of that period. The rights were to be defined as a proportion of the TAC, were to be divisible, inheritable and transferable, with the consent of the Minister. In the Bill (May 1998) and later *the Marine Living Resources Act 1998*, the right was redefined as a portion of the TAC, with the intent that quantities of fish made available by increases in the TAC would be available for allocation to new entrants, echoing the policy of the previous Government. Similarly, the maximum duration of a right was reduced to 15 years.

It is clear that the ANC Government, like the Nationalist Government before it, has shied away from a market-driven industry-structure based on the sale of rights in perpetuity. In both instances, the Governments of the day have been intent on broadening access to the hake fishery and on divesting control from the two largest companies. In 1999, these two companies still hold 64% of the hake TAC, while the five largest companies hold a total of 71%. A system whereby rights are allocated for a shorter period is more flexible and allows Government more opportunities for social engineering. This must be seen against the background of inequity that prevailed for so long in South Africa and the fact that both Governments were aware that restructuring of the Industry had to take place over a number of years. Both Governments were also aware that under a system of freely transferable long-term rights, the rights may revert back to the economically powerful. Although this domination is likely to lead to greater economic efficiency, the general feeling of both Governments has been that it might also have a negative impact on the restructuring process. As far as the sustainability of the major resources in the South African fisheries are concerned, it can be argued that even in the absence of long-term access or property rights, the management of the various resources has been reasonably successful.

6. CURRENT CHALLENGES TO TRANSFORMATION

6.1 Need for common purpose

The relationships and co-operation that existed between the fishery management authority and stakeholders under the old regime will be much more difficult to emulate during the post-transformation era due to the diversity of cultural backgrounds now involved. Differences will have to be overcome and a sense of common purpose will once again need to be established. In particular, it is essential that the Minister, members of the Consultative Advisory Forum and decision-makers within the government agency (Marine & Coastal Management) should share this sense of common purpose.

6.2 Economic *versus* socio-economic considerations

There is a divergence in the expectations of the established industry and the aspirant new entrants. The established industry feel that they should be permitted to continue as before because they have taken steps to transform their companies and were highly efficient operators earning valuable foreign currency and offering stable employment to a large workforce. The aspirant new entrants expect the Government to reallocate a significant portion of the TAC to them. Neither expectation can be met in its entirety. While there were some small allocations to new entrants under the old legislation, the new *Marine Living Resources Act 1998*, which is envisaged to bring about transformation, still has to be implemented. Employment stability will be a major consideration in the re-allocation process.

6.3 Black empowerment - financial and capacity problems

The Government's policy to empower black people economically has resulted in a number of schemes being initiated in the general economy. Some of these schemes are faltering as a result of debt burdens and the sluggish growth in the economy over the last few years.

Experience has shown that transformation will be a more gradual and multi-faceted process involving not only new entrants but also investments by black entrepreneurs in existing companies. However, lessons from the fishing (and other) industries have taught that markets, when left to themselves, tend to reinforce the existing distribution of income and assets rather than promoting diversification. In any event, this type of approach to Black Economic Empowerment is unlikely to prove rapid enough to satisfy the enormous expectations of the electorate. The Government is therefore under enormous pressure to facilitate rapid transformation through heavy-handed intervention (Gqubule 1999).

The Government is intent upon transforming the industry so that ownership more fairly reflects the demography of the country. However, the stranglehold by the established companies on marketing and distributional networks, domination of infrastructure and berthing facilities and lack of access to capital, are still a reality. The highly-industrialised nature of, for instance, the hake fishery means that in addition to viable rights, new entrants will need enormous financial backing. The problem is that the black population of South Africa has only recently been given the opportunity of entering the mainstream economy and has yet to develop the financial muscle or collateral required for this type of investment.

6.4 Legal challenges

There have been legal challenges against the Minister from existing rights-holders whose rights have been reduced or taken away. As any redistribution of rights will be at the expense of current rights-holders we expect more legal challenges in future.

6.5 Compliance

In the transformation process, the Government has committed itself to the allocation of rights to small and medium-size enterprises (SMMEs). While there are currently some SMME'S that share in the TAC, the number of these companies will have to be increased. The newly established hake longline fishery has also enabled the Government to bring new entrants into the industry as the threshold for entry into this fishery is relatively low. This broadening of participation will place an additional strain on the enforcement of regulations in the fishery as there are going to be many more rights-holders than before. The broadening of participation idea has created a lot of uncertainty among the existing rights-holders as the extent of adjustments have not finally been set. There is a danger that such uncertainty might lead to overcatching by those under threat.

7. CONCLUSION

As far as the sustainability of the major resources in the South African fisheries are concerned, it can be argued that even in the absence of long-term access or property rights, the management of the various resources has been reasonably successful. Success in implementing the new policy will likely depend upon the success with which the three cornerstones (sustainability, stability and equity) are "married" in the global interests of the country. A "marriage" of two entities is, as we know, fraught with some difficulty. How then will we fare in addressing all three in an optimal manner? The key to this lies in a balancing-act based on the rational utilization of the resources, something based in turn on a knowledge of the resources.

Future generations of South Africans will tell us how successful we have been in our balancing-act. In essence, and for a multiplicity of reasons, we dare not fail. Regarding the rights-regime, we believe we are on the right track and are positive that the current system whereby the state has scope for intervention is the only way in which to ensure that a redistribution, leading to equity, will take place. Once this has occured, a more classical ITQ system might be introduced.

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HOW "PRIVATIZATION" CAN RESULT IN MORE GOVERNMENT: THE ALASKA HALIBUT AND SABLEFISH EXPERIENCE

P.J. Smith
National Marine Fisheries Service, Alaska Region
P.O. Box 21668, Juneau, Alaska 99802, USA
<Phil.Smith@noaa.gov>

1. INTRODUCTION

By the late 1980s, the Pacific Halibut (*Hippoglossus stenolepsis*) and sablefish (*Anaplopoma fimbria*) longline fisheries off Alaska were seriously stressed by fleet over-capitalization. Fishing seasons had shortened from months (in the early 1980s) to less than 48h/year in several administrative areas! The fisheries were characterized by gear-losses and conflicts, waste, excessive bycatch of non-target species, poor product quality, vessels and human lives at risk, and other manifestations of the "race for fish". In response, the North Pacific Fishery Management Council recommended, and the U.S. Secretary of Commerce approved, an Individual Fishing Quota (IFQ) programme for the fisheries. Implementation of the programme began in 1993, and Quota Shares were initially issued to more than 5000 people in late 1994. Fishing under the programme commenced in 1995.

The Alaska IFQ programme is designed to protect the owner-operated nature of the fleet. To guard against excessive consolidation of the harvest privilege, caps are mandated on the amount of quota that may be held by any one person. To promote an owner-operated fishery, transfer rules insure that quota may only be transferred to *bona fide* fishermen. To insure the continuity of the heterogenous characteristics of the longline fleet, quota is issued in four different vessel-categories, and transfer across vessel-categories is prohibited.

This paper discusses the history of the fisheries, the conditions in the fisheries that led to the adoption of the IFQ programme, certain of the programme's design elements, and the programme implementation and management process. Data on various aspects of programme performance (transfer and consolidation of Quota Share among fishermen, consolidation of vessels used in the fisheries, *etc.*) are presented as well.

2. BACKGROUND - THE ALASKA HALIBUT AND SABLEFISH FISHERIES

2.1 Pacific Halibut (*Hippoglossus stenolepsis*)

In the North Pacific, halibut occur from the northern Bering Sea to California. The major fishing grounds lie off the Coast of Alaska (both in the Gulf of Alaska and in the Bering Sea) and off British Columbia. Halibut are long-lived flatfish that can grow to a significant weight (halibut that weigh more than 100 pounds are not unusual). Halibut are usually harvested with hook-and-line gear and commercial exploitation is limited to longline gear. In recent years the total allowable commercial catch (TACC) has been increasing, with a TAC of some 72 million pounds[1] of which slightly less than 60 million pounds are allocated to the fishery off Alaska in 1999.

Pursuant to the Pacific Halibut Convention, a treaty between the United States and Canada, the Pacific halibut resource and fishery have been managed by the International Pacific Halibut Commission (IPHC) since 1923. In accordance with a revision negotiated in response to extended jurisdiction (the "200 mile limit" established in the US by the *Magnuson-Stevens Fishery Conservation and Management Act of 1976*) adopted by the parties in 1979, the Commission adopts conservation regulations (establishing seasons, quotas, methods and means of harvest, etc.), which are then forwarded to both governments for approval prior to the fishing season. (Hoag 1993). The *Northern Pacific Halibut Act of 1982* is the US enabling legislation that gives effect to the protocol, and it provides authority to the US Secretary of Commerce to develop, in consultation with the North Pacific Fishery Management Council ("Council" - also established by the *Magnuson-Stevens Act*) other regulations (such as those that allocate the resource among competing user groups and that limit access) that do not conflict with IPHC regulations.

With the introduction of limited-entry in the Alaska salmon and herring fisheries in the mid-1970s, pressures on the open-entry halibut fishery increased rapidly. By 1988, over 3000 vessels were actively engaged in the fishery, a number that would increase to over 3500 before the IFQ programme was implemented in 1995.

The Canadian halibut fishery was placed under a licence limited-entry programme in 1979, at which time 432 licences were issued. Subsequently, in 1991, the management regime was converted to an individual vessel quota (IVQ) system (Casey *et al.* 1995).

2.2 Sablefish, or "Black Cod" (*Anaplopoma fimbria*)

Sablefish, which are much smaller than halibut with an average commercial weight of 5-7lb, range throughout a considerable portion of the North Pacific rim, extending from Japan and Eastern Russia into the Bering Sea down the West Coast of North America to Southern California. Off Alaska, the harvest is divided between trawl and fixed gear (longline and pot), with about 85% of the catch being allocated to the fixed-gear sector. Unlike halibut, in recent years the abundance of sablefish has been decreasing, with an annual commercial TAC of somewhat more than 30 million pounds in 1999 (down from 45 million pounds in 1995), of which approximately 85% is allocated to the fixed-gear sector (longline hook and line and longline pot).

[1] 1 million pounds (lbs) represent 455 metric tonne.

Historically, sablefish off Alaska were harvested by foreign fishermen (primarily Japanese). The extension of the Exclusive Economic Zone to 200 miles in 1976 initiated a more aggressive US domestic effort to harvest the resource and by the mid-1980s the fishery was fully "Americanized". By 1988, over 750 vessels were prosecuting the fixed-gear fishery, thus repeating in all the conditions resulting from over-capitalization and the race for fish. Faced with these problems, the Council initiated action to impose some form of limited-access. Even as the Council examined alternatives, and after the IFQ alternative was selected, participation continued to increase. During the early 1990s, the average number of US vessels targeting sablefish in the fixed-gear fishery exceeded 1000 - a ten-fold increase from the early 1980s.

3. A BRIEF HISTORY OF THE IFQ PROGRAMME

In the early 1980s, the North Pacific Fishery Management Council attempted to impose limited-entry on the halibut fishery (Pautzke and Oliver 1997). For a variety of reasons, these early attempts failed, so by 1985 the Council had turned its attention to other pressing business. However, with the full Americanization of the sablefish fishery by the mid-1980s, it became evident that over-capitalization was leading to chaos in the fisheries. At its meeting in November of 1988, the Council identified the following "problems" as they related to the sablefish fishery:

i. Allocation Conflicts
ii. Gear Conflicts
iii. Deadloss from Lost Gear
iv. High Discard Mortality Rates
v. Bycatch Mortality
vi. Excess Harvesting Capacity
vii. Product Wholesomeness (lack of)
viii. Safety at Sea (lack of)
ix. Economic Stability (lack of)
x. Need to develop a small boat fleet for rural communities.

These problems were also being felt in the halibut fishery. By 1990, the Council had added halibut to sablefish in its analysis of alternative management-systems with the goal of including both species under its developing Individual Fishing Quota plan.

Considerable debate ensued. Different sectors of the industry testified in different ways at dozens of public meetings and hearings. Tempers flared. The primary opposition was that management under IFQs would hurt the "little guy" – primarily the crew member with little experience and little investment, but a large dependence on income from the fisheries. Processors and fish-buyers were concerned and a shift in relative bargaining power between buyers and harvesters was anticipated. Those arguments intensified when it appeared the Council was leaning toward adopting an IFQ programme that would initially allocate the harvest privilege to vessel owners with the amount of the initial allocation based on their historic participation in the fishery (Pautzke and Oliver 1997).

Finally, in December 1991 the Council took a formal vote on the IFQ plan for halibut and sablefish; it was adopted, and work on creating the regulatory framework for the programme began in earnest culminating in the publication of a Final Rule in November 1993.

4. DESIGN ELEMENTS OF THE PROGRAMME

4.1 Nature of right

Under the terms of the *Magnuson-Stevens Fishery Conservation and Management Act*, and the regulations that establish the IFQ programme, Quota Share (QS) and the annual amount of Individual Fishing Quota (IFQ) derived from it constitute a *harvest privilege*, and may be legally revoked without compensation at any time. A person who holds QS/IFQ has not been granted an ownership right in the fish, nor have they been granted an absolute guarantee of access to fish. Procedures for managing the fisheries (research and quota-setting) were not affected by the IFQ programme. The International Pacific Halibut Commission is still responsible for conducting stock assessments and annually establishing area quotas (the Total Allowable Catch limits, or TACs) for halibut, and the Secretary of Commerce provides for fisheries research through the National Marine Fisheries Service (NMFS) and, acting on recommendations devised by the North Pacific Fishery Management Council, still establishes the annual sablefish TACs.

Quota Share was initially issued to persons who owned or leased vessels upon which landings of halibut or sablefish had been made during any or all of the three "qualifying" years (1988, 1989 and 1990); the amount of QS was determined by summing that person's total landings from the 5 "best" years between (1984-1990 (for halibut) and 1985-1990 (for sablefish). Once issued, the number of units of QS that one holds for any given regulatory area is a key determinant in the calculation of how many pounds of Individual Fishing Quota (IFQ) may be annually issued to that person[2].

4.2 Nature of QS and IFQ

QS is a permit with a variety of identifying characteristics including Species, Regulatory Area, Vessel Category, and "Blocked" or "Unblocked" QS.

There are two species (halibut and sablefish), four halibut-vessel categories and three sablefish-vessel categories, eight halibut regulatory-areas and six sablefish regulatory-areas and QS is issued as either blocked or unblocked. Taken in their different combination, these different indicators yield more than 100 different "types" of QS/IFQ, as follows:

[2] Editor's Note: This is an interesting example of divergence between the qualifiying period to participate in the programme and the period used to determine the indirect allocation.

Species:	2 (halibut or sablefish)
Regulatory areas:	8 halibut, 6 sablefish
Vessel categories:	4 halibut, 3 sablefish
Both species:	blocked or unblocked
Total halibut QS types:	8 x 4 x 2 = 64
Total sablefish QS types:	6 x 3 x 2 = 36

The relationship between QS and IFQ is explained below:

i. QS is a "permit," the face amount of which is used to determine the annual IFQ amounts. It is designated in "units" of QS; once issued, most QS is transferable.

ii. IFQ, which is calculated and issued annually to those who hold QS. It is also a "permit," and authorizes the harvest of a specific amount of pounds of fish ["net" (headed and gutted) pounds of halibut, and "round" pounds of sablefish] in specified IFQ Regulatory Areas, and with the appropriate category of vessel.

iii. Each year on 31 January, the units of QS in each IFQ regulatory area, and for both species, are totaled; the result is the Quota Share Pool (QSP) for that species and area;

iv. After the QSP is established, the QS holder's annual IFQ is determined by dividing the units of QS held by the units of QS in the QSP and multiplying the remaining fraction times the Total Allowable Catch in that area. Thus:

$$\frac{QS \times TAC}{QSP} = IFQ$$

4.3 Vessel categories

These different permit-types exist for different reasons, the primary one being to insure the perpetuation of the dominant characteristics of the longline fleet. To that end vessel-categories [which include catcher/processors, catcher vessels > 60ft length overall (LOA), catcher vessels between 35 and 60 feel LOA and catcher vessel < 35ft LOA] were established, as shown in Table 1.

Table 1
QS/IFQ Vessel Categories
*Catcher Vessel IFQ may be "fished down",
i.e fished on a smaller vessel but it may not be "fished up"
(fished on a larger vessel)

Characteristic of vessel	Halibut	Sablefish
Processor (any length)	A	A
*Catcher, >60' LOA	B	B
*Catcher, 35' to 60' LOA	C	
*Catcher, < 35' LOA	D	

4.4 Quota-share use caps

Another programme element designed to constrain consolidation is the existence of absolute caps on the amount of quota that any person, either individually or collectively, may hold and use. These caps vary by species and area, but none are greater than 1.5%, as illustrated in Table 2.

Table 2
QS Use Caps

IFQ Species	Regulatory Area(s)	QS Cap (as percent of QS)
Halibut	Area 2c	1.0%
	Areas 2c, 3A, 3B	0.5%
	Areas 4A - 4E	1.5%
Sablefish	Area SE	1.0%
	All Areas	1.0%

4.5 Vessel IFQ caps

The amount of annual IFQ that may be fished from any given vessel is also limited to a small percentage. This provision, together with the vessel category restrictions, is to insure that the number of vessels used in the fisheries will not fall below one hundred. Table 3 shows the "vessel caps".

Table 3
Vessel IFQ Caps

IFQ Species	Regulatory area(s)	QS Cap (as % of TAC)
Halibut	Area 2c	1.0%
	All areas	1.0%
Sablefish	Area SE	1.0%
	All areas	1.0%

Additional steps have been set to insure protection for smaller owner-operators in the fishery. These include issuing some QS as indivisible blocks of QS (meaning they may not be subdivided or consolidated upon transfer), and further limiting the number of blocks of QS that any one person may hold. To achieve the goal of an owner-operated catcher-vessel fleet leasing of such QS/IFQ is prohibited.

Further, although transferable, QS is not the unstinted "property" of the person who holds it, and all transfers must be submitted to NMFS for approval before taking effect. Approval is provided if the proposed transferee is a person who received QS by initial issuance, or one who holds a Transfer Eligibility Certificate (TEC) as one who has demonstrated that they are *bona fide* fishermen (*i.e.* at least 150 days experience as a member of a harvesting crew in any US commercial fishery).

These intricate programme elements are designed to insure that quota is not consolidated into a few hands, and that IFQ is not fished from a small number of vessels. Some observers have expressed their belief that all of these "bells and whistles" create so many impediments to free transferability that, taken together, they undermine the goal of attaining the economic efficiencies that privatization under ITQ systems is intended to yield. However, the evidence to date indicates that this fear is not well founded.

Monitoring of individual harvests throughout the 8-month IFQ season is a critical element of the programme. To accomplish this, each IFQ fisherman must deliver the catch to a Registered Buyer who, in turn reports each landing on an electronic transaction terminal. This device, which is not unlike a credit card "swipe" machine, is used to transmit the landings data to the central NMFS IFQ computer where the amount of catch landed is deducted from the IFQ holder's annual account. The computer calculates the balance and electronically returns that information to the fisherman using the terminal. By using the landing card, an IFQ holder can periodically check their IFQ balance, to insure that it is not exceeded.

Enforcement of the programme is also a challenge. A "four-tier" enforcement system consisting of patrol, monitoring, audits, and investigations has been established to encourage compliance with the programme requirements. (Matthews) Because there are no limitations on where IFQ fish may be landed (landings are made at some 40 ports on the coast of Alaska, British Colombia, and in Northwestern United States), considerable field work has been required, and a system of "hailing in" is also used to insure a reasonable opportunity for enforcement personnel to monitor IFQ as it is landed. The US Coast Guard has primary responsibility for at-sea patrol, while NMFS enforcement agents on shore carry out the other enforcement responsibilities.

5. IMPLEMENTATION OF THE IFQ PROGRAMME

5.1 Programme features

It is some of these "design elements" that make the Alaska IFQ programme unique and infernally complicated. Very strict (and low) caps on Quota holding, vessel limits, and the variety of characteristics discussed above, all work together to prevent the programmeoutcomes feared by those opposed to ITQ management, because of its perceived privatization of the public's resources and the concern that small-vessel fishermen and their communities would be at a competitive disadvantage in the Quota marketplace and thus would be unemploymed or (for some, a far worse fate) wage-earners working for non-fishing absentee quota-owners. But it had to be implemented, and it must be managed over time – and those tasks required that the Federal Government increase its role.

5.2 Getting up and running - Creating the bureaucracy

The Alaska Region of the NMFS began to expend funds for the specific purpose of IFQ implementation during the spring of 1993. At that time, computer specialists were contracted to begin the process of building the computer database necessary for initial allocation of Quota Share. Later during the 1993 fishing year, a fisheries management specialist from Hawaii was brought to Juneau to identify and provide preliminary planning for the organizational infrastructure that would be needed to implement the programme.

The IFQ regulations were formally promulgated by the Secretary of Commerce in November 1993; just prior to that event, the Region hired a Division Chief whose mandate was the primary responsibility of initiating IFQ programme implementation. The implementation activity was set up within a new Restricted-Access Management (RAM) Division (now called a "Program"). The Division was to provide the administrative support for the IFQ programme together with any other limited access programmes administered by the Alaska Region.

5.3 Staffing/Personnel

By early 1994 the new unit's staff had grown to include an Operations Manager, two Permit Specialists, two student aides and three contracted computer programmers. Within a few more months the Division had a staff at its current size and had begun formal processing of the more than 8000 Requests for application for QS that had been received by the Division. Current staff include the following personnel:

1 Programme Administrator
1 Data Manager
1 Permit Supervisor
1 Transfer Officer
5 Permit Assistants
3 Computer Specialists
1 Secretary
1 Clerical support specialist
1 (Part-time) Student assistant.

To review decisions made by the Restricted Area Management Programme to deny QS applications (in whole or in part), the Region established an Office of Administrative Appeals. The Office is currently staffed with the following personnel:

1 Chief Appeals Officer (attorney)
2 Appeals Officers (attorneys)
1 Appeals Assistant.

The Alaska Enforcement Division also added personnel and established an enforcement presence in a variety of ports around the State of Alaska and the Pacific Northwest (Seattle area).

Maintaining the system, annually computing and issuing IFQ permits and cards, assessing and acting on applications for transfers, reporting on programme performance in a variety of venues, meeting with fishermen, adapting to programme changes and adjustments approved by the Council and related activities have required an on-going commitment of personnel and funds from the Restricted Area Management Programme, for appeals, and for the Alaska Enforcement Division. Table 4 displays the estimated annual cost of managing and enforcing the IFQ system.

5.4 Cost recovery

The 1996 amendments to the *Magnuson-Stevens Act* require the NMFS to develop a cost-recovery system to fund the costs of managing and enforcing the IFQ

programme. The effort to publish a proposed way of accomplishing that goal is well advanced. This was discussed during this Conference (Smith and Sproul 2000). Summarized, it calls for IFQ fishermen to annually submit to NMFS a payment of no more than 3% of the ex- vessel value of their IFQ harvests. Failure to pay would result in a series of ever more drastic penalties, beginning with suspending the transferability of their quota. More recalcitrant fishermen could find that their annual IFQ permit(s) is not issued and (in extreme cases) their QS could be revoked. It is difficult to predict when the cost- recovery effort will be put in place, but some believe it will commence during the year 2000.

Table 4
Estimated annual costs of managing and enforcing the Alaska halibut and sablefish IFQ programme in the Alaska Region

Expense category	Estimated annual costs in $US
Restricted access management and sustainable fisheries	1 400 000
Administrative appeals	200 000
Alaska enforcement Division	1 200 000
Total	**2 800 000**

6. HAS IT BEEN WORTH IT? PERFORMANCE OF THE IFQ PROGRAMME

6.1 Conservation

The frantic race for fish that characterized the days of "derby fishing" is a thing of the past. Industry adapted well to the extended seasons, realizing the benefits of marketing a much-improved product at higher ex-vessel prices. In addition, a preliminary review of the conservation effects of the programme indicated that many of the conservation goals are being met (Gilroy *et al.* 1996).

6.2 Safety

Improving safety at sea was another major goal of the programme. According to the US Coast Guard, there were 11 search and rescue (SAR) missions undertaken for those participating in the IFQ fisheries during 1998. In the three years prior to the IFQ programme, there were an average of 28 SAR missions each year during the short, intense openings (O'Shea, V. pers.comm.).

6.3 Enforcement

Industry compliance with the myriad of regulations has been termed "generally good" by both the U.S. Coast Guard and the Alaska Enforcement Division of the National Marine Fisheries Service. During 1997 more than 1500 (14%) of IFQ deliveries were monitored by enforcement personnel resulting in 179 confiscations of halibut or sablefish (fish are confiscated when the total pounds landed exceeds the amount of available IFQ by more than 10%), for a confiscation rate of 1.6%. Reports of high-grading and under-reporting have been few and only anecdotal. Enforcement personnel are widely dispersed, however, and concern has been raised that more intense monitoring is needed to insure an acceptable level of compliance with programme regulations (Meyer, S. pers. comm.).

6.4 Transfers and consolidation of shares and vessels

Through year-end 1997, transfer activity was intense, as QS holders (and "newcomers") undertook to reposition themselves within the industry. During 1998 the number of transfers declined, as the "shake-out" from initial issuance began to be realized. Many transfers occurred because QS holders wished to consolidate their holdings in Administrative Areas close to their home. Some departed the fishery (thus leading to consolidation), while others entered the fishery for the first time. Overall, more than 15% of the QS was transferred each year during the first four years of the programme. Table 5 summarizes all QS/IFQ transfers by year.

Table 5
Summary of all QS/IFQ transfer activities by year 1994 through Year-End 1997

Transfer activity	Halibut	Sablefish	Total
1995 - all transfers	1279	443	1722
1996 - all transfers	1521	422	1943
1997 - all transfers	1498	485	1983
1998 - all transfers	730	275	1005

Consolidation of shares into the hands of fewer QS holders was a goal of the programme. Throughout the first four years the number of halibut QS holders (single) declined from 4827 individuals who received QS through the initial issuance to 3795 people at the end of 1997, a decline of 1032. In the sablefish fishery, a similar decline in the numbers of people holding shares has occurred, though the decline has not been as dramatic, from 1048 holders who received QS initially to 919 holding QS at the end of 1998).

Perhaps the most dramatic decline has been in the numbers of vessels deployed in the fishery. As Table 6 below shows, the numbers of vessels in both fisheries has declined precipitously from the three years prior to the implementation of the IFQ programme in 1995.

6.5 Distributional outcomes

A concern of many observers when the IFQ programme was being developed was that the transferability of quota would result in a loss of "fishing power" by Alaskans. There is no evidence that this has happened; in fact, from initial issuance through year-end 1997, the net distribution of quota to Alaskans has increased by about 5%.

Another fact of this concern is that quota might be transferred from holders who reside in the smaller communities (primarily Alaskan natives) to those who live in the larger communities. To examine this possibility, a series of reports on the "drain" of limited entry permits (issued by the State of Alaska, primarily for the salmon and herring fisheries) and Quota from these communities have recently been completed. The reports show that there has, indeed, been a decline in the amount of QS held by residents of those smaller communities; however, they

Table 6
Vessels participating in the IFQ fisheries
1992 through year-end 1998

IFQ Fishery	1992	1993	1994	1995	1996	1997	1988
Halibut	3452	3393	3450	2057	1962	1925	1601
Sablefish	1123	915	1139	517	503	504	449

also demonstrate that the mean gross earnings (ex-vessel value) from the fisheries have increased considerably for those who have remained active in the fisheries. Leaders of the communities have been meeting with the NMFS and with the Council to consider different approaches to the problem (one of which is allowing for a certain amount of the QS allocated to the Gulf of Alaska to be held by non-profit corporations established by the communities).

Finally, concerns were expressed that the programme would result in "locking out" individuals from the fishery. In fact, as of year-end 1998, QS was held by 785 new entrants who had received QS by transfer. Their holdings accounted for slightly more than 11% of the halibut quota and slightly less than 5% of the sablefish quota.

7. CONCLUSION

The Alaska halibut/sablefish IFQ programme demonstrates that many of the theoretical benefits and efficiencies of ITQ management (*i.e* "privatization") may be realized, even though the harvest privilege itself is narrowly defined and very tightly managed by government. However, for every impediment to the free workings of the marketplace that is built into an ITQ programme, there is a trade-off in terms of loss of efficiency and increased government administrative infrastructure and cost. Managers who seek to achieve certain social and economic goals as they design ITQ programmes should be aware that the price of doing so may well be "more government".

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TOWARDS A BETTER FUTURE IN FISHERIES MANAGEMENT: RIGHTS-BASED FISHERIES MANAGEMENT IN WESTERN AUSTRALIA

P.P. Rogers
Fisheries WA, S G I O Atrium, Level 3, 170 St George's Terrace
Perth, WA 6000 Australia
< progers@fish.wa.gov.au>

1. INTRODUCTION

Limited Entry Fisheries Management arrangements in Western Australia extend over some 36 years. Licence limitation through input controls were first introduced for the State's largest fisheries for Western Rock Lobster and prawns in Shark Bay 1963 as principally input-controlled arrangements. These limitations initially focussed on licence and total gear limits, with more detailed management arrangements coming in place in subsequent years.

Today (1999) in Western Australia there exist some 35 limited-entry managed fisheries with a variety of input and output controls whose value is approximately $A550m[1] throughout. Managed arrangements focused primarily on the commercial fishing industry. The management attention is in the main given to strategies to ensure resource sustainability, with management decision-making backed up by fisheries research and compliance programmes.

2. HISTORY OF MANAGEMENT

The Western Australian legislative base for fisheries management is derived from English common law principles, with fisheries being open to unlimited access and exploitation unless constrained by specific management arrangements supported by legislation. This legislation focusses on restricting access to particular stocks. This means that any person with a licensed fishing boat could exploit any species, unless there was in place a prohibition, or a management plan, which restricted access to those fishermen having a particular licence authorising them to fish.

This situation and legislative approach resulted in the general fishing fleet continuing to expand without limitation until 1983. This led to fisheries-management for specific fish stocks being introduced, often in a situation of already-existing excess fishing capacity. This in turn, under almost every fishery management arrangement, was exacerbated as fishing technology continued to improve.

The only significant commercial fisheries where management came into effect at an early stage of development were the Shark Bay and Exmouth Gulf prawn fisheries and the take of shell for pearl culture purposes in the Western Australian pearl oyster fishery.

Ultimately, in an endeavour to address this common law issue of unrestricted access to unmanaged fisheries, a freeze was placed on the further licensing of fishing boats within Western Australia in 1983. This problem of existing latent and excess fishing capacity was formally recognised by Government and industry following consideration of future management options for Western Australian fisheries in 1986. This led to legislation being introduced to allow the establishment of voluntary fishing-licence buy-back schemes. These tools were used between 1986 and 1999 for a continued attack on excess fishing-capacity within both managed and unmanaged sectors of the Western Australian fishing industry. Buy-back and fishery capacity reduction schemes within managed fisheries gradually saw the West Australian fishing fleet shrinking from its peak licence number of 1615 units in 1985 to 1361 by 30 June 1998.

The period 1973 to 1999 is also characterized by goodwill values tied to fishing licences of various types increasing from a total of about $A25m in 1973 to in excess of $A1.8 billion by 1998/99. This huge increase in market values tied to fishing licences largely arose from a combination of three principal factors. The first was a significant shift in long-term exchange rates in favour of Australia's principal seafood export markets, Japan and USA, with the depreciation of the Australian dollar. Second, new fisheries management arrangements allowed longer-term fleet size adjustments, offsetting both increases in catching-efficiency and capitalisation within the fishing fleet, thereby assisting profit and industry performance. Third, management arrangements themselves provided industry with the flexibility to allow industry operators to maximise the economic returns from their operations within a continuing framework of sustainable fisheries management. The combination of these factors, together with better certainty arising from bankers and lending institutions being able to record third party interests in licences on a central register, has meant significant economic rents have been captured by the Western Australian fishing fleet and industry.

These extraordinary outcomes have meant that the Western Australian fishing fleet is by and large profitable, reasonably financially secure and based on sustainable fish stocks. Managed fishery licences attract very high market values. Many fishermen hold capital assets of large value which has added to their individual capacity to invest into adjacent fisheries and in other industries. The success of Western Australian fisheries has also been a significant factor in driving boat construction within Western Australia, resulting in the State being the centre of commercial boat construction for Australia as a whole.

[1] All values in this paper are in Australian dollars.

One can also conclude that the fishing industry within Western Australia is one of the better primary industry sectors within Australia in which to invest.

3. MANAGEMENT FRAMEWORK

The current management framework enables the Government to introduce a range of management arrangements of specific stocks or fisheries within Western Australia. These cover quotas in their various forms, including ITQs and total allowable catch limits, and any variation or combination of biological and other input-controls necessary to support such management arrangements. These have included gear limitations, licensed boat limitations, time/gear unitization of fishing access, as well as gear unitizations. At an extreme, individual transferable effort-units made up of daily time gear-access units linked to satellite vessel- monitoring systems have recently been successfully introduced.

The traditional approach to planning when bringing fisheries under management has focused on a number of key issues. These include historical catch criteria for the granting of licences and levels of access, rules controlling fishing capacity - whether quotas or input-controls in their various forms – different biological controls aimed at protecting fish, area closures, *etc.* The legislation also provides for the creation of tribunals to deal with technical and equity appeals arising from the introduction of management plans for fishermen. Fishermen who have a case to bring forward are therefore able to obtain an independent review of administrative decisions on access entitlements and licensing.

The approach historically applied to bring fisheries under management on almost all occasions within Western Australia has involved the creation of management advisory committees. These provide a consultative forum for the Government and affected industry, bringing management into place for particular fish stocks or fisheries. The representative industry and recreational fishing bodies within the State also provide important sector-wide input to Government on individual management proposals. The result is that the management arrangements adopted usually balance between providing resource sustainability and equity for fishermen's access. Once a management plan has been established and implemented, changes to the plans require formal consultation with those in the affected fishery either directly or through management advisory committees.

For fisheries managed using input-controls, fishing capacity reduction rules are also sometimes built into management plans in recognition of the phenomenon of latent fishing capacity and the longer-term need for ongoing adjustment mechanisms.

Fishing capacity adjustment mechanisms have included unit-value changes in relation to quota adjustments, licence buy-back arrangements either funded by industry, or jointly by Government and industry or capacity reduction arrangements built-in at the time of licence transfers. In some gear input-controlled fisheries, capacity reduction has also taken the form of gear unit reductions across the fleet in the same way that quota reductions are often managed.

An additional arm of fisheries management in more recent years has been the development of resource- sharing mechanisms to deal with the increasing conflict between the commercial and recreational fisheries sectors over resource harvests.

In some cases there has been a deliberate shift of resource-use from one group in the community to the other. This has taken two major thrusts. The first has focussed on local funding of reductions in commercial fishing operations for the benefit of the wider community. The second has been a formal process of negotiations, led by an independent mediator, which involves the major commercial and recreational fishing stakeholder interests and Government aimed at reaching a settlement on particular resource-sharing conflicts. The results may be formal licence reductions; spatial or temporal user-group separations or some combinations of these.

4. OUTCOMES AND EXPERIENCE OVER THE LAST 30 YEARS

4.1 Rock lobster

Western Rock lobster is Australia's largest single-species fishery. Entry was limited in 1963 in an endeavour to constrain further growth in fishing effort through new boats entering the fishery. Constraints on the number of pots used within the fishery were also imposed. The grant of a licence was based on prior fishing history and having a licensed boat authorised to use rock lobster pots in the period prior to the declaration of the fishery. Appeals for access to the fishery were dealt with administratively by the Director of Fisheries.

Licensed vessels were limited to allocation of pots based on a formula of three pots per foot of surveyed boat-length. The maximum number of pots allocated to any single vessel was 200. The effect of these measures was to reduce the total fishing capacity from approximately 97 000 pots to approximately 76 000 and to stabilize fleet size at about 840 boats. Biological controls such as the legal minimum-size and protection of berried-females were important conservation foods.

During the formative years of this fishery, the fisheries agency's focus at the time was to enforce existing management rules. This included the imposition of limits in the number of rock lobster processors, which stamped out a widespread practice of illegal take of undersized rock lobster, and bringing fishermen who used excess numbers of pots under control.

By 1965 new boat-replacement rules were implemented to limit further expansion in boat size and associated expansion in pot usage. By the early 1970s both over-potting and the illegal take of undersize rock lobster were effectively under control. As a result, these management arrangements gradually saw the emergence

of goodwill values tied to licences when transferred. In 1973 licence values on pot transfers were estimated to be approximately $A200 per pot.

The period 1975 to 1993 saw an unparalleled growth in pot values increasing from about $A400 to in excess of $A12 000 a pot by 1993.

As the monetary values for these licences increased there was a continual increase in fishing effort as latent capacity within the fleet was taken up, driven by within-industry fishing competition, improvements in fishing technology and the need to reduce individual debt. Growth in fishing-effort and its impact on breeding stocks required ongoing adjustments to the fishery. These included shortening of the fishing season by six weeks in 1978, followed by a total pot reduction of 10% over five years between 1986 and 1991.

Despite these measures, the exploitation rate after each effort-adjustment continued to grow. The trading of pot entitlements and provisions for total pot redistributions also enabled the fishing fleet to continually adjust. There was a gradual long-term reduction in boat numbers, accompanied by an increase in average pot holdings per licence and boat size. The elements of competition between fishermen led many fishermen to continually upgrade their vessels and the emergence of a high-tech efficient catching fleet.

By the early 1990s the rock lobster fleet had shrunk to approximately 620 boats. There was also a rise in scientific and industry concern that breeding stock levels had fallen to 15-17% of virgin biomass. This led to substantial debate within industry about future management measures, ultimately resulting in the introduction of a package of temporary pot reductions of 18%, the protection of setose (pregnant) females and changes in gauge sizes during the migrating phase of the rock lobster, as well as protection for large female rock lobsters.

This package, developed by the Rock Lobster Industry Advisory Committee in consultation with the industry was controversial as the effects of the elements were not uniform across the fishery. Despite the controversy around the components of the package they were implemented over a two-year period and later extended until the present time. Recent analysis has shown that the package was successful in reversing falling breeding stock levels, principally through a combination of setose protection and pot reductions reducing overall exploitation rates. Breeding stock levels have risen from the estimated 15-17% of the estimated unfished virgin breeding biomass to between 25-30%, ensuring the sustainability of the fishery.

The introduction of the package in 1993 saw pot values rapidly rise from $A12 000 to in excess of $A30 000 a pot. This occurred in combination with higher ex-vessel prices for rock lobster. Pot values fell to around $A18 000 a pot when ex-vessel prices for rock lobster fell from about $A28/kg down to $A19/kg in early 1998/99.

The experience of the 1998/99 season shows that even with a reduction in fishing capacity through the 18% temporary pot reduction and other controls, a record catch of 13 000t could be taken by the fishing fleet. Current pot prices in response to the outcomes of the 1998/99 season and predictions of an even higher catch in 1999/2000 year has seen pot values recover to around A$25 000/pot.

Today, the rock lobster industry, in the main, considers the fishery to be in a ecologically sustainable state with considerable medium to longer-term investment optimism within the fishery. The management focus since 1993, following the success of the management actions in reversing the long-term reductions in breeding stocks levels has shifted towards maximising economic returns instead of sustainability alone.

This shift in direction has generated a new controversy within the industry about the role of the Rock Lobster Industry Advisory Committee and whether industry management committees should advise Government to change management arrangements for essentially short-term market benefits, rather that just focussing on stock sustainability.

Industry is divided on this issue. This has caused in some sectors of industry a call to review the role of the Rock Lobster Industry Advisory Committee, including its structure and processes. The level of dissatisfaction has also led to the establishment of an Inquiry by the Legislative Council of the Western Australian Parliament. This is currently reviewing the role of the fisheries agency and the Rock Lobster Industry Advisory Committee in the management of the rock lobster industry.

Against this background of controversy the Western Australian Fishing Industry Council, which is the representative fishing industry body for Western Australia, is seeking to gain Marine Stewardship Council endorsement for the fishery in recognition of the successful management arrangements for the western rock lobster fishery. This accreditation, if achieved, will be a world first.

4.2 Shark Bay and Exmouth Gulf Prawn Fisheries

These two fisheries were first managed on a limited-entry basis in 1963 and 1965 respectively. Access was determined based on fishing history with the predominant number of licences given to companies ownership investing in prawn processing facilities at Carnarvon and Exmouth. In both fisheries more than half of the licences were granted to those processing companies, with the balance provided to independent trawler operators. Initial gear controls included a maximum of 2 trawl nets per boat.

The fisheries were closely monitored through log-book programmes for research from the start. The data collected enabled decisions to be made in the context of Gulland's approach of incremental increase in effort so that over-fishing does not occur. Between 1963 and the mid 1970s the number of licences within each fishery expanded from 25 in Shark Bay to 35 boats by 1975 and

in Exmouth Gulf from 16 vessels to 23 over a similar period. By the late 1970s the fishery was in both cases operating at sustainable levels with no real requirement for further increases in the size of the licensed fleet.

By the early 1980s, following a series of boat replacements even within the constraints on boat size and fishing power, excess fishing effort occurred resulting in demonstrated over fishing of tiger prawn stocks within Exmouth Gulf and later in Shark Bay.

The 1980s was a difficult period for management of both fisheries as fisheries managers working with industry attempted to manage the recovery of tiger prawn stocks within Exmouth Gulf and Shark Bay. Early approaches in Exmouth Gulf focussed on an initial reduction of the licensed fishing fleet by 4 vessels, involving an industry-funded, government-backed voluntary licence buy-back supplemented and supported by a progression of area closures which provided for gradual recovery of the fishery over 5 to 6 years. Fishing effort and catches are linked to catch rates of adult tiger prawns as indices of residual breeding stock levels and therefore estimated recruitment levels the following year. This cautious approach to stock recovery enabled the existing industry within Exmouth Gulf to survive financially whilst recovery was underway.

The approach in Shark Bay differed in that spatial closures were less successful in initially recovering the tiger prawn fishery which although not collapsed, moved at about half the levels in the 1980s, as in the 1970s. The joint pressures of declining long-term price trends in prawns, together with the increasing view that tiger prawn stocks were overfished and recovery would be possible by lowering fishing effort, led industry to the conclusion that better economic performance in the fisheries could be achieved by further licence reductions.

Two years of negotiation within both the Exmouth Gulf and Shark Bay sectors led to an industry-funded Government-backed buy-back scheme for both fisheries in 1990. This resulted in the removal of 8 licences from the 35 in Shark Bay at a cost of $A9.6m and removal of 3 of the 19 licences in Exmouth Gulf at a cost of $A3m. These arrangements were negotiated by the fisheries agency which also provided legislative support. By the end of the 1990s both the Exmouth Gulf and the Shark Bay prawn fisheries were in a sound biological and economic state. Individual boat prawns catches in excess of 80/t/yr are now achievable in both fisheries.

4.3 Other Western Australian fisheries

As noted, Western Australia has about 35 managed fisheries. Many have come into place in the last decade and involve small unit fisheries. Management arrangements cover a huge variety of approaches and thus a range of access rights granted by licensing arrangements. Some of these fisheries have proved successful in their management arrangements whilst others have proven difficult to manage, particularly given the uncertainties associated with research advice and environmental variability that affects both recruitment and production levels.

The experience in bringing many of these fisheries under management arrangements during the last decade indicate that the negotiations with industry on management arrangements are often equally as difficult for small fisheries as for large fisheries. The licensing rights allocation issues are often driven by the success of the larger fisheries with the objective by some industry interests focussed on gaining access rights because of the recognised goodwill values generated by successful management arrangements. This factor alone has seen many fishermen seeking to bring individual fisheries under management to reduce the impact of new entrants, and excess fishing capacity and to maximise their own pecuniary interests.

The experiences associated with a member of these smaller fisheries are reported in detail in other workshop papers at this conference, for instance Cooper and Joll #, Borg #.

5. LESSONS LEARNT FROM 30 YEARS OF FISHERIES MANAGEMENT EXPERIENCE

Licence-limitation has been a key tool in creating rights of various forms through fisheries management. In Western Australia they have manifestly expressed themselves in high market prices which are captured by fishermen on licence transfer. Within the larger fisheries the markets are well understood and supported by financial institutions. However, in the smaller fisheries considerable uncertainty continues around the market value of licences and their security as collateral in the development of individual fishermen's business arrangements.

Quasi property rights in the form of licence arrangements are sufficient to attract considerable market value. Statutory rights, although regarded as superior as a full form of property, and thus desirable, are not essential for fishermen to gain substantially from property rights in their various forms.

There are many lessons to be learnt from the history of fisheries management arrangements in Western Australia. Given the opportunity, a number of issues might well be treated differently. These are described below.

i. *Fisheries management needs to be based on a total framework dealing with rights-based management across all sectoral groups. In other words once determining an ecological sustainable yield, the use of that resource needs to be allocated to individual sectors and managed accordingly.*

Neither Australia, nor Western Australia, is managing their fisheries in the context of a total framework for resource management. This must change if there is to be proper resolution of the problems of growth in recreational fishing pressure, changes that accommodate the use of fish for conservation and Aboriginal usage, and access entitlements established by the commercial fishing fleet.

For example, when one looks at the rock lobster fishery in Western Australia, commercial fishing rights have largely been provided by licensed access through the present management arrangements. In the period 1970 to 1999 recreational fishing pressure has continued to expand with population size. Recreational rock lobster take has increased as a proportion of the total catch from around 3% to 6-8%. This changing use of fish as populations increase is a clear challenge for Australia in dealing with impacts of coastal residential development and the ability to adjust commercial fisheries in a sustainable way in the face of changing use of fish. Without a comprehensive framework for managing all sectors, issues around long-term resource-sharing will become increasingly litigatious and security around access will become increasingly problematic. Governments ought not leave these issues to be determined by the courts. A comprehensive allocation-and rights-framework for fisheries provides, in my opinion, greater longer-term decision-making certainty.

ii. *The early adoption of a development fishery framework that recognises pioneer rights appears to be a better approach for allowing commercial fisheries expansion rather than one of unlimited open-access to unmanaged fisheries resources.*

Such a framework would enable a less-costly approach to fisheries management and reduce some of the excesses and consequences of surplus fishing-capacity on fish stocks. This would, of course, require a completely different framework and legislative base for the management of fisheries and provide for perhaps more orderly and less consequential impacts of growth in capital investment and fleet fishing capacity.

iii. *A greater rent-return to the community that could be directed to the management of the small, often more complex, fish stocks, may lead to a better overall outcome for fisheries resource management.*

The failure of Government in early years to capture a more substantial part of the economic-rent from fishing has generally meant that insufficient resources have been put into research to address the many questions around the management of fisheries. The introduction of cost-recovery arrangements in Western Australia, while addressing the longer-term management needs of the State's largest commercial fisheries, is not an effective tool to deal with many of the State's smaller finfish fisheries. If a higher rate of return had been captured in the early development years of the State's fisheries, it might have resulted in some reductions in growth in over-capitalization of the commercial fishing fleet. At the same time, rent-capture would have helped the community allocate resources to address long-term research needs for many of the smaller State's fisheries especially where there are multiple-use groups. Of course, today there is a real difficulty in turning back the clock because of the now-substantial capital investment made by the more recent entrants into the fishing industry.

iv. *Adequate resourcing of management agencies.*

Funding of research and management in almost all circumstances is inadequate to deal with today's issues, let alone those that need to be addressed for the future. Unless funding properly address today's and tomorrow's issues, management by its nature will be reactive rather than proactive and often too late.

v. *The form and nature of an appeals body that reviews access-rights and administrative decision-making can have an important impact on the success, or otherwise, of fisheries management.*

In our experience a part-time legal tribunal has proven to be expensive and on occasion, inconsistent in relation to fisheries policy and decisions taken. Some decisions by tribunals based on law have resulted in outcomes which are neither consistent with the intent of the management agency nor with the advisory committee management plans that were established. Consideration needs to be given to issues such as whether such an appeals body ought to be of a permanent nature and take a less legalistic route in dealing with matters of equity. The composition of such tribunals ought to extend beyond the legal profession and involve the mix of skills found in the community, business and law. Such an approach should be considered instead of treating tribunals solely as a place for legal advocacy in the same way as court jurisdictions. Defining the realm of the jurisdiction of the tribunal with guiding business rules in relation to legislation would also help.

vi. *There continues to be a need for skills-based management advisory committees rather than those based on industry representation.*

As fisheries management progresses to deal with issues which extend beyond matters of sustainability, new skills are required to encompass the wider objectives of resource management. These ought to include professional skills from outside the fishing industry in order to balance some of the pecuniary interests which drive decision-making around resource management. In my judgement representative-based management in the longer-term may cause fisheries management to be more conservative and less reactive to the needs for change to give effect to longer-term competitiveness.

vii. *Stock assessments of many smaller fisheries cannot be undertaken with adequate accuracy because of inability to justify the required research or other priorities.*

A different approach and methodology need to be developed so as to give greater objectivity to risk assessment and decision-making in relation to management of smaller fisheries. This requires the development of new techniques and the use of field monitoring to provide indicators of fishery health perhaps in the form of indices of fish abundance, recruitment levels or independent measures of spawning stock levels. This approach needs careful evaluation and further development.

6. SOME KEY POINTERS FOR ESTABLISHING FISHERIES MANAGEMENT ARRANGEMENTS AND INTRODUCING NEW PROPERTY RIGHTS OR ACCESS ENTITLEMENTS

Fisheries WA has been involved in limited-entry management arrangements for 36 years. Much of the fisheries management planning and issues around the granting of access entitlements has been reported through the agency's management series reports and miscellaneous management papers over the last 20 years covering in excess of 130 titles. Further reading is suggested in the short bibliography attached to this paper. Some of the lessons learnt over 20 years of fisheries management within a regime of licence entitlements as a form of input/output property rights are summarized below. They are matters for discussion and may not have universal application.

i. When governments announce decisions about establishing new management regimes, fishermen invariably respond by increasing exploitation to demonstrate higher performance in order to try to gain greater access-rights.

ii. Some members of the fishing industry cheat on data-reports so as to maximise their personal interests. Independent verification of catch performance is particularly important.

iii. Good legislation is the key to successful management. Controversial decisions invariably lead to legal action and early preparation of legal briefs to offset the risk of injunctive court relief can be appropriate.

iv. In the preparation and implementation of fisheries management plans one should ensure that the pivotal role between the Minister and the agency is not compromised by litigation and/or industry lobbying. On almost all occasions relevant Ministers, the Cabinet and particularly influential back-bench parliamentary- groups need to be properly briefed.

v. The risk of failure particularly in relation to the consultation process and growing industry support for change, should be recognised - and prepared for.

vi. It should be understood that the nature and form of fishing rights can complicate adjustment mechanisms. As a rule, market-based mechanisms in the long-term tend to be more successful than government intervention. However, the illiquidity or thinness of markets may be an issue in the case of small fisheries.

vii. Managers and governments, particularly ministers, need to recognise that there is a tendency for industry management advisory committees to find reasons to avoid hard decisions for fisheries management when fisheries are in a crisis. Normal responses are that research is inadequate, more data are required, independent peer review is needed, there is a sudden lack of faith in data-reporting systems, and uncertainties of data due to environment make decisions impossible, *etc.* The key to successful fisheries management continues to be good science and trust between the industry and government sectors, but ultimately the decision-makers will have to make hard decisions.

viii. The precautionary principle for conservative decision-making is difficult to implement in practice. This is particularly so when politicians, despite their rhetoric, do not support difficult decisions concerning the resources because of constituency or economic reasons. In the end good science is the key tool.

ix. Wealth-creation can in itself generate a new suite of outcomes. While it is easier to manage profitable fisheries in terms of addressing sustainability issues; success too can develop its own problems and may result in potentially higher litigation risks over fisheries-administration decisions.

x. Direct industry and community involvement with, and facilitated through, representative bodies can make a significant difference to successfully introducing new fisheries management arrangements. This approach can be essential in achieving successful stakeholder briefing and consensual decision-making.

xi. Successful fisheries management requires appropriate structures and processes, and effective liaison between industry and government as well as good science and appropriate legislative frameworks. Property-rights themselves create an opportunity for the fishing industry to take more responsible approaches to management. Government managers must be conscious of their wider stewardship-role and gain the support and confidence of industry and other key stakeholders in resource management decision- making.

xii. Governments have the prime role in the stewardship for community use of fish resources. As the final decision-makers they must bear the ultimate responsibility for both the form and nature of property rights and establishing appropriate mechanisms to deal with the long-term changing requirements of the community. The development of a total resource framework that is responsive to the security needs of the fishing industry and other user-groups is important and by necessity ought to involve some form of licence access or property right reform.

7. KEY DIRECTIONS THAT FISHERIES MANAGEMENT MUST NOW TAKE IN WESTERN AUSTRALIA

Fisheries management in most jurisdictions combines its history, the legislative framework within which it operates, development approaches undertaken and institutional frameworks in place, as much as the nature and form of the exploited resources and how they are harvested.

Western Australia's history in fisheries management has been built around limited-entry fisheries and freedom of access until management arrangements have been put in place. By and large fisheries management focusses on economic performance, and industry sustainability has been successful, based on effective industry consultation, legislation and valuable resources. As Western Australia moves into the 21st century the main issue facing long-term sustainability is how the Western Australia government proposes to manage recreational fisheries, and the longer-term growing impacts of population growth and coastal development.

To achieve long-term resource sustainability and security of access for the commercial fishing industry, a new framework of fisheries management is required. It must be based on a broad resource-sharing framework that allows the use and management of fish taken by different sectors of the community within ecologically sustainable catch limits. The challenge will be to address this requirement and to develop a sufficiently robust framework that in the long-term allows market forces, to adjust resource-use between and within the various sectors.

For this to work the community and its principal stake-holders need to decide upon the nature and form of future fisheries management resource approaches and agree on how future priorities in resource-use are to be met and modified over time. For this to be successful requires that the government and fisheries managers to lead, both in terms of the public debate that must arise, and allow the community to set new directions for fisheries management.

Failure to address this debate and to achieve agreement on an acceptable framework can only diminish the total value of access-rights around commercial fisheries in Western Australia in the long-term, and increasingly put at risk the future of many of the State's smaller commercial fisheries. This especially is true for those fisheries vulnerable to greater access and exploitation by the state's growing population and consequential expansion in the use of fish for recreation, conservation and traditional aboriginal fishing requirements. The challenge for government, and particularly the State's political leaders, is to take charge and be part of such a public debate and to achieve community consensus on these issues.

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OCEANIA'S BIRTHRIGHT: THE ROLE OF RIGHTS-BASED MANAGEMENT IN TUNA FISHERIES OF THE WESTERN AND CENTRAL PACIFIC

I. Cartwright and A. Willock
South Pacific Forum Fisheries Agency
PO Box 629, Honiara, Solomon Islands
<ian.cartwright@ffa.int> and <anna.willock@ffa.int>

1. INTRODUCTION[1]

The tuna fishery of the western and central Pacific (WCP) is at a watershed. Capacity has been increasing steadily since the 1970s, partly due to redirected effort from other world tuna fisheries. The important tuna stocks are generally in good biological shape, however there are early warning-signs, and the introduction of effective fisheries management measures will be essential if the fishery is to continue to avoid over-capacity and overfishing that has characterised tuna fisheries world-wide.

Various layers of fisheries management measures are either in place in the WCP, or in the case of an overarching multilateral arrangement, are being developed. With over 30 coastal states, distant-water fishing nations and entities involved in the fishery, it will be a significant challenge to devise management measures that are both practical and can find political acceptance across the wide spectrum of players and interests.

In the WCP, coastal states are seeking property-rights over a common pool resource and are facing the sorts of issues that usually concern industry operators within a single state's jurisdiction. While this is not in itself unique, the 1995 United Nations Fish Stocks Agreement and current efforts to establish a multilateral arrangement offer an opportunity for a fresh approach.

Central to the issue are the interests and aspirations of the island coastal states of the Pacific and in particular the members of the Forum Fisheries Agency[2]. The exclusive economic zones (EEZs) of these countries comprise close to 75% of the productive equatorial belt situated 10 degrees either side of the equator and from which 90% of the catch of tuna in the WCP is taken.

This paper examines the major characteristics of the WCP tuna fishery and the current status of management arrangements. Emphasis is placed on the potential for the use of rights-based management and the national, regional and multilateral institutional setting in which such management will be developed.

[1] The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Agency (where they worked in 1999) or its member countries.

[2] The membership of the Forum Fisheries Agency comprises the independent Pacific island States of: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Republic of Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Kingdom of Tonga, Tuvalu and Vanuatu, as well as Australia and New Zealand.

2. THE FISHERY

2.1 Major characteristics

The western and central Pacific tuna fishery is the largest and one of the most productive in the world, yielding catches of around 1 million tonnes of tuna annually with a landed value in excess of US$1.7 billion (Figure 1). These catches represent around one third of all tuna landed world-wide; 60% of tuna for canning, and 30% of the sashimi-grade tuna imported into Japan.

The fishery is characterised by its complexity and area, with close to 30 states and entities involved in the fishery which spans over 30 million km^2 of ocean. This paper uses as its base the Secretariat of the Pacific Community (SPC) statistical area (Figure 2).

The overriding importance to Pacific island nations of the ocean in general, and the tuna resource in particular, is evident. For instance, tuna represents one-third of all exports from the WCP and provides employment for 30-40 000 Pacific islanders[3]. For many Pacific island countries, it represents the only significant source of income and basis for future economic development.

2.2 Fishing operations

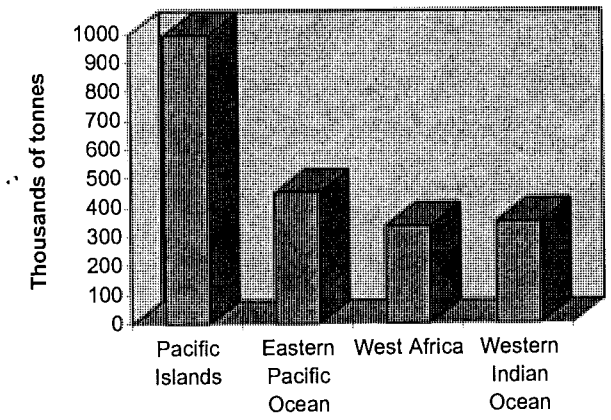
The tuna fishery of the WCP may be divided by type of fishing operation. The surface[4] fishery uses purse-seine and pole-and-line gear to target skipjack, and takes incidental catches of yellowfin and bigeye. The sub-surface fisheries use longlines to target large, deeper swimming yellowfin, bigeye and albacore. There is considerable interaction between the two fisheries, since the surface fisheries take significant catches of immature yellowfin and bigeye, a proportion of which would have recruited to the longline fishery. The issue of interaction has relevance for a range of management strategies, including optimum utilisation and allocation.

The purse-seine fishery has been dominant in terms of volume of tuna landings in the WCP. The catch averaged around 80% of the total WCP catch for the last five years and is destined primarily for canning, with prices typically below US$1000/t. The lower volume sashimi

[3] Gillett, R. (1997). The Importance of Tuna to Pacific Island Countries, FFA Report 97/15, Honiara, Solomon Islands.

[4] Purse-seines and pole-and-line gear are intensive fishing methods, catching surface swimming, schooling tuna. Longline gear is more extensive (a single longline can be in excess of 100 km in length) and targets larger, more solitary tuna at depths of up to 150m.

Figure 1
The relative volumes of the major tuna fishing areas (1994-98)
Source: Secretariat of the Pacific Community



longline fishery, while accounting for less than 20% of total landings, is worth around 45% of the total value of the catch. More than 90% of the tuna caught in the WCP is taken by vessels owned or flagged by distant-water fishing nations (DWFNs) and landed outside the region[5].

2.3 Species

The four tuna species (skipjack, yellowfin, bigeye and albacore) that form the basis of the WCP fishery all exhibit a high degree of spatial and temporal variability. This variability is closely associated with the El Niño Southern Oscillation (ENSO) index, which encompasses the extremes of El Niño and La Niña. These factors have a significant influence on the abundance and availability of the stocks, particularly on the east-west movement of skipjack and yellowfin. Predominant El Niño conditions results in movement to the eastern areas of the WCP region, while La Niña conditions see the fish move towards the west. Recent catches of the four key tuna stocks in the WCP by year are provided in Table 1.

Skipjack and yellowfin tuna are the dominant species in the WCP in terms of volume of landings. The catch of skipjack and surface-caught yellowfin increased dramatically during the 1980s due to growth in the international purse seine fleet, combined with increased catches by domestic fleets from Philippines and Indonesia and the displacement of the US fleet due to dolphin-tuna interaction problems in the Eastern Pacific.

Scientific opinion, based on extensive tagging programmes and evaluation of catch rates, indicates that the current exploitation rates of skipjack and yellowfin are sustainable. It has been stated that the skipjack stock is capable of supporting sustainable increases in effort and catches[6].

Bigeye, and to a lesser extent yellowfin[7] tuna of sashimi-size and quality are the most valuable of the tropical tunas. They are the principal target of large DWFN longliners in tropical waters who freeze catches, and the smaller, locally-based fresh-sashimi vessels. The recent trend for purse-seiners to use gear and techniques to target small to medium-size bigeye has increased this component of the catch to approximately 30 000t in 1997. Assessment of the interaction between the surface and longline fishery and the overall health of the bigeye stock is not clear. The WCP regional committee[8] that considers such issues remarked in 1997 that due to the '...present inability of stock assessments to produce unequivocal results..... (the Committee) considered that the present condition of the Pacific Bigeye stock is uncertain'.

Albacore catches are primarily taken by longlining in the WCP, and annual catches typically range between 30 000 and 45 000t. Although albacore are relatively slow-growing and longer-lived when compared to tropical tunas (factors that make albacore more susceptible to overfishing), there is no evidence from the available catch data that current levels of fishing are adversely affecting the stock. There is general consensus within the scientific community that current levels of fishing effort and catch can be sustained.

[5] One exception is the group of canneries in Pago Pago, American Samoa.

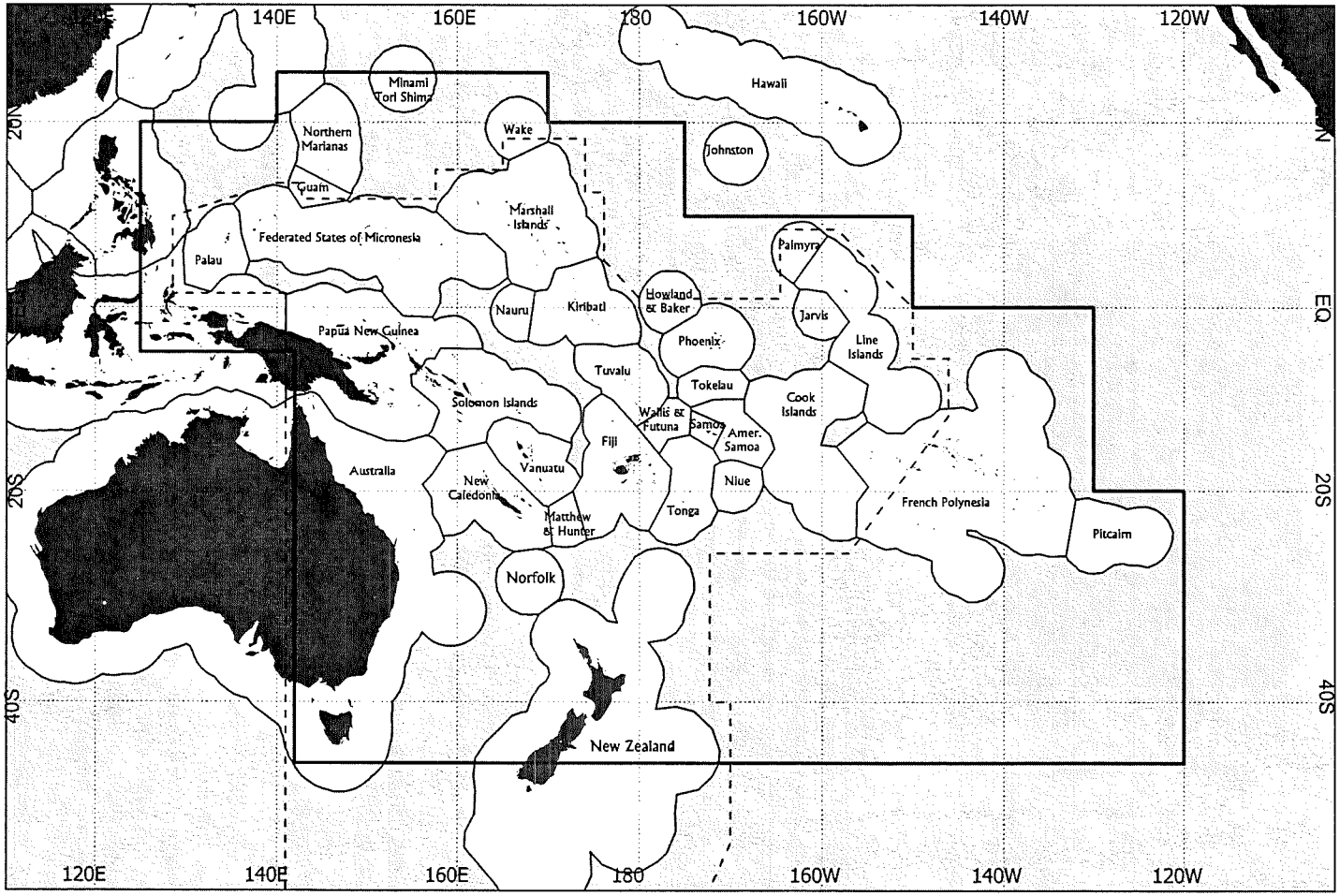
[6] Data on catches and status of stocks provided by the SPC, and taken from 'Status of Stocks' papers including Hampton, J., A.Lewis and P.Williams (1999) The Western and Central Pacific Tuna Fishery 1998: Overview and Status of Stocks. OFP Tuna Fisheries Assessment Report No. 1, 39p.

[7] Around 60% of the yellowfin catch is taken in the surface fishery, with the remainder taken by longline

[8] The Standing Committee on Tuna and Billfish (SCTB).

Figure 2

Western and Central Pacific (WCP) showing Exclusive Economic Zones (EEZs) as unshaded areas and the SPC Statistical Area (solid line)



Source: Oceanic Fisheries Programme of the Secretariat of the Pacific Community.

Table 1
Landings by species of the four key tuna species in the WCP, 1993-1997

Year	Albacore	Bigeye	Skipjack	Yellowfin	Total
1993	30 998	63 295	535 375	273 670	903 338
1994	36 432	65 188	676 953	255 078	1 033 651
1995	39 209	49 958	667 998	204 427	961 592
1996	39 638	50 360	675 616	136 262	901 876
1997	40 864	59 711	569 005	268 327	937 607

Source: SPC Tuna Fishery Yearbook 1997, compiled from logbook data

In summary, the tuna stocks of the WCP are generally in good health. There is an element of uncertainty over the bigeye stock, and this is currently being addressed through the research efforts of SPC and other research groups in the Pacific.

2.4 The players

An understanding of the geo-politics of the region is essential to an appreciation of fisheries policy formulation in the WCP, including the establishment of some form of rights-based management system.

2.4.1 Members of the Forum Fisheries Agency

The Forum Fisheries Agency (FFA) was established in 1979 in response to changes in international law, including the establishment of 200 nautical mile EEZs. Its primary mandate is to assist its membership with the management and development of their living marine resources and, in particular, highly-migratory species.

Whilst a considerable degree of homogeneity is shown by FFA member countries in regard to the management and development of their tuna fisheries, there are substantial differences in resource endowments and national policies. Table 2 provides a range of key indicators for FFA member countries, and US and French Territories. For instance, the atoll states such as Kiribati, Tuvalu and Marshall Islands have few alternatives for development other than fisheries and some limited tourism, whereas some of the larger islands (Papua New Guinea, Fiji and Solomon Islands) have other significant economic opportunities, including timber and minerals.

Countries endowed with the more productive (in terms of tuna) zones have formed the so-called PNA (Parties to the Nauru Agreement) group, which is a subset of FFA member countries. This resource endowment provides the PNA with considerable leverage in negotiations concerned with both access and management. This is particularly true for the purse-seine fishery, in which access to the EEZs of FFA member countries is essential for economic operations. The majority of access arrangements with DWFNs in the WCP are made with PNA countries.

The countries situated further south and east of the WCP (Cook Islands, Fiji, Niue, Samoa, Tonga and Vanuatu) tend to have less productive fishing grounds and larger adjacent areas of high-seas to the south. Accordingly these countries have reduced leverage with DWFN fleets who fish in their waters and in the surrounding areas of high-seas targeting southern albacore.

2.4.2 French and US Territories

France has three territories in the WCP; French Polynesia, New Caledonia and Wallis and Futuna. Each of these has its own political identity within the French Republic. All three territories are seeking (and gaining) greater autonomy over their marine resources.

The US territories comprise American Samoa, Commonwealth of the Northern Mariana Islands and Guam. American Samoa has particular relevance to the WCP tuna fishery due to the location there of two high-volume tuna canneries.

2.4.3 Distant-water fishing nations

DWFNs currently active in the WCP include Japan, US, Republic of Korea (ROK), Taiwan (Province of China), Philippines and China. As is the case with Pacific island countries, it is tempting to consider DWFNs as a homogenous block. Certainly, they are united on a number of issues and particularly their desire to achieve long-term overall control over harvesting-rights. However, each fleet is subject to different economic and operational circumstances which influences the perspective they bring to WCP issues.

Japan is the most significant DWFN operator in the WCP with its fleet comprising close to 50% of the fishing vessels active in the region. The fleet has been faced with increasing economic pressures across all types of operation[9] and is currently engaged in an active programme of fleet reduction (*gensen*) of longline vessels. Taiwan and ROK also have significant fleets and tend to align themselves closely with Japan on management issues, including allocation.

[9] Despite these pressures, a recent FFA study showed that the Japanese purse seine fleet was the most profitable of all DWFN fleets operating in the WCP. See Development opportunities in selected tuna fisheries for Pacific island countries. FFA/ADB Report, December 1998.

Table 2
Key indicators for FFA member countries and US and French territories

Country	Land area (km^2)	Population	Area of EEZ (km^2)	Total GDP	GDP per capita	Year
American Samoa	200	61100	390000	135000	6660	1985
Cook Islands	237	19000	1830000	133879	7069	1995
Federated States of Micronesia	701	111800	2780000	270133	2513	1995
Fiji	18272	779200	1290000	2618942	3163	1995
Guam	541	145400	218000	3999067	26795	1995
Republic of Kiribati	811	83400	3550000	55976	731	1994
Republic of Marshall Islands	181	60000	2131000	140319	2402	1995
Republic of Nauru	21	11200	320000	206250	35144	1989
Niue	259	2100	390000	8835	3946	1991
Northern Mariana Islands	471	65100	777000	732432	13231	1994
New Caledonia	19103	201300	1740000	4325268	22551	1995
Republic of Palau	488	18100	629000	121269	7613	1992
Papua New Guinea	462243	4311500	3120000	7336111	1859	1994
Pitcairn Island	5	47	800000	-	-	-
French Polynesia	3521	222300	5030000	5155020	23930	1995
Samoa	2935	177700	120000	211778	1288	1995
Solomon Islands	27556	401100	1340000	476282	1196	1995
Tokelau	10	1500	290000			
Kingdom of Tonga	747	97800	700000	212848	2128	1995
Tuvalu	26	10900	900000	15473	1674	1995
Republic of Vanuatu	12190	200	680000	322824	1943	1995
Wallis and Futuna	255	14200	300000	-	-	-

Bold type denotes FFA Island member countries.

The Philippines and China are relatively new DWFN players in the WCP[10]. Whilst there were over 400 Chinese longliners in the region in 1997, their number has dwindled considerably. Given the pressure on tuna stocks around the Filipino and Indonesian archipelagoes there will be continued pressure on the fleet to move east and into the WCP.

US activity in the WCP is centered on the highly efficient but now aging purse-seine[11] fleet, which has access to the waters of all FFA member countries under the multilateral US Tuna Treaty.

[10] The Philippines has a major domestic fleet, and an estimated catch of 400 000t of tuna and tuna-likes species in 1997. Of this catch 110 000t were skipjack, 56 000t yellowfin, and 5600t bigeye - these are estimates.

[11] Of the US purse-seine fleet operating in the WCP 1996-1998 (41 vessels) only two are less than 10-years old, and 32 vessels are more than 15-years old.

3. RIGHTS-BASED MANAGEMENT IN THE WESTERN AND CENTRAL PACIFIC

The WCP fishery currently operates under the two basic sets of rights provided by the Law of the Sea Convention (LOSC). First, coastal states have the right to explore, exploit, conserve and manage the resources of their EEZ and to charge DWFNs for access to catch fish in their Zones. Second, flag states have continuing freedom of fishing on the high-seas subject to general obligations.

These rights alone are insufficient to deal with effective conservation and management of the highly migratory fish stocks in the WCP; both coastal states and DWFNs are looking to achieve greater security over the resource, in regard to both conservation and long-term rights of access. In particular, because of the overwhelming dependence on tuna, Pacific island countries need more than just the right to manage and exploit the stocks when they are in their EEZs. In order to ensure long-term sustainabilityof the fisheries, and therefore economic se-

curity, coastal states want the assurance that their share of the resource is safe wherever it swims.

In examining trends in fisheries management worldwide it would appear that an improved form of rights-based management offers the best opportunity to achieve this security for all parties. Key factors in achieving enhanced rights-based management in the WCP are:

i. the extensive area of the fishery and the highly migratory nature of the tuna resource;
ii. a significant portion of the fishery takes place on the high-seas and are open to exploitation by the highly-mobile tuna fleets of the world;
iii. the wide diversity of interests in the fishery, from small island developing states to world superpowers; and
iv. the political, economic and cultural importance of the tuna resource to many Pacific island countries.

As noted, the WCP tuna fishery spans 30 million square kilometres, through the waters of over 20 sovereign states and territories and into extensive areas of high-seas. While some part of the tuna stocks may be semi-resident around archipelagic waters, the majority of the stock is highly migratory in nature. The result is that the tuna stocks are subject to many different jurisdictions and management regimes, each motivated by particular national objectives. This 'split ownership' means that no one state can implement effective conservation and management arrangements.

Due to its highly migratory nature, tuna may be present in a country's EEZ during one year and virtually absent the next. The predominant mentality of coastal states in the past has therefore been to catch the fish while they can be caught. Given the ENSO-effects and changes in stock abundance, the impact of fishing mortality is difficult to measure across the stock as a whole, and even more so at a national level. This means that any effects on the stocks of different types of harvesting strategies adopted by individual countries are largely externalised.

Not surprisingly, the highly migratory fish stocks of the WCP, like other major world tuna fisheries, are exploited by highly mobile fishing fleets. Global pressure on other world tuna species and effort displacement from the Atlantic, eastern Pacific and Indian Oceans has resulted in increased fishing pressure in the WCP[12]. Given that the high-seas remain basically subject to freedom of fishing, that part of the fishery is subject to open-access.

Coastal states are subject to almost continual bilateral approaches for access by the mobile DWFN fleets. While coastal states have the power (and obligation) to regulate and limit fishing within their EEZs, the short-term economic reality facing most Pacific island countries encourages short-term political decisions to allow increases in fishing effort. The sum of these individual actions has the potential to increase fishing pressure on the tuna resources.

A final challenge results from a tendency by Pacific island countries to strongly resist any diminution of the exercise of their sovereign rights through regional or multilateral cooperation. Most Pacific island countries are highly protective of their relatively new-found independence many having been subject to different colonial rules as recently as the 1980s. As well as being integral to most island cultures, the tuna stocks also represent one of, and for some states the only real hope for economic independence. These factors mean that decisions affecting the tuna fishery are decisions that directly affect the sovereignty and future economic prospects of many Pacific island countries.

3.1 Development of a multilateral regime in the WCP

The development of new management arrangements, incorporating an enhanced rights-based regime, is being pursued at national, regional and multilateral levels. Efforts at the multilateral level are the most significant of these given the need for any robust rights-based management regime to take account of the geographical range of the tuna stocks.

In the FFA Convention it was recognised that cooperation among island countries alone was inadequate to secure effective conservation and management of the highly migratory tuna stocks. In 1994, the Multilateral High Level Conference (MHLC) was initiated by FFA member countries in response to this need. The MHLC process is the most significant change to the institutional environment of the WCP, with the intention to develop a 'Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean'. The development of the Convention is in direct response to the 1995 United Nations Fish Stocks Agreement and the obligations that Agreement placed on coastal states and distant-water fishing nations to agree to some form of arrangement through which to co-operate for the conservation and management of highly migratory fish stocks.

While not yet in force, negotiations on this Convention are at an advanced stage and scheduled to conclude in August 2000. All coastal states and DWFNs currently operating in the WCP have participated in the negotiations, which will result in the formation of a supranational Commission with responsibility for ensuring that effective conservation and management arrangements are implemented.

One of the critical functions of the new Commission will be to establish levels of catch and/or fishing effort and then to ensure that these are not surpassed. The latest draft text of the Convention text provides the Commission with the mandate to "develop, where necessary, criteria for the allocation of total allowable catch or the level of fishing effort for highly migratory fish stocks in the Convention Area". Throughout the negotiations it has been

[12] A significant increase in effort in the WCP occurred in the 1980s as a result of the ban in the eastern Pacific on tuna sets associated with dolphins.

apparent that all participants expect that there will be some form of allocation to the charter members of the Convention, hence creating the institutional framework to establish a rights-based management system for the WCP. Indeed, the first mention of rights-based management in the WCP arose in 1997, at the second session of MHLC. At that session the Conference Chair, Satya Nandan, made reference to the development of some form of allocated participatory-right as one of the key challenges of the new multilateral regime.

While the text of the Convention will provide the Commission with allocative functions to support some form of rights-based conservation and management regime, already there are practical hurdles arising that will make effective development and implementation of such a regime extremely difficult.

The main hurdles emerging that will face the new Commission can broadly be divided into two main stages:

i. the process through which allocations will be agreed, and
ii. once allocated, making the rights-based system work in practice.

3.2 Allocation process

The initial allocation process will need to achieve equity between coastal states and distant-water fishing nations. Further, equity between individual coastal states as well as between distant-water fishing nations will also be important. In the absence of an equitable allocation, parties are unlikely to support the conservation and management arrangements, thereby undermining the authority and effectiveness of the Commission.

In the negotiations for the Convention, two different views on a future allocation process under the Commission have emerged. These two views can be broadly characterised as a coastal State view and a distant-water fishing nation view.

The fundamental difference between the two views is who 'owns' the catch history taken by distant-water fishing nations within the EEZ of a coastal state. The following figures highlight the importance to both coastal states and distant-water fishing nations of the outcome of this debate:

i. 92% of the total catch (1993–97) of the four key tuna species in the WCP was taken between 10°N latitude and 10°S latitude
ii. 70% of that catch is taken in the EEZs of Pacific island states and territories
iii. of the total catch taken in the WCP, over 65% of the resource is taken in the EEZs of Pacific island states and territories
iv. 90% or more of the catch in the EEZs of Pacific island countries has been taken by distant-water fishing nations.

In the distant-water fishing nations' view, all catch would be attributed to the relevant flag state for the purposes of allocation, regardless of where that catch was taken. The coastal state view is that catches taken within its EEZ should be attributed to it as a major factor in the generation of an allocation.

The underlying rationale for the distant-water fishing nation approach is that the mobility of the stocks means that it is illogical for a coastal state to establish a national TAC. Shares of a TAC should therefore reside with the flag states, reflecting past and present fishing patterns and allowing the mobile fishing fleet to reflect the mobility of the fish. Access to a coastal state's EEZ by a flag state in order to fish the stocks would remain a matter to be dealt with under an access agreement, with concomitant fees.

DWFNs currently active in the WCP wish to establish some form of longer-term security over their access to the resource. Prompting these moves, in part, are recent approaches by both the European Union and France, on behalf of its Pacific territories, to gain access to the tuna-rich waters of Pacific island countries. Allocations based primarily on catch history by flag state would reduce the impact of such new entrants to the fishery.

For coastal states, and in particular Pacific island countries, the distant-water fishing nation approach to allocation presents certain difficulties. The fundamental issue is that if the long-term right were to reside with the flag state, the coastal state would lose substantial harvesting control over the resources within its EEZ.

Island countries are in varying stages of developing their own domestic fishing industries. To receive an allocation based on limited domestic catches would severely hamper their future development options. While statements have been made at the MHLC plenary that some account would need to be taken of the development aspirations of coastal states in this regard, it is difficult to envisage consensus being reached for future reductions in parties' allocations.

A further problem for Pacific island countries is that, with no other natural resources, a high number of island economies rely heavily on income from access fees under multilateral and bilateral arrangements. Allocations based on the DWFN model would result in quota being concentrated into a few hands, leading to reduced competition between flag states and therefore the potential that the access fees might be reduced. A possible consequence of this is that in most cases, bilateral fisheries agreements also bring substantial indirect benefits to a country, including provision of aid directed at non-fisheries projects. Were DWFNs to enjoy greater security over the resource through an allocation process, and less competition between fleets, there would then be less need to provide these indirect benefits to Pacific island countries.

It is clear that, as with any allocation process, the criteria used to determine allocations under the new Commission will inevitably have a fundamental impact on the willingness of respective parties to accept any

rights-based management. In this regard, coastal states are arguably in a stronger negotiating position, given their existing rights to establish management measures, including TACs, within their EEZs. However, if coastal states take too hard a line in negotiations on allocations, distant-water fishing nations may decide that they are better-off with an open-access regime on the high seas rather than a rights-based system, with a low allocation.

Some form of compromise and resolution at the Commission may well be prompted by a combination of coastal states establishing in-zone TACs and/or compromising on allocations, and the entry into the region of new players on the high-seas.

3.3 Making the right work

3.3.1 Management challenges

Assuming the Commission can overcome the above difficulties and agree to an initial allocation, the following issues represent the next set of challenges in making those rights work:

i. dealing with new members and non-members
ii. accounting for the mobility of the tuna stocks
iii. monitoring and enforcement

3.3.2 New members and non-members of the Commission

One important challenge in trying to introduce more robust forms of property-right to the WCP will be to protect those rights against the impact of new members and non-members who will still seek to exercise their right of freedom of fishing on the high-seas. This is a problem that has plagued other tuna fisheries around the world with the rights of charter members being threatened with diminution through the requirement to provide some form of allocation to new members of the Commission.

The problem of new members may be decreased to an extent in the WCP by the fact that all distant-water fishing nations currently active in the region, as well as all coastal states and territories, are participants in the MHLC process. Therefore, all states with a 'real interest' in the fishery have the opportunity to become charter members of the new Commission and thus be party to negotiations over future allocations.

One potential source of challenge to the approach being considered at MHLC is that such a regime would be contrary to international law in that it would prevent non-charter members from enjoying the right to freedom of fishing on the high-seas. At this stage, an approach being put forward by some is to facilitate that right through the lease of rights allocated to charter members. The political and legal rationale required to underpin this approach is being examined further.

A further potentially more difficult issue is how to deal with non-members that wish to operate in the Convention Area. This is particularly relevant given the increasing difficulties experienced by international fisheries in dealing with 'flag of convenience' vessels.

Under UNFSA[13], non-members of an arrangement are able to continue fishing in the area of competence of that arrangement[14] if they abide by its conservation and management rules. The question arises if a TAC that has been set and 100% of the shares of the TAC allocated, whether a non-member would then be in breach of the rules if they operated in the fishery. If this argument can be sustained then, as with new members, the maintenance of the right of freedom of fishing on the high-seas for non-members would then be through the lease of existing rights from a charter member.

Discussions at plenary sessions of the MHLC have clearly shown participants' strong desire to introduce some form of moratorium on new entrants to the fishery for the period between signature and entry into force of the Convention. The initial stages of an attempt to 'close the door' on additional fishing capacity entering the WCP were agreed via a resolution adopted at the fourth session of the MHLC plenary. This resolution was revised at the fifth session of the MHLC to reiterate the previous statement on capacity and also that '...requests for participation in the MHLC will not be entertained until the draft Convention enters into force'[15].

The resolution also states that MHLC participants '...agree further that in future members of the proposed Commission...will refrain from consideration of catch history of non-members in the proposed Convention Area during the period of the interim regime in any future decisions by the Commission on allocation'[16].

If the resolution is given practical effect by the MHLC participants it will not only avoid additional capacity coming into the WCP but will also limit attempts by non-MHLC participants to secure a charter member allocation. If effective, this would firmly establish charter membership of the new Commission. Reinforcing this is the fact that the current draft text of the Convention states that new members of the Commission can only be admitted by a consensus decision of the charter members.

3.3.3 Mobility issue

Dealing with the mobility of tuna is likely to be the greatest challenge faced by Pacific island architects of rights-based management in the WCP. The distant-water

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[13] UNFSA - the 1995 UN Fish Stock Agreement (sometimes given the inappropriate acronym "UNIA" - UN Implementation Agreement - Editor)

[14] Note that access to the EEZs of coastal states would continue to be a matter determined by that State. However, by granting access to non-MHLC participants prior to the determination of allocated rights there is a danger that 'real interest' could be created that would erode the allocation to existing MHLC participants.

[15] Resolution of the participants in the fifth session of the Multilateral High-Level Conference on the Conservation and Management of the Highly Migratory Fish Stocks in the Western and Central Pacific ("MHLC"), meeting at Honolulu, from 6 to [15] September 1999

[16] Ibid.

fishing nation view is that the logic of attributing rights to a highly migratory fish stock to a coastal state is fundamentally flawed. This is because the abundance of the resource within a given EEZ can vary by as much as 200% from year to year and the assumption that a national quota could not be applied outside the coastal state's EEZ.

For any allocation to be meaningful the allocation to a coastal state must be based in part on the long-run average abundance in an EEZ. In addition, the right will need to be transferable so that the allocated right of a coastal state can be exercised in areas outside its EEZ, either on the high-seas or in the Zone of another coastal state. A legal issue being examined in regard to the latter transfer (EEZ to EEZ) is whether the right will, in effect, be on exercise of the coastal state's sovereign rights and therefore be unable to be exercised in another country's EEZ.

3.3.4 Monitoring and enforcement

For all parties to ensure that they are willing to commit to short-term constraints for long-term gains from a rights-based management regime there needs be effective monitoring and enforcement within the fishery to minimise illegal, unauthorised and unregulated fishing (IUU).

In this regard, the Commission will need to have a strong role in ensuring that individual parties abide by the agreed rules. Even if the Commission detects IUU fishing, given the significance of flag state responsibility under the UNFSA, there may be limited scope for the Commission to act. In the WCP, given the likely size of the Convention area as well as the limited monitoring capacity of the Pacific island countries to regulate fishing activity in their EEZs, this presents particular difficulties.

3.4 Role of institutions

3.4.1 Institutional participants

In order to overcome the hurdles outlined above and to make rights-based management work in the WCP, effective supporting institutional structures will be essential. The two main supporting institutions will be:

1. the WCP Commission and
2. Forum Fisheries Agency

3.4.2 The WCP Commission

3.4.2.1 Decision-making

Perhaps the most crucial element that will determine the effectiveness of the new Commission in supporting a rights-based management regime will be its ability to make decisions. Past practice of consensus decision-making, or voting with an opt-out clause, by other international organisations has led to a weakening of the management regime, including any participatory rights developed by those arrangements. As stated by the Chair of the MHLC, Satya Nandan, opt-out clauses are obsolete in regard to bringing about effective conservation and management regimes. Efforts are therefore underway to develop a more innovative decision-making process under the new Convention.

At this stage in the negotiations, a multi-layer approach is being considered whereby different matters would be subject to different decision-making processes. The inclusion of different forms of majority votes is being hotly contested, given the fact that the FFA member countries (whose generally common interests are anticipated to result in a bloc vote) represent 16 of the around 22 participants[17] in the negotiations.

In regard to the specific issue of allocation, the current draft text of the Convention attempts to respond to some of the concerns raised by participants (particularly distant-water fishing nations) by requiring that decisions on allocation be taken by consensus. Of course, this may well mean that no allocation will ever be made, as achieving consensus among over 20 parties with divergent interests and expectations will be extremely difficult. It will be interesting to see whether, in the end, individual parties will conclude that it is better to reach some form of compromise on their preferred allocation position rather than continue with an open-access type regime on the high-seas, with its concurrent impact on the amount resource available on a sustainable basis to be exploited by coastal states.

3.4.2.2 Allocation

In addition to the essential decision-making role of the Commission, a crucial issue is whether a top-down or bottom-up approach is adopted in the allocation of a participatory right. Under the 'top-down' approach the Commission would assume authority for determining allocations of the overall TAC to all eligible parties, regardless of whether they are coastal states or flag states. This approach is favoured by distant-water fishing nations and some coastal states as the only practical way to ensure that the sum of the individual allocations does not exceed the overall TAC.

Under the 'bottom-up' approach, coastal states would establish 'provisional' national TACs (that is, their share of the overall TAC) and then bring these to the Commission table. The Commission would only determine allocations in regard to the high-seas portion of an overall TAC, but would act as a coordinating forum to ensure that the sum of the shares did not exceed the overall TAC. This approach is favoured by many of the Pacific island countries. Distant-water fishing nations, among others, have strongly criticised this approach, partly on the basis that defining national TACs is incompatible with management of highly migratory fish stocks. It remains to be seen how this sensitive issue will be resolved in practice.

3.4.3 Forum Fisheries Agency

The language of the draft text of the Convention is relatively general in nature. It will be left largely to the

[17] It is not yet clear whether individual territories will be entitled to a separate vote within the Commission.

Commission to discuss and resolve the detail of how the new regime will operate. The FFA will provide a forum in which its member countries can discuss and, where appropriate, develop a consensus approach to issues to be discussed at the Commission. Such issues would include allocation processes, and monitoring control and surveillance. This regional approach by Pacific island countries has the potential to make the commission more effective. In addition, the FFA Secretariat would continue to provide support at the national level and advice on a range of technical and policy issues outside the scope of the new Commission.

Given the restricted resources of Pacific island countries it is unlikely that they would be willing, or able, to support two fisheries organisations with closely linked mandates. If the Commission is established to focus on co-operation and compatibility (on the high-seas) with existing in-zone arrangements – this will considerably reduce what needs to be done by the Commission. This will in turn reduce costs.

Apart from the WCP Commission and FFA, external international organisations are likely to play a key role in shaping the new regime and making it work. Such organisations will include international environmental groups who are beginning to devote more resources to fisheries issues, particularly those fisheries in which the stocks are still in a relatively healthy state.

A little over two-thirds of the members of the new Commission are likely to be developing countries. Individually, such countries have little scope either to take censuring action against economically powerful distant-water fishing nations or absorb short-term loss of revenue from the fishery. What will most likely be required is either cooperative action by these countries (through the FFA) and /or external pressure through the organisations mentioned above.

4. THE FUTURE

It will be extremely difficult for the parties to the Commission to develop a fully-functional management regime with well-developed property-rights. As has been seen repeatedly, there will be a tendency for the Commission to move towards a lowest common denominator outcome, which will call into question the value of an individual party showing constraint. Coastal states will be required to balance the need to secure as strong a property-right to the resource as possible without going as far as to remove the incentive for DWFNs to agree and comply with management measures.

Can all participant states enhance their sovereign rights through cooperation at the Commission? This question is being examined at a variety of pragmatic and theoretical levels, including through a game-theory approach. Such approaches will examine and attempt to quantify how individual states can be made better-off by cooperation, and the tuna fishery, whilst complex, would seem to be an ideal ground for such an approach.

There is also the issue of the multi-species, multi-gear issue. The FFA has developed a bioeconomic model that shows, among other things, the value to the overall fishery of changes in the mix of gear types. For instance, a decrease in the number of purse-seiners landing small, surface fish would lead to additional recruitment to the longline fishery. Overall, it has been shown that such an activity would make the whole fishery better off, but is unlikely to yield equal benefits, if any to some parties. More work in this area will be necessary if economic efficiency for the fishery is to be obtained.

Will the concept of freedom of fishing on the high-seas become a freedom that will erode the rights of the coastal state? The UNIA and the MHLC processes have certainly placed many caveats to that freedom, but it remains to be seen if they are sufficient to prevent the erosion of rent available from the fishery, or at worse, place some species in jeopardy.

There is little doubt that some sections of society are its broadest sense are increasingly growing intolerant of blatant abuse of natural resources and are prepared to act either directly or via market-based measures. The way in which public opinion changed the face of the eastern Pacific tuna fishery due to the tuna-dolphin interaction problem and the recent moves to establish eco-labelling are examples of such reactions.

5. CONCLUSIONS

The task facing the region in the implementation of comprehensive fisheries management arrangements cannot be underestimated. A total of around 30 states and territories with diverse social, economic and political objectives will need to co-operate if the sustainability of the tuna resources of the region are to be assured. For coastal states and DWFNs alike, the establishment of some form of relatively robust long-term rights in the fishery would seem to the most logical way of avoiding the disasters that have befallen other international fisheries management organisations.

So far, there are encouraging signs that the new Convention will provide the foundations for something innovative, but already those who question the loss of short-term gain for long-term benefit are arguing for types of mechanism that are essentially 'more of the same'. It would be a tragedy if the region's major renewable resource and the world's largest tuna fishery is eroded because international law and the diplomatic process cannot come to grips with what is essentially a technical fisheries management problem.

THE NORWEGIAN FISHERIES: AN UNREGULATED COMMON PROPERTY RESOURCE IN TRANSITION BY THE INTRODUCTION OF QUOTAS, CLOSED ACCESS AND THE INDUSTRY'S USER-RIGHT PERCEPTION

J.H. Williams and S. Hammer
Royal Norwegian Ministry of Fisheries
PO Box 8118 - Oslo N-0032 - Norway
<johan.williams@fid.dep.telemax.no>

1. INTRODUCTION

The Norwegian coast benefits from an upwelling system that makes its fishing grounds among the most productive coastal marine areas world-wide. This has provided Norway with rich fisheries that throughout its history have been of great importance, both as a source of livelihood to the coastal population and as a major source of export revenue to the nation. Throughout history the Norwegian fisheries sector has played a major role in the development of the Norwegian society and has consequently also been a major player in national politics. The fisheries are still a strong contributor to settlement and income for the people living on the western and northern coasts of Norway, though Norwegian oil production during the last 20 years has been, and presently is the main contributor to the Norwegian economy as a whole.

The annual ex-vessel value from the Norwegian capture fisheries in 1999 is expected to be approximately 9 billion Norwegian kroner (NOK)[1]. The total market revenue of fish and fish products is approximately 35 billion NOK, of which the export value is expected to be around 30 billion NOK. One third of this is derived from export of the fast-developing Norwegian aquaculture sector, at present mainly of Atlantic salmon. This has made Norway, as of 1997, the world's biggest exporter of fish and fish products.

The fish resources have always played a major role for the economy of the Norwegian coastal communities, especially for northern Norway. A strong coastal culture has developed, based on the local exploitation of the fish resources, as well as on the nationally-agreed policy that the fisheries sector shall contribute to the settlement of the coastal region. When the rebuilding of Norway started after the Second World War the Government formulated a strategy in which the development of the fisheries sector formed the backbone in the development of the coastal communities. This policy has been maintained, although modified following the general developments of the economic policies of Norwegian society. In the last Norwegian Government White Paper to Parliament "Perspectives on the development of Norwegian Fisheries Sector" No. 51 (1997-98), this policy objective is formulated as:

> *"The Fisheries policy shall contribute to establish a sound basis for an economically viable development of the fisheries industry. A sustainable management of the living marine resources is pre-conditional. Through marked orientation and increased value adding, the fisheries sector shall contribute to good employment and living opportunities in the coastal communities."*

Thus, the main objective for the Norwegian Government fisheries policy is not only to maximise profits through an economically efficient use of the resources by seeking the highest possible rate of return from the fisheries sector, but also to achieve a socio-economic optimum with respect to the total benefits for the communities of Norway. The Norwegian fisheries sector still plays an important role in the Norwegian government's overall policy to maintain the settlement structure in the coastal communities, especially in the northern parts of Norway.

In 1950 Norway had about 33 000 registered fishing vessels and 86 000 fishermen. Details of the structure of the industry are given in Table 1. The technical developments in boats, gear and equipment during the last 50 years, in Norway as in most other fisheries nations, has contributed to a fishing fleet capable of over-exploitation of most of the fish stocks. The economic development of Norwegian society in this period has led to a large reduction in numbers of fishing vessels and fishermen, while the catching-capacity has been maintained, and in a number of fisheries increased. Thus, in 1998 the numbers were reduced to 13 250 registered vessels and less than 17 000 fishermen.

2. SUSTAINABLE MARINE RESOURCE MANAGEMENT

The Norwegian model for sustainable marine resource management rests on the principles of (a) sustainable harvesting, (b) multi-species approach, (c) adequate regulations and (d) an efficient control and enforcement scheme. It is vital that these principles are accepted as legitimate by the fishermen themselves and that violations are subject to legal sanctions. It is also of utmost importance that these principles form an integral part of the fisheries agreements concluded with the neighbouring North Atlantic countries for the management of shared stocks.

Since Norway's economy is heavily dependent on the income drawn from exploitation of its living marine resources, prudent management of fish stocks is decisive to safeguard the future of its fishing industry. Nature always plays a significant role in the determination of fishing possibilities, but despite the whims of nature, it is firmly believed that it is both possible and necessary to

[1] NOK 9 billion (9 000 000 000) equivalent approximately US$ 1 000 000 000 (in 1999).

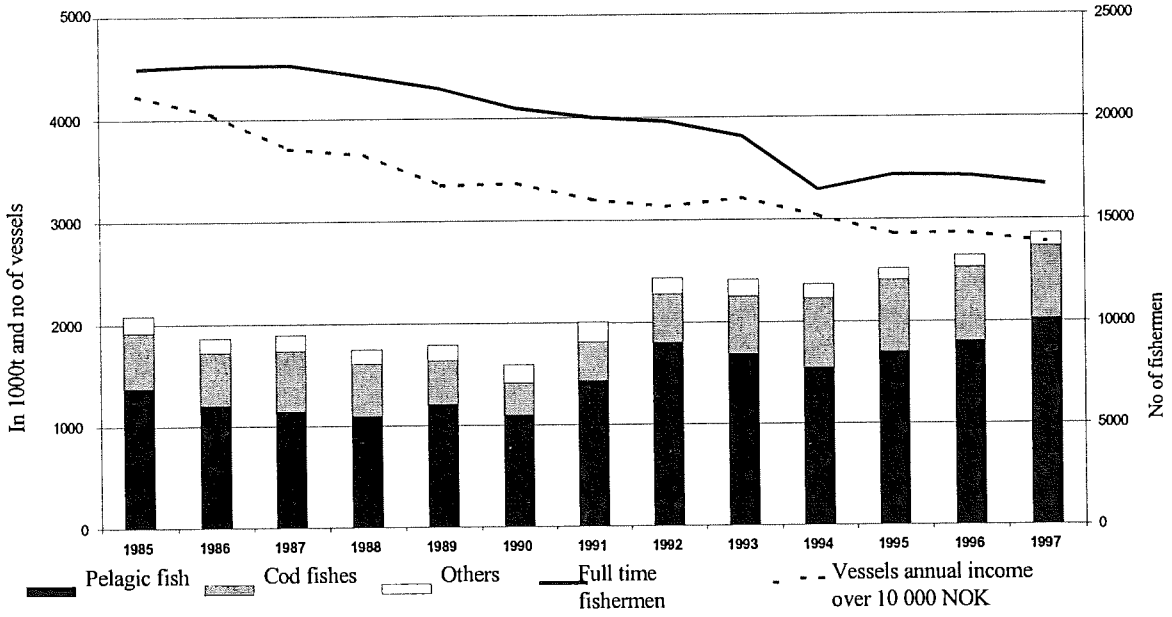
Table 1
Development and structure of the Norwegian fishing sector

REGISTERED VESSELS 1925-1998									
Year	1925	1930	1940	1950	1960	1970	1980	1990	1998
Number of vessels	19 336	21 352	25 931	33 579	41 636	36 201	26 504	17 392	13 252

VESSELS WITH INCOME OVER 10 000 NOK BY LENGTH (m) 1998						
Length	< 9	10-15	16-19	20-29	30-39	> 40
Number	3727	1045	282	278	143	210

FISHERMEN WITH FISHING AS MAIN OCCUPATION 1948-1997						
Year	1948	1960	1971	1975	1980	1995	1997
Number	86 400	45.200	30 819	25 388	25 140	17 160	16 661

Figure 1
Norwegian fish catches and number of fishermen and fishing vessel 1985 –1997



pursue a policy of sustainable management and conservation of the living marine resources. Thus, maintaining and rebuilding stocks to levels that can give predictable and sustainable yields, forms a fundamental basis of Norwegian fishery policy.

3. FISHERIES CO-OPERATION WITH OTHER NORTH ATLANTIC COUNTRIES

Internationally, there is a growing understanding for the need to see the marine ecosystem as a comprehensive whole. The utilisation of the different species must reflect their inter-relationship. The objective of Norwegian management policy encompasses both the commercial harvesting of large variety of species, and simultaneously maintaining them at safe levels. As more than 80% of the Norwegian fisheries are derived from shared stocks, the Norwegian management objectives can only be achieved in close co-operation with other North Atlantic fisheries nations.

The establishment of the exclusive economic zones of 200nm in the late 1970s required new forms of international fisheries co-operation as the most important fish stocks were shared between two or more states. Thus, agreements were concluded with the two main collaborators in management of the Barents Sea and North Sea resources; Russia and the European Union respectively. In addition agreements were concluded with the Faeroe Islands and Greenland, to enable a balanced exchange of fish quotas to help maintain traditional fishing pattern. An agreement regulating the fishery on the joint capelin stock in the Iceland/Greenland/Jan Mayen area was later concluded with Iceland and Greenland. Following the development on joint regional management on high-seas resources, based on the UN-agreement on straddling fish stocks and highly migratory fish stocks, an agreement between Norway, Russia, European Union (EU), Iceland and the Faeroes was concluded on the management of the ScandoAtlantic Herring, including a regime for the fishing of this stock in international waters, negotiated within

the framework of the North East Atlantic Fisheries Commission (NEAFC). A similar management agreement for the North Atlantic mackerel stock is being negotiated (November 1999) with Norway, EU and the Faeroes as the three coastal states.

Over the past decades Norway and Russia have co-operated to ensure rational and responsible management based on joint measures and close co-operation has been developed between the Norwegian and Russian control authorities, with a continuous exchange of data on catches and landings in Norwegian ports. At sea, close contact has been established between the two Coast Guards. Joint efforts made by Norway and Russia in the management of the resources in the Barents Sea have provided a common approach to resolve new problems.

The major challenge in fisheries co-operation with the EU, is to rebuild the major stocks in the North Sea to sustainable levels. Norway and the EU have both adopted comprehensive regulations and measures to control fishing and promote rational exploitation of fish resources. However, the principle of sustainable management and exploitation is applied differently in certain important cases. Norway has introduced a ban on discards based on the notion that all catches should be accounted for and deducted from the quotas to control the mortality of each particular fish stock. The EU, in contrast, imposes mandatory discarding of fish above the quotas or below size-limits as a central element of their management regime.

4. NORWEGIAN FISHERIES REGULATIONS

The technological development of the Norwegian fishing fleet proved early the need to impose regulations on fleet capacity and in 1908 the first restrictions on fishing activities were established by law. This, the so-called "trawler act", encompassed prohibitions on fishing with trawls in Norwegian seas. The first regulation regulating access to the fisheries came in 1932 when a licence-system for the trawler fleet was implemented. Since these first regulations, directed at restricting the development of trawling in the demersal sector of Norwegian fisheries, a number of different regulations have been imposed to protect fish stocks from over-exploitation while maintaining the right to exploit these resources by the fishermen.

Today, the Norwegian system of fisheries reflects a well-tested system of policies and instruments for the monitoring and regulation of key stocks based on multi-species management objectives. The overall objective is to provide for a sustainable development and a long-term optimal use of the living marine resources. This implies that catches of any TAC-regulated species must not exceed the agreed quotas based on the best biological advice available.

Norwegian conservation philosophy stipulates that, as a starting point, all regulations and corresponding enforcement should be directed towards the fishing activities themselves. The basic legal starting points are the prohibition to fish "illegal" fish, *i.e.* fish below the required minimum size, and the ban on discarding of all commercially valuable species. Moreover, every catch of an individual species is registered and counted against the quota for that particular species.

Participation in Norwegian commercial fisheries is restricted and regulated by a body of legislative and administrative instruments. The restrictions on fishing effort can be divided into terms controllling entry into the fishery and limitations relating to the use fishing gear which are a form of input regulations, and quantitative restrictions such as different kind of quotas that refers to output regulations. There are also a number of regulations to reduce the fishing capacity in different vessels categories.

5. INPUT REGULATIONS

Norwegian input-controls relate to vessels that are allowed to join the different fisheries and to who are allowed to own fishing vessels.

To be registered as a fisherman one must fulfil a number of criteria. These have been established to achieve the political objective that the ownership of fishing vessels, and thus the right to exploit the Norwegian fisheries resources shall be given exclusively to fishermen. Thus, the law states that only active fishermen can own the majority of assets of a vessel. For example, one criterion is that one must participate in more than three of the last five years in some Norwegian fishery to be entitled to own a fishing vessel. When these criteria are met, the individual can be registered in The Fisherman Register established in 1941, and the right to ownership of a Norwegian fishing vessel is permitted. There are, as well, a number of output-regulations based on the Register.

It is generally recognised that the current fishing capacity of the Norwegian fishing fleet is far too large relative to the resources available. To meet this imbalance, a number of input-controls have been established. Two basic models have implemented concessions and permits to regulate the number of vessels in the different fisheries. The difference between these is that concessions are granted for an unlimited time, while fishing permits are limited to one year.

Thus, while by law and in theory there are two different conditions, in practice, the annual permits are renewed indefinitely. In 1994, within the Norwegian fisheries, 14 different groups are regulated by concessions mainly within the off-shore vessel groups, eight groups with annual permits are established mainly among the coastal fleet. A few Norwegian fisheries are unregulated by either concessions or permits, and thus within the Norwegian fisheries a system of closed-access prevails for all important economic fisheries such that the in-principle open-access to fisheries by fulfilling the requirements of owning a fishing vessel, has only a theoretical value.

6. OUTPUT REGULATIONS

Norwegian fisheries are regulated by annual regulation of the share of the Norwegian TAC of all regulated stocks among the different groups and participating vessels. In addition, rules pertaining to periodic regulations

of harvest bycatch, fishing-season dates, sanctions when the regulations are broken, and eventual criteria for exemptions from the main rules of the regulation. For some fisheries the group-quotas are divided equally among the vessels, in others the vessel-quotas are differentiated by vessel-length, tonnage or other technical criteria. Regulations are implemented on North Atlantic Cod, North Sea Cod, North Atlantic Saithe, North Sea Saithe, ScandoAtlantic Herring, North Sea Herring, Mackerel, Sprat, Capelin, Shrimps in the Barents Sea, Shrimps in the North Sea/Skagerrak, Flatfishes, Blue Whiting, Redfish, Greenland Halibut and a number of smaller stocks.

In addition to the regulations on fisheries inside the Norwegian Exclusive Economic Zone, the Norwegian fisheries authorities also regulate fisheries Norwegian vessels working outside the Norwegian EEZ as a part of agreements with other states. A number of regulations are also set annually on the foreign fishing vessels to work in Norwegian waters. Norwegian fisheries authorities also regulate both input and harvest levels annually in the sealing and whaling sectors.

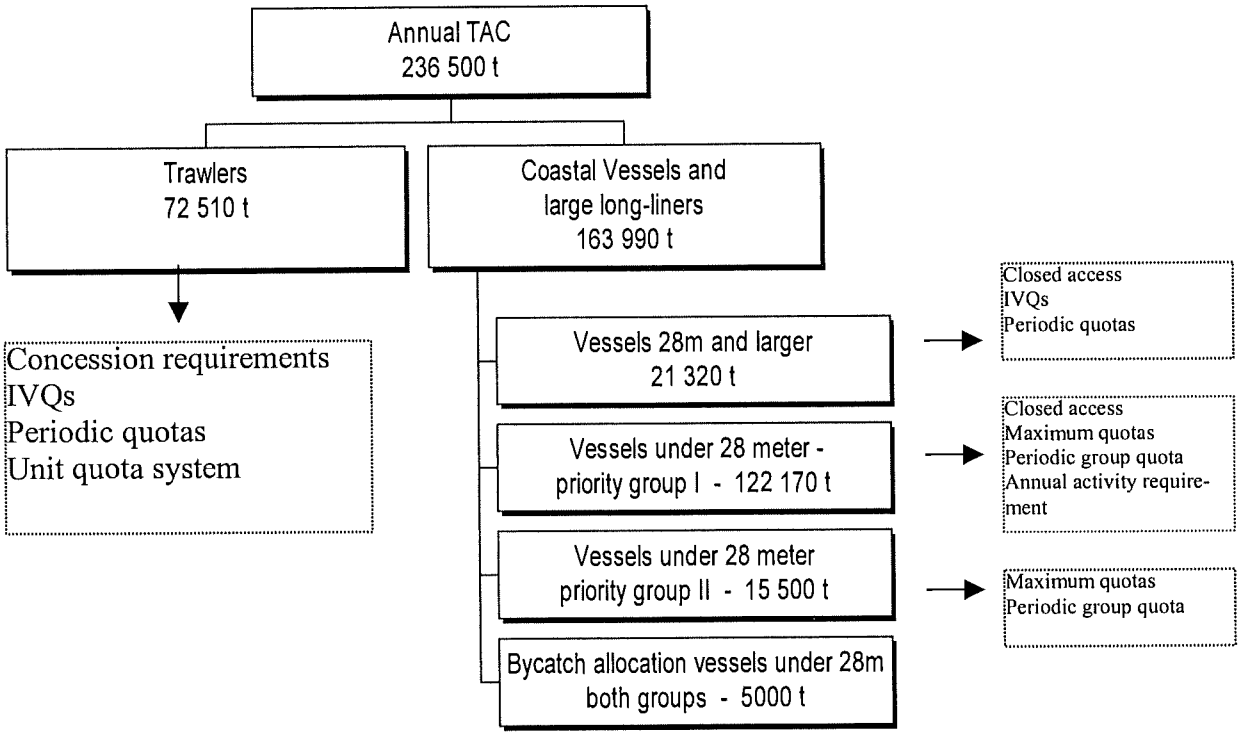
Harvests from regulated stocks are controlled through the allocation of the Norwegian TACs to different groups of vessels; these *Group Quotas* maybe in their turn fish the quota before the total *Group Quota* is taken, and fishing stopped. This system of "over-regulating" is used within vessel-groups that have a large variety of boats with large differences in activity level and thus catching-capacity. By this system the group gets the opportunity to catch the total *Group Quota*, though a number of the participating vessels only fish a portion of their allotment.

With the system of *Maximum Quota*, a boat owner risks that the fishing for that group is stopped before his boat has fished his *Maximum Quota*. On the other hand the system allows individual vessel to harvest extra quantities, which leads to motivations to invest in higher catching-capacity than on an average basis will be needed. The general renewal of vessels within a *Maximum Quota* group is, however, low as the competition to get as high a portion as possible of the *Maximum Quota* reduces profitability and thus the financial basis for renewals.

The regulations implemented for North Atlantic Cod in 1999 illustrate the combination of quota models used in Norway.

At the start of each year the regulations, in principle, are set for the whole calendar year. The main objectives,

Regulations in the Norwegian fishery for North Atlantic cod in 1999



allocated to each, either by Individual Vessel Quotas IQVs) or by *Maximum Quotas*. With IVQs, the *Group Quota* is shared amongst the participating vessels with a fixed and "guaranteed" portion. Using the system of *Maximum Quota* an upper limit is set to the annual catch. As the sum of the allocated *Maximum Quotas* is higher than the *Group Quota*, the participating vessels of the group have no "guarantee" that they will be allowed to

including those intended to achieve structural changes, are sought through a consultation process that leads to the annual regulations, which basically cover all important Norwegian fisheries. Adjustments such as increased vessel-quotas due to lower participation than expected, changes in the periodic *Group Quotas*, cessation of direct fishing, changes in bycatch regulations, *etc.* are implemented by the authorities without formal industry

consultations. This occurs throughout the year as assumptions upon which the starting regulation were based upon change.

As most Norwegian fish stocks are migratory and shared with other countries, the application of the single-species regulations must consider this. The large variation in the availability of the different fish species throughout the year and along the coast also bears upon the details of the regulations. Norwegian fisheries regulations also consider the processing sector's need for a stable supply to achieve highest possible quality, market prices and provision of regular jobs. As value-adding and maximum market-output is one overall economic objective of management, each of the fisheries regulations are also aimed at this objective.

7. STRUCTURE REGULATIONS

A quota-transfer system with the main purpose of reducing the number of vessels was first introduced in Norway in 1984 in the cod trawler fleet. The scheme was expanded in 1990 to include other groups and again in 1996/1997. It will exist on a permanent basis from early 2000. The scheme, the "Unit Quota System" (UQS), enables vessel owners to buy another vessel, remove the original vessel from the Norwegian fisheries, and fish both quotas with the remaining vessel for 13 years. The UQS has so far only been implemented for the offshore fishing fleet. The capacity, measured in number of vessels, withdrawn from each of the three groups due to the introduction of the UQS is about 10 %.

In addition the Norwegian Government has spent approximately 1.4 billion NOK since 1979 on different de-commissioning schemes. The schemes reduced the number of cod trawlers from 122 in 1990 to 103 in 1997 when the UQS took over, and the purse-seine fleet from 215 in 1980 to 98 in 1998. Since 1998 a new de-commissioning scheme was primarily directed at coastal vessels between 15 and 34m in vessel groups with closed-access. The present scheme has two components:

i. *De-commissioning*. The concession(s) or access-permit(s) is withdrawn and the vessel is removed from the fishery and destroyed.
ii. *Combined de-commissioning*. The vessel is permanently taken out of fishing and the concession(s) or access-permit(s) withdrawn. New concession(s) or access-permit(s) may be granted for a replacement vessel (new construction or used vessel). The aim of the combined scheme is to modernize the fishing fleet without increasing the number of vessels.

8. THE TRANSITION FROM OPEN-ACCESS, NO-QUOTAS AND LOW-CAPACITY TO CLOSED- ACCESS, QUOTAS AND OVER-CAPACITY

The evolution of Norwegian fisheries from open-access when all who fulfilled the requirements of being a fisherman, would get a licence to fish with his boat, to limited-access and different vessel-quota systems has naturally developed a notion of rights within the fishing community. Although in principle the Norwegian fisheries have open-access, closed-access on a stock basis exists such that it is impossible to be a professional fisherman exploiting only unregulated stocks, as more than 90% of the catch value comes from access-regulated stocks.

The exclusivity to participation and grant of the annual portion of the TAC – which is then repeated annually in perpetuity - has given the industry and the individual fishermen the notion of a right. And, the development of this right-based system has also led to a system of transferability.

In June 1992 the Government in Norway presented a White Paper to Parliament proposing the introduction of ITQs. This was rejected by Parliament, and in its pure form, ITQs are not at present an issue Norwegian fisheries policy.

Earlier the Norwegian fisheries were characterised by low status, low income and subsidies. In this situations the public showed no or little interest in the management of the fish-resources, and the management of the resources was left to the participants in the sector. At present in the Norwegian fisheries there is a focus on the marine resources as the future of our nation. There has been a rapid growth in export-income, and subsidies remain. As a consequence, the public shows much interest with the common view:

> *"This resource is too important to the Norwegian society that the management of it can be left for the fishermen alone – and for the fisheries administration alone for that sake."*

This development has been parallel with the process of closing access to fishing and introducing quotas in the Norwegian fisheries.

It is generally accepted in Norwegian society that: (a) it is necessary to have TACs; (b) it is necessary to have closed-access; (c) it is necessary to have Individual Vessel Quotas; and (d) there is a high degree of legitimacy that this exclusive right to fish be distributed to a limited number of fishermen – based on precedence, *i.e.* to the one who had taken up fishing before its access was closed. While there is a high degree of legitimacy that this exclusive-rights privilege is given to those who actually fish, a right to benefit from our nation's common heritage, it is not generally accepted within Norwegian society that anyone be given the right to trade it, and thus make profit and benefit from the fisheries resource – without actually being a fisherman. Thus, while there is in Norwegian society a high degree of acceptance of the closed-access and quotas, there is little support for the use of ITQs.

But when you have an exclusive licence to fish, and a fixed annual proportion of the TAC – which will be granted the next year also, and you can sell your boat, with the fisherman who buys the boat will get a licence to fish with the boat, (if he fulfils the requirements of being a fisherman entitled to own a boat), and he will get the same quota-portion of the TAC you had, and this is basically the Norwegian system, but then of course, ask the question "Does Norway have an ITQ-system?" You do have to buy the boat. It may be termed more a system of Individually Transferable Access instead of ITQs.

Thus, the Norwegian fisheries struggle with a system with a number of imperfections, unable to meet the major challenge of excess fishing-capacity; the fishery that rapidly over-exploits the fish stocks, and is over-capitalised to such an extent that it is not even able to supply a stable income and thus safe employment in the fishing community. And this of course has major implications for absence of any resource-rent. To answer the question why the fisheries sector in Norway is organised in such a non-economical way must look at the politically-derived main objective for the Norwegian fisheries sector:

> *"To establish a sound basis for an economically viable development of the fisheries industry. A sustainable management of the living marine resources is pre-conditional. Through marked orientation and increased value adding, the fisheries sector shall contribute for good employment and living opportunities in the coastal communities."*

Over-capacity leads to over-fishing – whatever the quota system. IQs, IVQs or ITQs do not eliminate high-grading, discard of bycatches, black-marketing and so on, as long as the vessels are able to fish more than they are allowed to. The most viable solution that also satisfies the major management objective is to reduce the number of fishing vessels, but to keep most of the resource rent within the sector at such a magnitude that each vessel can run 300 days a year using a double crew.

Maintaining a fishing fleet far to large for the available resources, and investing in fishing that far exceeds that needed to catch the annual quotas is contradictory to the objectives the Norwegian Government has set for the sector's development, as it reduces the national benefits to be drawn from the fishery resources. Thus, the only argument seen relevant for introducing ITQs in some form is their potential for reducing the fleet size. But, as Norway has experienced in the North Atlantic waters, the use of ITQs has actually increased the total fishing capacity employed in waters adjacent to national EEZs, which in its turn has led to unregulated, increased fishing on already fully utilised straddling stocks.

Use of ITQs therefore, has to include de-commissioning-obligations to address the global fisheries problem of over-capacity. This is a problem that has not been solved through the introduction of the existing ITQ-schemes, as these, to a large extent, have focused on increasing the profitability to limited groups of fishermen.

In conclusion, if the issues of global over-capitalisation and over-capacity are not met in an constructive manner through international co-operation, but more importantly through national actions, one may be able to live happy at home, but the bottom line for global fisheries will always be in the red.

THE DEVELOPMENT TOWARDS CO-MANAGEMENT IN THE DUTCH DEMERSAL NORTH SEA FISHERIES

W. P. Davidse
Agricultural Economics Research Institute, LEI - Burgemeester Patijnlaan 19
2502 LS The Hague, Netherlands
<w.p.davidse@lei.dlo.nl>

1. INTRODUCTION

The author of this contribution is not a policy-maker but a researcher employed at the Netherlands Agricultural Economics Research Institute, LEI. As such he has been an independent observer of the Dutch fisheries management process during the past thirty years. There is a Dutch expression saying "The best steersmen stand ashore". This makes their wisdom more relative but on the other hand their position enables a good overview of what is happening. From this observer's position the paper briefly describes the development towards a rights-based fishery in the Netherlands, with special attention to institutional changes. To identify these changes the broad definition of Anthony Scott about institutions is used: "...socially recognised and supported procedures and rules. They are unchanging relative to the fluctuating economic activities that they guide and constraint".

The next sections cover the developments since 1975 to illustrate that the current Dutch rights-based demersal North Sea fishery[1] is the result of a 20-year implementation process. The paper contains subsequent measures of the Ministry of Agriculture, Nature Management and Fisheries (MANF)[2] and reactions from the vessel owners to the regulations. A number of these measures have been also reactions of MANF to the behaviour of the vessel owners. Table 1 lists relevant information concerning this fleet.

Table 1
Dutch demersal North Sea Fishery, characteristics (1998)

Number of vessels	407
Engine power (KW)	319 000
Number of crew	1 860
Gross earnings (mln EUR)*	275
Main quota: (tonnes, 1999)	
Sole	14 555
Plaice	35 281

* 1EUR = US$ 1.05
Source: LEI

2. THE NORTH EAST ATLANTIC FISHERIES COMMISSION (NEAFC) FRAMEWORK, 1975-1983

2.1 Institutional characteristics

The development towards a rights-based fishery started in 1975 with the decision on Total Allowable Catches (TACs) by the North East Atlantic Fisheries Commission (NEAFC). The main institutional characteristics of the Dutch demersal North Sea fisheries at that time were:

i. Responsibility for fisheries management by MANF, Fisheries Directorate. The policy of this Directorate had been favourable for the industry because a programme for modernisation of fisheries had been implemented in the past. This policy also had somewhat liberal features in that the responsibility of individual fishermen was emphasised.
ii. Representation of the industry and also execution of some management tasks by corporate industry organisations, structured vertically (the Fish Commodity Board) and horizontally (the Fish Board).
iii. An organisation under civil law of the fishermen, the Nederlandse Vissers Bond (Dutch Association of Fishermen), having a say in both the corporate organisations[3].
iv. An attitude of competition amongst most of the fishermen living in more-or-less closed fishing communities.

2.2 Limiting measures

The TACs decided by the North East Atlantic Fisheries Commission (NEAFC) in 1975 meant important reductions (10% and 40%) in catches for plaice and sole, two of the Netherlands' main species. The Ministry of Agriculture and Fisheries delegated the enforcement of these catch-limitations to the Fish Commodity Board, which has the competence to impose regulations. The Board implemented a regulation to limit effort and landings in the sole and plaice fishery for the year 1975. However, the Board faced too many difficulties to enforce this regulation and returned this quota-management task back to MANF in the beginning of 1976.

To comply with the NEAFC TACs the Dutch Ministry implemented individual quota per vessel (IQs) for 1976. These IQs were in fact a fixed share of the NEAFC quota that had been allocated to the Netherlands. The

[1] In the Netherlands better known as the cutter fishery.
[2] Up to the 1990s the name of the ministry was ministry of Agriculture and Fisheries.
[3] In 1979 a substantial number of members separated from this Vissers Bond and established the 'Federatie van Visserijverenigingen'.

Dutch ministry wanted to give the individual vessel-owners more certainty and responsibility in taking up their quota. The IQs for 1976 were based upon the highest individual track record for sole and plaice in the years 1972-1974 [4].

2.3 Reactions of vessel-owners

The vessel owners heavily objected to the effort limitation in 1975 and the IQs for 1976. In particular owners who had expanded their fleet's fishing power by purchase of a new cutter with more powerful engines and those who had laid up their vessel for some time (*e.g.* because of re-engining) appealed against their allocated IQ level.

2.4 Revision of the system of individual allocations in 1977

MANF revised the allocation procedure in 1977 to take into account the important investments in the previous period. This change included a 50% dependency of the IQ on historical landings and a 50% dependency on the engine horsepower. This system still is the basis for the current sole and plaice ITQs. Representatives of MANF promoted the IQ system in subsequent years by emphasising their own responsibility and the flexibility in taking up the quota. "It is up to the fisherman whether he takes up his quota with a Mercedes or with a *Deux Chevaux*"[5] has been said repeatedly by them.

There was no very heavy enforcement of quotas in 1977 and subsequent years. To understand this one has to keep in mind that the NEAFC countries interpreted the TACs differently at that time. Some countries considered them as an advisory rather than obligatory catch level. In this situation the Dutch ministry could not enforce the quota very heavily. Moreover, such major production-limitations were quite new at that time and they conflicted with the previous MANF policy This included support for production increases, especially for agricultural products.

2.5 Reactions of fishermen for the period 1977-1983

Compliance with the limits of the IQ system was low in this period. Fishermen felt that if they had to stop fishing or obtaining the quotas then to fully comply there would be with a landing reductions of 30-40%. They revealed a very strong intention to remain in the fishery, in many cases because of desires for future succession to the fishery by their children. Enforcement was carried out by taking samples of landings, which regularly resulted in fines. However, the level of enforcement was too low to cause substantial financial damage to the industry so that over-fishing practices were continued.

From a management point of view the situation even worsened in the late seventies and early eighties because of fleet expansion. A general investment subsidy was implemented in 1978, which was in force for all Dutch economic sectors. This undermined the limiting-effort policy for the fishery sector of MANF. Vessel owners were heavily inclined in 1979 and onwards to make use of this subsidy that was received as a fiscal allowance of 12% or more from the cost of new constructions and a substantial number of new cutters were put into operation in the period 1979-1983. This development that was intensified by the severe competition among the vessel-owners. Consequently the engine capacity of the Dutch demersal North Sea fleet increased from 240 000kW in 1978 to 367 000kW by the end of 1983.

The IQ system came under further pressure in the early 1980s because of transfers of vessels that were in fact transfers of IQs. A cutter could be bought with the right attached to it and sold without this IQ, in order to aggregate the IQ on an existing cutter.

3. THE COMMON FISHERIES POLICY, FROM 1983 ONWARDS

3.1 Introduction of ITQs and licences

The Common Fisheries Policy (CFP), established in 1983, meant an important institutional change for the Dutch fisheries sector. Annual TACs and the Multi-annual Guidance Programs (MAGPs), which last four years, are the two main pillars of the CFP. Each country is allowed to implement these catch and capacity limitations in its own way.

The Dutch IQ system for sole and plaice was maintained in 1983 and extended to an ITQ regime in 1985. In this way MANF legalised the practices that had arisen of transferring rights via vessel-sales, as has been mentioned before. Codfish entitlements had been introduced in 1981 and they remained not-transferable. This policy was intended to protect the segment of the demersal North Sea fishery targeting cod and whiting.

To comply with the first MAGP target, MANF introduced an engine-power licence scheme for the seafaring fleet at the end of 1984. These licences are transferable and divisible. An expansion of the fleet as occurred in the period up to 1983 was impossible from that year on. Vessel-owners who wanted to add a new vessel to the fleet or intended to expand their engine-capacity had to acquire sufficient horsepower-rights by purchasing them from others. New vessel-constructions in the pipeline at the time of implementing the licence scheme caused a problem. MANF allocated horsepower-rights to new investments if the vessel owner could prove that the new vessel had been ordered before 31 December 1984.

3.2 Reactions of vessel owners

By the end of 1984 vessel-owners became aware of the upcoming licence system and a substantial number of them ordered a new cutter before 31 December in order to get additional horsepower-rights. Many of these orders were just contracts with the yard and there was no intention to start the new vessel construction immediately. The absence of these actual vessel constructions led to 'floating licences', licences not attached to a vessel, in 1985 in subsequent years. The capacity-targets of MANF had

[4] This contribution regards the Dutch demersal North Sea fishery (cutter fishery).

[5] A well known very cheap French car at that time.

been undermined heavily by this expansion of horse-power-rights. LEI estimated that a total of 60 000 horse-power existed in the form of such 'floating licences' in 1988.

3.3 Measures to strengthen enforcement

To reduce the number of 'floating licences' MANF limited the validity of these rights to a period of two years. In the second half of the eighties MANF developed a more stringent policy to prevent over-fishing of ITQs. This included:

i. A national quota reserve, created in 1987, whereby 5% of the national quota was not allocated to cover individual over-fishing of ITQs and to allow others to fully utilise their rights.
ii. Promotion of uniform prosecution of fishery offences, also in 1987, by creation of regular consultations among the responsible Attorneys General.
iii. Limiting a maximum engine-power of new to-be-built cutters of 2000 HP in 1987. Previously, vessels up to 4500 HP had been built. The maximum beam length of the gear was set at 12m.
iv. A system of obligatory days-in-port for the vessels in force from 1987-1992.
v. Strict monitoring of landings with 120 inspectors on 600 vessels, aiming at systematically controlling each landing of fish. This was implemented in 1988 and strict rules were set regarding places, times and other conditions for unloading fish.
vi. Introduction of a de-commissioning scheme, co-financed by the EU and the industry. Firms which would remain in the fishery would benefit from exits of colleagues and had to contribute together to approximately 10% of total cost of de-commissioning.
vii. Heavier sanctions for those who over-fished their ITQs, consisting of taking away the gain from this illegal action through an appropriate fine and reducing next year's ITQ by the quantity of over-fishing in the current ITQ-year.

Through these measures MANF intended to comply with the Dutch quota, allocated by the EU (the Council of Ministers) and with the MAGP capacity-requirements. The expectation was that strict control and punishments would force out of the industry those vessel owners who had a lack of rights, and de-commissioning could thereby act as an extra stimulus.

3.4 Reactions of vessel owners

The intensive monitoring of landings from 1988 and onwards led to heavy conflicts between MANF and the industry. A substantial number of fishermen circumvented the rules by unloading at illegal places and times, hiding fish in special holds on board, putting extra fish in boxes, *etc.* Several violent encounters between fishermen, controllers and riot police occurred in that period.

Initially the fines in cases of over-fishing were not high enough to prevent poaching. Fishermen calculated that the extra proceeds of over-fishing exceeded the amounts of fines. A saying went around like 'the last haul for the judge'. However, the amount of fines increased by the end of the eighties and more vessel- owners started to buy high-priced ITQs. A dramatic increase in prices of sole/plaice rights, from NLG 10-15/kg of permanent sole/plaice quota in 1986 to NLG 100-120 by 1988[6] demonstrated the effects of the strengthening of enforcement.

Re-flagging of vessels to other countries was another reaction of vessel-owners towards the enforcement measures in the early 'nineties. In this way they could transfer the ITQ from the re-flagged vessel to another one, still operating in the Dutch fishery and also the licence became available for aggregation or sale on the market. The re-flagged vessel was expected to have good fishing opportunities abroad, favoured by buying of cheap foreign-rights for these beam trawlers.

Although the enforcement became more effective around 1990, poaching and cheating still continued. A debate about these practices was held in that year in the Dutch Parliament whereby it was concluded that the Minister of Agriculture, Nature management and Fisheries (MANF) had failed to meet his policy targets. A motion of no confidence against this Minister was adopted in 1990 and he had to resign.

3.5 Development towards co-management

In the first half of the 1990s more and more fishermen disliked their illegal activities, e.g. to landings by night or at more or less hidden places. Several of them and of their representatives were jailed for questioning or as a punishment for offences. But a feeling arose that 'we should return to normal business practices'.

On the other hand MANF faced an increasing burden of regulations in the early 1990s and the policy- makers felt a need to delegate responsibilities to the industry. This fitted with the principle of owners owning the responsibility that had driven the Dutch fisheries management more or less from the beginning.

Both these circumstances led to a process of consultations between MANF and the fishery sector aimed at designing a system to implement a form of co-responsibility with the industry for compliance with the national quota. This process resulted in the establishment of seven co-management groups in 1993. A former Prime Minister, Mr Biesheuvel, played an important role in this development by chairing the meetings between the ministry and the industry and subsequently these co-management groups became known as 'the Biesheuvel-groups'.

In this system, the Group Board is responsible for compliance with the total quota of their members, *i.e.* the totals of their ITQs. Ownership of the rights remains with the individual members. Compulsory sale of fish via the auction is an important measure to record the landings reliably. An independent chairman of the Group Board has to be appointed (someone from outside the fishery sector) to prevent difficult judgements of vessel owners

[6] 1 NLG=US$ 0.49

about their colleagues. The Fish Board, as a corporate industry organisation, acts as a co-ordinator between the Groups to harmonise their regulations if necessary.

After the establishment of the co-management groups almost all the vessel owners in the Dutch demersal North Sea fishery became member of one of those groups. Allocation of extra days-at-sea to members and more flexibility in renting out and leasing of ITQs have been effective incentives to promote this membership. A threat from MANF to compulsorily reduce the individual capacity in terms of engine-power of the vessels in case the group-system failed has been another incentive for promoting group membership.

The activities of the co-management groups were favoured by the absence of major quota problems in the period 1993-1995. In particular the national sole quota allowed the ITQ holders to operate their vessels profitably in most cases. The groups came under threat in 1996 due to a 32% decrease of the national plaice quota. However they managed the uptake of the reduced ITQs effectively in that year, resulting in a sharp rise (17%) in the auction-price of plaice.

The Dutch experience demonstrates that co-management can secure the ITQ right successfully by sound management of group-quota. This includes monitoring of landings and measures (warnings not to land abroad *etc.*) when a group member has almost taken up his ITQ. And, such group management guarantees that the individual holder can fully take up his own ITQ. The threat that other colleagues will take a part of his ITQ by over-fishing their own one has been removed[7].

3.6 Further steps towards a rights-based fishery

Up to 1994 ITQs were in force only for sole and plaice. This changed in that year because the non-transferable codfish entitlements were transformed into ITQs. They acquired the same rights as in the sole and plaice fishery and the same applied for the herring and mackerel fisheries in 1996. MANF has followed the opinion of the industry in both cases.

Nowadays, the demersal North Sea fisheries are fully rights-based, with ITQs for all quota species. Moreover, input-rights exist as licences, specifying the capacity of the vessel, and also entitlements for the coastal zone. These rights are also transferable.

4. LESSONS FROM THE DUTCH CASE

The following points illustrate some lessons that have been drawn from the developments in the past twenty years. These lessons focus on institutional arrangements in the Dutch fishery:

i. The basic philosophy of the government, *i.e.* the relevant ministry, is important for the development of a rights-based fishery. In the Dutch case this includes a principle of owner-responsibility for the industry and the development towards a partnership between the government and the industry. The Deputy Director of the Fisheries Directorate of MANF expressed this as "Together we have to solve the problems", when speaking about effort-reductions during the annual meeting of the Nederlandse Vissers Bond in 1999.

ii. ITQs alone are not effective and should be accompanied by adequate enforcement and also by input measures.

iii. Pooling of ITQs into management groups importantly promotes compliance with the TACs, due to better guarantees for not exceeding full uptake of each ITQ (over fishing by colleagues is less likely) and also because of a certain say in the rules by the fishermen themselves.

iv. Under these conditions catch-limitations can change into rights. Measures that used to be circumvented evolve towards rights that are subject to investments and form a separate production factor for individual firms.

v. Institutional arrangements for a rights-based fishery result from an implementation process and cannot be established at once.

vi. Institutions and regulations outside the fisheries management area may hinder an effective policy for the fishery sector. This may refer to general investment subsidies and enforcement systems applicable to other industries.

vii. The same principles should apply for different management levels. The Dutch fisheries management is executed in the framework of the Common Fisheries Policy. Therefore it is for example bound to generic reductions of fleet capacity under the current MAGP. This more or less command-and-control approach now conflicts with the national co-management situation since the fishing effort should be reduced to such an extent that ITQs may not be taken up fully. This would heavily undermine the Dutch system of co-management of quota.

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COMMUNITY-BASED APPROACHES TO THE "FISHERMEN'S PROBLEM"

B.J. McCay
Rutgers the State University
New Brunswick, New Jersey 08901, USA
<Mccay@aesop.rutgers.edu>

1. INTRODUCTION[1]

Marine fisheries provide the most persuasive cases for the conventional theory of the "tragedy of the commons". This is a class of social dilemmas in which each self-interested rational actor has an incentive to behave in ways that are sub-optimal, or even tragic for the resource, the larger group of users, and, ultimately the actor himself. Sometimes called "the fisher's problem" (McEvoy 1986), it can be exemplified by an imaginary fishery, where everyone is fishing the same stock of fish (the "subtractibility" feature of a common pool resource: what you do affects what I can do) and it is difficult if not impossible to exclude others from it. Even though there is evidence that the resource is declining, for example the average fish being much smaller than before, the individual fisherperson's rational strategy is to continue, or even fish harder, because there is no way to stop others from doing the same. Another way to think about the dilemma is in terms of the "free rider" problem. Because the fish are like a public good, in terms of difficulty of excluding others, the optimal strategy is to let others do the conserving, be the good stewards, because they cannot prevent one from reaping the benefit. That would be a "first order" collective action problem (Olson 1995). A second order problem concerns difficulties creating the institutions required to manage the problems of the commons: again, being a "free rider" is the rational strategy of each participant, and it is thus difficult to get people and organizations to work together to come up with rules and systems for monitoring and enforcement, even when it is clear that they share interests in, for example, a more sustainable system of resource use. Hence recourse to governance by outside governments.

These abstract ideas have some application to real life fisheries. Marine fisheries share practical, legal, and cultural obstacles to exclusion, particularly where they are often perceived as highly cherished frontier economies, underscored by concepts such as the public rights to fishing and navigation in tide waters (McCay 1998). The resource users, or appropriators (Schlager and Ostrom 1992), tend to be in competitive relationships with each other (Crutchfield and Pontecorvo 1969); although often fiercely independent, they are also interdependent because they are appropriating from the same common pool resource or related resources within an ecosystem. They usually experience high levels of both risk and uncertainty (Hilborn 1997), the effects of which permeate through the entire system including family relationships, the structure of crews, attitudes toward safety precautions, strategies of investment and of finding the fish, and the regulatory process (Acheson 1981, Smith 1988). Risk and uncertainty also make collective action more difficult to accomplish in the abstract theory: for example, uncertainty about whether a particular set of rules will make the desired difference surely is a reason not to bother.

What then can be said about prospects for sustainable development of marine fisheries? Can resource users participate in effective management of fisheries commons or must it be forced upon them? In theory – and here I will not discuss exactly which theory – the numbers of actors or scale of the system, homogeneity/ heterogeneity of positions, wealth and interest among the actors, degrees of trust and forms of reciprocity, beliefs, values and other cultural attributes, the workings of markets, and the embeddedness of commons dilemmas within larger systems should affect answers to these questions. They may help answer the question of whether the imperatives of open-access, competition, and uncertainty overwhelm attempts by appropriators, and even their representatives in government, to come to terms with each other and the rather unruly, elusive, and unknowable resources on which they depend.

Community is the keyword to my approach. The classic model of the tragedy of the commons, whether proposed by William Lloyd in 1834, by Garrett Hardin in 1968, or by H. Scott Gordon in 1954, has no "community". The cartoon shown (couple of people outside a theater; billboard announces that "The Tragedy of the Commons" is playing. One person says to the other: "I hear it lacks dialogue") is about this fact and about the importance of "dialogue," of interaction and communication.

Communities are usefully thought of as social entities whose members share some identity and opportunities for social interaction. A spider diagram for community would include a shared past, or history, and shared goals or expectations for a future, which would bear upon such qualities as predictability of each others' behaviour, trust, and reciprocity, qualities well known to affect the outcomes of "commons" situations, Some communities are transient and contingent on the actions

[1] Parts of this paper are based on a chapter in *The Commons Revisited: An Americas Perspective*, edited by Joanna Burger, Richard Norgaard, Elinor Ostrom, David Policansky, and Bernard Goldstein (Washington, D.C.: Island Press, in press).

and resources of particular people; others are "corporate", enduring beyond the lives and persons of particular members or families. Communities have various and variable assignments of collective and individual political and property rights and responsibilities. They are nested within other social and political structures and they may vary with respect to the autonomy they have within those structures. They may be thought of as contexts for decision-making and action by households, firms, individuals, and other social units; they may also be the forum for collective decision-making and action.

What kinds of communities are there? The simplest division is between "communities of place" and "communities of interest". The places where people live and from which they work are usually how we identify communities. But the communities within which we actually live and interact are also constituted by people with shared interests and occupation regardless of place. In fisheries, communities are often constituted in terms of shared participation in a fishery, *i.e.* a particular area or fishing grounds; a particular technology (gill-netters versus purse seiners); a species focus (crayfishers versus prawn fishers).

As fisheries management develops these may become the basis of communities defined in terms of regulatory regimes. All of the licence-holders in a particular sector of a managed fishery have shared interests and concerns and may have opportunities to interact both on and off the fishing grounds, particularly *vis-à-vis* management authorities and law enforcers. That is one form of what we might think of as a "fisheries management community". When and where the resource users gain more of a say in, and responsibility for, fisheries management (the "user pays, user says" paradigm), this may be a "co-management community". Both the managers and the resource users (and other stakeholders) interact fairly regularly, come to know and trust, if not like, each other, and work together for more or less shared goals. Yet another form of management community may exist, something like the "epistemic" community identified as playing a major role in international environmental governance: organized around challenges of knowledge and science, and the application of science to policy, communities develop that involve scientists, industry members, government officials, NGOs, media personnel, and more, negotiating toward, if not entirely creating, shared visions of a future and goals for action. This discussion presupposes, of course, government agencies as key actors. Spinning off to the side may be other management communities: of coordination and accommodation within and among various groups, including communities formed to cope with conflict among various interests (commercial fishing and recreational fishing; environmentalists; indigenous groups). And, of course, management communities created in the course of devolved, self-regulatory regimes.

A gross generalization is that the trend is toward management and co-management communities; this trend is encouraged by private rights-based management schemes. However, in many countries and fishery-dependent regions, this carries the risk of further marginalizing already vulnerable place-based and occupational communities. Hence, a counter-movement can be discerned, to protect and build upon place-based, local-level communities. That is what most people mean by the term "community-based fisheries management," even though, as I have suggested, community can have many other referents and as such be effective in dealing with collective action problems.

I address these topics by briefly examining some international and national fisheries institutions in terms of the challenges faced in developing effective collective action for fisheries sustainability and restoration. I focus on the United States and Canada and discuss new directions in marine fisheries management, including IQs/ ITQs, the market-based alternative to top-down, command-and-control management, and various other institutional arrangements that can be seen as "community-based" alternatives. What we are really looking at, in resource management, are improved systems of governance, not government, and the governance powers of states, based on hierarchical structures of authority, are supplemented by or compete with market forces that govern behaviour. A third source of governance comes from the arrangements of civil society, or, loosely speaking, "community". This may be thought of as participatory governance (Van Vliet and Dubbink 1999). Consequently, in this paper particular emphasis is given to community-based management, including self-regulation by fishermen, cooperative

Types of "community"
Communities of place
Communities of interest; ethnicity; occupation; religion
Communities of shared activity (fishing area, gear type, species)
Management communities
Within the same regulatory regime
Co-management communities
Epistemic communities
Non-governmental communities

arrangements between resource users and government agencies, and other manifestations of "community" in fisheries management.

2. INTERNATIONAL FISHERIES COMMONS INSTITUTIONS

Truly "open access" fisheries remain in the high-seas, beyond national boundaries of extended jurisdiction (since the late 1970s, these are in most cases 200 nautical miles from coastal baselines). These include fisheries for highly migratory species such as the tunas and swordfish, and also for squids and many other species. The high-seas fisheries provide the worst cases of "tragedies of the commons". In the realm of international environmental management, there is no central authority. The system is technically one of anarchy and thus monitoring and enforcement are problematic depending as they do on the voluntary participation of member governments, which have no jurisdiction over the activities of vessels belonging to other governments, especially those of non-signatory countries (Peterson 1993).

Nonetheless, management regimes for many of the high-seas fisheries have developed within the aegis of the United Nations; they are based on regional and international treaties and the work of dedicated individuals, scientific institutions, and governments. A small but illustrative set of examples includes: the International Convention on the Conservation of Atlantic Tunas (ICCAT), the Northwest Atlantic Fisheries Organization (NAFO), the International Pacific Halibut Commission, the International Fur Seal Treaty, and the International Whaling Commission. Another significant organization is ICES (International Commission for Exploration of the Seas), which was founded in the late 19th century and brings together scientists from governments with interest in the North Atlantic and provides scientific advice for some of the European fisheries.

Ostrom (1990, in press) and McKean (1992) have come up with design principles for overcoming free-rider and other obstacles to effective management of common resources by the users themselves. Included are, for example, having well-defined boundaries and criteria for membership; the capacity to monitor and enforce; ways to handle heterogeneity of interest, value and wealth; time to experiment; and considerable autonomy from other structures of governance. Although these principles came from studies of small-scale communities, they may be relevant to international fisheries regimes as well. Noonan (1998) uses this framework to compare reasons for the relative success of the South Pacific Fisheries Agency (FFA) and the relative failure of the European Union (EU) in managing their fisheries commons. For example, the FFA has done better than the EU in providing arenas for conflict resolution and in providing incentives for monitoring and enforcement by the member nations (Noonan 1998) (see also Cartwright and Davidse, this volume). Another comparative analysis of international fisheries regimes using Ostrom's design principles (Hall 1998) showed that in five out of six cases the fishing nations involved have cooperated to create and maintain robust institutions for certain issues, namely access rights and resource allocation. But this does not necessarily mean conservation effectiveness.

A major challenge concerns "straddling stocks," fish stocks such as walleye pollock in the North Pacific and cod and other groundfish off Newfoundland which are found in both national and high-seas domains where national sovereignty applies to part of the stock and open access to the other (Burke 1997, Munro 1996). The United Nations has helped reduce the third-order collective action problem by providing information and infrastructure for deliberation on this as on other problems, but is hamstrung by the traditions of national sovereignty and flag-state enforcement.

At the international level, national governments are thought of as the key actors. However, in this domain as in others one can see increased involvement of fishermen, representatives of fishing communities, representatives of environmentalist and business NGOs. For example, in ICCAT, longliner fishermen from the US may participate on the team of US representatives to the negotiations. NGOs have difficulty getting "seats at the table" but they are increasingly given "standing room" in international negotiations. And some fishery-dependent communities are engaged in transnational activities which ignore or complement the actions of their national governments, because of the uncertainties and costs of relying on their governments and international politics to protect their interests. A notable example is the National Fishworkers' Forum in India, which used its international connections to help it force the government to cancel licences issued to joint ventures that were fishing indiscriminately in Indian waters (Kurien 1998).

3. NATIONAL FISHERIES INSTITUTIONS

With extended national jurisdiction over fisheries in the late 1970s – a key part of the United Nations' Law of the Sea negotiations that led to the 1982 Convention on the Law of the Sea (Sanger 1987) – the governments of coastal nations gained newfound powers and responsibilities for fisheries management.[2] How have

[2] The South American nations of Chile, Ecuador, and Peru had much earlier claimed "patrimonial" rights to 200 miles of ocean and hence the tunas and other fishes found off their shores. Canada too had a major stake in expanding its jurisdiction, particularly on its Atlantic coast, which had become the focus of a major international fishery for cod and other groundfish during the 1960s and 1970s, seriously depleting fish stocks of the region. The U.S. had a more ambivalent position because some of its fishing fleets depended on ready access to fish stocks off the shores of other countries (especially the South American ones mentioned above), while others were experiencing distress from foreign fishing off their shores (especially those of the Eastern seaboard) or saw opportunities in the rich foreign fisheries that had developed off their coasts

national governments managed their newly-enlarged commons? Appraisals for the US and Canada are not positive despite the wealth and scientific expertise of both nations. This discussion focuses mostly on Canada and the United States. I do not, however, see any reason for optimism for developing countries, where resources for fisheries science, monitoring, and enforcement are even more limited and where oceanographic phenomena such as "El Niño" play such a direct and often devastating role (Lagos and Buizer 1992).

Canada

In anticipation of, and closely following extended jurisdiction, Canada quickly developed a combination of science-based management and limited entry into most of its marine fisheries. By 1990 there was virtually no "open access" fishery of consequence left in Canada, but its fisheries were in trouble. Reasons are numerous and contentious but include errors in the practice of stock assessment (Finlayson 1994), misuses of science in the policy process (Hutchings *et al.* 1997) and unknown ecological factors (Hutchings 1996). The great cod fisheries of Newfoundland collapsed leading to a closure of those and other fisheries in 1992, which remains for most of the coast into 1999. Some of the salmon stocks of British Columbia are now in serious trouble as well.

In Canada, decisions about marine fisheries reside in a cabinet-level appointment, the Minister of Fisheries, who utilizes a complex system of technical and political advice from the regions but retains singular decision-making authority (Apostle *et al.* 1998). This appears to enable rapid decision-making about controversial measures such as shutting down entire fisheries or imposing individual transferable quotas (an attempt to use quasi-private property in managing the fisheries. Fisher-involvement has been limited to a complex "consultative management" scheme in which the Department of Fisheries and Oceans (DFO) retains control over the nature and extent of input that industry can provide (Apostle and Mikalsen 1995). But, policy appears to be moving in several directions. Recognizing that Canada's fisheries continue to be plagued by biological and economic instability (Parsons and Beckett 1997).

One trend is to remove allocational decisions from the agency by giving them to markets, as in individual transferable quotas (ITQs) or placing them in advisory bodies (a proposal not yet implemented). Another is to find ways to reduce capacity, including the numbers of people and vessels in the fishery, and increase the professionalism of fishers. A third is to delegate more responsibility and authority to user-groups. As Les Burke explained, "co-management" is a reality in many Canadian fisheries, especially the IQ or ITQ fisheries. Attempts to formalize co-management in a new Fisheries Act (the existing act is almost a century old) are in terms of "partnerships" between interested groups and the fisheries agency. In the meantime DFO has implemented such agreements in a system that could be called "contractual co-management" (Rieser 1997) and has more widely adopted a system whereby groups of fishers must present conservation harvesting plans for approval before allowed to fish.

The United States

There is much more political resistance to limited entry in the United States, but by the late 1990s most of the important commercial fisheries required licences based on prior involvement in the fishery or other criteria. This is partly in response to evidence that other management measures had not protected most fish stocks and an agency analysis that "open access" was a major cause of the problems (Sissenwine and Rosenberg 1993). It is also the result of protectionist moves of particular industries in response to competition from newcomers and outsiders as well as use of government to help cope with collective action problems.

In the United States, fisheries management within 3 nautical miles is delegated to the States; beyond that it is federal government responsibility but has been delegated by Congress to Regional Management Councils. The councils prepare fishery management plans that must be approved and implemented by the federal government (through the federal Department of Commerce, National Marine Fisheries Service). The delegated powers are limited by national standards and other laws established by the US Congress. The councils are designed to allow for considerable user-group and public participation in the process; voting members are not only representatives of state and federal fisheries agencies but also people who represent fishing interests, commercial or recreational, as well as academics and environmentalists. They are under repeated attack for being captured by special fishing interests but are diverse in structure, function, and problems.

New directions in US policy includes stronger representation of environmentalists and such ideas as biodiversity, the precautionary principle, and reliance on marine reserves. Note, I use the term "representation" rather than implementation, which remains a major technical and political challenge. We also have a more cautious approach to individual transferable quotas in management (as of 1995 a moratorium on them – and on even considering them – was imposed by the US Congress), and far less interest in devolving and delegating management roles to resource users and communities than in Canada. The regional councils are seen as devolution and delegation enough. Nonetheless, reviews of problems and solutions appear to recognize the values of improved user participation and attempts to better match the scale and scope of management regimes and natural systems (NRC 1994; 1996, 1999a, 1999b). In addition, the legislature and lobstermen of the State of Maine in the US have committed themselves to a system of devolved management of lobster (Acheson and Steneck 1997), and there is considerable co-management

(*e.g.* the Bering Sea fisheries for pollock off Alaska).

between many of the separate states and local fishing groups for fisheries inside 3 nautical miles.

4. MANAGEMENT BY RESOURCE USERS

4.1 Introduction

Policy emphasis on local-level, community-based and cooperative fisheries management is divided and wavering. Nonetheless, such forms of management are significant. The following section reports on "self-regulating" management regimes in relation to ideas about the nature of the resource and the size and heterogeneity of the resource users as well as other variables that affect the success and failure of collective action for sustainable resource use (Ostrom 1990 in press, McKean 1992, Miles 1989, Felt *et al.* 1997).

According to recent reviews of literature (Schlager 1994, Acheson and Wilson 1996), small-scale fishers are most likely to regulate access to valued fishing sites, open and closed areas and seasons, the technology used, and special areas thought to be essential for fish reproduction. Much rarer is user-group restriction of how much fish or shellfish they catch, *i.e.* what most contemporary fisheries science accounts mean by "management".

4.2 The virtues of staying put and local

Self-regulation is particularly apt for sedentary species, such as shellfish, and those targeted by stationary fishing gears, such as fish traps. It is far easier to create and maintain boundaries when the resource or the technology used to capture it does not move than when it does, particularly when both are close to land and hence readily monitored.

The history of fisheries for bay clams and oysters, highly sedentary species found close to shore, includes many instances of local regulation by the users or by local governments, such as the townships of Cape Cod, New England, or counties in New Jersey. In the US, even where state governments claimed exclusive rights to manage fisheries on behalf of the "public trust," management rights and responsibilities are often delegated to the local level, such that the management systems become examples of co-management (McCay 1998; Pinkerton 1994). Similarly, the successful cases of co-management as a vehicle toward sustainable use of small-scale fisheries in Chile concern benthic invertebrates such as conchs and sea urchins (Castilla and Fernandez 1998). Crabs and lobsters are more mobile but often found within a well enough defined area so that the fishers find it worth their while to defend exclusive territories and, in some cases, impose catch limits (Acheson 1988).

Fishers are also likely to manage sites of access to mobile resources in order to reduce the costly and dangerous effects of conflict and competition and achieve social norms such as fairness and equality. On Fogo Island, Newfoundland, Canada, access to inshore sites for placing large netted twine cod traps was regulated in locally distinct ways until the inshore fishery declined in the late 1980s (McCay 1978). Along the rocky shores near the communities of Joe Batt's Arm and Tilting, on the northeast and eastern sides of the island, no one could set a trap in a "berth" until a certain day in June, and then only after a gun was fired, so that all of the crews left for the berths they wished to use. If two or more crews converged on the same berth, the local fisheries officer drew straws to determine the occupant. On the other side of the island, particularly around the port of Seldom-Come-By, the regulatory system was different: the best trap berths were allocated according to inherited rights, the rest on a first-come-first-served basis. The system of Joe Batt's Arm and Tilting was devised around 1907 as a way of handling conflicts arising from increased demand on the trap berths due to increased population and to attempts by fish merchants to expand the use of traps. The situation had also become dangerous and costly: crews sometimes staked their claims early in the season, when high seas and ice were still likely. The new system addressed this with the opening gunshot.

Other rules in Fogo Island's fishery included restrictions on how close fishing gear could be placed to each other, particularly competing gears (*i.e.* gill-nets versus cod traps) and whether or not bait-less hooked fish-lures called jiggers could be used on certain more distant fishing grounds. The jigger rule was partly protectionist: local fishers could more easily get bait for fishing on those grounds, so an anti-jigger rule kept others away. It was also conservationist: the hooks on jiggers strike the fish at any part of the body, ripping them open but not always bringing them to the surface. This rule was particularly important at places and times when very large female cod were expected; these were referred to as "mother fish," *i.e.* fish to be protected for the future.

A supportive legal structure is often important to local-level systems of common pool resource management. The Newfoundland regulations described above were developed locally but written into the law of Newfoundland - as local rules - and enforced by the government's fisheries officer (see also Martin 1979; Andersen and Stiles 1973). When Newfoundland became part of Canada in 1949, and the fisheries became subject to federal management, the local rules were no longer legitimized at higher levels, but local observance of most of the rules continued, supported by the fishery officers (Matthews and Phyne 1988).

The scope and intent of the regulations described were, of course, inadequate to the task of conserving the fishstocks, which were migratory and covered huge areas and more subject to predation by large offshore fishing fleets. Nonetheless, when the Canadian government abandoned the local rules, particularly after the 200 mile limit of 1977 allowed it to take a major role in managing the fishstocks, it also left behind social and ecological lessons about the local scale (Matthews 1993). Only today, and in a halting way, are fisheries scientists in Canada and the United States recognizing the importance

of highly localized phenomena, such as breeding and overwintering grounds, otherwise defined at large scale, and of locally-derived knowledge about such stocks (Neis 1992) for the viability of fishstocks.

4.3 New Jersey cooperatives: Managing heterogeneity and free-riding

Local-level regulation of how much fish is caught and landed is rare particularly for highly migratory species found over a large area. However, it did occur during the late 1970s and 1980s at two fish marketing cooperatives in New Jersey (McCay 1980, 1987, 1989) where the critical motivating variable for self-regulation was the price of fish. The cooperatives not only regulated members' catches but also found ways to handle heterogeneity. The cooperatives each had between 18 and 22 vessel-owners as members. Becoming a member was, and is, difficult. Making it worthwhile to try were attractions such as the cooperatives' control over a critical scarce resource: waterfront space for offloading and tying up boats. There were other benefits as well, including help in marketing catches and the possibility of annual "patronage refunds" of the profits.

The Point Pleasant cooperative was studied in some detail (McCay 1980). Entry was limited by the amount of dock space available and members' notions of who could be relied upon to be (a) "highliner" or very productive fishermen; and (b) willing to go along with the informal and formal rules of the cooperative. This in effect imposed limits on entry into the fishery in the region because of the scarcity of dock space and fish packing houses.

The fisheries were diverse and wide-ranging, but during the winter months most members specialized in fishing for a whiting species, called silver hake. Although the cooperative sold to the large fish markets of the Atlantic seaboard, such as Fulton Market in New York city, demand for whiting was limited. Market "gluts" - when so many fish were offered for sale that the price plummeted - were common and problematic: the price could vacillate by factors of 10 or more (*i.e.* from 10 cents to $1.50).

The Point Pleasant and Belford fishing cooperatives developed systems of imposing catch limits on members' boats when the market had the potential of being glutted. A sign was posted: for example, "40 boxes today". It made sense to do this even though the fresh-fish urban markets were served by fishing fleets around the globe, because the winter whiting fishery was virtually theirs alone. At this time during the cold-weather months the fish were found fairly close to the New Jersey ports, in the warmer waters of deep submarine canyon emanating from the Hudson River system. The fish were less available to New England fishermen who fished for them in the summer months instead. Accordingly, the New Jersey ports as well as some in New York, had a near monopoly on the domestic part of this fishery during the winter months (far offshore foreign fishing boats targeted whiting as well but rarely for the fresh-fish markets). This helped keep the prices reasonably high, but gluts were still a problem. It was to this problem that self-regulation was directed.

At Point Pleasant, the catch limits were implemented in ways that dealt with the problems of rewarding high performance while punishing those who violated the rules. During the early part of the fishing week, captains who came in over the limit were given credit for the catches. There was slack in the system. However, later in the week, closer to the critical marketing period of Thursday and Friday, payment for anything they brought in over the limit was redistributed equally among the rest of the members. In these ways the cooperative recognized the heterogeneity of its members while keeping internal free-riding at a manageable level.

Free-riding, the *bête-noire* of collective action, was a far more serious problem at the regional level: other whiting fishers benefited from the market-price effects of the catch limits imposed by the New Jersey cooperatives. From time to time, in the 1960s and 1970s, leaders of the cooperatives tried to persuade people in the New York ports to adopt a similar system. This did not work, although they were able to organize several regional "tie-ups" to protest low market prices. Even with free-riding the cooperatives persisted, members aware that their "sacrifices" benefited others but convinced that without the catch limits, the price would plummet, hurting everyone.

This institutional arrangement was suspended throughout most of the 1990s. Free-riding was rampant and the resource itself declined as many new boats entered the fishery in response to sharp declines in TACs in the traditional groundfish fisheries of New England. Whiting were scarcer on the inshore grounds for which New Jersey boats had an advantage. Accordingly, the limits on entry created by the cooperative's control over scarce dock space were inadequate for the task. It became an open access fishery and self-regulation no longer made any sense. Members of the cooperatives had to find other fisheries, such as squid, and redirect their regulatory efforts to the workings of the regional fishery management councils, including attempts to use limited entry to protect their positions.

4.4 The surf clam fishery: Heterogeneity in a participatory setting

One of the constraints to self-regulation of common pool resources in the United States and other capitalist economies is that it can be interpreted as anti-competitive behaviour, coming up against anti-trust laws. The cooperatives noted above were absolved from this by a federal law protecting registered agricultural cooperatives from anti-trust challenges. Participants in another important fishery of the Eastern seaboard of the Atlantic coast, the fishery for surf clams, confronted this problem and turned their commons-dilemma over to one of the regional management councils, showing yet another way

that the embeddedness of locally-devised systems can make a difference.

By the 1960s and early 1970s participants in the relatively new surf clam fishery[3] recognized that they had created an open access monster: more and more vessels, larger and more powerful all the time, entered the unregulated fishery. The clams, immobile and hence easily harvested once located, were quickly depleted. The fleets moved from patch to patch, from Long Island, New York, to Virginia. There were discussions of industry-based regulation of catches or gear, but anti-trust issues loomed large. Therefore nothing was done until the regional fishery management council system was created in 1977. The surf clam fishery was the very first to be regulated under the new US system for managing fisheries from 3 to 200nm also to limit entry. The Council created a moratorium on new vessels, an overall TAC, and a system limiting how much time each vessel could be fishing for clams in order to spread the fishery over the year on behalf of the processors.

The industry was ready and eager to use the management system to accomplish goals it could not legally accomplish by itself. The new Council system provided the institutional solution to their second-order dilemma, that is, incentives not to participate in management because being a free-rider is an option. It is probable that the industry could not have come to agreement anyway, given the large number of participants (over 180 boats at the peak) and their economic heterogeneity (a few very large vertically-integrated firms; many "independents," some owner-operator vessels but some large fleets of vessels also; plus of course geographic, personal, and ethnic differences).

The obstacle posed by heterogeneity was evident in the new system. Between 1978 and 1989, the surf clam industry[4] had some co-management powers vis-a-vis the Mid-Atlantic Fisheries Management Council (MAFMC), which at times asked the industry to come up with its own plans for adjusting the system (Turgeon 1985). The heterogeneity depicted, and the real differences in power and interest it suggests, made it difficult for the industry to reach consensus on important issues, namely how to correct distortions created by the limited-entry system. As fishing capacity increased, and certain year-classes of clams grew large enough to be fished, the amount of time each vessel could fish had to be reduced in order to spread the quota over the year. By 1986 surf clammers could fish only 6 hours every two or three weeks. From as early as 1980 there seemed to be agreement that some kind of allocation of the quota to individual vessels would be necessary, but agreement on exactly how that would be done was elusive. The size and heterogeneity - the power structure - of the industry played a major role in causing an 11 year delay in the decision to make a major institutional change to individual transferable quotas (McCay and Creed 1990). This one a market-based system of management which has the potential of changing the conditions that had led to overcapitalization and dangers at sea (*i.e.* the race to fish against limited time or quotas).

ITQs went into effect in 1990, the first instance of this method of fisheries management in the US. In this case, ITQs rapidly led to fleet down-sizing and intensified the existing patterns that concentrated ownership and control in relatively few firms (McCay and Creed 1994; NRC 1999b). Nonetheless, the surf clam management regime remains a collective commons institution. Setting the annual TAC and other conditions of the fishery remain responsibilities of the regional fishery management council, on behalf of the public trust which remains in the clam resources themselves. The ITQ holders must continue to interact with each other, government regulators, and other members of the public as part of a management community. This is a good example of a "fishery management community," with some elements of co-management.

4.5 The Pacific whiting cooperative: How small size and homogeneity can work

In the context of the US moratorium on ITQs and the broader set of conflicts and concerns that lay behind resistance to ITQs, some successful experiments in alternative self-regulation have occurred. A recent case of self-regulation in the marine fisheries involves large, expensive catcher-processor vessels in the fishery for Pacific whiting in the cold waters of the Bering Sea in the North Pacific (NRC 1999: 128-129). (This has recently been followed by similar cooperatives for pollock fishing in the North Pacific; special legislation was passed to enable this in 1998). This case is a reminder of the virtues of small size and homogeneity in realizing working agreements for managing a common pool resource.

In the North Pacific, the annual TAC of whiting is divided among various sectors, including the catcher-processor vessels, which hold 34% of the 1997-2001 TAC. In the past, they competed for their quota in the familiar process which creates incentives for overcapitalization as well as wasteful practices such as taking and discarding other species (*i.e.* bycatch) and hurried processing leading to lower than optimal yields. In April 1997, the four companies involved agreed to eliminate this "fishing derby" and its side-effects by allocating the quota amongst themselves, forming a cooperative for the purpose. To avoid possible anti-trust prosecution, a significant barrier to user-based management agreements in the United States, members submitted their proposal to the Department of Justice, which approved it. This meant that the companies could use fewer vessels; the company announced that in the remaining portion of the 1997 fishery yield from on-

[3] The surf clam fishery began in the late 1940s when a hydraulic method was invented to help dredge up the clams; the clams quickly replaced bay clams in the important clam chowder market and other markets.

[4] To keep this account simple, I ignore the ocean quahog fishery, an outgrowth of the surf clam fishery.

board processing had improved by nearly 20% and there were significant reductions in bycatch.

The whiting cooperative continues. It may have had the negative effects of any limited entry system, in deflecting effort to other fisheries which might also be fully or over-capitalized, but the companies did succeed in developing a more rational system for their own fishery. Their success seems to have been made more likely because of the small number of actors involved, all of whom knew each other very well and who were fairly homogeneous in terms of investments. It was also increased by the fact that there was little uncertainty about the quota itself nor were other groups immediate hurt by the decision: the cooperative allocated a known quota that had already been allocated to the at-sea processing vessels[5].

4.6 Size, homogeneity, and co-management in a Canadian setting

In comparing the surf clam management regime with a Canadian ITQ fishery for groundfish (McCay *et al.* 1995; McCay *et al.* 1998), several points emerged. One was that size and heterogeneity did matter, but not that much. The Canadian fishery, a small-boat (<65ft) dragger fishery for cod, haddock, and pollock, mostly in Nova Scotia, experienced the dramatic institutional change of ITQs quickly, within a year after the possibility was announced, even though the size of the affected group was much larger. There were over 440 licence holders in the Canadian fishery compared with fewer than 60 vessel owners (about 120 vessels) in the US surf clam fishery prior to ITQs. The Canadian fishers were scattered over a huge area, in dozens of small and large fishing ports. The US fishers in this fishery worked out of only about four ports. On the other hand, the Canadian fishers were more homogeneous in economic terms: few were vertically integrated into processing firms and the goal and spirit of egalitarianism was supported by the rule that the owner had to be a vessel operator. But the main point, for the decision to make the change in property rights, was that the decision in Canada was not made by members of the industry; it was made by the Minister of Fisheries. The more democratic, participatory process of deciding upon ITQs in the US set up a situation were strong differences within the industry and which could result in long delays.

A second point was that whereas in the US the industry played a strong role in deliberations about the institutional change that led to ITQs, in the Canadian case, also begun in 1990, the industry emerged as a strong player in the next phase of management, deciding upon and implementing the actual details of the ITQ-based management system. A co-management arrangement was created once the major decision was made and representatives of the industry worked closely with government officials, and those they represented to design the details of the new system. This resulted in a system (like the ITQ system that went into effect in Alaska more recently, in 1995 [NRC 1999b]) designed to prevent the rapid downsizing and consolidation of property and power that occurred in the surf clam case. Holders of ITQ had to be vessel operators as well as owners (although exceptions were grandfathered in), there were upper limits on how much ITQ anyone could own, and, at first, there were strict limits on transferability, which was allowed only within the fishing season, not permanently.

Another significant feature of the Canadian system is that in exchange for gaining exclusive rights to quota, the ITQ holders had to pay for, and help design and implement, a system of dockside monitoring. This was another focus for the co-managing group that emerged and continues to meet regularly.

Whereas the ITQ system applies to the entire US surf clam fishery, the Canadian ITQ system is embedded with a larger management regime for the groundfish species, leading to a highly conflictual situation. The overall TAC is allocated between offshore vessels (belonging to a few vertically integrated companies, under an enterprise allocation system) and a fairly large set of nearshore and inshore vessels, by fisheries area and by species. An important distinction is between *mobile gear* (*i.e.* draggers) and *fixed gear* (*i.e.* gill-nets and lines). Government efforts to expand the ITQ system (and user-fees for monitoring and enforcement) are resisted by the fixed-gear fleet, as noted above in the discussion of efforts to develop community-based management.

4.7 Communities and co-management

As noted earlier in Section 3 above, Canadian fisheries policy is to develop formal partnerships between industry (or other groups) and the government fisheries agency. The partnership proposal is controversial in that it raises the question of what a "community" is. In fisheries, the truly active communities often become defined in terms of people engaged in the same fishery, such as all lobstermen in an area. With intensified government management - which in Canada includes management by gear-type, by fishing area, and by species - communities can also be defined in terms of regulatory regimes. Thus, all licence holders in a particular area engaged in a particular fishery become a community regardless of where they live, their personal and ethnic identities, or their social ties. Indeed, new social ties and identities are created in the process of regulator/regulated relationships.

[5] Very similar arrangements are found in Canada under the rubric of "Enterprise Allocations," precursors to individual transferable quotas. The difference is that in the Canadian cases, *i.e.* for offshore groundfish and lobsters, the government, not the companies, made the allocations among the companies involved in the fisheries. However, it is arguably the same: only a handful of companies are involved, they are working with a portion of the overall allowable catch that has been allocated to their sector of a larger fishery, and the representatives of those companies work very closely with government decision-makers such that it is difficult to determine where the rule-making initiative and power to decide actually reside.

These new communities can be the bases of contractual co-management as has happened, both formally and informally, in Canada. However, the co-managing communities and the government's "partnership" proposal have been seen with suspicion by people in the smaller-scale, inshore fisheries and people dependent on fish processing in coastal communities. Management-based communities, where membership is often limited either formally or *de facto* to those who hold limited privileges, have interests that are not necessarily the same as those of place-based communities.

Consequently, there are attempts to build upon place-based and local-level communities in creating alternative institutions for fisheries management. Assigning a part of a TAC to a community has been done. One case of community-assigned quotas occurred in 1995; there was agreement to allocate part of the TAC for a particular area to the fishers of the community of Sambro, Nova Scotia, who could decide themselves how to allocate it rather than have it assigned as ITQs (Apostle *et al.* 1998). Subsequent grassroots efforts and civil disobedience expanded the principle of community-based management to the "fixed-gear" sector in the Bay of Fundy region (Kearney *et al.* 1998). The DFO informally agreed to allocate quotas to "community management boards," based on the collective catch history of the fishers they represent. The boards then developed management plans through a participatory, consensus-based process. The boards have no formal legislative capacity to enforce these plans; instead they use contract law. Fishermen who wish to participate sign a contract agreeing to follow the plan and accept designed penalties for violation. If they decline, they may participate in a government-run competitive fishery. The boards are intended to become the basis for fishermen's participation in scientific research and an overarching council for the bay as a whole.

As Burke (2000) noted on Monday, some of these community-based management efforts have led to the use of ITQs by members of the communities. Thus, they are not necessarily alternatives to ITQs; the point, though, is that decisions about modes of allocation should be devolved to representatives of a broader notion of community than the usual licence-holder-based management community.

5. CONCLUSION AND EPISTEMIC COMMUNITIES

5.1 Summary remarks

All fisheries regimes, from international to local, must deal with similar problems, namely how to manage access to, and use of, common pool resources without depleting both the resources and the coffers of those involved beyond the point of no return. To date, governments have not accomplished much for the international high-seas fisheries largely because of the persistence of the rule of flag-state sovereignty and right to enforcement, but opportunities for change are perhaps more evident than before (Burke 1997). Within their own jurisdictions, national governments too experience difficulties in using their powers and abilities to support scientific research to make marine fisheries sustainable. In some places, this is because of the persistence of open access as an ideological position or the *de facto* outcome of difficulties enforcing restrictions. Open access, combined with attempts to conserve fish by setting TACs, sets up conditions for overcapitalization, which in turn creates immense pressures on management organizations to up the ante (Ludwig *et al.* 1993). In these and other places the problem is also due to the uncertainties of knowledge, scientific and otherwise, and social barriers to effective utilization of the knowledge of people actually working on the water.

Both Canada and the United States are grappling with these and related problems. Among the somewhat disparate directions that policy is taking in both countries there is interest in delegating and devolving some management authority to groups of resource users or "communities". Qualifications of local communities and groups of resource-users as resource-managers are mixed, affected in part by size, heterogeneity, and other variables identified in academic studies.

The cases reviewed show some realized potentials for user-based resource management within the play of such factors as the nature of the resource, the size and heterogeneity of the resource-using group, and the political economy within which they are embedded. In another work, we deal at length with the issue of embeddedness from a more social and cultural perspective (McCay and Jentoft 1998) is discussed at length. Here I close with a note on an expanded notion of "community-based management," which is another way of talking about self-regulation by appropriators and local-level management.

5.2 Virtual or epistemic communities

A recent National Research Council report (1999b) focused on "virtual communities," by which was meant communities of resource users who may or may not be from the same geographic or cultural communities, but shared involvement in a particular fishery and, I might add, more often that not depend on satellites, cellular phones, fax machines, and computers for communication and social interaction. Although I agree with the spirit of that suggestion (coming as it did from the experiences and thinking of people like Nat Bingham, a former fisherman and major coordinator of cooperation among fishers, landowners, and conservationists in protecting salmon, and journalist Brad Matsen) it seems too narrow for today's realities, and those of tomorrow. For one thing, many other "stakeholders" are not included. I propose some variant on the notion of "epistemic communities" instead.

There are intriguing congruences between the "epistemic communities" of the individuals, institutions, and governments that sometimes form around

international regimes (Haas 1989, Young 1982), and the communities that form around national/regional government-based fisheries management issues. In both the US surf clam and the Canada small-boat dragger ITQ cases, epistemic communities evolved over the years. They include scientists, agency officials, paid representatives of the industries, industry members, even journalists and academic observers. Like the international "epistemic communities", the effects of the diversity of backgrounds and interests present is modified by shared focus on tasks at hand, some consensus on values, or at least understanding of differences in values and objectives, and a history of interaction. People come to know each other, share information and ideas with each other, predict each other, and trust each other, with or without expectations that they will come to consensus. This, too, might be considered "community-based resource management" and it may be the only real hope for participatory management institutions that encompass a wide diversity of interest groups or stakeholder, achieve some fairness and some equity, and, above all, promote sustainable fisheries and healthy marine ecosystems.

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DIRECTION OF FUTURE FISHERY MANAGEMENT

K. Katsuyama
Japan Fisheries Agency - International Affairs Division,
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo, Japan
<takato_maki@nm.maff.go.jp>

1. INTRODUCTION

After Exclusive Economic Zones were established at the end of 1970s, there arose mounting international interest in marine living resources. Not only traditional fishing nations, but also newly-developing fishing nations, and even those countries with no tradition of consuming fishery products as food, began to take an interest in fisheries and fishery products. At present, quite a number of countries consider fisheries not only as a means of food production but also as important resources for obtaining fishing-fees and foreign-exchange earning from exports. It is not rare that large enterprises and new capital, which previously had no relations with fisheries, are entering into fisheries.

While the utilization of marine resources is being promoted rapidly, demersal fish targeted by trawlers are being depleted in many areas throughout the world. This has prompted large trawl fisheries to shift their target species from demersal species in the bottom-waters, such as cod and flounders, to schooling pelagic fishes in the mid-waters, such as horse mackerel, chub mackerel and sardine. Also, modern purse-seine fisheries have expanded the range of target species so as to increase their profitability and have been rapidly increasing their catch of schooling pelagic fish using fish-aggregating devices.

On the other hand, in the coastal waters of the developed countries, environmental changes caused by human activities and pollution from land-based sources have exacerbated the depletion of fishery resources, and this depletion is now expanding from coastal- to offshore-areas. Furthermore, in the newly industrializing countries and developing countries, coastal fishing grounds are being rapidly lost by: littoral development and construction in addition to the lack of sewage-treatment systems. Such damage also affects the primary production and the fish stocks. As a result, it often happens that small-scale artisanal fishermen living along the coast are forced to change their profession from fishing to the non-fisheries sectors.

There are also cases where fishermen themselves destroy the fishing grounds. In some developing countries where capital and fishing facilities are inadequate, there are still fishing practices that use explosives and toxic substances. In particular, the loss of coral-reef from destructive-fishing practices is comparable to the loss of many forests caused by slash-and-burn agricultural methods.

The rising global concern about utilization of the resources and their proportional decline and decrease, raises serious problems both internationally and in individual fishing nations. The importance of fishery management is now gradually recognized, not only by fishermen and managers, but also by consumers who are the final beneficiaries of those resources.

2. CHARACTERISTICS OF FISHERIES

While most of food production on land is subjected to artificial management in all its processes, almost all fish depend solely on natural reproduction within the oceans and seas until they are harvested as produce of the fishery. According to the statistics of the Food and Agriculture Organization of the United Nations (FAO), the overall quantities of beef and pork used for food are 132 million tonnes per annum, while the quantities of fish (excluding fish raised by aquaculture) are 96 million tonnes.

In the agriculture and livestock industry, production and management costs involve such elements as: elimination of weeds, pest control, investment in fertilizers and feed. By contrast, the cost of the reproduction and growth of fish stocks is almost zero because it is almost exclusively dependent on nature's capability. If we focus our attention on this aspect of fisheries, the marine living resources are indeed gifts from the oceans and seas.

On the other hand, the location of harvesting in the agriculture and livestock industries is mostly fixed to the area where farmers live, the risk to the harvest is relatively low and the necessary costs of production are also low. In fisheries, conversely, there always exists a big risk in terms of revenues versus harvesting costs (for the construction of fishing boats and maintenance of expert fishermen), because the fishing grounds are distant and are often subject to drastic changes. In other words, agriculture has transformed itself from its original state of harvesting uncultivated crops, into an artificial industry changing the environment and harvesting crops within limited ranges. But in the case of marine fisheries, harmony with the natural environment is indispensable because the fish resources are still largely depend upon it.

Under such conditions, is it possible to realize in fisheries the kind of planned production and management as in agriculture and livestock industries? Agriculture that produces grains is sometimes affected by natural factors such as sunlight and rainfall, but planned

production comparable to that for industrial products can be implemented because it is possible to carry out production-adjustment by increasing or decreasing the area cultivated.

For some specific fisheries resources, such as some shellfish and crabs, the estimation of stock-size seems to be relatively easy and planned production may be possible, at least in theory, because the habitats are relatively stable and there is little migration. Nevertheless, with respect to highly migratory fish-species, there are considerable difficulties in planning production because the estimation of stock- size is still uncertain at present, while the relationship between spawning-fish stock-biomass and recruitment after reproduction can fluctuate considerably, and moreover the range of distribution of the stocks is relatively wide and changeable.

It is well known that stock-sizes of small-size pelagic fish, such as sardine, can vary regularly regardless of the impact from fishing activities. Presently, the focus of research is given to annual pre-harvest pilot surveys, rather than to attempting to determine stock size. Further, with respect to annual species - such as squid - that live only one year, difficulties in conducting any planned production have been pointed out, and many cases of drastic fluctuations (including sharp declines) in stock-size have been reported.

The pelagic fish-species which attract the highest attention internationally are the tunas. Many of these stocks have been the subject of stock assessment by existing regional fisheries management organizations and various forums, and various management systems have come into being because of their high market-value compared with other fish species found in Japanese markets.

3. CHANGES IN FISHERY MANAGEMENT

In Japan, the living resources of the sea have been used from time immemorial and remains of shell mounds have been found in many historical sites, attesting to the fact that fish, shellfish and cetaceans were eaten. As a small island nation, Japan tended to rely on the ocean for protein supplies, taking advantage of the oceanographic features such as the strong Kuroshio and Oyashio sea-currents which transport various marine resources along the near-coastal zones. Major archaeological finds from the shell mounds include a variety of species of fish (sea bream, flounder, salmon, tuna and shark) as well as shellfish, octopus, squid, whales, dolphins, sea cucumber, sea squirt and sea urchin. It can be easily conjectured that fishing activities were already conducted in the offshore areas during those historical periods because the archaeological finds include oceanic fish.

In the Middle Ages, from the 8th century on, records indicate that typical fishery products from each region had been transported to the Central Government in Kyoto. Further, from the 17th century, communities of fishermen having particular techniques of harvesting were formed in various parts of Japan, in part with the encouragement of the Edo Government (1603-1868), and so fishery products from various parts of Japan were available for distribution and consumption, from the northern sub-arctic zone to southern sub-tropical zones. Thus, coupled with the Buddhist custom of avoiding animal meat, the foundation was laid for Japan to become a fishing and fish-consuming nation. As cetaceans were not classified as animal meat under Buddhist criteria, their utilization and consumption was expanded.

Under the Edo Government, feudal lords of the divided provinces encouraged industrial activities. In the area of fisheries also, they recognized the fishing activities carried out by the fishing communities as a type of right and obligation, and to prevent fishermen from failing as a result of through excessive competition, they established restrictive measures for new entrants and control of fishing effort. Through these measures the Authority attempted to ensure the stable development of fisheries as a household business.

Such a system survived in the *Fisheries Law* instituted in 1949, and those who had been traditionally engaged in fisheries were granted fishing-rights by the government. With respect to the resources targeted by each fishing community, the approach of self-regulating stock-management was encouraged, including adjustments with neighboring fishing communities. In the 1970s, with the aim of strengthening fishery management by the fishermen themselves, regional Fisheries Cooperative Associations were established throughout Japan as community-based management mechanisms for the coastal and the offshore fisheries, which included a mutual monitoring and supervising system.

As a result, those who intend to engage in coastal and offshore fisheries are required to comply with the resources conservation and management measures under fishing permits issued by the Central and Regional Governments. They are also obliged to join at least one regional Fisheries Cooperative Association, thus placing the overall activities of individual fishermen under mutual monitoring and control.

Fisheries in Japan, which in the past have developed centring around fishing communities, have commonly taken the form of household businesses. Maintenance of their artisanal activities on a long-term and sustainable basis was set as the major goal instead of high profit in the short-term. Accordingly, fishermen came to enforce various voluntary management measures to ensure the conservation and propagation of the fish stocks. Fishermen's initiatives included: preservation of spawning grounds, protection of small-size fish, as well as temporary control measures on fishing activities in cases where stocks were found to be declining.

In recent years particularly, fishermen have developed and enforced stock-recovery programmes through the Fisheries Cooperative Associations in collaboration with the Central and Regional Governments. There have been observed regional examples in which the fishery

resources have been damaged by external factors such as pollution of coastal areas from land-based sources, and environmental changes from artificial constructions. Direct measures could be taken relating to the existing status of the stocks, such as reduction of fishing effort to offset the decline in the resources, through curtailment of the operational periods and control of catch-quantities.

However, prompt recovery of fish stocks cannot be expected only from such reductions in catch when depletion of the resources is caused by external factors. With the initiative from fishermen, much more fundamental solutions have been undertaken, in collaboration with regional governments, such as environmental rehabilitation of the fishing grounds, including artificial tidelands and sea-weed beds, in addition to reducing the influx of land-based pollutants. There are limits to the ability of individual fishermen to undertake such measures by themselves, but it is possible to build up cooperation quite effectively and smoothly by calling on other sectors and the public in fishermen's communities.

In recent years it has been recognized that the cutting of forests in inland areas is negative, affecting the inflow of nutrients into the coastal zone, and has been the mechanism that caused losses of sea-weed beds which serve as nursery grounds for fish. For this reason, there have been a number of instances where fishermen called on the forestry industry and the general public for efforts to restore the forests, and the fishermen themselves, mainly through Fisheries Cooperative Associations, carry out tree-planting in the mountain areas. By accumulating specific examples of environmental improvement of fishing grounds realized from the planting of trees, it will become possible to encourage the recovery of forests, not only for the benefit of the fishermen, but also for the welfare of the general public.

4. CHANGES IN METHODS OF STOCK MANAGEMENT

Stock-management in Japan is of the general type adopted by traditional fishing-countries. It is based on an effort-control system by limiting licences that are re-examined periodically on the basis of catch and effort data. Fishing effort is usually controlled through limits, such as on the number of fishing vessels, the fishing period and the number of fishing operations.

The fishery resources cannot be measured directly, and even where stock estimates are made, there is considerable uncertainty compared to similar data for land resources. Further, the impacts that environmental changes such as El Niño and global warming are having on fishery resources is far from resolved to date. Accordingly, based on catch-data obtained from fishing activities and from research vessels, scientists can only estimate and forecast broad-based stock levels and trends.

Those who are involved in management, for their part, determine short-term or medium-term fishery management measures through consultations and by comparing past data and the results of analyses.

For demersal fish it is possible to estimate fairly accurately the stock-size level (or index) by trawl surveys using the area-swept method, because the distribution of fish within an area is generally constant. By contrast, there is much greater difficulty in the stock assessment of pelagic-fish. With respect to small-size pelagic fish, such as sardine, chub mackerel and horse mackerel, the stock-size fluctuates due to natural factors, and therefore management measures such as total allowable catch have had to be used, taking into consideration past catch patterns, and pilot surveys conducted before the fishing season starts. For this reason, the only management step that can be taken is to quickly modify the allowable catch level, with close attention to the long-term variation in catch and CPUE (catch-per-unit-effort).

With respect to squid no direct relationship has been observed between parental fish biomass and the next year's recruitment, because it is a single-year species, *i.e.* living its whole life-span within a year. On the other hand, for large pelagic fishes, such as tuna and marlins, Japan is not in a position to manage these stocks alone on a single-nation basis, because these species are highly migratory. Therefore, Japan follows compliance with the resource-management measures within international schemes, such as those of ICCAT, IATTC, IOTC, CCSBT, and meetings among countries involved with Central and Western Pacific or Northern Pacific tuna. These regional management organizations determine management measures for tuna generally from estimates of stock-size and future trends, by using statistical calculations.

Such moves have been adopted by various organizations after the ICCAT Scientific Committee introduced cohort analysis in 1981. Scientists spend enormous amounts of time on stock estimation every year, and managers and fishermen follow the results of the estimates presented by the scientists.

There are some variations in the models of statistical calculation: ICCAT and CCSBT use different types of VPA, while IATTC and SPC/SCTB use non-linear and non-equilibrium Production Models. There exist further complicated variations among groups of scientists engaged in stock assessment. This situation presents enormous difficulties and complexities for managers and fishermen who do not have any specialized background or knowledge of statistics and computer programmes. Added to this, arguments among scientists, are characterized by complex factors that do not necessarily produce a unified view. Under these circumstances, no fundamental solution to these problems has been found in spite of vast energy and costs invested in the improvement of stock assessment methods.

Accordingly, analyses by scientists are given to fishermen and managers in the form of simplified figures

and charts, but the latter cannot understand the whole process from the database to the presentation of the results. In extreme cases, it happens that the scientists who conduct the analyses cannot themselves explain how the whole process of the complex computer calculations produced the results.

Based on my experience in various types of scientific meetings of regional fisheries organizations, I have come to conclude that scientists are largely divided into two groups. In one group are those who are ready to share the difficulties in stock assessment experienced by fishery administrators and managers and who struggle as much as they can to find ways of improvement. In the other group are those who insist that they are performing to their best in their capacity as scientists, thus turning the responsibility for the use of the results, including uncertainties of assessment, onto fishermen and managers.

The former is the type of scientist who attaches importance to traditional and historical fishery management, while the latter prefers building stock management programmes based on scientific and statistical calculations. In Japan, fishery resources scientists of the former type constitute the majority, but after introduction of the TAC system for seven fish species we are now witnessing a rise in scientists of the latter-type.

5. ERRORS IN STOCK MANAGEMENT AND RISK OF STOCK COLLAPSE

The current management measures for fish stocks can be largely divided into quota-control (output- control) and effort-control (input-control). Management by means of allowable catch-quota, such as TACs, ITQs and IQs can be often found in relatively newly-developed fishing States, while traditional fishing States attach importance to management through control of fishing effort, such as the number of fishing vessels, in conjunction with monitoring of various types of stock index. What is done seems to depend on the degree of experience in fishery management.

Management through catch-quota is management in terms of quantities landed, and virtually no control is extended to the actual quantities caught or discarded at sea. When costs are incurred in the acquisition of catch-quota, fishermen can only begin to make profit after covering this cost.

Management by limited catch-quota will result in retaining onboard the fishing vessels only large-size fish with high-market value, and the continued discard of small-size fish into the sea. To avoid this, it is necessary to prohibit discards at sea or to measure the catch, not at the port of entry but at sea after each fishing operation. However, in both cases high management-costs for observers and inspection throughout all fishing operations are involved, and in some cases, management-costs exceed 10 times the fisheries income. For this reason, such an approach is not practical as it involves the risk of rendering fishing activities un-economic.

Although management based on fishing effort-control is often considered less stringent because there is no limit on catch-levels, it can in reality be managed to provide for a maximum limit of catch. However, the upper limit in this case is not established arbitrarily. It is the limit that is established by the capacity of the fishing vessel, such as trawling-speed or fish-hold size. It is not difficult to calculate fishing effort appropriate for the size of the exploitable stock, from such factors as maximum catch-capacity per fishing vessel and entrepreneurial profit, and no enforcement is required if the fishing operation is not affected by pirate vessels.

Criticisms have occasionally been made with respect to fishing effort-control, that this method does not allow the annual catch to be established beforehand; thus control cannot be regulated for the impact on stocks (which in contrast, is guaranteed by catch-quota management) and management measures cannot be applied with regard to over-fishing by the fishermen.

With respect to the issue of the impact of catches on stock sustainability, I do not expect much from such estimates. The science of fishery resources depends on the construction of hypotheses to explain past results. As long-term interaction within the ecosystem-pyramid and relations between the stock (*i.e.* parent group) and catch (*i.e.* sampled group) are constantly changing, assessments about absolute quantities cannot be relied upon unconditionally, even when such results are presented by prestigious scientists.

As fishery managers, what draws our attention most are not the apparent and well-structured figures, but the stock-size indexes and estimates, or assessment values of the impact caused by fisheries on the stock, and how corresponding fishing activities have changed. Further, we fishery managers bear in mind the feed-back system to adjust management targets, judging from experience with respect to interaction of the two [relative stock-size and impact on it caused by fishing] that have not been expressed as numerical values.

I have so far mentioned the potential clashes existing between stock assessment and stock management. Many regional fisheries management organizations solve these issues at generally reasonable levels. But, the largest threat to stock management in recent years is the rise of IUU (Illegal, Unregulated and Unreported) fishing. The issue of IUU has already been taken-up not only at FAO and the regional fisheries management organizations but also at the UN Commission on Sustainable Development (CSD) and the UN General Assembly (UNGA), but the problem is not moving forward towards to a solution.

With respect to IUU, there does not seem to be any conflict of views in that everyone supports its elimination. But there seems to have been little discussion on the

causes of IUU because it is simply recognized as an absolute evil.

There exist two types of illegal fishing practices. One is illegal activity in terms of the provisions of the UN Convention on the Law of the Sea. Specifically, it takes the form of de-nationalization of fishing vessels operating on the high-seas by concealing the vessel's registration or by flying flags of other countries [flags of convenience – FOCs]. The second is fishing in the Exclusive Economic Zones of coastal states without their permission while undertaking high-seas operations. The two types of fishing operations should be eliminated immediately, regardless of the diverse justifications given to them.

Unregulated fishing activities are not clearly classified as illegal activities within the framework of current international laws. However, engaging in unregulated fisheries targeting various fish species in various areas of the world will not only collapse international fisheries management arrangements but also accelerate depletion of the fish resources. In view of the fact that the member countries of regional fisheries management organizations comply with various stock conservation and management measures, the continuation of fishing activities outside regulations by non-member States cannot be accepted from an ethical point of view.

However, a State's decision whether to join a regional fisheries treaty or organizations pertains to its sovereign right, it is not possible to compel it to become a member. Regional fisheries management organizations do request non-member States to participate in their management schemes and request them to take similar measures as those laid down by them, even while the non-member States remain outside their jurisdiction. At present there exist, although only to a small extent, some co-operative non-member States, who comply.

An issue over which Japan has a serious concern is the market-competitiveness of responsible fishing States and the countries engaging in unregulated fisheries. The fact that fishery products from unregulated fishing operations may displace from the market those products from fishing activities by those who clearly abide by the rules, should not be condoned, even assuming that the World Trade Organization (WTO) upholds the principle of free trade.

There is a risk that fishing operators who comply with international regulations may be defeated in market-competition by those engaging in unregulated fisheries. This may mean an eventual collapse of the stock management scheme. Regarding this issue, Japan is urging UN organizations such as the FAO and the WTO to take up this issue seriously. In the meantime, Japan intends to discuss the issue with other member States.

6. DIRECTION OF FUTURE FISHERY MANAGEMENT

I would like to say that as far as fisheries are concerned stock management under the system of free-entry, open access and free-competition has already become an illusion. On the international front, fishery products have for many countries, shifted away from being only a source of food and already turned into a trade commodity to gain foreign exchange. And there continue to exist incentives to increase catch regardless of the domestic consumption capacity.

Of course, it cannot be denied that the control of fishing vessels at sea or at ports of entry is partly effective, but it is, so to speak, an endless game of "play-tag", with the result that costs of fishery management largely exceed the profits gained from the fisheries. The defeat of stock management in this game seems predetermined as long as there is a public consensus on ensuring a sufficient food supply, even at the cost of allocating huge amounts of government budget for this purpose.

Management based only on catch-quotas has the aforementioned deficiencies, thus international, regional or domestic control is necessary at least on the number of fishing vessels. Needless to say, Japan is fully committed to take every occasion to appeal to the world on this issue not merely as a fishing State but as a nation heavily depending on fishery products as a source of protein. We have no intention to assert that stock management can be attained only through control of fishing effort, but unless fishing effort controls are the basis for stock management, we fear that all the efforts will come to naught.

Next, I would like to touch on stock assessment for management. Currently, the introduction of the Precautionary Approach is being discussed with a view to reducing uncertainties in stock management. No substantial progress in the scientific sense has been observed on this specific approach. In its annex, the UN Fish Stocks Agreement refers to the establishment of reference points and management in connection with ensuring biological safe limits and maximum sustainable yield. But there is no development of methods concerning the definition of those levels.

For the most part, either existing stock assessment approaches are taken, or debate is continued, depending on the "feeling" of scientists. While it is natural that there exist differences in the "feeling" of scientists, there have arisen substantial differences in the assessment values and estimates in the present situation where stock assessment methods are not unified. If maximum safety is to be pursued, naturally the lowest assessment values are selected, and cessation of unfavorable fisheries is demanded in cases where the maximum sustainable yield (MSY) is not secured.

Is the MSY developed with the help of fishery-resource scientists? Originally, the maximum sustainable yield was dynamic, and could be understood as an equilibrium that could change according to the evolution of the stock and not only changes in ecosystem. Or is it intended to sustain the state of the stock state approximately half of the initial stock-level?

In discussion on uncertainties, one may take the view that the proponents of the lowest estimation of catch level are the most sincere scientists and managers. This is like carrying out bidding without a minimum price. The result of such an approach is like skimping on estimates and calculations.

Next, I would like to argue against the view that every depletion of fishery resources from the past to the present should be blamed on the irresponsibility of fishermen or administrative managers. It is true that both in the West and the East, there exist irresponsible fishermen, but it is the fishermen themselves who are most affected by marine contamination and environmental change. Also there are sincere fishermen who continue to be asked to remain responsible in a situation where no early solution is apparent to the market-issue of competition between the products from FOC and IUU fishing.

Given all these factors combined, I am sure that I am not the only one who doubts whether stock management by fishery managers, with reduction of catch-quota and the number of licensed fishing vessels in cases of stock decline, will suffice. Fisheries are not charities nor are they research programmes to provide data for scientists. As long as a fishery is an industry requiring certain levels of profit, is it not necessary to develop the kind of measures that would enable sustainability of fisheries by mitigating the variations of the resources in the natural environment?

Although I do not have the perfect answer to these questions raised above, I would like to refer to stock enhancement and propagation projects as one of the possible solutions. In Japan, projects on stock enhancement-and-propagation have been continued and expanded since the 1960s in the hope of supplementing other measures to restore some coastal resources which had been depleted because of severe pollution especially in semi-closed waters. Regional-based approaches were incorporated into a "Japan Sea-Farming Association" in 1979, and recovery with increases in the resources have been clearly witnessed from release-enhancement projects for such species as Japanese tiger shrimp, sea bream and herring. In the future, such trials giving due heed to the marine ecosystem, will be gradually carried out for predatory fish species such as yellowtail and Spanish mackerel.

As positive steps to stock-recovery, we could assume restoration and rehabilitation of the marine environment itself or the mitigation of environmental pressures. Specifically, one can think of the elimination of low-quality sediments and of making of seaweed beds and artificial tidelands to serve as nursery grounds. In this respect, we see a positive implementation of such measures in Japan, with support not only from fishermen but also from the general public. Needless to say, stock-enhancement is an approach with additional costs, which is implemented through contributions from fishermen, who are the beneficiaries from better resources, which are made the object of stringent stock conservation and management measures.

7. CONCLUSION

Needless to say, stock assessment and management should be carried out based on scientific evidence. However, it is true that the management of fishery resources involves large uncertainties compared with terrestrial living resources, because the fishery resources are distributed extensively in the sea and are not usually directly observable.

Since the 1980s, in line with the establishment of Exclusive Economic Zones, there has been a rapid increase in the number of countries interested in fishery resources, not only as food, but also as products for international trade.

To maintain international order with respect to stock management approaches, I believe that it is necessary to include consideration of the entrepreneurial aspects, not only the direct fishery-management issues but also the situation in newly-developing fishing States and developing nations, as well as consideration of international food supply and distribution.

It is my view that Japan, as a traditional fishing and fish-consuming State, has many past instances of success and failure in fishery management. While admitting that we need not learn only from the past, it is my hope that Japan will always remain a good collaborator in research on past experience as well as more effective and realistic stock-management practices in the future.

Japan has adopted and conducts fish-rights management through the effort-control system by limiting licences, and fishermen have also been engaged in management through their community-based mechanisms, which include a mutual monitoring and supervising system.

Since 1996, Japan has introduced TACs for several specific fish species (starting with six species, now seven), and these TACs have been divided and allocated to central and regional Fisheries Cooperative Associations. They have the nature of Individual Quota on a community-basis, without royalties or resource rents.

ITQs (as well as TACs and Iqs) are one option for fishery management measures, but they seem unable to fulfill proper management by themselves because of the shortage of measures to avoid the effects of the discard of small fish, or the proper compensatory or mitigation mechanisms needed, in cases of depleted fish stocks.

My recent concern is that large companies, whether they be Japanese or foreign, might trample upon subsistence and household fisheries in the coastal areas, or that weak fishermen may get involved in IUU or FOC fisheries by serving as a tool of the powerful large companies. Although the relations between IUU fisheries and investment have not been clarified yet, there is no reason why ordinary investors would not focus their attention on the economic efficiency of IUU fisheries. I sincerely hope that my concerns do not take on a concrete shape due to the absence of any regulations to control investment in IUU fisheries within the current international legal system.

ARE INDIVIDUAL TRANSFERABLE QUOTAS A REAL OPTION FOR FISHERIES MANAGEMENT IN URUGUAY?

E. Bertullo
National Fisheries Institute (INAPE), Constituyente 1497 - C.C. 1612 Montevideo, Uruguay
<ebertullo@redfacil.com.uy>

1. PRESENT FISHERIES MANAGEMENT IN URUGUAY[1]

The present fisheries management programme in Uruguay is not clearly described in documentation, although most of the regulatory issues have been published but not up-dated in a single published paper. The legal rules of general fisheries management in Uruguay were initiated with *Public Law 13.833* of 29 December 1969, and other laws, decrees and regulations. The *Decree 149/997* of 7 May 1997, is the most recent fisheries management guideline for government and industry.

The published regulations that describe the legal and institutional framework of the National Fisheries Institute (INAPE) include those for fish-allocation, fishing-effort control, measures for fish-stock conservation, research in oceanography, biology and fish population dynamics, monitoring and control of fisheries operations; development of land-based processing factories for export and local markets, and advisory support for artisanal fisheries and aquaculture.

The State Reform policy document (OPP 1998) describes INAPE's management objectives as *"to obtain the largest economic and social benefits from the aquatic resources including those from aquaculture and marine mammals through their responsible and integrated management, in the long term based on research and preservation that permits their adequate administration with the goal of supplying food for international and local markets"*. Uruguay has signed the *Rome Declaration* of 10-11 March 1999, concerning the *Code of Conduct for Responsible Fisheries*.

Eighty-five percent of the total commercial catches are mainly processed onshore and are exported to 40 different countries around the world. The value of fish exports in 1998 reached about US$ 103 million and seafood imports have increased since 1990 to around US$4 million/year, and the present national *per-capita* fish consumption is about 9.0kg/year.

The natural fisheries resources available to Uruguay come from the River Plate and from the Argentine-Uruguayan Common Fishing Zone (CFZ) (Figure 1), located in the South-western Atlantic Ocean (FAO, Statistical Area 41).

In the River Plate and CFZ the main exploited commercial species are whiting (*Merluccius hubbsi*), croaker (*Micropogonias furnieri*), seatrout (*Cynoscion guatucupa*), silverbream (*Cheylodactylus bergii*), squid (*Illex illecebrosus*), toothfish (*Dissostichus eleginoides*) and red crab (*Chaceon notialis*) which are transboundary stocks. Swordfish (*Xiphias gladius*) and tunas (Scombridae spp.) highly migratory fish are also exploited. Toothfish and the Antarctic krill are caught in the CCAMLR[2] area, in accordance with the Antarctic Treaty which has been ratified by Uruguay.

The CFZ is a large fishing area that extends to about 200 miles from coastal baseline points and was created by the Argentine and Uruguay Governments in 1973. Fisheries management for this area is administered by an international Commission (Comisión Técnica Mixta del Frente Marítimo). The vessels from both countries fish in the CFZ; but no other vessels are allowed to fish in this zone.

Table 1
Fisheries of Uruguay - Composition of fish stocks

Fish stocks	Transboundary	Straddling	High migratory	High seas
Main species	Sea trout	Whiting	Swordfish and tunas	Toothfish
Total landings	11%	35%	1.1%	1.1%

Source: INAPE.

The main commercial species have annual landings between 120 000 - 140 000t/year and Table 2 shows the trend in landings for the period 1994-1998.

Under the present regulations the fleet is classified as either commercial fishing vessels (more than 10 GRT) or as artisanal boats (less than 10 GRT). All fishing vessels either licensed by the Government and are classified and authorized to harvest specific fish, molluscan or crustacean stocks. The licences are general permissions to participate in commercial fisheries and they are distributed to different target fisheries; they are temporary, renewable every two years and transferable.

[1] This presentation represents the views of the author and not necessarily those of Uruguay Government concerning present Fisheries Management practices, or their views or policies in relation to use of Individual Transferable Quotas in Fisheries Management.

[2] Commission for the Conservation of Antarctic Marine Living Resources.

Table 2
Total commercial fish landings in Uruguay

Year	Tonnes
1994	120 737
1995	126 495
1996	123 276
1997	137 009
1998	141 076

The commercial fleet has at present 103 fishing vessels (Table 3) to which the 112 fish licences are assigned. Some vessels are authorized to operate in "A" and "C" or "B" and "C" categories. It is not authorized to have "A" and "B" licences on the same vessel, but it is possible to have and "A" or "B" and "C" licences on one vessel.

The fishing fleet is extremely old with vessels of 15-20 years or even more, generating in most cases a profit insufficient to allow the introduction of vessels with lower operational costs that would be more efficient.

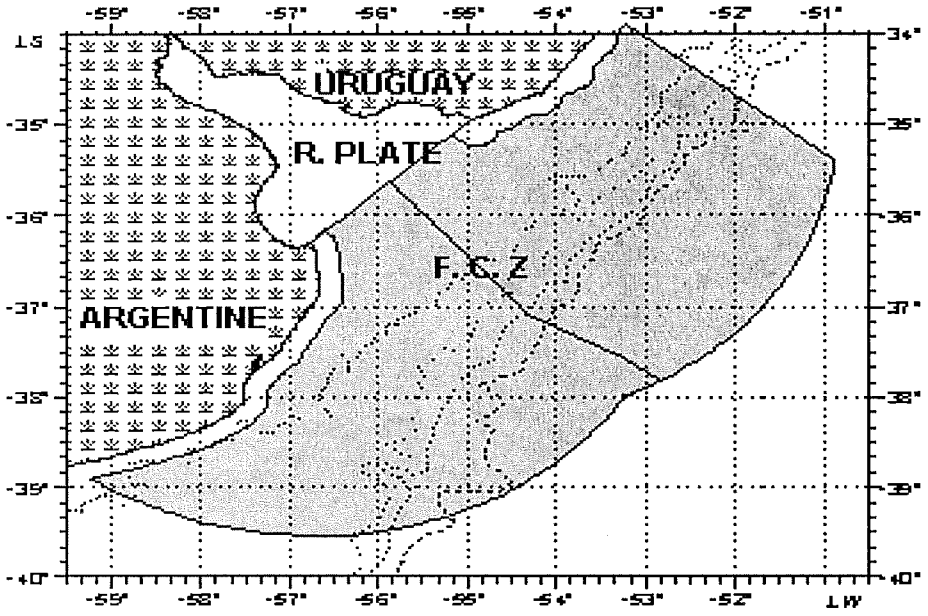
fish that they could during each season, as was usual in many fisheries around the world.

The problem of bycatch and discards has also been recognized from time to time by the fishermen who always target the larger fish since they realise more valuable dockside-prices and thus better profits. INAPE has been evaluating the bycatch from the coastal fisheries (croaker and sea-trout) during 1999 with the government's fisheries research vessel **Aldebarán**.

2.2 Present situation regarding government management by INAPE

Nowadays in Uruguay, fisheries management is focused on indirect methods of controlling fishing-effort, basically by licence control on the assumption that this provides an effective way of ensuring the conservation of the fish-stocks. The country also has many indirect methods to control fishing-effort such as closed seasons and areas, mesh regulations, minimum fish-size landings, *etc.* These controls imply increased surveillance and compliance costs to meet the more and more complicated regulations and stringent inspection requirements. The traditional fisheries for whiting, croaker and seatrout are limited-entry fisheries by Government regulation (INAPE, 1991, 1992).

Figure 1
Uruguay and Argentine Common Fishing Zone
Treaty of the River Plate and the Frente Marítimo (1973)



Map Source: Fishing Biology Department (INAPE, 1999).

2. MAIN FISHERIES PROBLEMS IN URUGUAY

2.1 Transboundary and highly-migratory fish-stocks

The distribution patterns of the targeted species and the estimations of their abundance over the whole area in absolute terms is complicated because the main fisheries exploit both straddling-stocks and some highly-migratory fish stocks. The past policies controlling allocation of the permitted catch encouraged the fishing companies to move towards an over-investment, excessive fishing-vessel size and too much equipment and labour, in an attempt to increase company yields to maintain profitability. Fishermen rushed to obtain the biggest share of

The use of catch limits (TACs) is perhaps not a good tool for regulating fishing-management of the straddling fisheries between Argentine and Uruguay, beyond their ability to solve problems of resource conservation. The present system provides strong incentives for increased competition between fisherman which is manifested in the developing of a "race to fish" where each individual

Table 3
Commercial fishing fleet in Uruguay
(September 1999)

Main species	Fishing vessel category	No. of licences	Fishing gear	Total fleet hold capacity (m^3)
Whiting	"A"	28	Bottom trawls	8 218.12
Croaker and seatrout	"B"	20	Bottom trawls	2 017.42
Croaker and seatrout or whiting	"Art. 13, lit. B"	15	Bottom trawls	1 492.75
Non-traditional: Tunas, swordfish, silver bream, redfish, tooth fish, red crab, squid	"C"	46	Beam trawls, traps, hooks,	11 408.86
Toothfish in the CCAMLR area, and krill	"D"	3	Hooks, trawl krill nets	1 575.54
Total		**112**		**24 712.69**

Source: INAPE.

fishing vessel seeks to maximize its share of the available fish stocks as is possible. This has led to excess capacity for some fisheries and increased costs, reduced profitability and "capital stuffing" in many fishing companies. Some fishing companies (operating vessels and shore-based processing plants) have gone bankrupt during the last few years.

Much depends on transboundary migratory species like whiting, for which we have no biological data when they migrate to the southern waters during the summer, outside the Common Fishing Zone. Nevertheless, when a fixed or increased level of effort is applied to the resources the catch-level changes automatically with the size of the fish stock.

Other indirect methods of controlling fishing effort are used for management, such as closed seasons; *e.g.* the Commission has a closed season for the squid fishery and vessels are not permitted to fish from September 1 to March 30. The closed season and the TAC are determined each year and harvesting is permitted from April 1 to August 31.

This method results in fishing-vessel inactivity during the time banned for fishing, decreasing the yearly profits of the companies.

Under the Commission the whiting fishery has seasonally closed areas delimited geographically in order to reduce fishing mortality on certain life history stages or age-groups. Among the management controls for this species are mesh regulations for trawling which are strongly controlled by observers on board and/or inspectors ashore. For conservation and scientific research the Biology Department of INAPE using the fishing research vessel is doing some trials with net- selective devices (DEJUPA) for whiting.

2.3 Fishing licences

The existing licences are not exclusive or held in perpetuity because the law prescribes licence-cancellation for the following reasons:

i. after approval by INAPE of the investment project, the entry of the vessel to a specific fishery has a maximum period of time
ii. when there has been an infringement of the Fishery Law
iii. when the vessel suspends operations for any period of more than six months
iv. if the relevant parties do not present themselves at the INAPE to be licensed.

The licences shall be renewed every two years and they can be revoked or cancelled in response to a serious legal offence as mentioned above, but in practice, history shows that no licences have been revoked or cancelled for serious lack of compliance with the Fisheries Law.

2.4 Some problems of fishing vessel owners

The most important fisheries in annual landings appear to be fully exploited, some species are probably overfished and for several years the fisherman have used excessive inputs of labour and capital. They compete for their share in order to have profitable operations, but obtain poor revenues. In some situations such as the coastal fishery, the loss of competition due to the regional financial crises, in this and earlier years (*e.g.* southern Asia) resulted in a long fishermen's strike and lockout of 120 days (May to August, 1999). More than 40 vessels were in dock during this period, landings declined, labour and money were lost.

Due to the fact that the fishing effort in the most traditional fisheries has reached the MSY, the further

increases in fishing effort have reduced the total catch that the fishing vessels can take on a sustainable basis; in the coastal fisheries the average fish-size has decreased, probably the bycatch has increased and the landings of the main fish species are less than in past years.

From the commercial vessel-owners' comments, it is apparent that the main fleet problems are the non-profitability of the operational trips. The new, non-traditional, fishery increased their catches during 1998, and they are the source of the higher final catch figures of this 1999 season.

2.5 Some problems of the processing sector

The lack of raw material for processing, in the fisheries plants located on shore, limits operations and has been aggravated by constraints in the international seafood-market where prices have remained stable for our species and seafood products. From 1990 other situations such as social-security tax levels, government monetary-policy, bank-rates, and labour expenses resulted in the fish factories finding themselves at a lower competitive level than in past years, and some companies are closed at present.

Further, the financial recovery from 1995 to 1998 coincided with the financial devaluation in Brazil in January 1999. Brazil had previously absorbed nearly 40% of the volume of fish market exports from Uruguay. The non-traditional seafoods accounted for the higher exports during 1998.

3. ALTERNATIVE FISHERIES MANAGEMENT OPTIONS

3.1 Management programmes and Individual Transferable Quota (ITQ)

In Uruguay INAPE is starting to learn and identify the issues and difficulties relating to the introduction of an individual transferable quotas management programme, the potential political, social and economic costs. The first step is to clearly identify if ITQs are considered property, because by law in Uruguay a property right about anything means the absolute liberty to dispose of this right, and the concept of *"the privilege to catch"* has not enough legal basis in our country to be deemed a property. The natural resources legally belong to the State (Government) and the fisherman acquires the right when the catch is taken on board. The legal concept in Uruguay is based on the criterion that you have or do not have a right. If somebody has the right (*e.g.* over the fishery products captured by the fishing vessel), they can sell, rent, donate, or discard it.

Nevertheless any proposal for a quota regulation should take into account the biological assessment of the fish stocks and the advice given by the biology scientists regarding the annual TAC for each fishery. The biological and scientific staff of INAPE should improve their efficiency and should have more financial resources to develop their research programmes. And scientific operational costs of the **R.V. Aldebarán** from INAPE should be addressed in any fisheries management programme.

An important objective for management is the long-term conservation of the fish stocks and the requirement of maintaining an adequate sustainable yield in the long term. The fisheries administration should have the responsibility to ensure that any new management programme will be better in terms of conservation, labour and profits to the industry.

Perhaps an early problem with the ITQs will be attributable to programme design and may not be the result of inherent problems of the concept in relation to new fisheries management proposals. The traditional fishery-vessel owners are organizing themselves into a different way to manage the fishery (*e.g.* the word *"quota"* is often used by them), motivated by the fact that the economic yields at present are not profitable and they recognize the need to change.

The Commission has introduced consideration of the quota concepts also. The main straddling-fisheries makes the possible use for ITQs programme more difficult, and perhaps when the common fisheries quota programme arrives in the coming years, quota management might be easy to introduce, but under a percentage-share allocation-criterion.

The croaker landings (1997-1999) have a quota of 40 000t/year (22 500t for Uruguay and 17 500t for Argentine), but Uruguay's share is used by all the fishing vessels of the Category "B" fleet. Some of those vessels have as a condition on the government licence a maximum landing constraint on the targeted species allowed to be landed per season, but this system has not been implemented. For this reason, the introduction of a share like a percentage of the TAC may be more difficult because, perhaps, some fishermen will assume that they have the "legal right" to have landing quotas measured in absolute quantities; this is a step to be further discussed.

As mentioned, there are not many published references in government documents to explicit fisheries management objectives, but the methods for regulating fishing-effort are well known. Fishing-effort is a complex concept and basically its evolution from 1995 to 1999 is showed in Table 4.

Obviously, the poor catches being obtained, the increasing vessel-time at sea, the loss of profits, some vessels being out of service in port, and the increasing administrative difficulties in managing fisheries, is prompting a change to the management strategies in the short or medium terms. This is not easy because redistribution of the benefits that come from fisheries is contentious and the sector has too much to learn and to debate, and political support is needed also.

I can see that it will be difficult to change the benefits from the fisheries because the revenues now are less than the costs, and traditionally the Uruguayan people, including fishermen, are very conservative; and surely not all the present fishermen want to leave the fishery for both social and economic reasons. Because of the country's economic recession there are no other investment or job options for people, and leaving the fishery does not assure employment alternatives.

3.2 Requirements for legislative and institutional changes

The Law 13.833 from 29 December 1969 provides for fishing authorizations (licences or permits) to take commercial catches in a timely condition and in selected waters by fishing vessels operation. Under Article 15 of this Law, INAPE is authorized to establish zones of capture and allocations, and for species conservation reasons to set the maximum sustainable yield (MSY), and to apply a species quota (as a dockside landing, amount/year concept). As was noted, this is recorded in the licence document issued by INAPE, and means that during the procedures of licence renewal the Administration includes in the document the maximum fish landings authorized for a fishing vessel during the season in question.

This is an indirect system to introduce a quota-control over a specific fish-stock, but only under a permission or licence condition on fish capture. The property-rights of the fishery resources in the natural environment were declared as belonging to the State, under the Art. 269 of the Law 16.736 of 5 January 1996. With this legal system it will be possible to introduce the ITQ concept in Uruguay, and it is not necessary to further change the Law.

Nevertheless, the River Plate Treaty and the Frente Marítimo, managed by the Commission restricts this law. The fisheries property-right according to the law of Uruguay is a "special" or "specific" property-right, because the current property-rights (applied to legal situations other than fisheries) means that the owner of this right can deliver it in any way he wants without restrictions.

In our fisheries the property right on the natural resources belongs to the State and the Government is responsible for the conservation, allocation, management and control of the fisheries. Fishermen's rights and property-rights to the fish begin only when the capture is on board. I assume that the property change option of the fishery resources in Uruguay, if it is necessary to develop ITQs, is not convenient and will be politically impossible in practice. In this hypothetical situation the fishery Law 13.833 should be modified, but at present I am convinced that the fishery resources property-rights in Uruguay will continue under the State's control.

To elaborate and discuss new legislation for the Parliament will not be easy because the country has not a fishery tradition and general knowledge about the natural resources dynamics and fisheries implications is limited. Any eventual new legislation would obviously have different political points of view though, probably with the same conservation aims. But, it would not necessarily have the same economic and social objectives, especially in relation to the fishing vessel owners, industry owners, fishermen and government bodies.

3.3 Institutional changes

The institutional mandate of INAPE, a government unit, is at present, part of the Ministry of Livestock, Agriculture. Revising this mandate for fisheries will be a not easy political change due to the diverse interests of the people involved in fisheries and related administrative activities. The present Administration has proposed to the Government the possibility of developing a more independent office but the new Law is not studied yet. Probably a constitutional but decentralized Service to be named National Administration of Fisheries (DINAPE), more autonomous, with fewer people and better-paid positions, and new up-dated objectives, could complete a future fisheries management option for the third Millenium. The basic concept is to propose and formalize a stronger institutional body for fisheries management, because without this institutional strengthening the risk of minimising even further the fishing sector in Uruguay is enormous.

A new integrated fisheries management system should introduce new concepts and relationships between biological, economic, financial, social, operational and political processes, involving all the participants, *e.g.* the Commission, scientists, fishery managers, fishing-vessel owners, unions, fishermen, industry operators and exporters in a specific fishery.

The TACs and political issues should be addressed in each fishery in order to establish the available quota, and calculate the number of individual quotas or shares in terms of percentage of the TAC. Government Decree 149/997 included the possibility of transferability of the licencees and the transferability of quotas is permitted by the present regulation. It does not seem possible to enable the transferability of just a part of an individual's share because it appears administratively complicated and too bureaucratic.

3.4 Initial allocations

Other issues must be addressed before the introduction of quota-management in fisheries:

i. The existing and projected guidelines and regulations from the Commission about the CFZ fisheries management.
ii. Selection of one or more fishery to be used as a pilot experience for an initial ITQ programme. For example the International Commission for the Conservation of Atlantic Tunas (ICCAT) manages the swordfish fishery, and Uruguay has an allocation of the 4.5% of the TAC; which means a total catch of 694t/year. This small fishery lands in two ports and there are only 10 fishing vessels in operation in Uruguay.
iii. Considerations about the initial quota allocation to the participants. The historical catches of participants should be very important, and a specific qualifying period should be established; one problem could be false fishing reports, missing fishing reports and the government monitoring system needed to control all the fishing operators in an equitable manner.
iv. The data requirements during the initial individual-quota allocation.
v. Policies and tools to ensure the economic efficiency and recovery of the fishery during the transfer process
vi. Mechanisms to ensure equity between "winners" and "losers", with the least possible negative social

Table 4
Fishing effort on Uruguayan fisheries

Fishery	Number of vessels		GRT		Main engine power	
	1995	1999	1995	1999	1995	1999
Whiting	24	28	10 479	13 832	27 700	36 011
Croaker & seatrout	33	34	3 900	4 049	13 091	13 045
Non-traditional	16	41	4 850	22 183	11 847	41 611
Total	**73**	**103**	**19 229**	**41 235.74**	**52 638**	**90 667**

Source: INAPE.

and economic impacts. The employment rate is one of the main political targets of the Government.

vii. Establishing new fishermen's responsibilities, *e.g.* bycatch-reduction mechanisms by selective devices applied to bottom-trawling fisheries and proper attention to the fishery conservation regulations.

viii. Study of the options for payment of the fisheries management changes and its implementation (education, training, licencee's costs, fishing vessels renewal, *etc.*).

ix. Procedures for quota administration, control and enforcement of quotas, *e.g.* control of vessels by satellite.

3.5 Future considerations

In accordance with Shotton (1998) some questions should be posed and be considered by all the people involved in the fishery. Obviously the implementation costs will be higher than the present INAPE administrative costs, and how to pay these is one of the elements to be discussed. Perhaps the Government does not want to pay this bill. And has the fishery sector the financial resources to pay the implementation?

In addition to such increased costs obviously the costed control measures for implementation should also be addressed (observers on board, Navy /INAPE control at sea; dockside inspections, etc.).

4. PROSPECTIVES FOR ITQ IMPLEMENTATION

4.1 Policy for the next fisheries administration in Uruguay

What is pending? Probably the main constraint to the introduction of an effective ITQ programme is the setting of an appropriate TAC for the straddling fisheries. This depends of the Commission's future regulations, which will involve conservation, economics, social and political issues, none of which are easy to resolve. Even introducing these concepts to the Ministry of Livestock, Agriculture and Fisheries will be very complicated; many Ministries do not have previous knowledge about fisheries, thus many of the fisheries management concepts, purposes and understandings are not easy to introduce to them given their lack of prior experience.

4.2 Political issues to be addressed concerning the introduction of ITQs

Fisheries management is not easy to understand for people outside the fishery, and this includes politicians and government officials outside of INAPE. The introduction of a "property-rights" concept in fisheries is complicated for lawyers also, and the "quotas management system" and/or ITQ is difficult for fishermen too. A major issue is whether the present legal system is strong enough to enable the introduction of new management strategies.

In Uruguay natural resources belong to the State, and the licencee acquires the ownership-right (the property) when the fishing vessel catches the fish. It is not clear if ITQs would be a real option for fisheries management in Uruguay, but it is obvious that the country needs a specific objective to manage the fisheries for the future because we should have a profitable fisheries activity in accordance with the points of view of the conservation, economics, social and national politics: Uruguay, as a coastal developing country, needs developed and well- managed artisanal and commercial fisheries to export, and to feed people.

The initial allocation of quota-shares is one of the most controversial aspects of the implementation phase of ITQ programmes, as it focuses on who could be eligible and under which conditions. This should be as wide as possible. For example:

i. who should receive an initial allocation?
ii. how should the shares be allocated (by fishing vessel, by catch history, by number of crew, by company performance (sales, exports, etc.)?
iii. how many shares should a stakeholder receive?
iv. what should be required in payment of the share?
v. how much share-payment should be required for each fishery? (probably not the same rate for croaker or seatrout compared to red crab or toothfish).
vi. how much should the government be required to pay for the not-shared licences remaining?

Some of the present share allocations are shown in Table 5.

To base the initial quota-share on ownership, perhaps main figure should be the historical catch during a specific qualifying period according to the history of the vessel's participation in the fishery, and adjusting this criterion by considering the capital-value involved in the older and newer fishing-vessels and/or licences.

4.3 Individual Quota Transfers

At present the licences are transferable under Government permission by two ways:

i. Selling the licence to another operator; the selling rates are outside Government control as sellers and buyers are free to negotiate a mutually acceptable agreement; or

Table 5
Main recent fishery-shares in Uruguay
(Regulatory, 1998)

Fishery	Whiting	Croaker	Swordfish
Share (t/year)	100 000	22 500	694.5 (4.75% of the South Atlantic Stocks)
Regulation	Regulation 2/79 from the Common Fishing Zone Commission (Argentine & Uruguay)	Regulation from the Common Fishing Zone Commission	ICCAT, Swordfish TAC 1998-2000. 13 June 1998

Source: INAPE.

ii. The using transfer (*rent-a-licence*) for a period of time.

The licence owners acquire legal rights to their licence, but not to the natural resources. The ITQ shares are a percentage of the total-quota allocated by the Administration under the TAC calculation, and it appears to provide an incentive to manage capital, reduce or control over-capitalization.

4.4 Institutional changes required

INAPE is at present part of the Ministry of Livestock, Agriculture and Fisheries. It has many bureaucratic and administrative costs for management, which must be reconsidered, including the management of the natural resources and the costs of industry challenges in international markets which are happening quickly because of globalization.

Perhaps INAPE's mandate should be addressed by another institutional body with more autonomy and dynamic administrative structure, as an autonomous service probably to be called National Fisheries Administration (Dirección Nacional de Pesca, DINAPE). This will be a political option for decision by the new government to be established 1 March 2000. Nevertheless, as a coastal developing country and for a true fishery sector, Uruguay should have a strong effective national fisheries institute.

4.5 The main controversies

What are the concerns with an ITQ system?

i. The fishery concentration, which would permit processors or dockside wholesalers to obtain effective monopoly control over the landings, so that individuals, or companies, could influence the market obtaining a disproportionate allocation of benefits.
ii. The participation of the share stakeholders and the share allocation will be, at the start, a major controversy.
iii. An ITQ programme will need an accurate landings-information system without false catch-reports and, more difficult, will need to introduce true reports of fish catches and bycatch: the problem of control and enforcement must be discussed and resolved, and finally, it is not clear yet if fisheries-resource conservation will result from an ITQ programme. Industry profitability and competitive recovery on export sales will depend on the political and macro-economic environment and financial steps followed by the new Government awaited in year 2000.

4.6 Future needs for ITQ implementation

A number of actions will be necessary for implementation of an ITQ system. These are:

i. Identification of the financial resources for the implementation costs. Repayment schemes for those who may wish to leave the fishery.
ii. The challenge for INAPE in relation to the new fisheries-control measures will be enormous, and scientists, technicians and administrative personnel should be trained and salaries should be commensurate with new responsibilities and duties received.
iii. Training needs for vessel's owners, fisherman, industry and technicians, including materials, such as brochures, papers, videos, tele-conferences, e-mailing lists, web-editions, local and regional meetings, etc.
iv. International financial assistance and technical co-operation to implement new fisheries management strategies, education and enforcement.

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INDUSTRY PERSPECTIVE ON RIGHTS-BASED MANAGEMENT: THE SHETLAND EXPERIENCE

J. Goodlad
Shetland Fish Producers Organisation, The Shetland Seafood Centre, Stewart Building
Lerwick, Shetland, ZE1 OS Scotland
<john.goodlad@sfpo.zetnet.co.uk>

1. INTRODUCTION

Shetland is one of the communities most heavily dependent on fishing within Europe. The islands have a long tradition of fishing and fish processing and, within the last 15 years, have developed an impressive aquaculture industry largely based on farming Atlantic salmon.

Shetland seafood (whether caught, farmed or processed) is worth around £170 million per year. Over 2500 people are directly and indirectly employed in the seafood industry; a figure which represents around a quarter of the workforce. Perhaps the best indication of how the seafood industry dominates the Shetland economy is the fact that over 80% of all Shetland's exports consist of fish and fish products.

The real importance of the seafood industry to Shetland lies in the fact that alternative employment and economic prospects are limited in this northerly, infertile and fairly remote archipelago.

Fishing has underpinned the Shetland economy throughout history. Its importance continues undiminished with a fleet of around 150 boats catching upwards of 100 000t of fish every year. The annual catch generally consists of 15 000 to 20 000t of high-value ground-fish (cod, haddock, monkfish, whiting and saithe), 20 000 to 25 000t of herring, 35 000 to 40 000t of mackerel, 15 000 to 20 000t of industrial species (blue whiting and sand eels) and around 2000t of shell-fish. The fleet is modern, competitive and efficient. At the same time the traditional shareholding pattern of working fishermen owning their own boats continues.

The Shetland fishing industry has remained important at a time when fishing has declined throughout much of the UK. Shetland has therefore become one of Britain's principal fishing centres and has been at the forefront of many fisheries management initiatives in recent years. In particular, the fishermen's representative organisation, the Shetland Fish Producers Organisation (SFPO) has played an important role in the development of the UK quota-management system.

2. THE ORIGINS OF THE UK QUOTA-MANAGEMENT SYSTEM

Before 1984, fisheries within the UK were managed on the basis of fortnightly or monthly quotas, which were allocated to individual vessels by Government Fisheries Departments. For example, if North Sea whiting or West of Scotland herring were subject to catch limits, all UK fishing vessels would receive the same fortnightly or monthly quota from Fisheries Departments. From time to time these quota allocations varied depending on vessel-size. Such a system took no account of regional variations nor of the requirements of different sectors of the UK fleet. This system was also rather remote in that fishermen, through their organisations, were not directly involved in the decision-making process as such. There were regular consultations with the fishing industry, but the final decisions on setting vessel quota-limits were made by Government.

The absence of any real involvement in the decision-making process, together with the lack of a regional, or sectoral dimension in the quota-allocation process, led to much criticism. Nowhere was this criticism more marked than in Shetland. During the early 1980s there was a lucrative industrial fishery for sand eels around Shetland during the summer months. This fishery regularly attracted a large number of vessels that would otherwise have been catching ground-fish. This left only a small number of trawlers to supply the local ground-fish processing plants. In 1983 the UK haddock quota-limits were particularly poor during the summer months. One unforeseen result of this quota was that the reduced number of Shetland trawlers were unable to land enough haddock to supply the needs of the local fish-processing industry. By the time the sand-eel fishery had finished in September, the haddock catch-limits had been raised. But, although the entire Shetland trawler fleet was now able to fish for haddock, the 'summer haddock fishery' had been lost. The possibility of landing sufficient haddock during the summer months, when a large proportion of the fleet usually diverted to industrial fishing, only seemed possible if larger per-vessel-quotas could be allocated, something which was patently impossible under the national quota-system which existed at this time.

In view of this, the Shetland fish-catching and fish-processing industries argued that a more flexible system of quota management was necessary to take account of the particular circumstances pertaining in Shetland at that time. The Shetland Fish Producers Association (SFPO) had been established in December 1982 in order to improve the marketing of its members' catches. Since the effective marketing of the haddock catch to the local fish-processing industry was being prevented by an inflexible quota-management system, the SFPO began to promote an alternative system.

Why not, it was suggested, allocate to the SFPO that share of the UK haddock-quota that the Shetland fleet would normally catch during a full year? This quota could

then be shared between member vessels in the manner best suited to local market conditions. The Scottish Office Fisheries Department was persuaded and the SFPO received its own haddock quota-allocation for 1984. The first tentative steps had been taken to decentralise quota management within the UK. This system of allocating quota to fishermen's organisations became known as the sectoral quota (SQ) system.

This experiment, in so far as the Shetland fishing industry was concerned, was successful. Unlike the previous system, it allowed fishermen, through their representative organisations, to manage fisheries. At the same time Fisheries Departments welcomed the opportunity to devolve the increasingly burdensome and time-consuming job of fisheries management. As a result there was a rapid move towards adopting sectoral quotas throughout the fishing industry at large. By 1985 most haddock, cod, whiting and saithe fisheries were being managed under the SQ system. Within two years the herring and mackerel fisheries were also being managed under this system.

3. PRODUCER ORGANISATIONS

Producer Organisations (PO's) are a relatively new type of fishermen's organisation. Unlike the long-established trade organisations (many of which have been in existence for most of this century), POs are the direct result of British membership of the European Union (EU). The first British PO was established in 1973 – the year Britain joined the then Common Market.

Under the terms of the EU Common Fisheries Policy (CFP), POs play a central role in the common organisation of the market. The principal objectives of the POs throughout Europe are "to encourage rational fishing and to improve conditions for sale of their members' products". In order to achieve these objectives all European POs have a responsibility to implement the marketing regulations of the CFP. The PO system enables fishermen to enjoy the benefits of the EU minimum-price scheme and market-support mechanisms. POs therefore must ensure that fish landed by member vessels are properly graded according to EU size and freshness criteria. The EU official withdrawal price (*i.e.* the minimum price below which fish cannot be sold) must be strictly observed if PO member vessels are to benefit from the market-intervention system (*i.e.* the system whereby financial compensation is paid for fish which cannot be sold at the official withdrawal price).

All POs throughout Europe are now involved, to a greater or lesser extent, in the implementation and administration of the EU marketing regulations. Some POs have become involved in related activities such as the establishment of quality-control systems, the marketing of fish and the establishment of fish-processing plants. It is only within the UK, however, that POs have come to play a central role in fisheries management. This new role for POs was recognised in 1993 when the EU marketing regulation was amended to allow POs, at the discretion of member states, to manage national catch-quotas. With this change in the relevant regulation, the EU has clearly signalled its approval of fisheries management by the PO sector. It will therefore be interesting to see if other member states follow the UK approach and develop fisheries management systems based on PO participation.

Within the UK there is now a total of 19 POs. These are largely, although not entirely, regionally-based. These POs now represent the vast majority of Britain's fishermen, boats and catch. There are (on the latest figures available) 2939 fishing vessels over 10m in length in the British fleet; of these 1725 are in membership of the PO sector. While this represents only around 60% of the total number of boats, but in terms of gross registered tonnage and total engine power the PO sector accounts for 80% and 77% respectively of the total UK fleet over 10m. In terms of fish-quotas it is estimated that the PO sector manages over 95% of all quotas. The 19 POs reflect the geographical and sectoral diversity of the British fleet.

That proportion of the British fleet which is not in membership of the PO sector is referred to as the 'non-sector'. Although the non-sector accounts for a fairly large number of boats, it represents less than 5% of British quotas. The non-sector is managed in much the same way as all fisheries were managed before 1984, *i.e.* by individual vessel monthly-allocations set by Fisheries Departments. The non-sector largely consists of smaller vessels, but in addition to the non-sector, there is also a very large number (5372) of 'under 10 metre vessels' within the UK fleet. While very large in terms of numbers of individual vessels, this sector obviously consists entirely of small boats, many of which are operated on a part-time or seasonal basis, and is also managed directly by Fisheries Departments.

4. THE DEVELOPMENT OF SECTORAL QUOTA MANAGEMENT

Since its introduction in 1984, the Sectoral Quota (SQ) system has continued to develop and adapt to changing circumstances. Each year Fisheries Departments issue a consultation paper which proposes certain changes to the basic SQ system. On the basis of the response from the POs and the non-sector, changes are made to the management system for the ensuing year.

Through regular changes and modifications, the SQ system has now developed into a complex and comprehensive system of fisheries management. POs must now manage all fisheries for which there are UK quotas in the North Sea (Area IV), West of Scotland (Area VI) and the Irish Sea and English Channel (Area VII). It had previously been possible for POs to manage some fisheries and opt to remain under non-sector management (*i.e.* management by Fisheries Departments) for others. Sectoral quotas have been calculated on the basis of the actual catches (track-record fishing performance) of member vessels during the previous three years. Pelagic quotas had previously been based on the catches of the previous two years. Since 1992, track- record fishing performances

have been attached to, and transferable with, vessel licences, rather than to the vessels themselves.

Having established the sectoral quota available to each PO, Fisheries Departments then monitor catch uptake and will close a fishery when the sectoral quota has been caught. Apart from this, the management of the quota is largely at the discretion of the PO concerned. As one would expect, different POs adopt different quota management strategies depending on their individual circumstances. In so far as ground-fish quotas are concerned, most POs continue to allocate quotas to member vessels on a monthly basis. Sometimes these quotas vary according to vessel-size bands, but more often similar quotas are allocated to members regardless of vessel size. Several POs, however, began to allocate individual annual vessel-quotas based on the individual vessel licence track-record fishing performance. In other words the quota-allocation which a PO receives on behalf of a member vessel is simply reallocated to that vessel on an annual basis. Some POs allocate all their quotas on this basis, others only for some species, and others only for some vessels. Other POs have made similar arrangements but on an individual-company basis as opposed to an individual-vessel basis.

Pelagic quotas are essentially allocated to only two POs (the main Scottish PO and the Shetland PO) with individual pelagic quotas being allocated to those pelagic vessels not in membership of these two POs. Both POs in turn allocate individual annual pelagic quotas to their pelagic members. Again these quotas are related to individual track-record fishing performances.

A further development of the SQ system was to allow POs complete discretion in swopping fish among each other. This ensures that UK quotas would not remain uncaught. Quota-swops are now becoming very commonplace with POs swopping away fish-quotas unlikely to be caught in return for fish-quotas which are in short supply. Direct fish-for-fish quota-swops are most usual although quota-gifts (which can be re-paid in future years) have become more common.

Purchase of fish-quotas has been possible since 1993 through a special scheme which was introduced to complement the fleet de-commissioning scheme introduced at that time. Under this scheme, vessel owners interested in de-commissioning their ships could, as an alternative, sell their quota entitlement (arising from their track-record fishing performance) to the PO they had been a member of for the past three years. In return for selling quota entitlement to the PO, the vessel owner had then to relinquish his vessel licence in the same way as when a vessel owner accepts a de-commissioning grant. This scheme is essentially a form of industry- funded de-commissioning, and since the requirement to have been a member of a PO for three years was subsequently relaxed, a vessel's quota entitlement can now be sold to any PO. The SFPO has purchased the quota entitlements of seven vessels to date, with a view to owning these quota entitlements on a communal basis.

As already noted, Fisheries Departments continue to manage the non-sector. Over recent years the size of the non-sector has been reduced. Most larger vessels are now in membership of POs and the non-sector now consists of a large number of small vessels. The departure of larger vessels from the non-sector to the PO sector has resulted in substantial track-record fishing performance being lost from the non-sector. This has in turn resulted in the non-sector quota allocations being further reduced with very poor individual vessel-quotas being allocated to non-sector vessels by Fisheries Departments.

As a SQ system developed so did increasing awareness of the importance of track-record fishing performance. As each PO endeavoured to maximise its sectoral quota allocation, increased attention was focused on the catch record of vessels applying for membership. Most POs adopted a policy of only admitting as member those vessels that had a track-record of fishing performance comparable to vessels of a similar size who were already members. It became widely recognised that admitting vessels as members with inadequate catch records would simply result in new members requiring quota-allocations but be unable to contribute significantly to the quota pool.

The non-sector consequently became a residual for that proportion of the fleet that had poor track-record catches and were therefore unable to secure membership of a PO. Real fears were expressed that, if more of the non-sector fleet with reasonable track-record catches were to join the PO sector, the already poor non-sector quota-allocations would become even worse. In response to this, Fisheries Departments have, since 1995, guaranteed a minimum quota-allocation to the non-sector.

Throughout the development of the SQ system, UK fishermen remained almost unanimously opposed to the buying and selling of quotas. The SFPO quota-purchase initiative was therefore roundly criticised by many UK fishermen. In response, the SFPO pointed out that it was simply trying to secure future fishing opportunities for member vessels and that this option was open to all UK PO's under the SQ system rules. While no other PO followed the Shetland example, increasing numbers of fishermen began to consider securing additional quota on an individual basis.

5. FIXED QUOTA ALLOCATIONS

One of the main advantages of the SQ system, based on the three-year rolling reference period, was the fact that quota-allocations were directly based on the historical landings of vessels. In this way quota- allocations would always bear a close resemblance to actual landing patterns. The principle disadvantage was, however, the scope for individual vessels to increase their track-record fishing performance by deliberately increasing their landing records. In other words fish which had not been

caught were "landed and sold" in order to improve a vessel's track-record during the reference period. This became known as "ghost fishing" and is, of course, the opposite of over-quota or "black fish" landings. The scale of "ghost fishing" increased during the mid 1990s as more and more fishermen realised that fishing vessel licences with large track-records were worth more than licences with small track-records.

In an effort to prevent "ghost fishing" spiralling out of control, UK Fisheries Departments and the fishing industry established a Working Group to examine this issue. The Groups concluded its work in 1997 and recommended that, in future, the SQ system should be based on fixed quota-allocations derived from vessel landings made during the three year reference period of 1994, 1995 and 1996. This would, the Group argued, fix track-records and thereby remove the incentive to "ghost fish". It would also simplify the SQ allocation system in that every vessel licence would have a fixed track-record attached which would not be subject to annual variation depending on catch performance.

Fixing track-records, detractors argued, would remove the flexibility inherent in the rolling reference period. It would also, it was argued, take the industry closer to a system of property rights based on individual transferable quotas (ITQs), something which had hitherto been opposed by British fishermen. In the event, UK Fisheries Ministers accepted the Working Group recommendations and have managed UK fisheries in 1999 on the basis of fixed quota-allocations. Each vessel licence has been allocated a fixed quota-allocation (FQA) based on its landings from 1994 to 1996. This allocation is expressed by species in 100kg units and, when related to the total UK quota during this period, is effectively the individual vessel-quota entitlement of the UK quotas.

Apart from the change from a rolling to a fixed reference period, the SQ system has remained unchanged with quota-allocations being made to POs on the basis of member vessels FQA's. In reality, however, a fundamental change had been made to the SQ system which focused the attention of licence holders on the size of individual quota-allocations and their value in terms of selling and renting. The UK fishing industry had consequently taken a huge step towards a management system based on property rights.

6. THE INDUSTRY RESPONSE

Although UK fish-quotas are not assets with legal title of ownership (as is the case with property rights), for some time now fish-quotas have been seen as having a monetary value. Ever since POs allocated individual quotas to individual member vessels (based on that vessel's track-record catch), fish-quotas have become tradeable. Although the change to FQAs did stop the deliberate enhancement of track-record performance for subsequent resale, it also focused attention of all fishermen on what their track-record fishing performance actually was. For the first time, all UK fishermen had to confirm their agreement with the quota allocations attributed to their licence. This raised the profile of quota value in a way which had never been the case under the old SQ system.

The fact that fish-quota is not a legal asset in its own right, and is inextricably linked to a vessel licence, has not discouraged the emergence of quota-trading as a growing activity. Standard legal agreements are now used to separate quotas from licences and the industry itself is arguing that Fisheries Departments should formally reallocate individual FQAs every year to reflect the quota-trading which has taken place during the preceding year.

Most quota-trading has taken place in the ground fish sector as the pelagic sector has fewer vessels and a much smaller number of quota transactions. The clear trend has been the purchase of additional quota by the more successful fishing partnerships who have in turn made arrangements with their PO for an individual annual quota to reflect the enhanced catch-opportunities which they have purchased. This has inevitably hastened the decline in fishing vessel numbers as less successful partnerships, or licence owners wishing to retire, have sold their FQAs.

In addition to the sale of FQAs, quota-rental is now becoming more widespread. Fishermen, who are perhaps short on quota during a quota period, or lack the capital to purchase FQA, often rent quota from those with quota surplus. Again, because of the fact that quotas do not have separate legal title, rentals are subject of standard legal agreements involving the 'swopping' of fish between POs. The development of a market for quota rental has in turn encouraged the emergence of a group of FQA holders who have decided it is easier to rent quota rather than to fish it. This is a development which appears to be commonplace wherever ITQs have been introduced.

The inevitable consequence of the developing market for quota-purchase and quota-rental is a call for the system to be further simplified whereby the quota would be separated from the licence and would thereby assume a legal entity of its own. This would eliminate the need for costly legal agreements covering quota- purchase and quota-rentals, but would of course be a change which would further transform the SQ/FQA system and move it even closer to a system based on property rights.

Despite the ever increasing scale of quota-trading which is now taking place, the official policy position of the national fishermen's federations is still one of opposition to ITQ's. This reflects the fact that the majority of fishermen have not yet participated in the quota-trade. But a sizeable, and ever growing, minority have bought, sold or leased quota. These fishermen are becoming increasingly vocal in defending the system of quota-trading. There are now clear signs of the beginnings of a fundamental shift of opinion amongst British fishermen regarding the issue of property rights.

7. THE LEGAL POSITION

This debate on property rights within the UK fishing industry has given rise to an interesting legal question. It is clear that independent states (such as Iceland and New Zealand) can confer a legal property right of fish-quota to individuals out of what has hitherto been regarded as the property of the State. Within the EU, the situation is different. Member States do not "own" fish-quotas as such. Fish-quotas are essentially a "common resource" under the terms of the CFP. Each member State receives an annual entitlement to fish a proportion of this "common resource". These national allocations are determined by an agreed allocation key which is known as relative stability. While management of these national allocations are clearly the responsibility of each member State (and hence the variety of fisheries management systems adopted within the European Union) the national allocation is not the "property" of the member State as such.

There is therefore an interesting debate as to whether or not the conferring of property rights can be done by the member States or can only be done by the European Union. If property rights were to be conferred by the European Union, and these were to become freely tradable amongst community fishermen, the principle of relative stability would be compromised. This would cause enormous political problems for many member States and would therefore be resisted. On the other hand, member States may not have legal competence to confer property rights on their own fishermen. Until this question is resolved, it is unlikely that British, or other E.U fishermen, will be able to obtain full property rights over fish-quotas.

8. THE SHETLAND RESPONSE

The Shetland PO recognised at an early stage that quotas were becoming valuable commodities. As early as 1993, the SFPO took advantage of the Government scheme to purchase fish-quota in association with the decommissioning of vessels/licences. As already noted, the SFPO have purchased (between 1993 and 1997) a total of seven vessel-quotas under this scheme. The SFPO took a decision to make a substantial investment in purchasing fish-quotas under this scheme with the aim of holding this quota in common ownership for the benefit of all member vessels, both present and future. This total investment amounted to some £850 000 enabling the Organisation to purchase 2386t of ground-fish.

As quota-trading has become more widespread, so the cost of acquiring quota has increased. This was particularly marked in 1998 as a result of the introduction of FQAs in 1999. An indication of how quotas values have increased, is that the SFPO paid £250/t for cod in 1995; by 1999 the cost of buying a tonne of cod has increased almost eight-fold to £2000/t; ground-fish quota held by the SFPO is probably now worth well over £4 million.

This quota investment by the SFPO has obviously been financially successful and has enabled the Organisation to provide member vessels with enhanced fishing opportunities. Largely as a result of this, few individual Shetland fishermen have seen the need to purchase their own additional quota. The Shetland PO has also been unique amongst UK PO's in becoming a quota-holder in its own right. With the enormous changes taking place in the UK fishing industry in terms of quota-ownership, there is concern within fishery-dependent communities, such as Shetland, that unless there can be greater security over quota, quota could be sold outside the islands never to return. Shetland's economy, after all, is dependent on the fishing industry and, without fish-quotas future economic and employment prospects for Shetland would be bleak. While the initiative that had been taken by the SFPO was commendable, this FQA of 2386t represents only 16% of the total SFPO ground-fish FQA.

After much debate the local government of Shetland, the Shetland Islands Council (SIC), took the decision to invest in quotas to create a pool of community-held fish-quota. The SFPO agreed to act as agents for the SIC and to hold any quota purchased in a separate "community FQA". The funding for this community investment came from Shetland Leasing & Property Development Ltd (SLAP) which is a commercial investment agency of the SIC. A total of £2.5 million was invested in acquiring 2445t of ground-fish quota in 1998. So far this year a further 2000t of ground-fish quota has been acquired at a cost of £3.3 million.

The SFPO therefore holds two pools of ground-fish quota; one representing its own investment of 2386t of FQA with another held by SLAP on behalf of the wider Shetland community of 4445t of FQA. Taken together, these two quota-pools amount to some 6831t of fish. This is a significant quota-pool compared with the 12 489t of quota owned privately by the Shetland fleet. In summary therefore, out of the total ground-fish quota of 19 320t administered by the SFPO, some 6831t, or 35%, is held in community ownership (either by SFPO itself or by SLAP).

The fact that a significant proportion of Shetland's ground-fish quota availability is effectively held in common ownership is unique within the UK. But what makes the "Shetland ownership" of the marine resource so significant is the use which is made of this quota.

9. THE NEW ENTRANTS SCHEME

With the development of quota-trading, the cost of entering the fishing industry has escalated. Not only does a prospective fishermen have to pay for a boat and fishing licence, he must also now finance the cost of fish-quota. In many cases the cost of quota is as much as the combined cost of a boat and fishing licence. This has the inevitable consequence of making entry into fisheries much more difficult for young fishermen. There is now a clear trend for existing successful fishing partnerships and companies to acquire additional quota and thereby expand their operations. In short, the UK fishing industry is becoming concentrated into fewer hands as quota is traded.

While Shetland has many successful fishing partnerships, there is no guarantee that their FQAs will not, in the fullness of time, be sold out of the islands. At the same time, there may be many young Shetland fishermen who lack the capital to buy quota and thereby become successful fishermen in their own right. It was this scenario of an island group, surrounded by fish and dependent on the seafood industry, seeing its marine resource being eroded away which prompted first the SFPO and then the SIC to enter the market and purchase quota.

The SFPO quota-pool is used to augment member vessels' monthly quota-allocations and will continue to enhance member fishing opportunities in the future. There are no circumstances in which the SFPO quota-pool would ever be sold and it will therefore continue to provide additional fishing opportunities for future generations of Shetland fishermen. This is the "return on capital" which the SFPO is obtaining from its quota investment, quite apart from the considerable appreciation in value over time.

In contrast, the SLAP quota-pool is being used to help new entrants get started in the industry. The SLAP quota-pool is set aside by the SFPO as a quota reserve for fishermen who cannot afford to purchase quota. These fishing partnerships are able to become full members of the SFPO, and are able to fish out of the general quota-pool (and thereby obtain the benefit of the additional SFPO quota-pool) despite not having any individual FQA. Instead they pay a proportion of their gross earnings to the SFPO in order to "rent" a share of the SLAP quota-pool. To date a total of 8 "new entrants" have been able to acquire a boat and licence and start fishing without having to purchase quota. The total numbers of new entrants able to start fishing under this scheme will ultimately be limited by the size of the SLAP quota-pool. The intention is, however, to continue to invest in quota in order to enable more new entrants to join the industry. So far only ground-fish quota has been purchased but there is the possibility of acquiring pelagic quota in the future.

The "return on capital" for SLAP is the rental income (which the SFPO collects and remits to SLAP), the appreciation in quota values and, finally, the fact that investment in these quotas is enabling fishing activity to continue to develop within the islands. As well as creating jobs at sea, an additional Shetland fishing vessel will create employment onshore in the fish-processing and ancillary services.

Despite considerable original criticism, there is now growing interest in the Shetland scheme. A number of other UK PO's are now considering quota-purchase and rental schemes in order to secure fishing opportunities for their own membership.

10. CONCLUSIONS

The system of UK fisheries management is firmly based on quota-allocations and is therefore a classic resource-based management system. The development of the SQ system, and especially the recent introduction of FQAs, has resulted in fish-quotas being bought, sold and leased. Although there is no legal title to UK fish quotas, increasing numbers of fishermen are prepared to invest in an administrative system which confers most of the advantages of an ITQ system. For many people the UK system of fisheries management is virtually a system of ITQs by another name.

At the same time there are important differences. The fact that FQA holders do not have a legal title over their investment is clearly important. In reality, it would however be inconceivable that any Government would consider abandoning quotas as the method of managing fisheries. Another important difference is that POs play an important role in the management of UK quotas. Under a classic property-rights system it would be difficult to envisage a role for POs as fishery managers.

The debate over whether the UK should formally introduce ITQs, with legal title for fish-quotas, will continue. The UK Fisheries Minister has rightly said that there is presently no consensus within the fishing industry for such a system. Having said this, increasing numbers of fishermen (who have bought FQAs) are now calling for ITQs to be introduced. Indeed, there is now the beginnings of what could be a seismic shift in attitudes amongst UK fishermen on the issue of property-rights. It may only be a matter of time before the majority opinion favours a system of ITQs. It is therefore probable that further changes will in due course be made to the SQ system which will separate FQAs from vessel licences and thereby confer legal title on fish- quotas.

Whether or not there is a further move towards ITQs, the Shetland system of "community-owned fish-quota" will continue to secure access to the marine resource for a fisheries dependent island community. In particular, this pool of community fish-quota will continue to be used to help young fishermen start their fishing careers without having to invest in fish-quota. There is no reason why the concept of community fish- quota cannot be as valid under an ITQ system as it is under the SQ/FQA system.

Shetland has pioneered the concept of community ownership of marine resources which provides the necessary security of fish quota to sustain the islands' fishing industry into the foreseeable future. This system of community fish-quota could be relevant to other fisheries dependent areas where alternative employment opportunities are limited.

NO RIGHTS, NO RESPONSIBILITY

M. France and M. Exel
Kailis and France Group, PO Box 280
Mt Hawthorn, WA 6915 Australia
<mfrance@newfish.com.au> and <mexel@newfish.com.au>

1. INTRODUCTION

The aim of this paper is not to preach to the converted. It is widely accepted that rights-based management is a fundamental tenant of effective fisheries management practices. Yet this concept has faltered in its application to international fisheries – particularly high-seas fish-stocks. The reluctance of nations to challenge the oft-quoted "freedom of the high seas" is in direct conflict with national and international responsibilities for conservation, management and protection of the environment and fisheries.

As an Australian company, we have significant concerns at the lack of rights-based management on the high-seas. We are recent entrants to high-seas fishery operations having only been involved over the past decade though we have been involved in domestic fisheries for over 40 years. We operate in the international arena, with experience variously in high-seas fisheries such as tuna, orange roughy, Patagonian toothfish, and other international resources.

We have located new resources in several instances and have had the distressing experience of watching as these are rapidly over-exploited, often by vessels from nations that have stringent, effective rights-based management regimes in their domestic fisheries.

It is time for nations to deal with the problems of high-seas fisheries management and begin to embrace the proven requirement to move to rights-based management. Most recently, we have located a new resource of several species including orange roughy, on the high-seas in the Indian Ocean. We have sought assistance from governments to effectively manage, enforce and research the area. Yet the problem appears almost insurmountable, as all parties become tangled in the debate of "freedom on the high-seas". The fact that this approach is directly opposite to the strong stance these same nations take on conservation appears lost on their governments. The United Nations can only move forward at the behest of concerned parties – and it is time to raise those concerns significantly at an international level. We offer more detail on these issues later in the paper.

There is no single cause for the problems of high-seas management yet lack of effective access-rights is certainly one of the biggest. There are many others – politics is a common example - often linked to sovereignty issues or allocations. Yet too often the last factor that seems to get consideration in the debates is the fate of the resources and the environment. Simple delays of a couple of years can result in the over-exploitation of a resource to a point of commercial non-viability. The Louisville Ridge orange roughy fishery (approximately 1000 miles east of New Zealand) was a classic example of the speed with which this can occur.

We recognise there are still paternalistic attitudes of some governments and organisations against rights-based management for industry members and it is these attitudes that are directly impeding progress towards effective conservation and management of fisheries resources.

At the 2nd World Fisheries Congress held in Brisbane, 1996 it was clear that over-capitalisation was one of the largest problems facing our fisheries, world-wide. The underlying cause of this problem is the lack of tradeable, secure fisheries access-rights. With no incentive for the fishermen to protect the environment or the fish-stocks, they are forced to compete by purchasing larger, faster, better boats than others in the fleet, and catch as much fish as they can before someone else gets a larger share. Little wonder the environment comes last in this equation and no surprise that over-capitalisation and over-exploitation are the results of a history of fisheries management without secure access-rights being allocated.

Environmental groups have a perception of fisheries as being ove-rexploited generally and are increasingly expressing major concerns over the lack of sustainability of current fishing practices. It is time to listen to some of these concerns and take proactive steps to prevent unsustainable practices in the future.

The United Nations Convention on the Law of the Sea (UNCLOS) is a conservation-based Convention, yet it deals haltingly with international rights-based fisheries management regimes. References to cooperation in management can be found in various Articles, but the challenge of dealing with international rights was too great at the time UNCLOS was prepared. This is not meant to criticise UNCLOS, which has resulted in significant progress for fisheries management over time, but rather is to identify the single biggest challenge that has yet to be resolved.

Recognition of the difficulty in dealing with high seas issues under UNCLOS has recently resulted in formation of the "Agreement for the Implementation of the Provisions of the United Nations Convention of the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995" (the Fish Stocks Agreement). This has gone part way towards addressing the problems of management of international fisheries. But, it still stops short of addressing the fundamental

issue of rights-based management, leaving that to the Regional Fisheries Management Organisations to deal with as best they can. Without guidance, and without acceptance that rights-based management is a fundamental requirement to effective and long-term fisheries resource sustainability, international fisheries are going to suffer a more accelerated fate than national fisheries have in the past. For boats to be able to operate on the high-seas they must necessarily be larger, more efficient and able to harvest more fish than the typical inshore domestic fleets. This exacerbates the problem of over-exploitation as they are able to take large quantities of fish in a relatively short period of time. Without rights-based management, boats will be over-capitalised, stocks over-exploited and the environment will be a secondary consideration.

It is axiomatic that any person will look after their property better when they own it, compared to when they rent, lease, or worse yet, squat in it. House owners are more willing to put time, effort and money into their property compared to when they are renting accommodation. It is no less the case for fisheries access- rights. The problem is exacerbated in fisheries as operators have to compete directly with their peers for a share of the stocks – hardly a recipe for success.

It is beyond time to deal with allocation of fisheries access-rights for high-seas fisheries. Everyone is aware of the problem, but it is necessary to locate someone prepared to deal with it.

2. WHAT IS RIGHTS-BASED MANAGEMENT?

Rights-based management need not be individual transferable quotas (ITQs), which are simply one mechanism for fishing access-rights that are often confused as being the mainstay requirement. To date, ITQs are probably the strongest form of rights allocated in fisheries, but they are not applicable in all instances. This paper does not deal with the issue of "which rights are the best". That debate must necessarily be linked to the particular management requirement, fishery and circumstances at the time.

There are a myriad of options for rights-based management tools ranging from the most simplistic, that being a "limited-entry" regime where boat numbers are restricted. The options move through all manner of input-controls (vessel size, shape, engine power, net sizes etc) to the more commonly discussed output-controls, which operate on the basis of restricting the amount of fish that can be harvested from a particular fishery, or region. Recent environmental literature is moving into the use of "indicator species" to determine the health of the fishery ecosystem, and moving away from the focus on target species as the main management tool – perhaps this will become yet another form of right in the future?

What is important for any rights-based management regime is that the rights must be secure, easily definable, adjustable and preferably tradeable. The rights can stand totally separate from the level of permissable catches – for example they could simply be restrictions on the number and sizes of vessels. Alternatively, they could take the form of proportional shares of the Total Allowable Catch (TACs), as in the case of most ITQ schemes. This allows the TAC to be varied upwards or downwards, without affecting the rights allocated to individuals, so maintaining the security of the rights. In extreme situations, TACs can be set at zero – yet the operator will still hold a share of the rights to that fishery or fish-stock.

Managers should avoid the desire to take away fishing rights for breaches of rules or regulations as this simply undermines the strength of the rights as management tools. Fines, suspensions, prison sentences and many other administrative measures are available to ensure adherence to rules and regulations. And the greater the security of the rights, the greater the imperative for industry to work with managers, scientists and environmental agencies.

3. WHAT ARE THE FISHING INDUSTRY'S RESPONSIBILITIES?

To harvest fisheries resources is no longer a right that everyone can say is theirs, with any conscience. Resources are too limited and recognition of the damage that can be done by unregulated access is increasing. Given this, those of us who operate in fisheries must take responsibility for:

i. sustainable resource harvesting practices
ii. maintaining environmental integrity
iii. research into the fisheries and associated species
iv. effective surveillance and compliance, and
v. sharing the costs of management.

How these responsibilities are implemented will vary among nations. In some cases, industry will be expected to pay the full costs of these management responsibilities and meet license requirements to an extreme level.

In other cases the governments may pay all, or a portion, of the costs and industry may only have to meet limited requirements towards maintaining overall environmental integrity. The mechanisms to meet these responsibilities is not the focus of this paper, but the fact that they must be implemented is unquestionable.

To apply these responsibilities to high-seas fisheries should not be difficult. They are basic principles of management for any fishery and should be followed by all.

4. WHY WILL THE FISHING INDUSTRY NOT DEAL WITH THESE RESPONSIBILITIES WITHOUT RIGHTS-BASED MANAGEMENT?

While there is an obvious answer for many, there is still some debate over the efficacy of rights-based management in various parts of the world and probably among various groups involved with fisheries.

It would be unusual for the fishing industry as a whole to agree on any single issue, but it would be safe to

say that the vast majority of the industry agree with the need for rights-based management. How to define and implement it is a different matter, as is how to allocate those rights, once defined. But the principles are certainly clear.

The passion for, or against, rights-based management on the high-seas flows often from the position you hold within the industry itself. If you are a "follower" waiting for someone to locate resources, then moving in to participate in the over-exploitation of resources, you clearly do not want rights-based management. More specifically, a follower will not support rights-based management until they have managed to catch their share of the resource or create sufficient catch-history to assure their vessel of an allocation in future. A pioneer who believes in defined rights (just as a gold prospector seeks to stakes his claim) will despair at the senselessness of it all when nothing happens.

Operators have no security of tenure without secure access-rights. This means they have no future in the fishery past the point where they and their competitors over-exploit it to the point of commercial non-viability. They can do little other than work on the principle of "making a quick buck" from the fishery, and hopefully, doing it faster, more efficiently and effectively than their competitors. There is an imperative for operators to get into the fishery before others do, and to get as much from that fishery as fast as they can before others destroy it.

There is no incentive for the fishing industry to be responsible in its actions without rights-based management. In fact, there is a positive disincentive to being responsible. Rules and regulations can be implemented to mitigate this partially. Yet, as with all rules and regulations when they are forced upon human beings, they are not embraced or treated with enthusiasm when compared to regulations developed with input and genuine understanding of the benefits to individuals.

Without rights-based management, the fishing industry is forced to take the short-term approach, and will pay limited regard to the environmental and regulatory regimes in place, past meeting the bare minimum requirements. With sensible, structured rights the industry has a positive incentive to improve all aspects of its fishing responsibilities - from the starting point of research and compliance through to sustainable environmental practices.

5. WHY IS THE ISSUE OF RIGHTS-BASED MANAGEMENT ON THE HIGH-SEAS SO IMPORTANT?

5.1 Origins of the problems

To extend the concept of rights-based management onto the high-seas fisheries was impossible at the time UNCLOS was developed – it was hard enough coming to grips with domestic management arrangements.

Over time, operators have been forced to travel further afield to locate new stocks, new regions and new uses for their over-capitalised fleets. As national fisheries management began to slowly solve the fundamental problems of over-capitalisation and over-exploitation by introducing rights-based management regimes, the excess fleets had to go somewhere. National management agencies paid limited regard to where the excess vessels moved to - as long as they were no longer in their backyard and in fact subsidies were often paid to re-deploy the excess fishing-capacity elsewhere.

As excess capacity was moved out of domestic fishery opportunities, they moved into Developing Nations' Exclusive Economic Zones, or Fishing Zones, and the high-seas. The problem continued. An increasing number of boats began to explore high-seas regions in the hope of locating new stocks as there was limited scope for alternative uses for the vessels. It became a choice of tying the bigger, better, faster boats up to the wharf for many months of the year, or explore new regions. This increased competition for those fleets that had been fishing the high-seas for many years and who had endured the additional costs and complexities of large scale fishing with only limited competition for some time. The race was on.

5.2 Highly-migratory species

Over the past decade there has been increasing recognition of the problems created with unregulated high-seas fishing activities on highly-migratory species. Southern bluefin tuna are now being caught on the high- seas at higher levels than ever before by vessels from nations outside the management group of Japan, New Zealand and Australia. The rights-based management regime in the Commission for the Conservation of Southern Bluefin Tuna is neither all-encompassing in terms of current participants in the fishery, nor is it enforced against those outside the management regime. Yet it has assisted management of the stocks by those nations included in the regime, but they are constantly faced with the battle of having to deal with "outsiders" undermining their efforts.

Those outside the southern bluefin tuna management regime continue to increase their activities on the high-seas, even though the tuna stocks are recognised as under pressure. They have virtual freedom to do this, as there is no scope to allocate and enforce high-seas rights for a highly-migratory species at present. Implementation of the Fish Stocks Agreement should change this - one can only hope so.

5.3 International management regimes' failure to deal with rights-based management

In the Sub antarctic, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) is responsible for conservation of fisheries resources as well as other species. Scientifically it is one of the more impressive international groups and deals with environmental interactions, not just the target species. But a management agency it is not. Not only does CCAMLR refuse to deal with the issue of rights-based management (allocations), it still operates in the world of

competitive TACs - the very management mechanism that has proven disastrous in numerous cases around the world - probably hundreds. Yet the political problems of allocation have stifled progress on rights-based management.

What is the result of CCAMLR's inability to deal with rights-based management? Icefish stocks, fished to commercial non-viable levels in the late 1980s; grey rock-cod stocks, fished to commercially non-viable levels in the mid 1980s; marbled rock-cod, fished to commercially non-viable levels in the mid 1980s; Patagonian toothfish - currently being fished extensively by illegal and unregulated vessels both inside and outside the CCAMLR regions - to the extent that some NGOs are urging the species be listed as endangered under CITES!

Because there are no rights allocated it is not in any one particular CCAMLR member's (or group's) interest to enforce the management regime - and there are limited benefits to undertaking the role of policeman alone. In the example of toothfish, responsible industry members from around the World are taking action with environmental groups and some government agencies to curtail at least the illegal and unregulated fishing aspect of the problem. Yet the more fundamental problem of non-rights-based management within the management framework remains.

The competitive TACs under the CCAMLR regime increase the need for industry to get better, bigger and more efficient boats. This increases the costs of fishing and speeds up the race to catch "their share" of the competitive TAC. Once the season closes, these newer, bigger and better fishing vessels must either be tied to a wharf until next year, seek new resources on the high seas, or participate in illegal fishing activities in CCAMLR waters knowing there is a low risk of being caught. Some do a mix of all three. Others remain positive in the face of adversity and challenge the conventional "wisdom" of a management body that supports outdated and internationally derided practices like competitive TAC-fishing to take place.

Whatever the approach, it is clear that rights-based management is essential if the toothfish fishery is to remain viable in many regions. Nations like Australia, France, South Africa and the United Kingdom which have EEZs around islands in CCAMLR waters can continue to protect their portion of the toothfish stocks and do so vigorously. Interestingly, both Australia and France have allocations of quota to limited numbers of vessels – they have recognised the essential need for rights-based management in fisheries.

5.4 Straddling stocks

Orange roughy stocks are not found exclusively on the high-seas but also within EEZs, and straddling stocks are recognised by the Fish Stocks Agreement as being another group that has not been effectively managed over time. Canada probably began the main push for this management as a result of the collapsing (now collapsed) cod stocks and fishing by other nations in waters just outside their EEZ off Newfoundland. Yet the issue is still present, as evident by recent activities on straddling stocks less than 20 miles to the south of the Australian EEZ.

Aggregations of orange roughy had been located by Australian operators, who fished them alone for several months before they were joined by New Zealand vessels wanting to take part. Meantime, the Australian industry had convinced the Commonwealth management agency to limit the permissible Australian licenses to the number of boats operating, or intending to operate. No further entrants were to be considered. This limitation was the first step towards effective rights-based management.

The New Zealand fleet, joining the fishery, created some understandable opposition within Australia, and negotiations over the following 12 months resulted in an agreement between the two countries, and industries, to a TAC, and appropriate shares of the fishery. This was a major step forward for rights-based management and it was recognised that the Fish Stocks Agreement specifically covered such eventualities, albeit not currently in force internationally.

Within one month of both Australian and New Zealand catches of the precautionary TAC and respective allocations being filled this year, 4 foreign vessels "arrived" on the aggregation and began to harvest orange roughy in defiance of the Agreement between Australia and New Zealand. That three of them came from one country with crew or officers aboard who were known to have been fishing the region previously under the legal New Zealand and Australian regimes is regarded as no coincidence in the fishing industry. The fourth boat carried a Flag of Convenience, and has been linked also to groups known to have fished the area previously within the regulations.

For the legitimate industry members in Australia and New Zealand, who were avoiding fishing the region to protect the stocks, and taking responsibility for their actions, to say that there was "considerable anger" is a significant understatement. We sat back and watched while four vessels – claiming rights to participate under the "freedom to fish the high-seas"- plundered the very stock we had agreed to manage responsibly.

Interestingly, and to the point of this paper, those operators with the rights-based management allocations have NOT broken ranks and sought to plunder the stocks in the face of extreme provocation. They have chosen to act responsibly, to deal with the issue through diplomatic and international channels, and to make sure that those identified as linked to these irresponsible practices eventually pay for their actions. With rights allocated to the existing group, it is in their interests to protect the resource, see it properly managed and researched, and ensure it is sustained for the long term.

5.5 High-seas stocks

The discovery of orange roughy concentrations on the now-famous "Louisville Ridge" is another classic

example of where the lack of rights-based management on the high-seas is failing to protect resources. The fishery was discovered by two vessels. Within 12 months there were about 20 vessels fishing for orange roughy on the same spot. One year later, there were over 40 fishing vessels catching the species. The fishery was literally commercially non-viable within three years of its discovery. The speed of over-exploitation is often what impedes proper management – and is used as an excuse not to act internationally, as it is recognised as a slow, painful process likely to lead nowhere.

More recently, we have discovered localised aggregations of orange roughy and several other species of fish on the high seas in the Indian Ocean, in an area we have named "Halliville". There are few secrets in the fishing business, and within a month there were an additional four vessels fishing alongside our vessels. Fortunately the other companies are willing to discuss the concept of rights-based management for the fishery, but it is only a matter of time before others begin to plunder the resources.

We directly approached the Australian government with details of the fishery, the region, and all aspects of our operations. They in turn have approached their foreign-country counterparts to gain support for the implementation of a regional Agreement, using the Fish Stocks Agreement as a possible model for introducing effective management. But the governments appear hampered by the lack of definition of high-seas rights. They are confronted with the problem of possibly regulating the legal industry, but being unable to control the unregulated operators, claiming "freedom of the high-seas" to participate in the plunder of high-seas stocks.

How long before these newly discovered resources are commercially unviable depends on the will of governments to grapple with the problems of having no rights-based management for the high-seas. As a company we are resigned to being more heavily legislated and regulated than those outside the management regime that becomes implemented. We may well have to sit on the boundary having filled our quota and watch others decimate the fishery. No-one should accept this as reasonable practice in this day and age.

On the high-seas, the fishing industry is unable to take firm responsibility for its actions without suffering financial losses. In some cases (*i.e.* for the 'followers') these losses are short-term, as they would only regard the fishery as an opportunity to make a quick buck and then move on. For those with a more responsible approach, it is more likely to be a long-term loss as they abide by regulations and end up watching others plunder the stocks.

Many in the industry are being forced to adopt other priorities instead of responsible management as a result of the inability or unwillingness of governments to deal with conservation of high-seas resources. Industry have to survive amongst the many competitors who will rapidly leap in and take their share regardless of the fishery or environmental implications, and irrespective of the morality or otherwise of their actions. Many of those prepared to fish in an unregulated manner are fighting for their survival, as explained earlier. This problem will not be resolved until governments are prepared to implement conservation–oriented management and introduce effective rights-allocation on the high-seas.

The attitude of governments to the "freedom of the high-seas" is often driven by politics. This must change if we are to see high-seas resources still available in coming years.

6. WHY IS IT SO DIFFICULT TO IMPLEMENT RIGHTS-BASED MANAGEMENT ON THE HIGH-SEAS?

High-seas fisheries resources should be treated no differently than national resources. Governments and industry have a responsibility to protect, sustainably manage, and effectively enforce exploitation of high-seas resources. Over-exploitation of a resource is just that - no matter where the over-exploitation takes place. It is easier to "blame others" for creating the problem when it is on the high-seas, so no single nation, group, or industry member has to take responsibility for the decimation. That means we must all take responsibility for the problem and resolve it together.

Articles 117, 118 and 119 of UNCLOS talk about cooperation of States in the conservation and management of living resources in the areas of the high seas. Notably, the last subparagraph of Article 119 says:

> "*...3. States concerned shall ensure that conservation measures and their implementation do not discriminate in form or in fact against any fisherman or any State.*"

Clearly this is open to many interpretations and needs to be clarified. If it means that it is impossible to limit entry to fisheries resources (the most basic approach to conservation and rights-based management) then the UNCLOS Convention cannot be said to deal with conservation and management of fish-stocks on the high- seas. We do not believe this statement precludes sensible conservation and management practices, but this debate is yet to be had.

The difficulty of implementing rights-based management regimes on the high-seas lies in the same as that for any national management regime – allocations. Until the precept of "freedom of the high-seas" is eliminated, allocations are going to be extremely difficult to deal with. There is no painless mechanism to allocate fishing access-rights, it is a matter of identifying the issues and principles, and then implementing them in a fair and equitable manner. Nations must accept their responsibilities and work together to implement rights-based management on the high-seas. Granted this is easier said than done, but the alternative is for fisheries to continue

being over-exploited. Using the excuse of it being "too difficult" to implement is no longer acceptable.

7. CONCLUSIONS AND RECOMMENDATIONS

Rights-based management is integral to conservation of resources and the environment and it must be extended to high-seas fisheries as a matter of urgency. To ignore the matter is to support unsustainable fishing practices and unregulated fishing.

It is vital that nations agree on the importance of rights-based management for high-seas fish-stocks - whether they be highly-migratory, straddling stocks or separate resources. More vital again is that they then implement their words - take action. The choice is simple. Nations can claim the issue is too difficult and knowingly allow, if not directly encourage, over-exploitation to occur on high-seas stocks. If International Commissions continue to "manage" stocks on the high-seas in the knowledge that their techniques are not just outdated, they are directly causing over-exploitation and over-capitalisation, then they must take the criticism and the consequences. Or they can work to resolve the problem. Allocation of resources is a difficult process nationally, much less internationally, yet non-allocation of resources results in the worst possible of all outcomes.

Some problems appear insurmountable but be assured they are not. There are many examples where rights-based management regimes have been implemented successfully, and it is well past time for the high-seas fisheries to be conserved for the future, along with domestic fisheries. An example of a remote, distant fishery which is well managed with existing access rights, is the Heard Island and McDonald Islands fishery in the sub-Antarctic, managed by the Australian Fisheries Management Authority. The problems of surveillance, enforcement and allocation of rights are not simple to overcome, but they can be resolved.

8. ACKNOWLEDGEMENTS

Particular acknowledgements must go to the dedicated seagoing and shore-side people from Austral Fisheries and Kailis and France Foods who continue the high risk business of exploratory fishing, and then have to accept the raftload of regulations that are an inevitable consequence of responsible fishing. Thanks also to the Australian authorities for their cooperative approach and recognition of the rightful place industry has in the scheme of responsible fisheries management.

RIGHTS-BASED FISHERIES MANAGEMENT: A PERSPECTIVE FROM THE WESTERN UNITED STATES

R. Moore
West Coast Seafood Processors Assn.,
P.O. Box 1477, Portland, OR 97207 USA
<seafood@attglobal.net>

1. INTRODUCTION

Before beginning of any discussion of rights-based management as it pertains to United States fisheries some background on US fisheries and some explanation of US laws is necessary. The United States is blessed (or cursed, depending on your perspective) with a large variety of fisheries occurring along all of its coasts, in marine waters within the US Exclusive Economic Zone, on the high-seas in international waters, by licence or treaty arrangement in the waters under the jurisdiction of other nations, and in many inland waters. These include commercial fisheries using just about every type of fishing gear imaginable; recreational fisheries; subsistence fisheries (in Alaska); and fisheries conducted under tribal treaty rights (especially in the Great Lakes, Washington, Oregon, and California).

Accompanying this diversity of fisheries is a maze of regulatory arrangements and agencies, including: the US Department of Commerce; several other Federal agencies that regulate fishing in water areas under their jurisdiction; eight regional fishery management councils; fifty State fish and game agencies and several similar agencies covering fishing in other political jurisdictions; three Marine Fisheries Commissions involving, respectively, the Atlantic States, the Gulf States, and the Pacific States, and which are composed of the fish and game agencies from those constituent States; numerous tribal governments; several Community Development Corporations comprised of villages in Alaska; the occasional city Parks and Recreation Department; international organizations, such as the International Pacific Halibut Commission; and probably a good many other political entities that I have not discovered. Of course, one can add to this list the various agencies - federal, State, and local - that are involved with public health and safety, water quality protection and regulation of weights and measures.

The cost of all this "management" is staggering and would take several years of diligent research to uncover. Suffice to say that for fiscal year 1999, the amount of money appropriated by the US Congress to the Department of Commerce simply for marine fisheries research and management was over $290 million. Just as another example, a recent report by an Oregon newspaper estimated that the total cost to all federal, State, and tribal entities in fiscal year 2000 of dealing with salmon species in the Columbia and Snake River watersheds will approach $1 billion. Why this staggering cost and plethora of bureaucratic entities? It evolves from a combination of law, history and tradition, and social policy.

2. LEGAL PRINCIPLES

2.1 The US situation

Under US law and legal principles no individual owns a fish until they have physically taken possession of it. The fish are owned by the people as a whole. Even in the case of fish found within the US EEZ - but outside of US territorial seas - the United States does not argue a legal claim of ownership; rather, have claimed sovereign rights to conserve and manage those fish including the right to regulate harvest.

Extending this legal principle further, no individual or other entity - with two exceptions - has the right to harvest fish. Harvesting fish is a revocable privilege, whether granted by a general licence, a permit under some form of access limitation programme, or as a quota share, which may or may not be transferrable. Thus, a fisherman exercises his skill under a grant of privilege from some governmental entity and does not even own his fish until he gets it into his boat.

The two exceptions to which I refer involve tribal treaty rights and - to a limited extent - subsistence fisheries in Alaska. Under the former, the United States courts have interpreted various treaties to require a grant of a certain percentage of some fisheries to specific Native American tribes. The exact amount of fish that can be taken can vary from year to year depending on the size of the fish stocks. Under the second exception, the United States Congress has specified that use of some fisheries in Alaska for personal consumption, trade, or barter will have a priority over other uses and that such *subsistence* use will be the last to be constrained if reductions in harvest are necessary for conservation reasons.

2.2 The law

Under the US Constitution, powers not specifically delegated to the federal government or denied to the States are reserved to the States. While this concept works well for such things as declarations of war, it becomes confusing when dealing with fish species that migrate over large areas and the fishermen who chase them. Regulation of wild stocks of fish (and wild stocks of fishermen) has been a continuing sore point in the relationship between government entities and continues to be so to this day. Compound this with separate federal laws that govern protection of endangered species (including some species of fish) and marine mammals, treaties between the United States government and Native American tribes, and treaties between the United States government and other national governments and you begin to get some

idea of why there are so many players in the management game.

I should also point out that the concept of reservation of powers embodied in the US Constitution is also found in the constitutions of the individual States, thus leading to such things as the separate State of New York and City of New York fishing licences that I had to obtain as a young man.

2.3 History and tradition

Historically, fishing occurred only within internal waters of the United States or along the coast. Thus, most regulation - and conservation, to the extent it was practiced - fell under the jurisdiction of the State agencies. In areas which were federal territory, the Bureau of Commercial Fisheries - an arm of the US Department of the Interior - regulated fishing.

As both our country and its fisheries expanded more power was placed in federal hands in the case of marine fisheries. However, since recreational fisheries had traditionally been the province of State governments, many recreational fisheries were left under State authority even though they occurred in marine waters. The same was true for certain commercial fisheries where the federal government chose not to exercise control for reasons of cost or political expedience.

Even on the federal level, political in-fighting - rather than logic or efficiency - drove the organization of fisheries management. When the President and the Congress created the National Marine Fisheries Service in 1970, which incorporated most of the former Bureau of Commercial Fisheries, they placed it in the Department of Commerce. However, fisheries management in inland waters - to the extent not exercised by individual States - was left in the Department of the Interior's US Fish and Wildlife Service. When - two years later - the Congress passed the *Endangered Species Act* and the *Marine Mammal Protection Act*, jurisdiction was again split between the two departments. Thus, a Kemps-Ridley turtle, while in the water, is under the jurisdiction of the Department of Commerce. As soon as she crawls ashore to lay her eggs, she falls under the jurisdiction of the Department of the Interior. I will not even attempt to describe the maze of jurisdictions through which an anadromous fish has to swim.

2.4 Social policy

It has long been the social policy of the United States to maximize employment and provide every person with an opportunity to pursue the livelihood of his or her choice. Commercial fishing especially, with its individualistic and independent nature, its small economic cost of entry, and its pursuit of a resource that is owned by the people, has been seen as a career that should be open to all.

The price paid for this is the enormous cost of licensing, data collection and regulation of a large number of individuals and commercial operations. However, removing individuals from the fishery has its own set of social and economic costs and - given the near invulnerable nature of bureaucracies - there is some question whether simply removing fishermen will result in a lowered cost of fisheries management.

3. RIGHTS-BASED MANAGEMENT IN THE USA

3.1 Some examples

Now that I have imparted a complete understanding of US law and policy in the course of 3½ pages, I will turn to some examples of rights-based, or quasi-rights-based, fisheries in the US. Since most of my personal experience is confined to the Pacific Coast and Alaska with the most recent being the former, I will confine my examples to those areas. Please note, however, that other regional examples exist in the US. Near certain towns in New England, local control and rights have been exercised over shellfish beds since the 18th century. In the mid-Atlantic States, an individual quota programme exists in the surf clam fishery, as does one in the wreckfish fishery in the South Atlantic - a fishery about which I profess complete ignorance.

In some respects, nearly all fisheries management in the United States is quasi-rights-based. After all, we are a government of, by, and for the people - and the people own the resource. Most States require by law that the public be allowed to participate in setting fisheries management policy. At the federal level, the eight regional fishery management councils, which recommend regulations for most marine fisheries, are composed of both public and governmental members and the requirements for public notice and comment are enshrined in law. Even though the final arbiter of regulations is a federal official, most recommendations of the councils are agreed to as long as they meet the standards set by law. The councils are even required to maintain advisory committees so that the views of the fishing industry, recreational fishermen and the public can be heard.

3.2 Tribal fisheries

There are few "pure" examples in the United States - on where harvesting rights are conferred in exchange for monetary compensation, conservation and management responsibility, or both - under a more traditional definition of rights-based management. Again though, keep in mind our legal principles regarding both ownership and "rights" *vs.* "privileges". The closest thing to a true rights-based system is the tribal fisheries exercised under treaty rights in the Pacific. Here is a case where a right has been established under law, constrained only by the judicial limits imposed on that right and by the need to exercise conservation.

Four tribes in Washington State - the Hoh, Quileute, Quinalt, and Makah - were granted the right to take fish in common with citizens of the United States in usual and accustomed areas. Although there are several legal issues still unresolved - including some in which my Association is involved as a plaintiff - the general theory is that the tribal fisheries are entitled to up to 50% of that portion of

those fish stocks that they traditionally harvested in certain discrete areas.

From a practical standpoint, once the allowable catch for certain species has been established, the tribal "share" is taken off the top before the rest of the allowable catch is allocated among other users. The tribes generally negotiate among themselves and with the federal government (which has a Constitutional responsibility to act as trustee for the tribes) to determine which tribe gets how much of the tribal share. Once the amount is divided up and each tribe knows how much it is getting, they are free to allocate it among tribal members, allow it to be caught as they wish, *etc.* In most cases the tribes require their tribal fishermen to register with the tribal fisheries department before fishing. In this way, all interested tribal members can be assured of some opportunity to participate in the fisheries. Most tribes employ their own fisheries biologists who not only monitor the tribal fisheries but also participate in fisheries research and in management discussions with their contemporaries in State and federal fisheries agencies.

3.3 Community development quotas

A different example is found in Alaska with the Community Development Corporations. Two of the major fisheries in Alaska - crab and groundfish - occur just offshore of small coastal villages. Other than seasonal salmon harvests, many of these villages have no economic base. Unemployment and various social ills are high, and communication and transportation can be haphazard at best. As a result, the fisheries were developed by fishermen from other areas of Alaska and the western United States. Fish are landed in a small number of ports and there is - or was - virtually no economic return to the nearby residents.

In the late 1980's, an interesting twist in social and economic policy was developed by several representatives of the villages. They argued that if the villages were given a dedicated share of the harvest of the adjacent marine resources and required to put those resources to good use for the villages, then such things as welfare payments and unemployment benefits could be reduced. They also argued that the villages had been pre-empted from developing their own fisheries for these resources due to the presence of other fishermen from areas with more economic power. The result was a mandate by the US Congress in 1996 that a guaranteed share of the total allowable catch of certain fisheries be set aside for the Community Development Corporations. These shares - known as Community Development Quotas, or CDQs - can be used or leased. To date, most of the CDQs have been leased to larger fishing or processing companies. The economic gain has been useful to the villages; whether it has achieved the suggested results of reduction in social payments is still, to my knowledge, undetermined.

3.4 Halibut and sablefish

The other, more traditional, rights-based system involves the fishery for sablefish (black cod) species and halibut species in Alaska. The fishery is prosecuted using bottom longline gear (pot and trawl fishing are prohibited in the Alaskan halibut and sablefish fisheries). Halibut is marketed as both fresh and frozen product in the United States and overseas; sablefish is marketed almost exclusively as frozen product in the Asian market.

In these fisheries, eligible fishermen are granted a percentage share of the annual quota based on their level of participation during a "window" period of several years. These individual fishing quotas, or IFQs, can be bought, sold, or leased. A certain minimum quota was established to recognize smaller participants. Fish can be harvested at any time during the season, which runs for most of the year. Landing of halibut is restricted to certain specified ports. Restrictions exist on ownership by non-US citizens and by corporations and on the total percentage any individual can own.

Establishing the system was highly controversial and often pitted large-vessel owners against small-vessel owners, harvesters against processors, residents of one part of the United States against residents of other parts and vessel owners against vessel crew members. Success has been difficult to judge, in part, because there are so many different ways to judge success and failure. For the most part, those who have received IFQs consider it successful.

3.5 Other examples

Access limitation programmes are in effect in many fisheries in Alaska and on the Pacific coast of the United States, including those few salmon, Dungeness crab, and Pacific groundfish. Unfortunately, many of these programmes were established piecemeal leading to a large number of qualifying participants; some have large loopholes (Pacific groundfish in particular); and some are not completely under limited access arrangements, *e.g.* Pacific shrimp, which is limited in Oregon and Washington but not in California. In addition, because each programme was established separately by a State or federal management entity the inevitable spillover occurred with vessels not qualifying for one fishery scurrying into another thereby increasing capacity in that fishery.

One interesting recent example of a rights-based fishery was established by a segment of the fishing industry themselves. The Pacific whiting fishery, a trawl fishery prosecuted off Oregon, Washington and California is allocated among three sectors: vessels which deliver their catch on shore (the onshore sector); vessels which deliver their catch at sea to motherships (the mothership sector); and catcher-processor vessels (the factory trawler sector). The allowable catch, after deducting for a tribal fishery, is allocated as a set percentage to each sector. Season starting times are determined by regulation and

the season ends for each sector when its percentage of the TAC is caught. All harvesting vessels - including factory trawlers - must hold Pacific groundfish limited-entry permits.

In 1998, the four companies that owned the ten factory trawlers with permits to participate in the fishery entered into a cooperative-harvesting arrangement whereby each company would agree to harvest only that portion of the whiting harvest percentage allocated to the factory trawler sector which that company's vessels had on average harvested over the previous few years. These portions were included in the contract. The result was that each company could reduce the number of vessels used in the fishery, bycatch was somewhat reduced and less waste occurred during processing. Since this arrangement was accomplished by private contract, once it was blessed by the US Department of Justice (the Department was asked to review it to ensure that no anti-trust violations were occurring) it could be put into effect by the participating companies. Unless one of the participants decides to withdraw, this arrangement is likely to continue.

A similar cooperative arrangement, specified by a convoluted piece of legislation known as the *American Fisheries Act*, is also being established in the Bering Sea pollock fishery. Legislation was required to establish this arrangement for reasons too complicated to explain here and so it has all the impracticalities and unanticipated external effects of any system created by committee. We will have to wait and see how successful this version will be.

4. RIGHTS-BASED MANAGEMENT

4.1 Some points of view

The biggest problem in creating - or in judging the success of - a rights-based system is that every such system has winners and losers. If you are a winner, then it's the greatest thing since the invention of bottled beer. If you are a loser, then it is a product of Satanic influences and causes pregnancy in unmarried teenage girls. Consider also that rights-based systems are viewed by the participants - correctly so, in my opinion - as economic systems. Although there may be ancillary biological or ecological benefits to establishment of a rights-based system, the underlying purpose is to make money for somebody. Given that background, I will try to at least characterize some of the views on rights-based management that are commonly heard in the western United States.

4.2 The fishermen

An old adage in the United States says that "where you stand depends on where you sit." This is certainly true in any discussion of rights-based management. Leaving aside the winners and losers in the Alaskan halibut/sablefish fisheries, most fishermen base their views on what they have seen elsewhere and on whether they perceive that they will be winners or losers. Owners of smaller fishing operations, in particular, tend to oppose any sort of quota system because they fear that they will be left out or forced out economically. Larger vessel owners, who often are operating at far less than peak economic efficiency tend to like quota systems because they can make a bigger (or perhaps even some) profit.

An interesting example can be found in the Pacific groundfish fishery, which - for the most part - is operating under a limited-access permit system. Fish are harvested by both fixed gear (pots and longlines) and by trawl gear. Other than in the fishery for sablefish, there is no allocation of harvest among gear types; in practice, most of the fish is landed by trawl gear.

Recently, both gear-sectors have begun separate discussions on an individual quota system. Fixed-gear participants want quotas to be assigned differently to fixed-gear and trawl-gear and to require vessels to use only the gear for which they qualify. Trawl vessels, while willing to have different requirements for initial allocation of quota shares but want a share-holder to be able to harvest fish using any gear he wishes. Even in agreement there are differences!

Another brief anecdote illustrates the complexity of establishing a rights-based system. During the initial discussions on creating a quota-share system for trawl-gear, discussion leaders insisted on first talking about what the system would look like *after shares were initially allocated*. The meeting went well and a rather creative set of options was developed. Then, the topic of who would qualify for initial shares was raised. The formerly cooperative, productive meeting turned into a shouting match with every vessel owner arguing for a distribution arrangement that would most benefit his operation. The meeting was adjourned without agreement on this issue.

4.3 The processors

I will do my best to be unbiased here, though admittedly it will be difficult. In the Pacific fisheries the majority of catch landed is processed by a group of "traditional" processors, many of whom have been in business for several generations. Plants, some larger than others, are established in several ports. Fish are generally marketed as fresh fillets although some are exported in frozen form. Crab are sold cooked unfrozen, as fresh or frozen meat and in frozen sections.

In recent years, the number of large "traditional" processors has decreased along with reductions in harvest levels. At the same time, many small processors have moved in and out of the business, comprising anything from a fisherman selling his catch off his boat to small custom-processing operations. There is also a growing sector that generally sells live fish to ethnic markets in major west coast cities. Thus, the profitability of traditional processors with fixed establishments and large capital investment has decreased.

The general attitude of processors is that a rights-based system can be acceptable if the economic needs of processors are recognized equitably with the economic needs of fishermen. Processors have invested capital in the fishery along with fishermen to provide a market for

those fishermen. They have weathered the same economic storms and thus they argue, if rights (and resulting economic benefits) are granted to fishermen then some sort of similar rights and advantages should be granted to processors.

One particular problem for processors is the effect of a reduction in fleet-size - by whatever means - on product flow. Plants are built to handle a certain volume of fish and employ workers to handle that fish. If the fleet-size decreases, then even though the total volume of fish landed may remain the same, the volume landed at any particular processing plant may vary greatly. Thus, they are concerned that some mechanism be found to enable them to operate with the reductions that inevitably occur with a quota-share system.

Of course, not all fishermen agree with this approach. At a recent meeting, a fisherman waxed eloquent about a proposal he was making to reduce competition among vessels by restricting participation from a certain class of vessel. When my turn came, I suggested a similar proposal for restricting new processor construction from capital sources outside our area pointing out that the same over-capacity arguments applied to both the plants and the boats. The fisherman became incensed and began proclaiming loudly that he believed in competition, not monopoly. Evidently, based on his prior proposal, that belief ended at the water line.

4.4 The environmentalists

Environmental groups are relatively new players in the fisheries management field, but their size, fund-raising capability, public relations machines and political connections make them viable players in the game. And, to be fair, they have a right to participate: they are members of the public and we are dealing with public resources. Nevertheless, to many in the seafood industry, they are outsiders.

Environmentalists in the United States are divided on whether or not to support rights-based management, with the division following no particular line that I can discern. Some see rights-based management as a way to extract economic rent; others as a way to control harvest. On the other hand, some see it as a way to perpetuate certain fishing practices they oppose. Suffice it to say that environmentalist's views are mixed.

4.5 Fisheries managers

The tendency of fisheries managers in the United States is to support some sort of rights-based management, usually on the grounds that a reduction in vessels is needed to achieve conservation and management goals: *i.e.* there are too many vessels chasing too few fish. Managers also tend to make the same economic arguments about the fishery being more profitable and efficient. Unfortunately, in making those arguments they usually gloss over the fact that there are winners and losers, a fact that does not escape the attention of the potential losers. This usually does not enhance any cooperative relationships between managers and fishermen.

4.6 The Congress

In 1996, the US Congress passed a wide-ranging suite of amendments to the *Magnuson-Stevens Fishery Conservation and Management Act*, our central federal fisheries law. A large part of the debate between the two houses of Congress involved how to handle individual quota programmes. The House of Representatives advocated a series of standards and restrictions designed - in their view - to protect the public interest and ensure fair play when quota-share programmes were being debated and established. The Senate advocated a complete moratorium on quota-share programmes along with a study. In the end, the Senate view prevailed. We now have a federal ban on any individual quota management programmes, a ban which has been extended by regulatory definition to include several things that one would not normally think of as an individual quota. Although the ban expires on 1 October 2000 there is a good chance that it will be extended for at least one year.

Why did the Congress enacted such a sweeping measure? Much has to do with internal politics within the fishing industry; some has to do with the aforementioned division within the environmental community. I will not attempt to explain the Byzantine intricacies of either, or how they affected public policy in this instance. However, given Sir Isaac Newton's Laws of Motion, it will take a considerable outside force to change the *status quo*.

4.7 The consuming public

If you ask the average restaurant customer what they think of rights-based fisheries management, they will probably call the "maitre-de" and ask him to eject you. So, be polite and ask another series of questions about what kind of fish the customer is eating and whether it would matter if fish of a different species, but similar quality, color and texture, were substituted. In most cases, it would make no difference whatsoever.

Sadly, at least in the United States, although I suspect that the same holds true for urban areas in other countries, most consumers do not know what they are eating, where it comes from, whether it is wild-caught or farm-raised, what kind of vessel and gear is used to catch it and certainly not how it is managed. They do, mostly, care about quality (although not as much as they should) and they certainly care about price. Will rights-based management make a difference to them? With certain exceptions dependent on a good marketing programme it will only attract their attention if the price goes up. So much for public management of a publicly-owned resource.

5. WHERE DO WE GO FROM HERE?

Before I suggest some ideas for the future, I must make a confession. In my earlier discussion on social policy in the United States, I mentioned that commercial fishing was sometimes thought of as the last chance for a rugged individual to make a living with a small capital investment, and that rights-based management schemes

would destroy that opportunity. In my heart, I still have this illogical and romantic illusion, so any discussion of quota- shares or other rights-based schemes causes an almost automatic twinge of disapproval. But I can look at reality too and the reality I see - at least for the United States fisheries - is that a big change is needed.

We are not all going to be winners. We need to accept the fact that we are facing amputation of limbs in order to survive. The only question is whether we develop a dignified and painless as possible way for some to leave the fishery or whether we go through the upheavals and disruption of economic chaos and revolution. I prefer the former.

So what will the brave new world look like? Here is my "Top 10" list of suggestions of what it could look like based on what I see now and on the experiences of other fisheries around the world:

i. Management based on recognition that fish have value as food and not just as creatures swimming in the ocean.
ii. Fewer harvesting and processing participants.
iii. Harvesting and processing participants operating in some sort of cooperative fashion, even if financially independent.
iv. Catch-accounting, data-collection, and other scientific and management information electronically linked so real-time data can be obtained.
v. Fisheries participants playing a major, **meaningful** role in both scientific research and management decisions.
vi. Management measures (and thus need for enforcement) kept to a minimum.
vii. Recognition that a "whole ecosystem" approach means we manage species that are currently sacrosanct.
viii. Clear lines of management-agency jurisdiction.
ix. Clear and final allocation of harvest-rights among different participants.
x. Everybody making money.

What kind of rights-based management system will get us there? If I knew the answer to that one, I would be rich and retired. However, with everything changing around us, I think now is the time to get together and develop that magic system.

6. ACKNOWLEDGEMENT

The author is the Executive Director of the West Coast Seafood Processors Association, a non-profit trade association representing seafood processors in the States of Washington, Oregon and California. The views presented here are those of the author. This is not a scientific paper but a descriptive one; thus any mis-statements of fact are solely the fault of the author. The author is indebted to the hundreds of people whom he has known and with whom he has worked over the past 25 years and is grateful for the knowledge imparted in every classroom, meeting and late-night bar-room discussion. In particular, this paper is dedicated to the late David Harville and Oscar Dyson, two fine fishermen and good friends who are now fishing somewhere over the rainbow.

FISHING RIGHTS - AN INDUSTRY PERSPECTIVE
ITQ'S AND FISHERMEN'S ATTITUDES: THE CHANGE FROM HUNTER TO FARMER

P. Talley
Talleys Fisheries, PO Box 5, Port Motueka, New Zealand
<caroline.talley@talleys.co.nz>

1. INTRODUCTION

In line with my directive as a conference speaker I intend to focus my address on an "Industry Perspective" from my personal point of view and from our company's experience of the Quota Management System (QMS). I shall attempt to relate the thinking of the New Zealand (NZ) Industry that prevailed at the time when the QMS concept was first introduced to us by Lee Anderson and Phil Major and to recall the changes that have occurred to both the QMS and our industry since 1986.

I, like many of my counterparts, was initially extremely suspicious of the concept of individual quotas. As a fish-processor I was concerned that the introduction of quotas would severely restrict our ability to purchase raw material for our fish-processing plants. The model used for introduction of quotas made no provision for the investment in onshore processing facilities. There were concerns that quotas would be tightly held by fishermen and the opportunity to acquire quotas would be very restricted. I, like many others in the industry, never envisaged that fishermen would sell their quota-rights in the way they did immediately after the QMS was introduced and catch-history rights became tradeable. This massive 'sell-down' of quota caught many operators by surprise and contributed to a major and rapid restructuring of the NZ industry.

My other major concern at the time was the introduction of Resource Rentals even though the initial level was set at $NZ3/tonne to entice our acceptance of the concept. Our worst fears were soon to be realised when after the first three-year period Treasury officials spotted the opportunity to use the QMS as a revenue gathering mechanism rather than a resource management tool for which it was designed.

The opportunity to collect revenue from the industry attracted all kinds of economic geniuses, some of whom believed that resource-rents should be such that controlled quota values were near zero level to facilitate trading in quota. They were concerned at the high value at which quotas were being traded in perpetuity. They believed high resource-rentals would lower the incentive to own quota and thereby lower quota values. It took approximately three years of pain and zero growth in our industry for these economists and their theories to be sidelined.

The fishing industry is labour intensive, capital intensive, energy intensive and catch rates are known to fluctuate wildly from season to season. For these reasons it is essential that the industry utilises retained earnings for expansion rather than a high percentage of borrowed capital.

Fishing vessels are unable to carry high debt-loads and if earnings are siphoned off by resource-rentals, expansion will simply not occur. It is understandable to tax mature-industries such as the beverage, gambling and tobacco industries but it is wrong to deprive immature-industries, such as fishing, of the capital flows essential for their development.

As an example of the vagrancies of the business of fishing there were 49 fisheries companies in NZ in 1963 - the year I started in the business. Today only 4 of that original "year-class" remain in the seafood industry.

2. DEVELOPMENT OF THE NEW ZEALAND QUOTA MANAGEMENT SYSTEM

Our Quota Management System was built out of a crisis – both of fisheries and the economic state of the country as a whole.

This QMS has provided a means of managing over-exploitation and has facilitated industry shifting its efforts from increasing harvesting power to seeking greater efficiency, quality and sustainability.

The need to race for fish is no longer present. There is a high level of world-wide interest and support for the QMS and a reasonable and increasing understanding in the community of its contribution to conservation.

The fishing industry, along with other primary industries in New Zealand, developed in the 1960's and 70's in a climate of central government support, subsidy and investment. A statutory board was established to promote the development of the fishing industry in 1963. Fisheries licensing systems were deregulated and access protected by the establishment of exclusive economic zones (EEZs).

Direct subsidies to the industry focussed on building, catching and processing capacity. Subsidisation ranged from that of government-guaranteed mortgages for purchase of new fishing vessels to subsidised vessel ownership, savings schemes and the direct allocation of funds for development. Just as subsidies for pastoral farming were leading to over-capitalisation on farms and development of sub-marginal land so too did they stimulate over-investment in fishing our inshore stocks. Inshore finfish and shellfish stocks were becoming depleted in the late 1970s and government moved to re-regulate fisheries.

By 1982 the state of the stocks and the decline in catch-per-unit-effort (CPUE) was such that in New Zealand it was clear that something had to be done. And that it had to be something more radical than a continuation of input-controls or limited-entry, both of which are run in

accordance with government edict rather than from an industry perspective. The fishery needed to be re-structured.

The state of our inshore stocks reached crisis level in the early 1980s. At the same time our deep water fisheries boomed. This boom was stimulated by the declaration of the 200 mile EEZ.

3. OWNERSHIP OF RIGHTS

It is important to understand that there can be no value or property-rights established on a fishery resource until a fishery has been "developed". Fishery resources by themselves do not constitute a realisable value, as a fishery is not just having the resource in the ocean. A fishery is only formed when there is a direct inter-action between that resource the fishermen and their vessels. Without this inter-action between men and resource there can be no fishery. So by their very presence the fishermen have created a fishery and in doing so have in effect created a property-right and should receive free access to these rights based on their previous history in the fishery.

Property values exist in the form of limited access rights to a fishery. These rights can be enhanced by:

i. public support and public understanding of the benefits that can be derived by hosting a viable fishing industry
ii. sustainable harvesting regimes
iii. proven reliability of stock assessment methods
iv. delivery of efficient fisheries-management services
v. enhancement of the wild fish-stocks through the co-operative actions of access-rights holders
vi. the adoption of integrated management plans to ensure that all users of the marine environment are catered for.

Such enhancements can only take place within the confines of a Quota Management Scheme and only with the co-operation of the fishermen involved.

There is a grave misconception about the QMS as to who actually owns the resource. The ownership of quotas does not constitute ownership of the resource. The Crown retains the ownership of the parent stock and all an Individual Transferable Quota (ITQ) allows is the right to harvest the annual surplus produced from that parent stock. An ITQ is in theory a harvest-right.

The Deep-water Trawl Policy in 1983 provided for the introduction of Deepwater Enterprise Allocations. These were a prototype for the Quota Management System. Quota was allocated politically and pragmatically to the nine New Zealand fishing companies that had a demonstrable investment in deepwater fishing and processing.

The year 1983 also saw the enactment of new fisheries legislation. The 1983 Act provided for the establishment of government-administered fisheries management plans and also provided a politically expedient, although morally reprehensible, mechanism to remove some fishing effort. By administrative-means about half of our fishermen were declared "part-timers" and excluded from the industry. Part-timers where classified as all those fishers who had "declared gross income" from fish of less than $10 000 per annum. It also inadvertently effected Māori subsistence fishers, and ultimately opened the debate on traditional Māori fishing rights. Convoluted planning legislation however did not address the immediate need to reduce effort and address over-capitalisation problems in our inshore stocks.

In August 1984 the Government agreed to help fund a scheme to reduce capital and effort along with the introduction of ITQs into our inshore fisheries. Quota tenure for deepwater stocks was extended in perpetuity at the same time.

Initial quota was allocated on catch histories which were priorated downwards to be allocated as a proportion of Total Allowable Catch limits (TACs). On average, 40% of catch histories were removed in some stocks through the need to reduce TACs. Fishermen were given the option of surrendering (*i.e.* selling) their quota to Government under a tender-scheme or retaining their reduced quotas in the knowledge that fish stocks would eventually recover.

In establishing the buy-back scheme the Government placed individual values on the various fish stocks and entered the market to buy quota-rights from those wishing to exist the industry rather than face the prospects of attempting to carve out a living based on a restricted-access management regime. Many fishermen accepted the pay-out as it offered them the opportunity to leave the industry with dignity.

Those who choose to remain and take their chances with the new management regime were rewarded in three ways:

i. The Government buy-back scheme reduced the extent of the Total Allowable Commercial Catch (TACC) reductions quite considerably.
ii. The Government buy-back price had the effect of posting a "bench price" on quotas and offered remaining participants the comfort of knowing that they could always "sell out" in the future.
iii. Those fishermen who had decided to remain in the industry were guaranteed preferential access to future increases in TACCs to a level that would restore the compulsory cuts imposed by the Crown.

Few understood the complexities of this system. Arguments about the fairness of initial quota-allocations have pervaded our QMS to this day. It is important to understand that the QMS was introduced to protect fish stocks, not to protect fishermen's way of life. There can be no doubt that the introduction of the QMS has achieved its principal objective.

The concept of the Crown operated by-back scheme was a pivotal instrument in persuading fishermen to accept the introduction of the QMS. Government had to promote the model and get it right. Banks would not finance the industry for the industry-changes that were needed. It was essential that Government became involved with the buy-back. Without the safety net of a Government-funded buy-back scheme to reduce effort, the introduction of the QMS

would not have received the necessary level of support from fishermen.

4. DESIGN OF THE QUOTA MANAGEMENT SYSTEM

When designing a rights-based fisheries management system for the commercial sector it is natural that other interest groups such as indigenous fishers and recreational fishermen would demand that their rights be specified and provided for in shared fisheries. Work is currently being undertaken in New Zealand to address this vexed question. While indigenous rights have been satisfied the debate is now developing as to the rights of recreational fishers. It is accepted by both the recreational and commercial sector that improved-management of recreational fisheries is paramount and that recreational fishers do have a role to play, especially in the management of those fisheries that are shared with the commercial sector.

If a fixed-quota allocation is awarded to the recreational sector, the issue of how to measure the output from the fishery and the cost of administration will pose a difficult task. But, it would be pointless allocating a specific tonnage to the recreational fishing sector if there were no means to accurately record the total catch from this sector. It is for this reason that I believe a special tonnage allocation to the recreational sector will not work.

5. MĀORI ISSUES

Māori used to put stakes in the ground to define the extent of their tribal fishing rights. Case law had determined that our fisheries law did not apply to Māori commercial fishermen. Māori viewed the introduction of ITQs as an alienation of their rights and in 1987 were successful in obtaining an injunction stopping the introduction of further species into the QMS.

In my opinion this legal action subsequently became a saviour of New Zealand's ITQ system. An interim settlement was made with Māori in 1989 which involved a cash settlement and the allocation of 10% of all quota to Māoridom. A final settlement was reached in 1992 which included the purchase and allocation of 50% of New Zealand's largest fishing company along with allocation of 20% of any new species brought into the QMS.

ITQ rights became not simply a fisheries management tool but also part of the Crown's settlement with our indigenous people. It gave the industry additional strength in arguing against our fishing-rights being eroded in nature and extent.

Prior to the *1989 Māori Fisheries Act* there were many interest groups strongly opposed to the principal of private ownership of our fisheries. Their opposition to the QMS was intense and in some cases professionally executed. It was not inconceivable that future governments could undermine the property rights. Once the Crown had used quotas as a currency to settle indigenous grievances they had unwittingly locked the QMS into place. If they, or future governments, attempted to tamper with quota-rights they could be accused of attempting to once again settle indigenous claims with a basket of empty promises or a bag of "trinklets".

6. MANAGEMENT COSTS

The final settlement with Māori claims led to a debate on the appropriateness of retaining resource-rental on quota. Māori successfully argued that they should not pay the Crown annual rental payments for an asset that was rightfully theirs. With the support of Māoridom our industry entered into discussions with government to remove resource-rentals and replace them with a regime that recovered the costs of management. It was clear to us this would involve getting the delivery of services and the conflicts of interest out of government's hands.

Government agreed that cost-recovery would include institutional reform of the fisheries management agency. Government then immediately moved to restructure the fisheries Ministry and put the research arm into a separate, and profit-motivated, Crown research agency. The new Ministry of Fisheries was left with the roles of purchasing the research, providing the policy advice to Government, running the quota information-systems and enforcing fisheries rules. It was also given the job of recovering its costs incurred in performing these functions from industry via a cost- recovery regime.

Whilst we were to be "consulted" as a means of holding government legally accountable for the "Nature and Extent" of the costs, we had no say in the efficiency of their expenditure. Costs are recovered against government outputs agreed between the Minister and the Ministry. Costs are levied against all QMS transactions and quota. Quota-based costs are levied using an arbitrary tonnage times port price allocation formula. This has caused considerable tension given the difficulties of identifying port price figures for particular fish species in a vertically integrated industry. The economic naivety of this approach is obvious.

With the development of the "user pays" philosophy, fishermen are being bombarded with a rising number of fees that are collected and protected with statutory powers.

The industry is struggling under the costs associated with:

access fees	survey fees
oil pollution fees	pilot fees
lighthouse levies	primary industry inspection fees
weather forecasting duties	scientific observer fees
harbour levies	quota management fees

These fees must be recovered irrespective of how much (or little) fish is placed in the hold. What is also of concern is that the fees can be increased annually at the whim of those departments now forced to balance their expenditure and income. We were to learn the hard way that the Crown is not an efficient deliverer of services.

7. QUOTA MANAGEMENT

Our industry remains plagued by decisions of the past and we are still locked into debate over the proper process

for allocation of new species within the QMS. But it is fair to say that our relationship with the Ministry of Fisheries on issues is changing. Our initiatives are being acknowledged and acted upon. In August this year, the responsibility for managing the registries for the Quota Management System were transferred to a subsidiary of the Seafood Industry Council. Inequities of the cost-recovery regime are being recognised and some removed.

Unfortunately that is only part of the story and we are now being faced with the task of ensuring our rights and responsibilities are integrated with the wider management of the marine environment.

New Zealand was quick to adopt "sustainable management" as the principle for the management of our natural and physical resources. Reform of our environmental legislation culminated in the establishment of the *Resource Management Act* in 1991 where "sustainability" is firmly entrenched. Under a banner of "sustainable management", this legislation delegates the power to manage our land and the coastal environment to regional and local government. Importantly that power includes the functions of allocating rights to occupy the coastal zone to marine farming activities. The control of harvesting and enhancement of fish species, however, remains with the Ministry of Fisheries but only for defined purposes.

As the natural resources become more valuable, more people will become politically active and their attention will be directed at the actions of industry. Government and their advisors are interpreting the rules to mean "compensation shall not be payable" when large areas of fertile coastline is effectively taken for the public good. Struggling fishermen are expected to surrender major property-rights to achieve biodiversity, marine parks, and anything else that is flavour of the month. The conservation movement is being used or abused to justify theft of property-rights on a scale that would have shamed the ancient barons.

The Act, whilst solid in principle has not resolved the conflicting demands now being placed on our inshore coastal zones and presents major challenges to the security of our property-rights. The provisions of the *Resource Management Act* have created tension between marine farmers and the rights of holders of finfish ITQ. The presence of marine farms can exclude traditional fishing methods. It has facilitated a conservation movement hell-bent on undermining the established property rights given by our *Quota Management System*.

These property-rights central to the ITQ system are being gradually eroded by 'environmental creep'. Issues of biodiversity, marine reserves and other 'ideals' are being fertilised by the loosely worded provisions of the *Resource Management Act*. These marine property-rights do not enjoy the same recognition and security of land-based rights which have been constrained by a host of rules and regulations, but have been developed and fined-tuned over a long period.

Common law restraints on property-rights which have been developed over centuries recognise that use of one's land can degrade your neighbour's enjoyment of theirs. And it works both ways – hence with land issues we have well-developed laws against nuisance and damage. These laws restrain our neighbours' rights but our rights are similarly restrained and protected. We all benefit from these mutual restraints and benefits. But when struggling fishermen are told that large areas of productive fishing grounds are to be fenced off, they can rightfully ask – *"but what will the nation do for us"*. The answer they get is nothing. The rest of society want your fishing grounds for the public good. "This is otherwise known as 'theft of a property-right'." In response fishermen will have to be very professional in administering their businesses to protect their rights because those opposed to commercial fishing will be relentless in their pursuing it.

It is alien for fishermen to discuss the business of fishing in these new forums, consequently many of our traditional fishermen and fishing families are leaving the industry, fed up with the complexity of the operation of a hunting-style business in today's environment.

Most of the fishermen I know are tired of the complexities in operating a fishing vessel. They complain about their landing logs, catch effort logs, rental invoices for fish they haven't caught, TACs , CAYs[1], MSYs, MCYs, MAYs and the mountain of paper work associated with ACC, GST, IRD and of course their QMRs.

The business of fishing has unfortunately become very complicated. The editor of the *NZ Seafood Magazine* invented a new term in fisheries management, M.S.F.L, which stands for "Maximum Sustainable Frustration Level". Fishery managers for their purposes are attempting to introduce a degree of complexity into the system that is neither practical or acceptable, and in many cases, impossible to comply with, let alone administer. This complexity is not necessary if fishermen are given responsibility for managing their own system. Fishermen understand that to manage a fishery effectively a sound information-base is required but it is the duty of those responsible to ensure that the systems are kept simple. Any management system must maintain the goodwill of fishermen to be totally effective.

8. FUTURE DEVELOPMENTS

With the Quota Management System successfully up-and-running fishermen are now examining ways of enhancing the wild fish-stock to further improve their earnings. This development is particularly exciting as all over the world aquaculture development has resulted from the demise of the traditional fishermen. With wild fish-stock enhancement schemes the role of the fishermen, vessel and crew is preserved. The opportunities for increasing the productivity of our oceans are indeed mind-boggling.

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[1] CAY = Commercial Annual Yield; MCY = Maximum Commercial Yield; MAY = Maximum Annual Yield; ACC = Accident Compensation Commission; GST = Goods and Service Tax; IRD = Inland Revenue Department; QMR = Quota Management Returns

The fertility of the oceans that surround both New Zealand and Australia could be the most valuable national asset we have. It is an indictment on our industry that the development of this gigantic farm has not even started because New Zealand's and Australia's success as a nation of farmers was only achieved through the use of modern technology in animal-husbandry and plant-nurseries. By the use of technology the world-wide production of land-based food increased 30 or 40 times in the past 20 years. With the technology that is available today it is possible to rear millions of juvenile fish in shore-based hatcheries, nurse them through their critical growth-stage and then release them into the ocean to supplement the natural recruitment to the fisheries.

Once fishermen are issued with a property-right in a fishery in the form of exclusive or individual quotas or permits there is an in-built incentive for them to join forces with other rights-holders and jointly fund fisheries enhancement schemes. There is a risk that this exciting development of our wild fisheries could be restricted if Government policies fail to recognise and provide well defined property-rights.

Fishermen accept and acknowledge the fact that unrestricted fishing will lead to the virtual extinction of any fish resource. Fishermen are equally well aware that to survive as an industry future fisheries-management policies must be constructed to enhance fleet profitability.

Fisheries decision-makers of the future need to be aware of the absolute necessity to preserve the fishermen's way of life as well as to preserve the resource. In the past it has been too easy to protect the resource by simply placing restrictions on the activities of our fishermen.

The task of fishing industry leaders will be to ensure that fishing is as economically efficient as possible. This management objective must be strictly adhered to. It is in my mind the critical success-factor in the business of fishing. Those who are assigned the task of conserving our fish stocks will be forced to look further than the age-old habits of the past where they simply applied restrictions that limited efficiency, such as:

i. increased mesh sizes
ii. restricted entry by adding lines on charts
iii. imposed horsepower restrictions
iv. fishing-method restrictions
v. closed seasons and
vi. imposed size-restrictions on the construction of vessels.

Under a Quota Management System fishermen are required to sacrifice the thrill and flexibility of open- access exploitation of the resource. If they are forced to accept restrictions on access it is imperative that unnecessary restrictions to efficiency are removed. Quota is our most valuable asset. It measures our profitability. Like any industry, we want to improve our profitability and enhance our assets.

The extraordinary thing is that industry does not have the right to manage our assets. The Government manages them for us. While we cannot manage our assets we suffer the consequences of bad decisions made on our behalf without compensation. The Government is the supplier of services to our industry. But, unlike any other supplier, they are not accountable to us for what they do. And we have no choice but to use them.

There is light at the end of the tunnel. Fisheries research is now a contestable government service. Management-support services are being devolved to industry. Cost-recovery is becoming better aligned with government and industry functions, industry organisations are restructuring around fisheries and their management, and industry-led fisheries management is emerging.

Progress is nonetheless slow, difficult and constrained. Hurdles are high and progress is limited by government prescription, control and politics. The playing-field has widened to include the marine environment as whole. Conflicts between fisheries rights and other marine activities are emerging.

The challenge for our industry's future is to enhance our rights and to manage our own assets. Just as Māoridom placed stakes in the ground to define the extent of their tribal fisheries so too must our industry place stakes in the ground to integrate our rights within the management of the marine environment as a whole.

9. THE ROLE OF SCIENCE

Another critical factor for success in protecting property-rights in a fishery is to ensure that meaningful fisheries research programmes are administered. I say meaningful because many of our current research programmes have been designed principally to keep research staff in a job rather than to focus on the accurate assessment of fish stocks. Not surprisingly, fishermen are wary of past and present scientific predictions of our fish stocks.

There is a grave misconception of science in our society. Society assumes that research always proves things beyond doubt. However there is usually little agreement on interpretation of research among scientists and much disagreement on virtually every issue. There are competitive theories, inconclusive data, questionable interpretation and damaging assumptions. Stock-assessment is an imprecise science and uncertainties need to be spelled out and discussed more fully with industry, rather than covered up or suppressed. Fishermen are often the victims of computer-simulated models. Much of the information going into computer-simulated models is in in fact garbage, collected from what I term outdated research methods.

The accurate assessment of fish stocks is a critical ingredient for successful fishery. Unfortunately in many of our fisheries the required degree of accuracy is not possible nor practical owing to the natural fluctuations of fish stocks even when they are subject to little, or no, commercial activity.

Industry-profitability and catch-rates are directly related. Without reasonable catch-per-unit-effort (CPUE)

profitability in a fishery will cease, investment will halt, and a corresponding reduction in property- right values will occur. In real terms catch-rates have only been maintained in some fisheries because of increased gear-efficiency and improved fish-detection equipment. The development of gear technology and fish-detection equipment appears now to have been maximised and we can no longer rely on increased technology to maintain catch-rates. Fishermen realise that future catch-rates can only be maintained by the preservation of our fish stocks.

The role of fisheries biologists needs to be removed from fisheries management decisions and focused on research that will aid in the enhancement of stocks. It was this type of research that lead to the scallop enhancement scheme in Tasman bay and Golden Bay being so successful. The biology of the scallop was studied and understood and a method for capturing spat in huge quantities was developed so that they could be protected and grow to a size where they would survive on the bottom before release. This in turn has lead to rotational harvest to protect juveniles and promote maximum growth-rates and survival. A fishery which yielded only 200 tonnes in an unenhanced state has now developed into a fishery that yields some 1200 tonnes. This was only possible with the QMS as fishermen saw they would get a proportionate share of the profits from co-operating and contributing financially to the programme.

We need to see more focus on this type of programme from biologists and less on managing the stocks. We need an entirely new approach to fisheries research methods noting that, for example: acoustic surveys are expensive and unreliable; trawl surveys are ineffective especially when the survey vessel is crewed by able- bodied seamen instead of "active" commercial fishermen. Many of the research vessels "couldn't find fish in a bag of fish and chips".

Randomly selected co-ordinates for research tows is inappropriate when assessing aggregating fish stocks. It is similarly inappropriate to select computer-generated co-ordinates from longitude and latitude information gathered from fishermen's returns as it is widely recognised in the industry that fishermen will go to great lengths to distort longitude and latitude bearings to protect their favourite fishing spots.

The end result is that trawl surveys have a limited value in identifying fish abundance when trawl surveys are conducted from specialised fisheries research vessels. It is a lot more meaningful and efficient to charter commercial fishing vessels with experienced commercial fishermen in the bridge.

TACC levels of the future should be determined by economists and mathematicians not biologists. Future TACC levels should be driven by the interests of the industry to improve "catch-per-unit-effort" and to select fish that are in the best year-classes for processing and marketing. All too often the bulk of our catches comprise younger fish that are more difficult to process and do not provide the market returns that they could if left to grow for another year. Farmers do not harvest their potatoes until they are the correct size so why should fishermen harvest such a large percentage of their crop prematurely. If we are to be serious about the switch from a hunting to a farming-approach to the business of fishing we need a lot more economic *advice* and a lot less biological *opinion*.

The easiest and most efficient way to increase CPUE levels is to increase the number of mature adults in the parent stock. Having a lot of stock in the water is akin to leaving one's money in the bank. In this regard, we have never really used the QMS to its full potential. The next step is to focus on improving profitability and market-acceptability of the products we produce. The QMS can be the mechanism to achieve this objective. If there is a lot of fish in the water – why should we go through the annual motions of acoustic surveys, trawl surveys, egg surveys, *etc.*

Future TACCs could be set solely on CPUE data and by close-monitoring of year-class changes in the parent stock. Older fishing industry participants who have enjoyed the open-harvest regime of the earlier days of fishing will be harder to convince to keep TACCs at lower-than-necessary levels to ensure sustainability. In contrast, new entrants to the industry who have never experienced the "wild west" approach to fishing will be easier to convince of the benefits to be gained by increasing CPUEs in a fishery.

Fisheries scientists have in the past "captured" the process of advice on TACC levels. In determining CPUE levels the role of fishermen are critical as they have an empathy and understanding of the resource that executives in the industry and bureaucrats do not have. For the Quota Management System to be successful it requires the full support of those required to work within the constraints provided. This essential support can only be gained by the full involvement of the industry in all aspects of fisheries management.

It is difficult enough to make a fishing vessel pay under any management system but the advancement of technology has enabled a modern fishermen to firstly locate, track, target and then land large shoals of fish all from the comfort of his wheelhouse, consequently it is little wonder that they find it difficult to accept the limitations of quotas. Under a Quota Management System these skippers will often have to steam away from fish when their holds are only partially filled owing to a shortage of the necessary quotas. This is alien to most skippers and it is therefore important that they are involved in the decision making regarding total allowable catches to ensure that they support, understand and of course obey the restriction they are forced to accept.

Having lived through nearly two decades of rights-based management of fisheries in New Zealand I have several messages for conference delegates.

It is our experience that fishing rights will turn your marine resources from a liability into a national asset. If administered properly, your fisheries will contribute to the

wealth of your nation instead of being a net cost. The introduction of "fishing rights" will give your marine environment a value that will be strongly protected by the participants.

The problem that you face in allocating fishing-rights is that you need to be:

i. Proactive - allocate the rights before the fisheries become over-developed. Do not use fishing-rights as the ambulance at the bottom of the hill. They are the best way to go from the start.
ii. Be inclusive - do not distort management of the resource.
iii. Allocate the rights across all users at the beginning.
iv. Allocate the rights to manage and not just the right to take. Allocate the responsibilities as well as the benefit and risk. Integrate the rights into a total package.
v. Above all else - be fair. Establish a level playing-field. Do not allocate then confiscate.
vi. Get politics and government out of the business of management.

There are no compromises. There are no half-way houses. Both government and industry need to face up to these issues right from the start.

A COMPARISON OF BRITISH COLUMBIA'S ITQ FISHERIES FOR GROUNDFISH TRAWL AND SABLEFISH: SIMILAR RESULTS FROM PROGRAMMES WITH DIFFERING OBJECTIVES, DESIGNS AND PROCESSES

B.R. Turris
Pacific Fisheries Management Inc.
NewWestminster, 333 Third Street
British Columbia, Canada, V3L 2R8
<Bruce_Turris@bc.sympatico.ca>

1. INTRODUCTION

In Canada, the implementation of ITQs in commercial fisheries has been slow, disjointed and generally fishery-specific. There has been no general government policy supporting or recommending that fisheries move to ITQs. Indeed the move to ITQs in a specific fishery was more likely the result of a dramatic failure of the existing management regime that led front-line fishery managers and associated industry participants to consider alternative management approaches. This is clearly the case in the British Columbia commercial sablefish and groundfish trawl fisheries. Both fisheries were in unsustainable situations (in terms of stock abundance and economic viability) and the need for changing the management structure was overwhelming. Although both fisheries chose to implement ITQs and have seen similar improvements in stability, sustainability, and economic viability, the objectives and processes used to bring about the ITQ programmes differed significantly and resulted in programme designs with more differences than similarities. While some of the differences are entirely an artifact of the species harvested and the gear used, others are characteristic of the breadth of the participants and their social and political views.

The following section provides some background to both the sablefish and groundfish trawl fisheries and how they evolved from limited-entry "derby" fisheries to ITQ fisheries. A brief description is then provided about each ITQ programme and the rules which govern the fishery. Next, a number of retrospective questions are posed and answered to give a feel for how well, or poorly, the programme has done and the level of support from various industry participants. Essentially, the questions posed are those put forward by the Conference's organizers. Finally, an attempt is made to look into the future and discuss the direction these programmes may take and changes that may be forthcoming.

2. BACKGROUND

2.1 Commercial sablefish fishery

Sablefish have been harvested off the west coast of British Columbia for more than 40 years. The Japanese distant-water fishing fleet targeted Pacific sablefish for over a decade before foreign fishing was extinguished with the adoption of Canada's 200 mile Exclusive Economic Zone in 1997. This left sablefish to be caught as a bycatch in domestic groundfish fisheries where it was viewed as a nuisance fish because of the low landed-price paid by local processors. In the late 1970s several Canadian fishermen attempted to establish a directed-sablefish fishery by pursuing oversees markets in Japan and experimenting with trap gear as a more effective and productive harvesting method.

In 1981, following increased market-demand and escalating trap and longline fishing-effort, the Department of Fisheries and Oceans (DFO) took steps to limit entry into the sablefish fishery. The implementation of limited-entry resulted in 48 vessels receiving sablefish (Category "K") licences issued annually by the DFO. The fishery was managed by opening on a specified date and then closing when the DFO estimated that the TAC (Total Allowable Catch) was taken.

It did not take long to realize that limited entry was no panacea to the problems surrounding the management of the "common property" sablefish resource. As in all other limited-entry fisheries, sablefish licences took on significant value and were traded amongst fishermen. To justify the investment in their vessels and licences, the vessel owners fished harder and more efficiently than their predecessors. Although the total number of vessels had been capped, effectively nothing had been done to curb the race-for-fish attributable to the "common property" nature of the fishery. Vessel owners used whatever means available to increase their vessel's fishing power. Bigger boats, more crew, fishing twenty-four-hours a day, extra gear and traps, the use of packers to transport additional gear to the grounds, improved sounders, sonars, lorans, and bait-loading soon became necessary if a vessel was to compete and at least maintain its share of the catch.

The side effects of this race became increasingly worrisome and dangerous for the sablefish fishery participants. The period of the fishery became shorter, shrinking from 245 days in 1981 to a mere 14 days in 1989, despite a 42% increase in the TAC. Increasingly, safety was compromised as vessels with excessive gear and fatigued crew fished around-the-clock in hazardous weather conditions because the financial costs associated with not fishing were too high. More and more gear was lost as vessels set too many traps or hooks, fished in rough seas, or were run over by other vessels. Lost gear continued to fish (ghost-fishing), reducing future available catches and became a biological and economic drain on the fishery.

The quality of the catch diminished as fishermen spent more time hauling and setting and less time properly bleeding, dressing, icing, freezing, and storing the catch. Large quantities of fish would be landed at the same time resulting in sablefish sitting at the dock for days prior to being shipped to the market or placed in cold storage. The economic-rent generated by the fishery was largely dissipated in excessive fishing and harvesting costs, reduced quality and supply gluts. Short fishing-periods meant that fishermen could not meet the market-demands for consistent year-round supply. The result was lower landed prices. Further, as the openings became shorter the financial loss associated with vessel breakdowns, sickness, injury, and poor weather increased. A vessel breakdown almost certainly meant missing the entire opening. Even a few days missed could represent a significant reduction in annual earnings and threaten financial stability. Fishing costs were continuously increasing while landed-prices fluctuated with the vagaries of the market, supply gluts, and cycles in the economy. Greater flexibility was needed to maximize the total fishing operation and to target more lucrative markets. Flexibility was also needed for safety and to reduce losses from vessel breakdowns.

The DFO's ability to manage the annual TAC was becoming increasingly difficult. The sablefish fishery catch had exceeded the TAC every year from 1981 to 1989. As the openings became shorter it was more difficult for fishery managers to estimate fishing-power and catching-capacity so TAC overages became more pronounced. Both the DFO and industry were concerned that the growing inability to maintain the annual harvest within the TAC would lead to stock declines and threaten long-term resource sustainability.

The DFO was also concerned about more than just controlling the total annual harvest. Budget cuts and Departmental priorities had made monitoring and enforcement of the sablefish fishery almost impossible. Although the sablefish season was only 14 days in duration, there were rumors that operators were setting early and hauling after the closure, and that other commercial users (groundfish trawlers and longliners) were illegally landing sablefish throughout the year. The DFO had no enforcement officers specifically addressing sablefish issues and sablefish landings were not being monitored.

In the fall 1989, the government and industry agreed to discuss changes in the management of the sablefish fishery. Following several months of consultation, a consensus was reached on the implementation of ITQs in the sablefish fishery in 1990.

2.2 Groundfish trawl fishery

A commercial groundfish trawl fishery has operated off the west coast of British Columbia for more than 50 years. The groundfish trawl fishery is a multi-species fishery harvesting approximately 60 different groundfish stocks. Prior to extended jurisdiction in 1977 much of the fishing effort and catch was taken by foreign fishing fleets. Licence-limitation was introduced in 1976 and resulted in 142 limited-entry groundfish trawl "T" licences being issued to vessels ranging in length from 35 to 150 feet. Fishing effort was relatively unrestricted in the late 1970s with less than half the eligible vessels active and few species under any form of overall quota management.

The federal Department of Fisheries and Oceans' first management plan for the groundfish trawl fishery was released in 1980. The plan allowed for a year-round fishery and introduced some mesh-size restrictions and a limited number of species quotas (17) based on stock assessments prepared by government scientists.

Despite limited-entry, fishing effort continued to increase as more licensed vessels became active and as active vessels improved catching-capacity by using engines with more horsepower, more effective gear, new fish-finding electronics, improved hydrographic charts and switched from side to stern trawling. Increased harvesting pressure resulted in TACs being reached prior to the end of the twelve-month fishery. In order to keep the fishery open year-round (a necessity if domestic processors were to maintain market access), management plans became increasingly complex as a variety of restrictions were implemented in an attempt to limit and distribute effort and catch throughout the year. Trip-limits and monthly-limits were the primary management tool. As fishing effort continued to escalate, fishing-limits were shrunk and at-sea discarding and mis-reporting of catch worsened. To compound matters further, additional TACs were being introduced annually on stocks previously unrestricted and a burgeoning hook-and-line fishery was placing additional pressure on groundfish resources.

The inability to monitor catches at sea meant that the DFO had to set coastwide TACs that resulted in many area specific stocks being over-harvested. By 1995 fishing capacity had increased so dramatically, and fishing limits declined to such small levels, that discarding was a major concern and the ability to stay within annual TACs (based strictly on landed catch) was proving extremely difficult for several important species. In September 1995, due to significant TAC overages, the British Columbia groundfish trawl fishery was closed for the first time.

The groundfish trawl fishery remained closed nearly 5 months, reopening in 1996 with numerous new rules imposed by the DFO, including 100% at-sea observer coverage for all bottom-trawl trips, 100% dockside monitoring of landed catches and the imposition of species and stock-specific catch-limits. These compulsory government requirements for conservation and management purposes imposed significant costs on an already financially troubled industry. Landed prices were generally low, markets had shrunk (due in part to the closure), and there were too many vessels trying to derive an income from the fishery. The costs of the at-sea observers and dockside monitoring programmes exceeded $Can 3

million and would be largely borne by licence holders (more than $Can 21 000 per vessel on average). In addition, the DFO had decided to increase licence fees for all commercial fisheries. The groundfish trawl annual licence fee jumped from $Can10 to an average of over $Can7000 per vessel. Unable to address their economic problems under the existing management structure, the groundfish trawl industry entered into difficult negotiations with the DFO in early 1996 regarding changes to the overall management plan. Following fourteen months of negotiations, ITQs were introduced into the groundfish trawl fishery in April 1997.

3. PROGRAMME DESIGN

3.1 Sablefish fishery

The fishery is open from 1 January to 31 December and licensed vessels are permitted to fish at any time as long as they "hail out" prior to commencing fishing and "hail in" prior to landing at one of the 14 designated landing locations. Vessels are authorized to fish with traps or longline gear and may retain all sablefish greater than 55 cm in length. Traps must have two escape rings with openings no smaller than 8.89cm in diameter and a rot-out panel that is sewn with fiber that will deteriorate if the trap is lost.

Sablefish fishing is very specialized and requires considerable investment in vessel and gear. The average sablefish trap vessel is 75 feet long, carries nine crew, and fishes on the edge of the continental shelf with 500 to 600 traps at depths of 200 to 600 fathoms (1200 to 3600 feet). The average sablefish longline vessel is 60 feet long, carries six crew, and fishes at depths of 200 to 400 fathoms. The investment in vessel and gear is significant, and is necessary to effectively access the areas where commercial quantities of sablefish are found. The fishery is relatively selective with small quantities of bycatch (primarily rockfish) being encountered.

The sablefish ITQ programme is very simple in comparison to the groundfish trawl ITQ plan. The simplicity of the plan is largely due to it being a single species fishery, having a small number of participants, minimal on-shore processing and value-added prior to export, and no significant allocation disputes. Sablefish ITQ is allocated annually to each of the 48 licensed vessel as a percentage of the TAC approved by the DFO. The ITQ is not considered property. The sablefish licence issued annually by the Minister of Fisheries is considered a privilege granting the licence holder (vessel owner) the opportunity to catch a specified share of the TAC. The allocation formula used by the Minister was recommended by sablefish licence holders and uses a combination of catch history (70%) and vessel length (30%).

Vessel operators must complete a fishing-logbook documenting their fishing effort, location, and catch. All landed catch is monitored by certified fishery observers at the designated off-loading locations. This information is used to update the ITQ vessel's balance remaining uncaught. Vessels are permitted an annual 10% ITQ underage or overage which is added, or subtracted, from the vessel's ITQ in the following year. Unlimited transfers (number of transfers and quantity of fish) of sablefish ITQ between licensed sablefish ("K" licence) vessels are permitted on an annual basis. While transfers of greater than one year are not permitted by the DFO, legal agreements between sablefish licence holders give effect to longer-term quota transfers. Quota transferability has reduced the active fleet by approximately 50%.

3.2 Groundfish trawl fishery

The groundfish trawl ITQ fishing plan is extremely complex. This is largely due to the multi-species aspect of the fishery (55 different quota species), the various fishing and transferability rules, and the programme's objective to meet numerous conservation, economic and distributional requirements. Following the completion of annual stock assessments and setting sustainable harvest levels, the commercial TAC is then allocated to three different quotas: vessel owner ITQs (80%), Groundfish Development Quota (10%), and Code of Conduct Quota (10%).

Eighty percent of the TAC is allocated annually to the licensed groundfish trawl vessels ("T" licence) based on an allocation formula established by the DFO in 1997 following extensive industry consultation. The formula is based on catch history (70%) and vessel length (30%). The groundfish trawl licence issued annually by the Minister of Fisheries is considered a privilege (not property) granting the licence holder (vessel owner) the opportunity to catch a specified share of the TAC for an identified stock.

Ten percent of the TAC is allocated annually as Groundfish Development Quota (GDQ). GDQ is allocated to joint processor/vessel-owner groups whose submitted proposals are deemed by the GDA (Groundfish Development Authority) to meet various objectives. The purpose of the GDA is to aid regional development, attain market and employment objectives, support sustainable fishing practices, and ensure fair treatment of crews and safe vessel operation in the groundfish trawl fishery. The establishment of the GDA reflects a negotiated agreement by the various industry participants (vessel-owners, processors, union, and community groups) that the entire influence and benefit from the groundfish trawl ITQ fishery would not accrue only to "T" licensed vessels. With 80% of available quota allocated directly to vessels, the GDA was established to provide the Minister of Fisheries with advice on how the balance of the quota, 20% (10% CCQ and 10% GDQ), would be allocated to vessels. GDQ proposals are submitted jointly by vessel owners and a processor. All proposals are then rated by the GDA. Proposals are evaluated and ranked based on the extent to which the proposal contributes to the achievement of GDA objectives, the total ITQ commitment of proponents, the processing history of the applicant and evidence of adherence to previously-submitted plans. A proposal's rating will determine the amount of GDQ it receives. GDQ allocated to a proposal is then allocated amongst the licensed ves-

sels participating in the proposal in accordance with the amount of ITQ brought to the proposal. GDQ can not be transferred.

Ten percent of the TAC is allocated annually as Code of Conduct Quota (CCQ). CCQ was established as a tool to ensure that under the ITQ programme crew members are treated fairly and equitably. The CCQ is allocated to each vessel in proportion to the vessel's area-specific species ITQ holdings. Complaints of poor treatment of crew are made to the Groundfish Development Authority (GDA) which then reviews all available information and makes recommendations to the Minister on whether or not to hold back some or all of the CCQ for that vessel involved in the claim. The final decision is that of the Minister of Fisheries. CCQ is subject to the same transferability rules as ITQ.

Within the fishing year of 1 April through 31 March, vessels are permitted to harvest their ITQ subject to various restrictions. All vessels must carry a contracted, the DFO-certified, at-sea observer for all bottom trawl trips. The at-sea observer provides independent verification of the location and composition of all catch (including discards), towing time, mortality estimates (of discards), and collects biological information and samples.

Upon landing, the vessel's catch is monitored dockside by contracted port-observers (also certified by the DFO) to confirm landed weights by species. The contractor providing the at-sea observers and the dockside-observers invoice the vessel-owner directly for these services. The dockside weights are then merged with the at-sea observer estimates to determine the poundage to be debited from the vessels various ITQs. For each ITQ species, other than hake and halibut, vessels are allowed to carry forward into the next fishing year an overage or underage of up to 37.5% (18.25% for halibut and hake). Vessels exceeding a species ITQ by more than the overage carry forward provision are restricted to midwater trawling for the area in which the species ITQ has been exceeded for the remainder of the year, or until such time as sufficient ITQ has been transferred onto the licence to cover the excessive overage.

Vessels are subject to ITQ vessel holdings-caps and species-caps to limit quota-concentration and minimize fleet rationalization. ITQ holdings-caps were calculated for each groundfish trawl licence during the first year of the ITQ programme and these limit the total amount of groundfish trawl ITQ that a licensed vessel may hold. The ITQ holdings-cap is measured as a percentage of total groundfish-equivalents in groundfish- equivalents. While the holdings-cap vary considerably from licence to licence, the largest holdings-cap is approximately 2%. Individual species-caps are set for each species at a level that allows vessel owners to adjust their ITQ holdings to a viable level, but ensures they cannot accumulate an unreasonably large amount ITQ for a specific species. The species-caps vary by species and are based on abundance, distribution, and selectivity. Currently, species-caps range from 4% to 15%. Applications for ITQ transfers, that result in a licence exceeding its holding-cap or species-cap, are denied.

Subject to holdings-caps and species-caps, groundfish trawl ITQ can be transferred amongst groundfish trawl licences. All transfers are registered with and approved by the DFO. Technically there are no temporary (annual) transfers. The DFO considers all groundfish trawl ITQ transfers as permanent. However, legal agreements between licence holders can result in short-term or annual transfers (commonly referred to as leases).

4. RETROSPECTIVE

4.1 What process was used between industry and government to introduce ITQs?

In the sablefish fishery the process was quick and simple and involved a small number of participants. Generally, it was cooperative with both industry and the federal government (DFO) supporting the move to ITQs. On 24 October 1989, the Pacific Blackcod Fishermens Association, an organization representing most of the 48 sablefish licence holders, made an initial recommendation to move to ITQs. The DFO then consulted with the Sablefish Advisory Committee (SAC), an industry advisory body made up of eight sablefish licence holders and a processing company representative. Following a half dozen meetings with the SAC to develop an allocation formula and ITQ programme rules and operating procedures, an ITQ programme proposal was mailed out to all sablefish licence holders. A ballot was also mailed to each sablefish licencee asking them to vote on whether or not they supported implementation of the ITQ programme and allocation formula outlined in the proposal. The yes-vote was overwhelming (46 of 48 voted in favour) and a sablefish ITQ fishery opened on 21 April 1990 a mere six months after the initial request from industry.

In the groundfish trawl fishery the process was far more extensive, comprehensive, and inclusive. There were many tense moments as parties defended positions, expressed frustration and issued ultimatums. At times it appeared that the process would fail, but the potential economic disaster facing the entire industry pushed all parties to find a workable compromise. The process started in January 1996 and continued through till March 1997. The existing Groundfish Trawl Advisory Committee (GTAC) was too large, too heavily representative of licence-holders and not representative of communities to be the appropriate forum to consult with regarding the design of a new ITQ programme. A subcommittee of the GTAC was therefore formed and called the Groundfish Special Industry Committee (GSIC). The GSIC was comprised of a balanced number of representatives of licence-holders, processors, unions, community, and provincial government (the fishery is managed by the federal government). Over the next 13 months, the GSIC convened for more than 40 days of meetings to negotiate programme details such as ITQ allocation, transferability, species-caps, holdings-caps, and the GDA, the GDQ and

the CCQ. The ITQ allocation formula and the allocation of groundfish between trawl and hook and line users was turned over to an arbitrator (a retired supreme court justice) who received hundreds of recommendations via mail, industry meetings, and numerous public meetings held throughout the province between September and December 1996. The arbitrator submitted his recommendations to the Minister in January 1997.

By January 1997, the GSIC reached a consensus on a draft ITQ plan for the groundfish trawl fishery that represented a compromise of the various parties' initial positions. The draft plan was reviewed by the GTAC and subsequently submitted to the Minister for approval in February 1997. The ITQ programme commenced 1April 1997.

4.2 What might have been done differently?

In the sablefish fishery, perhaps more time and analysis could have been applied to the issue of temporary versus permanent transferability. From the beginning, only annual (temporary) transfers have been permitted and this has led to a considerable amount of leasing between licence holders. At the time, however, the DFO was only willing to allow temporary transfers. The programme has been in effect for a decade and leasing has become well entrenched. There are both positive and negative aspects associated with leasing, but perhaps some of the criticisms of the programme regarding "armchair" fishing, leasing costs being passed onto crews, and high lease rates could have been avoided or mitigated if the issues had been analyzed more thoroughly.

With respect to the groundfish trawl fishery, the allocation between the commercial trawl and hook and line sectors should have been more clearly defined (i.e. been quantitative and species-by-species). The arbitrator recommended, and the Minister approved, an allocation formula that provided a total percentage of the overall rockfish species harvest to each gear sector and allowed the species specific allocations to vary from year to year. This has lead to continued reallocations of traditionally trawl caught species to the hook and line sector as traditional hook and line rockfish species remain overharvested in a competitive derby fishery resulting in stock depletion and shrinking TACs. In addition, the species caps should have been determined differently. The species caps are on an area specific basis rather than a coastwide basis. This would have made it more difficult for speculators to accumulate excessive amounts of species quota from a specific area that has an small overall TAC but which is important for bycatch when harvesting other more abundant species in the same area.

4.3 Is industry happy with the change brought about by the move to ITQs?

In the sablefish fishery, the majority of industry participants remaining are satisfied with the move to ITQs. Crewmen who lost their jobs, however, are less than pleased. Remaining crew have more stable employment and are better paid, but are often unhappy about having to absorb the costs of quota-leases through reduced crewshares. In some instances crew members have been paid a day-rate rather than a share. Overall working conditions have improved and are safer and the stress of fishing under the "derby" system has been eliminated. All industry participants are pleased with the improved economic performance of the fishery under the ITQ system. Improved product-quality and attention to market needs has resulted in higher prices (adjusted for inflation) compared to pre-ITQ fishing. In addition, many of the vessels are multi-licensed and are better able to plan their entire fishing operation under the ITQ programme. Improved returns and increased stability have resulted in higher licence and quota values for existing licence holders while making it more difficult for others to buy in. Licence holders are also pleased with the improved management which has resulted from the change to ITQs. ITQs have created an environment for co-management and greater industry involvement in the research, assessment, monitoring and administration of the sablefish fishery. The Pacific Blackcod Fishermens Association (PBFA) funds all DFO-related management costs (through a complicated cost-recovery mechanism) in addition to employing independent researchers, scientists, and fishery managers. Indeed, a majority of management activities associated with the sablefish fishery are carried out by parties contracted by the PBFA.

In the groundfish trawl fishery, generally all industry participants believe that without the change to ITQs the fishery would have collapsed through resource and/or economic failure. There is a clear consensus among industry members that the adoption of the ITQ programme has moved the fishery in the right direction. Vessel owners who had entered the fishery in the late 1980s and early 1990s were unhappy with the period (1986 to 1989) used to determine the catch-history component of the ITQ allocation. Small vessels were also opposed to the formula stating that it favoured large boats and did not recognize that small boats often focussed on delivering a quality-product rather than large volumes. Owners of small vessels also opposed the ITQ programme's requirement for 100% at-sea observer coverage on all bottom-trawl trips (at-sea observers record discards, mortality, and catch by area and species), stating that they neither have room for observers nor can they afford the significant costs (currently $Can280/day). Indeed, a number of smaller vessels were forced out of the fishery as a result.

There has been a decrease in crew (approximately 20% reduction), but generally the crew, and the union representing many crew, are supportive of the programme. The CCQ does deter vessel owners from mistreating crew. However, the crew would like to see some revisions to the CCQ process so that it better protects crew who file complaints and offers other methods of penalizing the vessel, other than deducting 10% of the vessel's ITQ (which would also penalize the crew).

While all participants agree that some level of leasing (temporary ITQ transfers) is necessary in the multi-

species groundfish trawl fishery (so that boats are not shut down and the fleet can get the fish out of the water), some (vessel owners and crews) would like to see restrictions placed on the amount of leasing. Crewmen are also concerned about having the leasing-costs taken solely out of the crew share. Some licence holders, crew and the union are concerned about "armchair" fishermen (quota-holders who do not fish but simply lease-out quota annually). The same groups are also concerned about individuals buying up large amounts of valuable area-specific quota (not abundant and often needed as a bycatch for other species), and then leasing it out at extremely high rates (demand far exceeds supply) to licence holders desperate for more bycatch quota so they can harvest their other species-quotas for the same area.

Even though accepting the GDQ was important if agreement on an ITQ programme was to be reached, many licence-holders believe the GDQ is used by processing companies and communities to unfairly leverage additional ITQ from independent operators. Licence-holders contend that the GDQ programme interferes with healthy competition and results in lower average prices. Coastal communities and processors with significant investments in the fishery, argue that the GDQ has served to minimize the possible dislocation and disruption resulting from ITQ programmes.

Groundfish trawl licence-holders also believe the ITQ programme has focussed them more on issues concerning the health and sustainability of the numerous groundfish stocks harvested by the fishery. Industry participants (primarily licence-holders) are so concerned about the lack of research and assessment resources dedicated to the fishery by the DFO that they have established a new organization called the Canadian Groundfish Research & Conservation Society (CGRCS) to provide financial and human resources aimed at improved groundfish stock assessments. The CGRCS conducts surveys, gear-selectivity research, collects biological information and employs technicians, researchers, and stock assessment scientists, who work cooperatively with the DFO science staff on groundfish research and stock assessments.

4.4 What are the views of other stakeholders not directly involved in the fishery?

There are no significant recreational or aboriginal interests or allocative issues involved in either the sablefish or groundfish trawl fisheries. Outside of the parties directly involved, interest is shown by environmental groups (Greenpeace, Sierra Club, *etc.*) or participants from other commercial fisheries. A common complaint from other commercial fishermen is that the ITQ programmes have greatly increased the cost of entry into the fishery. Since fishing licences and quota are not property, lending institutions cannot register liens against them and are, therefore, hesitant to finance ITQ licence and quota-purchases.

Even though sablefish and groundfish trawl ITQs are not legally considered property, many community groups complain that they closely resemble property and, therefore, further remove valuable resources, and the benefits they generate, from broader public access and utilization. Many Coastal communities would like to see fish allocated as CDQ (Community Development Quota) and used to improve local economic opportunities and benefits derived from the sablefish and groundfish resources.

Environmental organizations have shown little interest in the sablefish fishery, but have kept a watchful eye on the groundfish trawl fishery. Prior to the introduction of ITQs in the groundfish trawl fishery, Greenpeace was lobbying the government to stop the fishery due to problems associated with consistent over-harvesting and concerns about discards and resource wastage. The ITQ programme has allowed the fishery to address many of these problems. While Greenpeace recognizes the significant improvements in the fishery, they continue to express concern about the impact of trawl gear on marine habitat and the benthic community.

Representatives from the groundfish hook-and-line industry were unhappy with the allocation between the groundfish trawl or hook-and-line sectors and suggest the process did not adequately include their issues and concerns. The allocation was based largely on catch-history. Hook-and-line participants only started to significantly increase their investment and fishing effort in the late 1980s and through the 1990s. Hook-and- line representatives also believe that some of the historical trawl-catches are a result of illegal fishing and catch mis-reporting and should not have be recognized in the allocation formula.

Most commercial fishing vessels in the British Columbia fleet are licensed to fish more than one fishery (often as many as four or five fisheries). A complaint from vessel-owners involved in non-ITQ fisheries is that the sablefish and groundfish trawl ITQ programmes have increased the fishing pressure in non-ITQ fisheries. In some cases, vessels without sablefish or groundfish trawl ITQ are speculating that ITQs will eventually be brought into all fisheries and they are attempting to increase their catch in the event that catch-history is used in the allocation formula. Fleet-rationalization in both the groundfish trawl and sablefish fisheries (approximately 50% in both) has allowed vessels exiting, or reducing activity, to increase fishing-effort in other fisheries. Another concern is that profits realized in the ITQ fisheries are being directed towards increased fishing-effort in non-ITQ fisheries, thereby fuelling the race-for-fish and resulting in wasteful and redundant investments in excessive fishing capacity.

5. FUTURE DIRECTIONS

5.1 Main trends in management measures

There are a number of different commercial fishing fleets licensed to harvest groundfish off the west coast of

Canada. Some of the most commercially important species include halibut, sablefish, lingcod, and various species of flounder, sole, rockfish, and cod. The historical development of commercial fisheries management in British Columbia has been to establish separate fisheries by species and/or by gear-type. As a species became heavily fished and required protection, the DFO would implement various management measures and input controls (*i.e.* TACs, closures, size-limits, gear-restriction, and effort-controls). Licence-limitation was often one of the most common methods for attempting to restrict fishing effort. Licence-limitation was introduced in the groundfish hook-and-line fishery in 1969, the groundfish trawl fishery in 1976, the halibut fishery in 1979, the sablefish fishery in 1981 and in the rockfish hook-and-line fishery in 1990. Each limited-entry licence fleet has a separate quota, fishery and management plan outlining the operational and administrative rules specific to that fishery.

While the objectives of limited-entry may have been to cap fishing-effort and improve the management of fishery resources, it did nothing (in fact it fuelled the race-for-fish) to slow down or reverse the movement towards excessive harvesting capacity, continuous TAC overages, irresponsible and wasteful fishing practices, and intense hostility between fishermen and resource managers. Since 1990, comprehensive ITQ programmes have been introduced into three of the five limited entry B.C. groundfish fisheries (groundfish trawl, sablefish, and halibut). Two fisheries (groundfish hook-and-line and rockfish hook-and-line) remain limited-entry programmes which continue to be managed with input-controls. The ITQ programmes have, to some extent, addressed the problems that limited-entry (on its own) was unable to solve. These fisheries have generally stayed within TACs, decreased mis-reporting and high-grading, reduced excessive-investment in harvesting capacity, improved economic-returns and viability, and established an environment and incentive structure for greater industry involvement and cooperation with the DFO. These are positive steps, but there are many more steps to be taken.

While the following vision for the future will be confined to the commercial groundfish fishery, it would not be difficult to expand it to include all fisheries on the west coast of Canada. In setting out a vision, the author does not attempt to outline a management structure that serves as a panacea for the commercial groundfish industry. Rather, the measures described below should be considered as small, but significant, steps that would advance the groundfish fisheries and build and improve on the measures taken over the last decade. Over the next decade, three important measures should be undertaken and completed:

i. All limited-entry groundfish fisheries should be managed under a comprehensive ITQ programme;
ii. All barriers that divide the current fisheries by licence categories should be gradually removed until there is only one licence covering all of the groundfish species;
iii. Direct involvement of industry in the management of groundfish should be significantly expanded.

These measures do not need to happen sequentially, nor is the successful implementation of one dependent on the success of another (although it may improve the chance of successful implementation). Rather, efforts to achieve all three measures should occur simultaneously to the extent possible.

5.2 Limited entry groundfish fisheries managed under a comprehensive ITQ programme

The groundfish hook-and-line and rockfish hook-and-line fisheries should be brought under ITQ management regimes. This will require extensive consultation with all industry plus non-industry participants affected so that the programme addresses the varying objectives and needs where reasonable. These fisheries are following in the paths of the other groundfish fisheries prior to the adoption of ITQ programmes and will not be sustainable or economically viable in the long-term. Experience shows that much of the initial opposition to ITQ programmes in B.C. has stemmed from a fear of the unknown (how will "I" be affected by ITQs) and skepticism by individual licence-holders that the allocation formula will not treat them fairly. Strong leadership is therefore needed by the DFO to ensure that the long-term needs of the fishery and resource are not left at risk because of allocation disputes and often overstated and unsubstantiated fears. All parties must realize that there will be an adjustment period as they move from a fishery with excessive investment (of labour and capital) and with an incentive structure that works in opposition to responsible and sustainable management, to a fishery with an incentive and business structure consistent with well defined property-rights. There will be continual fine-tuning and adjustment but within two or three years one should expect the programmes to be broadly accepted by remaining participants.

5.3 Removal of barriers that divide the current fisheries by licence categories

The artificial barriers, expressed through the various limited-entry licences and attached licence- conditions put in place to separate vessels and fleets catching the same species have resulted in wasteful bycatch, inefficiencies, mis-reporting, and animosity between competing fisheries. These barriers must be removed. Vessels with ITQ in the sablefish fishery should be able to trade quota with vessels in the groundfish trawl fishery that catch sablefish as a bycatch in the deepwater rockfish fishery, and *visa versa*. If a trawl licence-holder wishes to use trap-gear to harvest his sablefish quota to minimize bycatch and enhance product quality, then he should be able to. Presently he is restricted to using only trawl-gear. Vessels licensed to fish halibut often catch various rockfish species as a bycatch, which they then discard if the weight of the rockfish catch exceeds 10% of the halibut catch (a common occurrence). The halibut licence holder should be able to purchase rockfish ITQ from either the groundfish trawl or rockfish hook-and-line licence-holders. Any

vessel fishing groundfish should be able to retain all by-catch. Therefore, the various licensing and gear restrictions that separate the fleets must be removed over time. Initial steps could allow the trading of ITQ between two distinct licence-categories. This would gradually be expanded. Next, vessels should be given the flexibility to use differing gear-types that improve selectivity, reduce mortality, and enhance product-quality. This could also be phased in, starting with a couple of experiments and then expanded. Eventually, the need for distinct licence-categories will become pointless and a single licence-category for all groundfish species with overarching conditions (*i.e.* dockside monitoring, hailing, logbook requirements, *etc.*) and gear specific conditions (*i.e.* only certain gears can be used for identified species and/or areas) will be implemented. These changes will improve efficiency, reduce wastage and mortality, encourage regionalization and specialization, reduce conflict and enhance communication and cooperation.

5.4 Direct industry involvement in the management of groundfish

A positive development resulting from the implementation of ITQs in the sablefish and groundfish trawl fisheries has been the increased role that industry has played in the management of commercial groundfish fisheries. Under ITQs, consultation between the DFO and industry participants is more cooperative, meaningful and productive. Industry operates and funds dockside-monitoring and at-sea observer programmes essential to the management and credibility of the ITQ systems. In the sablefish fishery, licence-holders fund, on a cost-recovery basis, 100% of the DFO-related enforcement, administrative, management and science activities, in addition to employing numerous contracted scientists, technicians and resource managers. Groundfish trawl licence-holders coordinate, fund and conduct research charters and are spearheading the development of a long-term research survey and assessment programme for slope rockfish to be carried out by the industry fishermen and contracted scientists and managers. All of the work by industry is being done in cooperation with the DFO.

The past decade has seen the DFO's budget continually reduced and has led to a shortage of government-sponsored human and capital resources available for the proper management of fisheries. In the groundfish ITQ fisheries, industry resources have been quick to fill many of the management voids, and in the groundfish trawl and sablefish fisheries, industry's involvement has actually expanded the level of resources dedicated to the management of the fishery. Indeed, industry's performance in the management of groundfish has, to date, been as good as government's or better. This trend needs to continue. The more-involved industry becomes in all aspects of resource management (*i.e.* monitoring, stock assessment, operations, planning), the more responsible it will become. The DFO must continue to devolve responsibility to industry to the point where government's role in the management of the commercial groundfish fisheries is simply to set standards and over-arching public policy-objectives, and to then enforce the standards, rules and regulations, and ensure that the public's interests are properly served.

THE MALAGASY PRAWN FISHERY

B. Coûteaux*
Malagasy Prawn Fishery Industry Association
GAPCM Villa Maria, Lot VA 20 BE – Tsiadana, 101 Antananarivo, Madagascar
<gapcm@dts.mg/www.madagascar-contacts.com/gapcm>

1. BACKGROUND

Madagascar is a large island to the south-east of Africa. This developing country has a challenge to reduce its great poverty and to improve its economy. It is a great challenge for such a country to manage the marine resources of its 1 000 000km^2 Exclusive Economic Zone and its 5000km of coastline! The continental shelf has an area of 112 000km^2 and is narrow on the east coast. An important prawn fishery has developed which at present has annual catches of about 12 000t and is one of the primary sources of foreign exchange earnings for the State. Consequently, it is important to ensure a sustainable future both for the resource and the fishery activities and to improve the economic and social impacts.

One characteristic of the fishery is that the resource is very close to the coast, in shallow waters. The first trawling trials occurred in 1951, but the industrial fishery mainly started in 1967. Of the five species harvested, the white prawn (*Penaeus indicus*) is the major species in the catch.

2. FISHERY MANAGEMENT

There are three sub-sectors in the prawn fishery: the industrial-sector with trawlers up to 500 hp, the artisanal-sector, which is more varied in its vessel characteristics (more ambiguous) with trawlers up to 50 hp, and the traditional-sector. For historic reasons the prawn fishery is divided into 14 fishing zones; with 10 zones on the west coast and 4 on the east coast. Licences are granted and individual boat trawling zone authorisations are given each year for the industrial fishery. The development of the fishery has resulted in conceding 5 exclusive zones to 2 companies. The others are common access zones accessible to all companies.

The yield, or productivity of the fishery, is very heterogeneous. On the east coast, annual yields are about 70 to 80 tonnes/industrial boat; in the common zone, they are 125 to 150 tonnes/boat and more than 200t in some exclusive zones. Such differences were the beginning of the problems that the fishery has to face: some of the companies fishing only in the common zones are claiming that they should have equitable access to the resource in all areas. One must add that there is a bycatch of small fishes of very low value and currently a requirement to land one unit of bycatch for every unit of prawns landed.

3. ECONOMICS

The first precise economic data for the prawn fishery were collected for 1996 and are presented in Table 1.

It can be assumed that the economic impact has considerably increased since 1996. The total tax revenue has doubled and licence fees almost tripled. The contribution to the Gross Domestic Product is now (1999) about 1.5% and the revenue of the fishery is about $US100 million. The first licence taxes were imposed in 1996. In some particular cases, for exclusive areas, the fees have been increased six-fold.

Table 1
Data on the Malagasy Prawn Industry
(Dollar values are expressed in millions)

Taxes revenues	$US	GDP contribution	$US
1996	3.0	1996	1.07%
Licence fees		**Balance of Trade**	
1996	0.6	National	- 208
1997	0.6	Prawn fishery	+ 32.6
1998	1.2		
1999	1.6	Turn-over	74.5
		Added value (direct)	5.4
Direct employment	10 000	Indirect employment	30 000

* Accompanied by M. Robert Rabesalama, Director of Fisheries.

4. INDUSTRY

There are 75 trawlers (between 250 hp and 500 hp), 68 of which are based on the west coast, and 36 artisanal boats. The latter have licences, but do not need trawling-zone authorisations because they are limited to the areas surrounding the main commercial harbours.

An important condition to obtain access to the Malagasy fishery is the requirement to have onshore processing facilities. The industry approves of this rule because it considers it provides security for the government. However the law is a little ambiguous and this creates misunderstandings among some participants as well as informal abuses. Today, there are 15 onshore facilities, which are mainly processing-and-freezing plants.

5. GLOBALISATION

As everywhere, the Malagasy industry, which is 100% export-oriented, has adapted to international market exigencies, prepared for the future, and maintained its competitiveness. This has mainly consisted of adopting the international hygiene standards (EU / HACCP-based) and of horizontal integration by merging companies.

6. REGIONALISM

Madagascar recently adopted a new constitution. Six Provinces have been created and will acquire autonomy. Our association is concerned that this will multiply the fishery management problems. Already, five marine Provinces are claiming the right to grant licences. Also, the central province is claiming access to the sea, and therefore, the right to grant licences. As the prawn fishery is important from a socio-economic point of view, considering the level of development of the country and the weakness of the provincial administrations, the industry considers that the only way to create a sustainable and secure fishery is through central management. Thus it is important to consider the sector from a strategic and constitutional point of view. However, the industry considers that the point of view of the Provinces should also be considered. So, taking our cue from practice in the United States and in Canada, we have proposed the creation of a National Council for the Conservation of Prawn Resources. Such a Council would gather together everyone concerned with the prawn fishery (central government, provinces, research, surveillance and enforcement, professional association, *etc.*) to find the best solutions for the challenges to the management of the industry.

7. THE MALAGASY PRAWN FISHERY INDUSTRY ASSOCIATION

To face the coming changes, to safeguard the industry, to avoid economic over-fishing, and to reduce informal management of the fishery, the fishery companies have decided to organise themselves into an association. I have the honour to have been chosen by them to prepare a work programme, to run the association and to propose changes in the management of the fishery. This Association has been helped with start-up subsidies from French bilateral co-operation and is now fully operational and funded through its own revenues. In practical terms, the Association co-manages the prawn fishery. From the date of its creation in 1996, all the major contributions to the sector came from the Association. A basis of our management method is the well known Greek maxim: "Know yourselves". We are convinced that development of knowledge and information will facilitate the debate and enable the establishment of good fishery management. This will reduce disorder in the industry. The Association is financing the National Prawn Research Programme which is conducting resource assessment and tagging programmes, a socio-economic assessment, and an anthropology programme in the traditional sector. The association has made an important macro and micro-economic study of the sector that will be followed up with economic monitoring. We also are involved in several other activities: bringing the processing plants into line with EEC standards, a satellite survey (forthcoming), improvement in port facilities by dredging, space management studies, a study on conflicts (around the world) between industry and traditional fishermen, a study on the concept of Concerted Management Zones (CMZ), and so on.

8. TRADITIONAL FISHERY ISSUES

As Madagascar is one of the poorest countries of the region, a lot of people, mainly poor farmers, are migrating to areas richer in resources, in particular the regions where prawns are abundant (west and north-west). Unfortunately, a lot of non-governmental organisations are facilitating such migration flow by giving money, gillnets and other incentives. This creates conflicts with the local communities, conflicts over space with the industrial and artisanal fishery, negative impacts on the resource through exploitation of juveniles, problems for the environment (mangrove-wood exploitation, over-exploitation of sea-cucumbers and shark, for their fins) and quality problems. Gillnet fishing is expanding a lot and now there are claims from the traditional sector for a reserved 2-mile zone. This claim is now more or less supported by some NGOs and politicians, but also by some small businessmen for political and financial reasons (elections, securing fish resources to sell to the industry). The problem comes down to the fact that Madagascar has an ambiguous law regarding the sea that it is not really adapted to the fishery problems. A 2-mile reserve-zone on the existing baseline would exclude the entire industrial and artisanal prawn fisheries. It would be irrational, first because of the strategic importance of the prawn fishery for the economy of Madagascar, and second because it is a 100% export-oriented industry, and the traditional fishermen depend on the industry to sell their products.

9. STATEMENT OF PROBLEMS

After having obtained first the research information on the prawn resource and the economy, it was necessary to summarise the different problems that the fishery was facing. But the difficulty was the major issue of conflict of interest between the prawn industry members them-

selves, and the resistance of politicians who had found good informal opportunities to benefit from the prawn fishery themselves. As a result, nobody was able to tell the truth and propose real changes. Finally, the Association overcame its conflicts and requested a committee of 'wise men' to state the 10 major problems of the fishery. This committee consisted of three fishery experts (J.Wilson from Canada, W. Griffin from the U.S, and I. Sommers from Australia). They were fully independent in terms of nationality and business from anybody dealing with the Malagasy fishery. Their conclusions were as follows:

i. *Restructure the Commission Interministerielle and strengthen its role.*
This Commission, comprising representatives of different ministries is theoretically consulted before cancelling or granting any licences. In fact, it does not work and its power of granting licences is discretionary.

ii. *Freeze the number of licences.*
Scientists concluded that the maximum sustainable yield has been exceeded and that it was essential to freeze fishing-effort.

iii. *Increase licence fees and rationalise Agency funding.*
This agency for fishery development, funded by a portion of licence fees, was considered as managed with a discretionary and non-transparent power.

iv. *Establish a viable system of surveillance and enforcement.*
Compliance with the rules of the fishery is essential for its conservation.

v. *Recognise the recommendations on the ongoing nature of fishing-rights.*
Strengthening of fishing rights will lead to a more prosperous industry and more rational benefits.

vi. *Remove the requirement of onshore facilities for retaining fishing-rights.*
In some cases more rational benefits will be created from at-sea processing.

vii. *Consider the establishment of Industrial Zones.*
We prefer to speak about Zone d'Aménagement Concerté (ZAC) (see below).

viii. *Integrate the traditional fishery into fisheries management.*
Effective fisheries management must encompass all sectors.

ix. *Revise the two-mile protection zone.*

x. *Enforce quality-control and different level of standards.*
Failure to ensure optimum levels of product-quality will result in forgone benefits.

10. STRUCTURAL ADJUSTMENT

To set up a programme to reduce the poverty, the multilateral development agencies, *e.g.* World Bank and IMF, together with the bilateral co-operation agencies, proposed to negotiate with the Malagasy government a rapid development through a structural adjustment programme. In exchange for a significant programme of loans and subsidies, the government committed itself to a letter of intent (DCPE) on the common objectives to be reached. This consisted in improving key macro-economic data, reducing the debt, developing health, social welfare and education, improving important sectors (energy, communications, *etc.*). The programme may also include the private sector, which is considered a driving force for development.

In considering the first results of the fishery studies, the Association came to the conclusion that the time had come to take some strong management measures on the fishery. This explains why the prawn fishery has now been included as a pilot sector in the structural adjustment programme, with conditions to be met in terms of income (licence fees) and fishing-rights. Therefore an important study is ongoing to set up a transparent, non-discretionary and competitive system for cancelling or providing fishing-rights.

11. CONCLUSION

The fishery companies really desire to secure their investment and to realise a sustainable fishery, and are ready to pay to ensure that. However their ability to manage or co-manage the fishery must be fully recognised. I will use an image as a gentle hint to our colleagues in the multilateral funding agencies: the industrial fishermen do not want to be considered as sharks defending their territories and their privileges, they are serious partners wishing to negotiate. I would like also to emphasise that the industry fears dogmatic recipes for success and stresses that pragmatic, efficient and effective solutions are required. They are aware of the weak economic environment of Madagascar as a developing country, as well as average world fee-level practices to be considered, before any specific licence fees are fixed.

Are ITQs really adapted to such a context? How does one take into consideration existing investments and facilities and specificity of fishing zones? How does one control total fishing effort with the uncontrolled growth in the traditional fishery? How does one avoid the race for the resource and the considerable associated bycatch losses? How does one allow modernisation and renewal of investment? What will be the cost of any new system that is proposed? These are the main questions asked by the industry, and suggestions are welcome.

One option that the industry is studying today is the concept of Zone d'Aménagement Concerté (ZAC). Different companies could negotiate with local communities and bid together for a zone to be allocated. If they are allocated, a collective will co-manage the zone.

QMS IN ARGENTINA – THE UNCOMMON (?) TRAGEDY OF PROPERTY RIGHTS

C.A. Verona
Calle 28 #977 (7620), Provincia de Balcarce, Argentina
<carlosverona@yahoo.com>

1. INTRODUCTION[1]

1.1 Facing the issue

This presentation is about issues and queries of the Argentine fishing sector to show where it is, where it is coming from and where to go from here. During the presentation it will be clear that we need to search for a minimal set of conditions that must be fulfilled to accomplish our purpose, that is: the improvement of the fishery administration.

With passage of the *Federal Fishery Act 1998*, the Argentine Congress for the first time mandated in January the adoption of a quota management system (QMS) to administer all Argentine fisheries. The new legal framework introduced individual transferable quotas (ITQs) as the core property-rights of the system. The stated policy objective is to avoid the risk of falling into 'the tragedy of commons' and its consequences.

Although some people in the government are working hard on the system, until now the attempts to implement the new regime have failed for several reasons that signal future conflicts. However, high expectations still remain in the fishery sector because of the need to overcome current problems - stock depletion by over-fishing and excess of fleet capacity.

The central government is facing the dilemma of continuing with a short-term strategy adopted during the last ten years and the need to design a long-term strategic orientation toward the build up of a sustainable fishery. New federal authorities (recently elected in a general election) will be urged to find the way to migrate from the weak traditional management practices to a full operative and effective QMS.

1.2 The nature of the solution

The rational behind 'the tragedy of commons', as it was originally stated by Garret Hardin in 1968, was that certain dilemmas do not have technical solutions. And, a successful implementation of a fishery administration under property-rights is not straightforward application of a technical recipe. International experience is clear that proactive attitudes to adopt the best social organization, with the power, skill and motivation to solve problems are essential to fully accomplish the job. Otherwise, countries that attempt to install a new order in the fishery sector will find that 'the tragedy of commons' changes her name adopting a new one: 'the tragedy of property-rights'. It could be useful to consider, as an hypothesis, how uncommon these circumstances are.

1.3 A prophecy

A 1998 mission by the World Bank began its final report titled: **Argentina. Towards Rights-Based Fisheries Management**, saying:

> *"The fisheries sector is currently faced with a choice between continued export revenue and employment growth, and the collapse of the most important commercial marine species. The distinction between these two scenarios is based primarily on the implementation of an effective fisheries management regime.*

1.4 Truisms about the prophecy

First. A rights-based management system can be a good idea in theory but it will only be a good system in the reality, if and only if, all the potential stake-holders, mainly the industry, agree on that. *Second.* Besides this, much depends largely on the will of the government to head the transformation and on its effective ability to lead the process.

2. PRESENT OUTLOOK

The present outlook can be characterized by a single word: uncertainty. Let me explain the reach of this concept based on a number of points:

i. Although fishing resources as anchovy or hoki could be developed, and still others seem to be reasonably well-managed (shrimp, squid, scallop) the species of main economic interest (the common hake) has almost collapsed.
ii. It is estimated that as many as 10 000 workers could lose their jobs if catch-level reductions are enforced to prevent stock collapse (Argentina currently has an unemployment rate of 18.9%, higher in coastal communities).
iii. The *Federal Fishery Act* was temporary suspended by the effect of an *Emergency Fishery Act* whose mandate is to postpone the implementation of a QMS until December 31.
iv. Argentina has a legal framework to administrate the fishery but has no policy to establish where we wish to go.
v. The Federal Fishery Council, created by law, did not get the full support of the marine coastal provinces (only one on five provinces expressed explicit support). This situation created additional doubts about the formal power of the highest level of authority in the fishery.

[1] This paper forms part of a large work on QMS implementation prepared under contract by requirement of nine of the major fisheries enterprises of Argentina

vi. The Federal Fishery Council has neither been able to adopt a structure and legitimate operation mechanism, nor to understand its responsibility as the main institution for the political management of fishing.
vii. On the contrary, it has become a situation of disputes and controversies, where the parliamentary manoeuvre of not giving quorum to block government's administration has been used. The persistence of these sorts of problems will not enable recovery of the sector.
viii. The Argentine Exclusive Economic Zone includes 11 administrative regions plus another four interprovincial limits. This creates many constraints to reaching a common approach to administrate the fisheries industry.
ix. The main course of the hake fishery's history could be inferred from Figure 1, in which the dramatic increment of official catches, during the period 1988-1997, could be clearly seen.
x. In this decade the National Institute of Fisheries Research and Development (INIDEP); by far the most reliable component of the fishery-administration system, recommended for hake a total allowable catch (TAC) in the range of 400 000 tonnes.
xi. Notwithstanding that during the same period the catches doubled, causing a decrease to less than a half of the total biomass and the spawning-stock biomass, and
xii. The fishing success expressed as catch per unit effort (CPUE) also diminished considerably (see Figure 2).

This anarchical and irrational situation, frankly contributes to the behaviour that hinders the development of the proactive attitudes that are required to favour negotiation and initiatives toward overcoming the crisis.

3. CHANGING COURSE

In order to frame the analysis, I found appropriate to bring an adaptation of Figure 3 originally from Csirke, J. and G.D. Sharp, 1984. Reports of the Expert Consultation to examine changes in abundance and species composition of neritic fish resources. FAO Fisheries Report No. 291, FAO, Rome.

The figure describes a fishery cycle, from its beginning as a mainly subsistence-exploitation phase. Then follows much growth, when the development of the fishery occurs by the entry of new vessels and by maximizing the profitability through the implementation of the best available technology, until full resource- exploitation is achieved. From this point to the over-exploitation of the resource is only one step, and this is unavoidable if the race-for-fish is not stopped. Traditional administrations have proven ineffective to limit the increase of investment of the private sector, which gives rise to over-capitalisation of the industry and collapse of the fishery.

Taking as a variable of analysis, the fishing efficiency expressed as the catch per unit effort (CPUE), the figure shows that, at the beginning the CPUE has high values due to the existence of a few harvesters with a low investment level in fishing capacity, and relatively abundant resources.

As soon as the development phase begins, the CPUE plunges because of the entrance of new vessels in the fishery. This tendency continues in the following phase, now due more to the progressive reduction of the abundance of resources than to the increase in the fishing capacity, that anyway continues growing. During the over-exploitation and collapse phases, the CPUE reaches its minimum values, before beginning to increase again during the recovery phase, mainly due to the reduction of the fleet and the incipient increase of the resource abundance and catches.

Figure 3 is an excellent backdrop to illustrate the reality of the Argentine fishery, but it is also useful to describe the attitudes of the actors involved, since at each stage their strategies and tactics are often deeply conditioned by the short-term perspective that characterises them.

What follows is an attempt to describe the responses that appear in each phase of the evolution of a fishery with the intention to schematically infer the current situation of the Argentine fish stocks and the attitudes needed to be adopted to promote, or to discourage, the actors and to achieve the necessary and adequate consensus required to solve the problems.

4. REACTIVE ATTITUDES

Pre-competitive attitudes

Before entering into the growth phase, the fishery usually consists of a marginal activity that provides constant revenues instead of income maximization. Under these conditions, the actors play within a scenario of co-operative attitudes, reaching a stable equilibrium among their members.

Competitive attitudes

During the phases of active development when decreasing CPUE levels prevail, the dominant game is characterized by non-cooperation. In their struggle to gain profitability, each company zealously looks to maximize its benefits over the other ones. Non-cooperative games impose a demanding competitive scenario in which only the fittest survive.

Post-competitive attitudes

When arriving at the collapsed stage of the stock everything turns out to be different. Even the better-positioned companies suffer its impact. It is here that the limits of the rationality are reached. The CPUE is at its minimum level - below the economic viability - and game-theory is no longer useful. The open-access fishery is in chaos, and those involved in it do not realize that the only convenient measure is to stop the over- exploitation as soon as possible. If this is a good description of a collapse, then Argentina has one.

Figure 1
Total catch, Argentina and Argentine CPUE

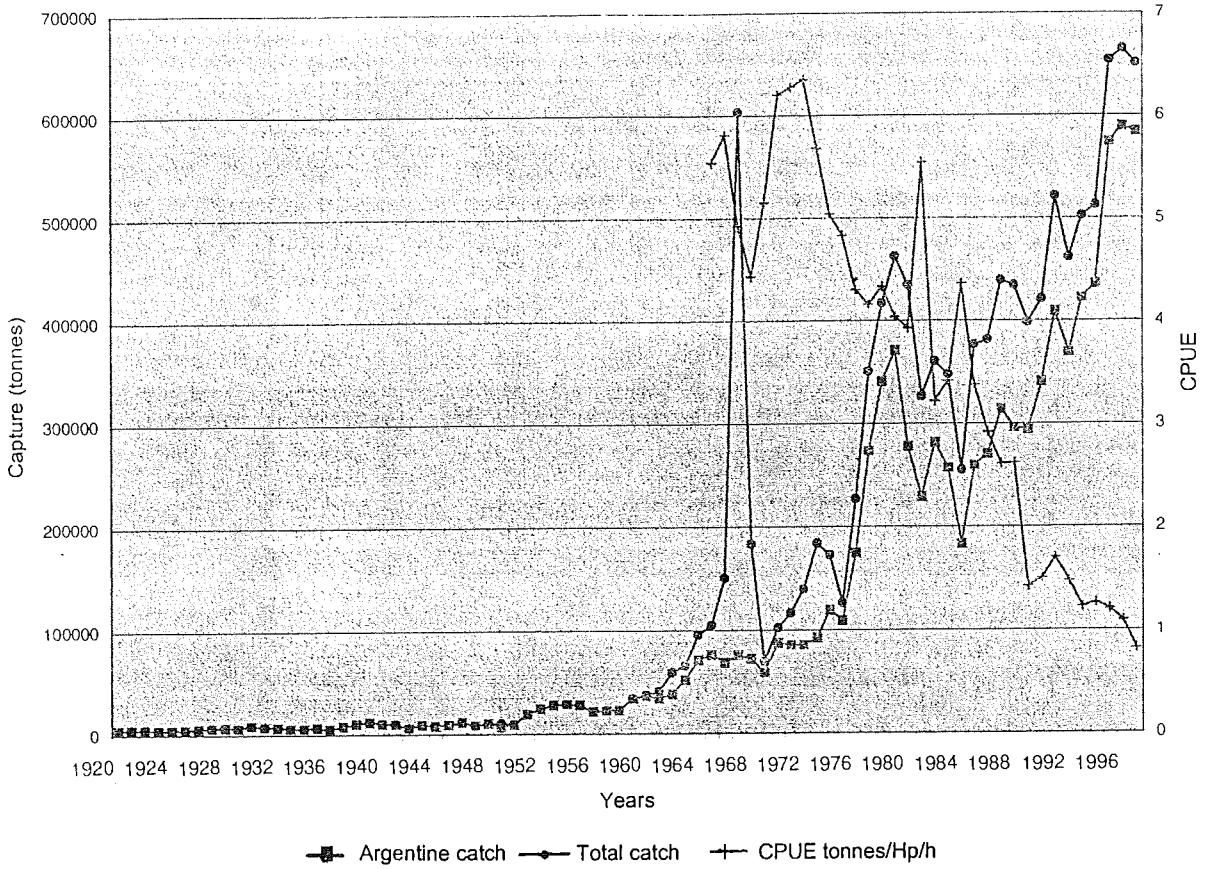


Figure 2
CPUE and total effort, Argentine fleet

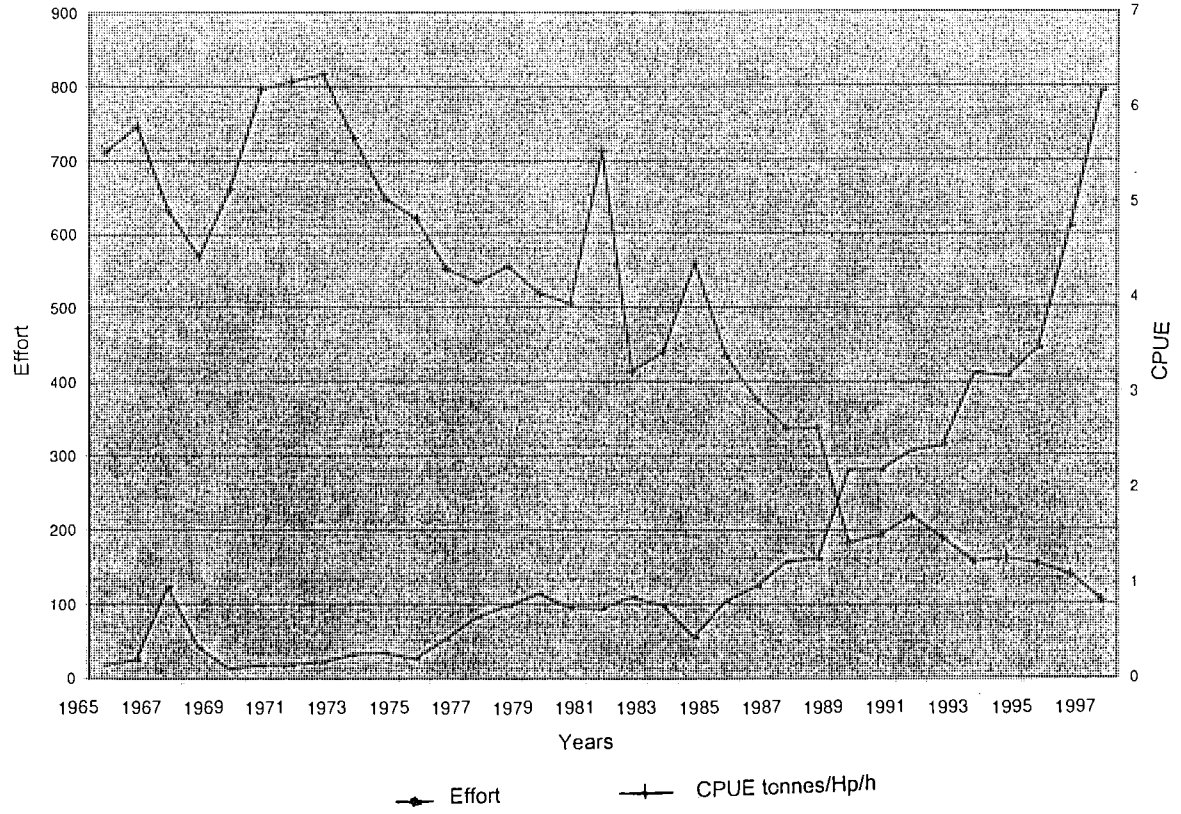
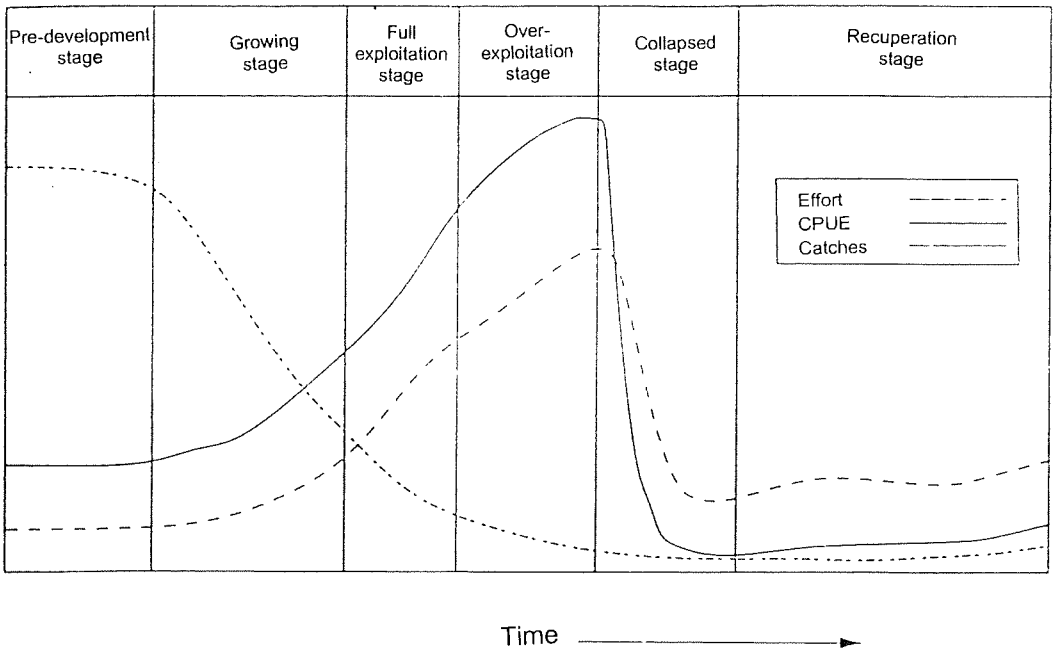


Figure 3



But, today some actors still refuse to accept the new reality and they persist in attitudes characteristic of the pre-collapse stage by trying to "catch the last fish". Others, generally those who feel weaker, try to present themselves in front of public opinion as the only sector armed, by appealing to the easy argument that the culprits are among the members of the strongest sectors. Notwithstanding this, there is agreement in the private sector, to blame the Administration by attributing the problems to its inability or attitudes, and quarrelling over the ethics, although many in the fishing sector took advantage of both weaknesses.

5. PRO-ACTIVE ATTITUDES

The previous situation described constituted the "reactive atttitude", and even the last, that of the individual's survival is only heard half-heartedly, given the characteristic scepticism that sums up the anarchy, distrust and uncertainty of most fishers involved.

If the repertoire of reactive attitudes can be resolved, one option can appear: on one hand their stillness represents resignation to cope with the unavoidable, but on the other hand, the difficulty of a "pro-active attitude" able to encourage hope in finding a common solution to a problem shared by all.

It is time to negotiate over how to search for alternative solutions to a common problem. It is neither about an unconscious willingness nor an irrational ingenuousness, but the opposite. There must be a coherent effort directed to create trust, on which a cooperative understanding can be built. This is not an easy task, but a worse problem will arise in the absence of other options. In any event, it is important to act responsibly, because to define a cooperative action and to give room for decision, the pursued objectives and the game rules must be clearly set out beforehand.

Participation and transparency are two essential elements when a process of this type is considered, as well as the capacity, seriousness and leadership with which the authority must act. There is no room for unproductive deliberations any more. The objective is to emerge from the disaster; which means that in the future those attitudes that have brought about the present situation should no longer persist. The Argentine fishery is experiencing the necessity of migrating from the present state to a new more reliable one, in which ecological sustainability, economic efficiency and social equity can be granted. If an administrative regime based on property rights can be implemented with success, it is because it will have had the minimum active consensus required, but once started, it will perhaps be necessary to play a competitive game again. The government's orientation and ability will define whether competition will operate in the global market, maintaining cooperation at the internal level or, on the contrary, in the national business sector competition will be encouraged also.

6. CONCLUDING REMARKS

What everyone has learnt from this FISHRIGHTS99 Conference is that:

i. the transformation process to rights-based management is neither simple nor is always obviously what should be done
ii. a set of minimal condition must be present, or must be created, in order for such a new management regime to succeed and

iii. warnings, or other industry alerts, must be recognized early in order to enable timely recognition of problems and to avoid falling into trouble again.

7. THE BOTTOM LINE

i. The current strategic responses of the industry to QMS have been reduced to finding the best answer to a simple question: How to survive in a sea of uncertainties?

ii. The main concerns are about intended outcomes and unintended consequences of QMS implementation: the losers *versus* winners dilemma.

iii. The arrival of a new government has created high expectations about the short-term decisions and the long-term policy on fisheries.

iv. In the near future, the government will have much work to do, but a job well done will require commitment, consensus skills negotiating partnership, transparency and motivation. The debate has just started; it has not ended yet.

v. In reconsidering the title of this presentation (including the question mark) it could be said that the status of QMS implementation in Argentina is not such an uncommon situation after all and that it could exist in many other places under similar circumstances.

Table 1 summarizes the changing course in which Argentina's fisheries may be involved.

Table 1

Changes in course from the present and the desirable state of Argentine fishery management

Element	Present state	Desirable state
Thinking process	Tactical	Strategic
Time horizon	Short-term	Long-term
Prevailing attitudes	Reactive	Pro-active
Focus	On means	On ends
Social interactions	Competition	Partnership
Nature of the game	Non-coperative	Cooperative
Production	Quantity and commodity oriented	Quality oriented
Economy	Minimization of present risk	Maximization of future benefits
Management style	Traditional	Ecosystem and rights-based co-management
Regulations	Focused on enforcement. Mandatory	Focused on voluntary self-benefitting compliance
Performance evaluation	Efficiency	Efficiency + Effectiveness
Government	Top down: Command and control; Unaccountable	Participationary; Consultative; Accountable
Leadership	Autocratic; Power-based	Democratic; Knowledge-based
Concerns	Nothing explicit	About intended results; About unintended consequences
Information	Government monopoly	Shared with stake-holders
Conservation	No explicit objectives	Stewardship + ownership; Sustainable benefits
Management costs	Paid by the society	Paid by the private sector
Rents and profits	Indiviuals/enterprises	Society as a whole
Foundations	On individual interest	On shared values
Fishing practices	Fishing the future	Fish for the future
Management responsibilities	Government	Government + stake-holders

INDUSTRY PERSPECTIVES: TAKING THE INITIATIVE FOR THE MANAGEMENT OF NEW ZEALAND'S COMMERCIAL FISHERIES

M. Harte
New Zealand Seafood Industry Council, Private Bag 24–901
Wellington, New Zealand
<michael@seafood.co.nz>

1. INTRODUCTION

The management of the world's fisheries has reached a turning point. Government-centred management of fisheries resources is by and large a failure (Jentoft *et al* 1998, McGoodwin 1990, Sharp 1997, Townsend, 1995). Behind its failure is an ignorance or denial by regulatory agencies of the importance of property-rights. Compounding the failure is their reluctance to acknowledge the potential of fishers to manage fisheries resources under decentralised, or devolved, management regimes.

New Zealand's fisheries management system is arguably an exception. In 1986 New Zealand was one of the first countries to adopt a comprehensive property rights-based quota management system (QMS) in which catch limits for each fish stock are set by government and allocated to fishers through Individual Transferable Quotas (ITQs). An ITQ is a perpetual harvest-right. It permits the holder to catch a proportion of the total allowable commercial catch (TACC) for a fish stock. ITQs can be bought, sold or leased in the same way that property is bought, sold or leased.

The government has also implemented far reaching reforms that provide for: a) devolution of fisheries management functions to rights holder associations and b) approval of fisheries management plans developed by representative and accountable rights-holder associations

This paper describes briefly:

i. the evolution of rights-based fishery management in New Zealand
ii. the development of fisheries plans as the basis for self-management initiatives by commercial rights-holder associations.

2. COMMERCIAL FISHERIES MANAGEMENT IN NEW ZEALAND 1908–1999

Although commercial fisheries have a decade and a half of experience of rights-based management since the introduction of the QMS in 1986, opportunities for devolved and/or decentralised management of commercial fisheries are a recent feature of New Zealand's fisheries policy. The southern scallop fishery represents potentially the start of a new chapter in the history of the country's fisheries. In describing three previous phases of commercial fisheries management in New Zealand this section aims to demonstrate why the concept of decentralisation and devolution has become a practical management option only with the maturing of the rights-based quota management system (QMS). A more detailed description of the history of New Zealand's fishery management can be found in Batstone and Sharp (1999), Sharp (1997) and Gaffney (1997).

Limited-entry 1908–1963

Fisheries management has its legislative origins in the *Oyster Fisheries Act 1866* and the *Fisheries Act 1908*. The 1908 Act provided statutory authority for regulations aimed at the purpose of biological protection until 1983. During this period most fisheries were small and confined largely to an inshore domestic industry. Over-exploitation of inshore stocks led to the introduction of a limited-entry management system in the late 1930s.

A Royal Commission examination of the fisheries in the late 1950s concluded that the regulatory environment was detrimental to the development of the fisheries in that there was little or no technological advancement, no competition among fishers, and a range of resources that were not being exploited.

Regulated open-entry 1963–1986

In 1963 the system of limited- entry was dropped in favour of open-entry development under a permit system. The system provided for a range of regulatory measures restricting gear, the size of harvests and where fishing could occur. Economic objectives, rather than conservation, shaped the management of the fisheries. The government sought to encourage investment in the fishing industry through investment incentives, capital grants, allowances and tax breaks.

However, the government's desire to facilitate economic gain was unfocused and its policies encouraged the natural tendency of commercial activity towards over-capitalisation. Citing economic and biological objectives, the government took measures to correct this, beginning in the late 1970s when a moratorium was placed on the issuing of new fishing permits. The moratoriums and regulatory environment compromised economic efficiency. Restricting new entrants dampened competitive pressures. Restrictions on inputs, such as boat-size and net-size, and activity merely served to increase the cost of fishing.

The measures never got to the heart of the problem. Fishers were left with a common stock and no constraints on how much fish they could catch. A significant and unintended effect of the regulatory environment was to encourage an investment in extracting as much fish as

was commercially profitable, when and where fishers could fish, using allowable fishing techniques.

Evolution of a property rights-based system 1978–1999

By declaring a 200-mile exclusive economic zone (EEZ) in 1978 the government expanded the range of fish and stocks under national control. Deep-sea fisheries were previously exploited by foreign operators with few controls placed on their harvest. The government had to develop policies to manage the fish resource of a large and unfamiliar area. Initially, the EEZ and inshore fisheries were managed separately. Subsequently, the government applied a policy of limited domestic expansion, joint-venture arrangements and licensing of foreign fleets to the zone outside 12 miles.

In 1983 the government introduced an economically-oriented management system based on individual transferable quota (ITQ) for seven species in the new 200-mile zone. This quota management system served later as a model for inshore stocks and its existence offshore made it easier to persuade fishers of the effectiveness of such a system.

Also in 1983 the government passed the first new Fisheries Act since 1908. The Act introduced the concept of fisheries management plans. And, significantly, for the first time in New Zealand fishing history, the government gave legislative recognition not only to biological objectives but to the goal of encouraging an optimal return from the fisheries. The Act, however, did not address the fundamental question of how these biological and economic goals could be linked.

The potential for the advancement of both goals was provided by a 1986 amendment to the 1983 Act. The amendment recognised economic goals more comprehensively by introducing the quota management system for 21 inshore species and providing for its broader application to the offshore fisheries. The offshore fisheries quota granted in 1983 were transformed along with the newly-introduced individual transferable quota, into tradeable entitlements in perpetuity.

The seven founding aims of the quota management system (Luxton 1997) were to:

i. rebuild inshore fisheries where required
ii. ensure that catches are limited to levels that can be sustained over the long-term
iii. ensure that catches are harvested efficiently with maximum benefit to the industry and to New Zealand
iv. allocate catch entitlements equitably based on an individual permit-holder's commitment to the fishery
v. integrate management of inshore and offshore fisheries
vi. develop a management system that can be applied both nationally and regionally
vii. enhance the recreational fishery.

In 1990 individual transferable quota was changed from a specified tonnage of a total allowable commercial catch, which could be repurchased by government, to a proportion of the total allowable commercial catch that varies as the total allowable commercial catch varies. The change reflected the reality that the process of government buying and selling quota to change levels of total allowable commercial catch was cumbersome and costly.

There is general recognition that the quota management system has played a significant role in improving the biological status of the fisheries resource and commercial return to fishers (Annala 1996). Further discussion of New Zealand's quota management system can be found in Clark *et al.* (1988), Dewees (1989), Memon and Cullen (1992), and Sissenwine and Mace (1992).

Today there are over 250 fish stocks managed by New Zealand's QMS covering 40 species (out of the 100 species caught commercially). This represents over 85% of the total known fish catch in the EEZ. Owners of individual transferable quota have a large incentive to invest resources into the sustainability of the fishery because any lowering of catch limits reduces the value of their investment in the fishery. As Jentoft *et al.* (1998) suggest, the private nature of QMS rights has given a more accurate indication of who the users are than under previous management regimes. Importantly, a clearly defined set of holders of exclusive rights makes it easier to assign responsibility for devolved and/or decentralised management of a fishery.

Responding to the productive incentive structures of the quota management system, New Zealand's quota owners/leasees are increasingly following the example of the southern scallop fishery and organising themselves into management associations based on functional and/or territorial communities. Depending on the fishery, these associations have a number of purposes but, at this stage, they appear to have several key functions:

i. to facilitate the collection of funds to finance fisheries management activities such as research or re-seeding and to manage the delivery of such services
ii. to make fisheries management rules and to impose sanctions on non-compliance of company shareholders
iii. to represent the interests of shareholders in government processes that involve consultation – such as determining (government required) fisheries management services and the setting of total allowable commercial catches
iv. to defend against erosion of harvesting-rights and to promote the expansion and development of management rights.

3. CO-MANAGING FISHERIES: THE FUTURE FOR NEW ZEALAND

Although New Zealand's fisheries management system has successfully devolved management responsibility to rights-holders in some fisheries, it has yet to fulfil its potential to provide for profitable and sustainable

fisheries (Harte and Bess, in press). There needs to be a change in attitude towards fisheries management by many in government, some ITQ owners and other fishery stakeholders if the potential of New Zealand's marine resources is to be realised. Although many ITQ owners are critical of government, not many are prepared, like the Challenger Scallop Enhancement Company (CSEC), to take on additional responsibility for the management of fisheries.

Nevertheless, the success of the southern scallop fishery, and other fisheries with more limited management responsibilities such as the rock lobster fishery, has increased awareness that the management of New Zealand's fishery resources needs to move away from a centralised regime. To facilitate an increasingly positive relationship between property rights-holders and government, that leads to mutually beneficial outcomes, the government must devolve additional rights, responsibility and authority for fisheries management to resource users and local and regional communities.

'Co-management' is the model favoured by advocates of less government control and more say by resource users as the management alternative with the greatest likelihood of resolving fisheries problems. Jentoft *et al.* (1998 p 426) wrote:

> *It [co-management] is a social system that changes the nature of the game, the relationships between players and what each of them strives for. Co-management means an ongoing collaborative and communicative process, where resource users and other actors are in an entrepreneurial and creative role.*

Co-management and the reshaping of government's role

The government's role in co-management is to define how, through legislative and policy instruments, power is shared and decision-making arrangements established. Only government can legally establish and defend user-rights and security of tenure (Pomeroy and Berkes 1997). The government may, in addition, address issues beyond the scope of stakeholder arrangements to support the sustainability of stakeholder organisations. It may also undertake a co-ordinating role to enable the various parties in a co-managed fisheries environment to interact.

The New Zealand *Fisheries Act 1996* outlines the role of central government in New Zealand as providing for the "utilisation of fisheries resources while ensuring sustainability". In practice this means:

i. establishing the rules and regulations that enable successful and sustainable fishing activity
ii. ensuring that fisheries harvesting rights are clear, appropriate and enforceable
iii. transferring management responsibilities to fisheries rights-holders
iv. co-ordinating the collection and provision of information to fisheries stakeholders
v. ensuring the effectiveness of management frameworks and systems, including:
   - setting standards for fisheries management plans
   - monitoring and auditing the performance of fisheries management plans
vi. prosecuting offenders who break the law.

Co-management and devolution of management roles to fisher associations

Pomeroy and Berkes (1997) emphasise that unless government and its officials can be convinced of the desire and ability of fishers to manage themselves, little progress can be made on devolution and co-management. New Zealand's fishers have a responsibility to demonstrate a high level of organisational and management ability.

The role of commercial, recreational and customary rights-holder groups in fisheries management is to develop management frameworks that provide for and deliver the utilisation of fishery resources while ensuring sustainability.

In the near future, rights-holders and the Ministry of Fisheries see rights-holder associations becoming increasingly responsible for developing fisheries plans that:

i. set management objectives and performance measures
ii. specify rules for management and governance
iii. define necessary services including: a) research, b) administration, c) monitoring and compliance and d) establishing funding arrangements.

After developing a fisheries plan, rights holders associations must implement them by:

i. managing decision-making processes
ii. purchasing research services
iii. administering access
iv. monitoring fishing activity
v. providing information/education services
vi. enforcing non-criminal rules;
vii. collecting levies to fund management activities.

All rights-holders, stake-holders, government officials and scientists will need to continue to work together to evaluate fisheries management performance. The government needs assurance that such management systems provide for sustainability; rights-holders need a clear framework in which to formulate the details of sustainable harvesting and management practices. This approach will increase innovation, reduce conflict between alternative stake-holder groups, reduce transactions costs and provide for the utilisation of fisheries resources while ensuring sustainability.

Rights-holder groups and government will jointly decide devolution decisions based on the capabilities of rights-holder associations to handle management functions. Commercial fishers are already a long way to achieving this experience and capability in New Zealand

closely followed by some *iwi* and distantly by recreational fishers.

4. CONCLUSION

Most fisheries issues will not find resolution on scientist's computers or in policy-makers' offices. They will be solved by the collective actions of fishers on the water, by fishers who are willing to listen and learn and are ready to change in response to the management needs of fisheries.

Notwithstanding the challenges ahead, the New Zealand seafood industry has confidence in the future. At every challenge the property rights-based fisheries management system has emerged stronger and better specified. The door is opening for co-management, devolution and the decentralisation of fisheries management to rights-holder associations. It remains to be seen how far it opens and who is prepared to pass through it. At best many rights-holders will seize the opportunities offered, at worst rights-holders must ensure the door is not slammed shut by those who wish to protect their own standing conferred by a centralised management regime.

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PROPERTY RIGHTS IN AUSTRALIA'S NORTHERN PRAWN FISHERY – AN INDUSTRY PERSPECTIVE

A. Jarrett
Australian Fisheries Management Authority
8 Harwood Close, Brinsmead, QLD 4870 Australia
<annie.jarrett@internetnorth.com.au>

During the past few years we have seen subtle, and sometimes unsubtle, changes in approaches to commercial fishing and fisheries management. Gone are the cavalier attitudes of governments and industry which resulted in the excess fishing-effort and over-capitalisation which has left many of our fish stocks decimated. Gone is the disinterest of the community and our environmental groups who were previously busy saving forests, not fish.

That has been replaced with conservatism by fisheries managers, respect and concern for our marine resources by most fishers, and a keen awareness and increasing focus on fisheries worldwide by environmentalists and the general community. Lessons have been learned along the way. We have learned that fish stocks can be depleted - who would have thought that 20 years ago? We have learned that none of us are islands and that we must all work together. We have learned that we must adapt our fishing and management practices to reduce pressure on our heavily-depleted fish stocks, and to protect our marine environment. We have learned to change.

One fishery which has managed to keep pace with change, and which has often been ahead of it is Australia's Northern Prawn Fishery, known as the NPF. The NPF has the reputation of being one of the best- managed fisheries in the world. There are a number of things which have contributed to its success. To me the most significant are industry's involvement in the management process, and the strong well-defined fishing property-rights held by the commercial fishers.

The Northern Prawn Fishery covers a vast area and extends across the top of Australia from Cape York to Cape Londonderry. Prawn fishing began in the NPF in the 1950s when a few adventurous souls discovered banana prawns in the Gulf of Carpentaria. This discovery created interest in both fishing and scientific communities and as a result of collaborative efforts by industry and the Commonwealth Scientific and Industrial Research Organization (CSIRO), a commercial prawn fishery was established by the late 1960s. The main species caught were banana prawns but the fishery was slow to develop due to the remote area and lack of infrastructure.

Interest in the fishery escalated in 1974 when, as a result of huge monsoonal rains, in excess of 12 500t of banana prawns were caught. The bumper season, coupled with the 'come all ye faithful' approach of the government of the day which was intent on developing Northern Australia, and the 'gold rush' mentality of the industry, resulted in vessel numbers and fishing effort rising at an alarming rate over the next couple of years - a classic case of over-exploitation. At this time the fishery was an open-access fishery with no input or output- controls in place. Catches of tiger prawns were also being recorded at this time and the negative impact on the stocks was inevitable.

As industry had taken the initiative in developing the fishery, it began to take a leading role in management. The first formal advisory committee, Northern Prawn Advisory Committee (NORPAC), was established by the Government in 1977 and provided for industry participation in the management process. It was at the behest of industry members of NORPAC that, in response to concerns about the increases in vessel numbers and the resultant fishing effort, a moratorium was introduced on new vessels entering the fishery, and limited-entry was introduced in 1977. The effect of the limited-entry policy was to provide the participants in the fishery with exclusive commercial access to the area. It was not acknowledged at the time, but this was an important step in the establishment of property-rights in the NPF and the pathway to improved management of the fishery.

A refinement of the limited-entry policy occurred when all NPF licensed vessels were 'unitised' as an additional means of restricting and controlling fishing effort in 1984. Each vessel was granted a B-class unit which represented the right of the boat to access the fishery, and a number of A-class units based on vessel size and enginepower, broadly representing a boat's individual fishing power. A and B-units were tradable and thus had a commercial value. As a result they soon became recognised as the currency in the fishery. This was an interesting development in an input-control fishery as popular wisdom of the time was that property-rights were only conferred by the allocation of ITQs.

The 1980s were lean years in the Northern Prawn Fishery (NPF) with nearly 300 highly efficient, purpose-built freezer-trawlers targeting banana and tiger prawn stocks. Industry again took the initiative to reduce fishing pressure and in 1985 convinced the Government to introduce an industry government-funded buy-back scheme. While the purpose of the buy-back scheme was to remove boats, and thus reduce fishing effort, it was an interesting test of the strength and legality of NPF units as fishing-rights, as buy-back prices were based on A and B units. As a result, A and B units became further entrenched as the currency of property- rights in the fishery.

The real test of whether NPF units were property occurred when the initial buy-back was not as successful as hoped and a dedicated restructuring programme was implemented in 1990 to overcome falling prawn prices,

biological concerns and the ongoing problem of excess capacity. The restructuring programme included an accelerated buy-back scheme, again based on A and B class units, with a compulsory surrender of A units if the total number of A units in the fishery was not reduced to 50 000 through the accelerated buy-back scheme. The target was not reached through the buy-back scheme and the accelerated restructuring programme culminated in operators either selling out of the fishery, or surrendering approximately 30% of their A unit holdings in 1993.

The restructuring programme successfully reduced the number of vessels to 130 but resulted in two Federal Court challenges being mounted on whether the compulsory surrender of A units constituted an acquisition of property under Constitutional Law. In considering the evidence, the Courts accepted that NPF units were property but determined that as the compulsory surrender was proportional across the fishery, it did not constitute an acquisition of property. These decisions were significant milestones in the history of property- rights in the NPF as they laid a strong foundation on which to base future management decisions to ensure there is no diminution of these fishing-rights over time. It was also good news for the industry and financiers who had for some time been treating NPF units as collateral for business loans.

Industry continues to take the initiative in the NPF today. Industry pays 100% of the fishery's attributable management-costs and is a driving force on the Northern Prawn Fishery Management Advisory Committee (NORMAC). Industry takes a leading role in reviewing management-costs, initiating and funding research projects, and developing closures regimes, enforcement programmes and other management strategies to protect target and non-target species, and the marine eco-system. It is widely recognised that input-control fisheries such as the NPF require ongoing restructuring of the fishery to ensure that technological advancement and effort-creep do not result in stock depletion. Even prior to the completion of the 1993 restructuring programme, NORMAC at industry's behest, began investigating alternative management approaches to seek a more flexible and responsive system than the existing unitisation system. As a result, NORMAC has recommended that a gear-unit system be implemented in the fishery in the year 2000. Under the gear-unit system, the fishery will be managed through net sizes and numbers, rather than through vessel size and horsepower. The change to gear-units will include an immediate 15% reduction in gear towed to further reduce fishing pressure on the fragile tiger prawn stocks.

Industry has played a vital role in the development of the gear-unit system, including the decision to further reduce fishing effort by reducing the amount of total gear towed and in the development of the transition formula. Legal advice indicated that as A units are the recognised property-right in the fishery, the transition to gear units must be proportional to A unit holdings. This advice was adopted by the majority of industry and the Australian Fisheries Management Authority (AFMA) Board, who are keen to ensure there is no diminution of the existing property-rights in the transition to gear units. This approach is testimony to the strength, legality and acceptance of the existing NPF units as property and is important to the financial institutions which continue to recognise fishing-rights as property, and therefore collateral against borrowings.

It is my experience that where strong, well-defined property-rights exist, whether in the form of quotas or input-control rights such as boat or gear-units, fishing habits change and operators are more prepared to become involved in the management process. This is certainly the case in the NPF where industry continues to take a leading role in management and remains committed to implementing management strategies to achieve sustainable management and economic efficiency. Hard decisions to reduce fishing-time, fishing-effort and fishing-capacity have been, and will continue to be taken when necessary to improve the management of this fishery.

I know many people share my view that secure property-rights are integral to sustainable fisheries management. The NPF experience is a good example of how secure property-rights result in greater awareness by industry of sustainability issues in relation to target and non-target species and the marine eco-system in general. NPF industry has greater ownership over management direction and decisions and is now working in partnership with managers, environmentalists and other user groups to protect both the marine environment and their fishing property-rights. Today the NPF has a gross value of production of approximately $A130 million. NPF units are valued at around $A6500 each. An average size NPF vessel licence is worth almost $A3 million. None of this would have been achievable without strong property-rights.

I am personally committed to improving the strength and security of commercial fisheries property-rights and it is to the credit of my AFMA Board colleagues that positive steps are being taken in this regard in relation to property-rights in Australia's Commonwealth fisheries. However there will be new and ongoing threats to our property-rights as threats to fish stocks evolve and increase around the world. Industry must continue to take up the challenge in all fisheries to ensure they are granted secure, well defined access-rights and must be prepared to take their place in the management framework. Managers and legislators must be encouraged to accept the need for, and benefits of, secure property-rights in commercial fisheries and must move to enshrine those rights in relevant legislation. Only then can our mutual aspirations for sustainable fisheries management begin to become a reality.

RIGHTS-BASED MANAGEMENT: A EUROPEAN UNION[1] PERSPECTIVE

D. Symes
Department of Geography, University of Hull,
Hull HU6 7RX - UK
<geo@hull.ac.uk>

1. INTRODUCTION[2]

Property rights have become a key issue in the debates about fisheries management and a topic which divides both the fishing industry and the academic community. It is perhaps axiomatic that a precondition for the effective management of sustainable fisheries is the resolution of problems allegedly created by the common property nature of fisheries and the derived characteristics of open and equal access and a common use-rights system of exploitation (CURSE) which underlie the so-called 'tragedy of the commons'. But the current debate has been prematurely narrowed to a deceptively simple choice between the apparently anarchic conditions of CURSE and the seemingly more orderly privatised use-rights system of exploitation (PURSE), constructed around the concept of individual transferable quotas (ITQs). It has also been distorted by the uncompromising nature of the arguments. The case for rights-based management has been argued with a proselytising zeal by economists and endorsed by fisheries administrators and large-scale fishing interests – and rebutted with equal vigour by the social sciences and the small-boat sector.

The deceptively simple choice belies the complexity of the situation. Among the concerns expressed by the social sciences is the way in which the privatisation project has tended to ignore salient features of the social and cultural contexts in which fishing systems are customarily embedded. However, as the debate has developed and matured, there has come recognition that while ITQs may address certain aspects of the management question, they form an appropriate response only under certain basic conditions. The time has come to abandon the ideological debate and to seek instead answers to more pragmatic questions.

For the fishing communities some of these key questions are:

i. under what particular conditions do ITQs, or indeed any other property-rights system, serve the goal of more effective and enduring resource management without causing serious threats to the viability of artisanal fisheries and the communities they support?
ii. what safeguards may be introduced into a system of privatised property-rights which offer adequate protection against the dispossession of the fishing communities' means of livelihood without enfeebling the economic incentives to exploit resources in a rational manner?
iii. what kinds of property-rights systems are best able to cope with the conditions of risk and uncertainty engendered by fluctuations in stock abundance, markets or political circumstances?
iv how do different property-rights systems measure up to the need to replace short-term perspectives on the future of the fishing industry with a more coherent and consistent vision for achieving the long-term sustainability of the resource base?

This paper seeks to address some of these questions from a European perspective. It begins by briefly summarising the advantages and disadvantages of rights-based management, more generally, from a social science viewpoint. The focus then switches to the particular circumstances of Europe's fisheries, suggesting that the unique conditions affecting both the fisheries and their governance are perhaps less conducive to universal and unalloyed adoption of rights-based management, but also indicating ways in which the three principal objectives of fisheries management – resource sustainability, economic efficiency and social equity – might be pursued through a system of differential management combining elements of both rights-based and community approaches.

2. THE PROS AND CONS OF RIGHTS-BASED MANAGEMENT: A SOCIAL SCIENCE PERSPECTIVE

Although the arguments both for and against the introduction of rights-based management systems are well known, it is at least useful to summarise the advantages and disadvantages in order to focus attention on those negative aspects which bulk large in the minds of certain sectors of the fishing community. The case for ITQs rests essentially on economic grounds, namely:

i. the progressive rationalisation of structures within the harvesting sector, through the transferability of quotas, resulting in a reduction of the number of fishing vessels and a better balance between harvesting capacity and the resources. Politically this is a telling argument as overcapacity is recognised as a major problem and one which is expensive to solve through decommissioning schemes
ii. the improved efficiency of the individual fishing enterprise as the economically marginal units are

[1] The EU, founded 1 November 1993, was formerly known as the European Community (EC) or the European Economic Community (EEC), but for consistency the term used here is EU. The European Commission (also EC), represents the 'civil service' of the EU [Editor].

[2] The text was up-dated slightly in October 2000. [Editor].

removed through the operation of the quota market: the surviving enterprises are also in a far better position to plan for the optimal utilisation of their quotas

iii. an alleged reduction in transaction costs through the internalisation of information costs and a reduction in external monitoring and enforcement costs

iv. unproven claims relating to (a) a reduction in discards – recently it has been claimed that discarded cod catches in Iceland may be as high as 100 000t when the TAC is set at 250 000t (*Fishing News 20* August 1999); (b) a greater concern among privatised quota-holders for the long term sustainability of fish stocks and the marine environment, not easily upheld if the allegations concerning discard levels were to be confirmed; and (c) the simplification of the regulatory system with less need for complementary measures to achieve sustainable patterns of fishing activity.

Seen in this light, it would appear that ITQs are primarily an instrument for promoting economic efficiency rather than for resource conservation, in either the short- or long-term. Basically they serve to protect the value of the capital invested in the industry – a self-perpetuating function as increasing sums are expended on the purchase of quotas.

Apart from concerns over the question of natural justice in allowing common-use rights (*res communis* or *res publica)* to be abrogated and reallocated to private individuals as patrimonial rights and over the potential irreversibility of an ITQ system because of the formidable financial implications of reimbursing the capital value of repossessed quota-entitlements, the social sciences' critique of ITQs focuses on their distributional effects and the erosion of social equity in access to common-pool resources. Their arguments thus reflect the concerns of potentially disadvantaged sections of the fishing community by highlighting:

i. the nature of structural changes engendered by ITQs involving increasing capitalisation and industrialisation of the fishing fleet and the concentration of ownership in the hands of fewer but more powerful owners, not necessarily actively engaged in fishing (quota barons, armchair fishermen, financial institutions, *etc.*), and the geographical concentration of fishing activity in the more central locations

ii. the high costs of acquiring quotas which impose virtually unsurmountable obstacles to new entrants moving into vessel ownership through progression from crew member to vessel owner

iii. the implied threats to the survival of the small-boat sector which generates considerable employment, and to the unique socio-cultural characteristics of the artisanal fishermen and the implications for the sustainability of geographically-marginal fishing communities

iv. the undermining of pluriactive economies characteristic of certain geographically disadvantaged regions through the effective exclusion of part-time, seasonal and casual participation in local fisheries

v. the development of capitalistic relations within the fishing industry affecting ownership of vessels, the remuneration of those working on the boats and the uneven distribution of windfall profits from the sale or lease of quotas, which favours the boat owner but leaves crew members without compensation and without employment.

It would clearly be wrong to attribute the processes of concentration and centralisation of the fishing industry, the progressive marginalisation of the small-boat sector and the dislocation of traditional patterns of local dependence (formerly built around the integration of local fisheries, local fishing fleets and local processing industries) solely to the introduction of rights-based management. These are the on-going processes of modernisation affecting a wide range of economic activities. In a free-market economy, the ascendant tendencies favour economies of scale, the growth of technology, the free movement of goods, labour and capital and the centralisation of economic activities. In fisheries these tendencies will tend to discriminate between the inshore and offshore sections, leading to the decline of the small-boat sector and setting in train a cycle of outmigration of capital and labour, poor internal recruitment to both fishing crews and processing plants, the substitution of 'guestworkers' for indigenous labour and an increasing instability of the fishing community and the coastal settlement (Hanssen 2000).

Modern fisheries management systems, whether based on restrictive licensing or quota allocations, have tended to underwrite these trends and there is considerable circumstantial evidence, especially in Iceland (Eythórsson 1996, Pálsson and Helgason 1996) that the introduction of ITQs serves to accelerate and intensify the structural changes to the disadvantage of the many and the advantage of the few. In the words of one Icelandic fish processor:

> "The nation's fish resources are now in the hands of a few people, while fishermen and the people who work in processing ashore have no stake in their industry. What is in the interests of a few trawler owners is not the same as what is in the interest of the nation as a whole" (*Fishing News International, August 1999)*

It would also be wrong and perhaps pointless to oppose the modernisation processes except where it can be demonstrated that the advantages gained for the fishing industry as a whole are outweighed by the disadvantages suffered by particular sectors or regions in terms of overall economic and social welfare. Here it may be appropriate to impose restrictions on the modernisation process and, in the case of rights-based management, to implement checks and balances to rein in the most serious socio-economic impacts through the capping of individual quota entitlements and regional ring-fencing schemes.

But it must be recognised that any such interventions are likely to impede the effective operation of the quota market and so recreate a sub-optimal structure for the fishing industry (Symes and Crean 1995), without materially improving the welfare of the disadvantaged populations. It might, therefore, be more sensible to predetermine the conditions which would favour the adoption of rights-based management without incurring severely negative socio-economic impacts. These 'preconditions' may refer to the biological conditions of the fishery and the geopolitical frameworks for management, as well as to the social and cultural contexts of fishing activity.

It may be significant that in most cases where ITQs have been successfully introduced, the biological, economic, socio-cultural and political conditions have been relatively simple. Rights-based management is perhaps likely to be of less relevance to the overexploited but highly complex fisheries of European waters than to the developing fisheries of less geopolitically complicated parts of the world. Nonetheless, the ITQ issue is moving into the centre of the political debate in Britain and Europe.

3. EUROPE'S FISHERIES: AN UNSUITABLE CASE FOR PRIVATISATION?

The complexity that surrounds Europe's fisheries and inevitably frustrates the search for simple management solutions derives from a wide range of factors, each compounding the intricacy of the others. They are rooted in the very geography of Europe and its surrounding seas, emphasised by strongly differentiated socio-cultural patterns, exacerbated by the effects of overexploitation and exaggerated by the evolving political structures.

The lessons of geography

In a continent which covers roughly 10.5 million km² - not all that much larger than Australasia (8.9 million km²) – and contains a population of circa 728 million (*cf.* Australasia's *circa* 20 million), there are no fewer than 30 separate coastal states sharing a comparatively short but deeply indented coastline. The European seas, meanwhile, can be divided into five highly contrasting fishing regions: the open North East Atlantic ocean; the weakly saline, virtually enclosed Baltic Sea (422 000 km²); the more open and diversified North Sea (575 000 km²); the high saline, semi-enclosed Mediterranean Sea (2 505 000 km²); and the heavily polluted and biologically impoverished semi-enclosed Black Sea (461 000 km²).

Such is the complexity of the land-sea relationships in Europe that only those coastal states fronting directly onto the Atlantic Ocean can claim relatively uninterrupted 200nm Exclusive Economic Zones (EEZs). By contrast, for the seven North Sea coastal states and the nine Baltic Sea coastal states, the geographical extent of their EEZs is defined by median lines. Thus a majority of fish stocks occurring in Western Europe waters can be described as transboundary stocks. In the Mediterranean, the poorly developed continental shelf, averaging only 40km in width, has not so far encouraged the development of exclusive fishing zones beyond the limits of the territorial seas (6 or 12nm). Only in a very few instances (Algeria 1994, Spain 1997) have the coastal states seen fit to extend their exclusive fishing zones beyond these traditional limits – and so by far the greater part of maritime space in the Mediterranean is defined as 'high seas' (Symes 1999b).

The lessons of history

European waters have a very long history of exploitation and local management. Collet (1999), for example, points to a continuum of local management systems in the Mediterranean based on the recognition of fishing territories and access regulation from the third millennium BC (temple culture) down through the centuries via the medieval guilds and 'brotherhoods' (*prud'homie* in France; *cofradia* in Spain) to modern times. This tradition of local territorially-based management challenges the assumptions of Hardin's 1968 ' tragedy of the commons' – upon which the *a priori* arguments for privatisation of the commons are constructed – that the common pool resources of the seas were bereft of appropriate and effective management.

In Atlantic Europe the evidence for effective local management is perhaps less compelling, though we do have the examples of a century of successful local regulation of the seasonal cod fisheries of the Lofoten Islands in northern Norway (Jentoft and Kristoffersen 1989) and the institution of regional Sea Fisheries Committees for the management of fishing activities within territorial waters around the coasts of England and Wales from 1882 onwards (Symes and Phillipson 1997). In the Baltic, Finnish and Swedish inshore waters are subject to private ownership with fishing rights bound to the ownership of the shoreline. Management is shared between the private shareholders, through statutory fishing associations, and since 1982 through publicly administered fisheries regions (Sipponen 1999).

Local management schemes have generally shown themselves inappropriate and therefore inadequate in attempting to contain the growth of highly mobile, industrial forms of offshore fishing activities which developed strongly in the twentieth century. Just as northwest Europe provided the cradle for industrialisation in the late eighteenth and early nineteenth centuries, so too the intensive, technologically-sophisticated offshore fisheries had their origins in the North Sea and were quickly diffused into the waters of the North Atlantic. State intervention has failed to discover the formula for success; indeed, it has left fishermen confused, alienated and embittered – a situation which, in part, rights-based management is seeking to address.

The lessons of biology

Throughout much of the European seas commercial fish stocks are now seriously depleted – a consequence of unrestrained fishing effort built up over several decades. Stocks have become inherently unstable and reliant on the

strength of individual recruitment year-classes; as a consequence the total allowable catches (TACs) for many important stocks are subject to considerable annual fluctuations. For all roundfish stocks in the North Sea some 60% of biomass is recovered through fishing each year and scientists have recently warned of the risk of collapse of the North Sea cod stocks (Cook *et al.* 1997). With the introduction of a precautionary approach to fish stock assessment, TACs for North Sea cod were slashed by more than a third in 2000. Similar problems attend the Baltic and Barents Sea cod (ICES 1997). Despite this, the North Sea still maintains its reputation as a remarkably prolific region, yielding around 2.5 million tonnes of fish annually. However, the structure of the biomass has undergone significant changes and the fishing industries only succeed in maintaining the volume of output through the substitution of less valuable species for those of higher commercial value: the industrial fisheries for sprat, Norway pout and sand eels now account for 56% of the total yield of the North Sea (Symes 1999a).

The underlying causes of the problem are undoubtedly linked to the huge overcapacity of fishing effort in Europe's fisheries, estimated by the Lassen Report (1996) to be in the order of 40% for the EU's fisheries with similar figures cited for Norway's fishing industry, which modern management systems have so far failed to address effectively. This, no doubt, forms an important platform for arguments in favour of the adoption of rights-based management in European waters. The problem is less apparent in the less prolific and more diversified fisheries of the Mediterranean where the development of large-scale industrial fishing has yet to challenge the dominance of artisanal fisheries.

The problems of governance

The merging institutional frameworks for fisheries management in Europe only add to the complexity. Today, one can identify several different regional organisations each claiming responsibility for the management of marine fisheries within a defined geographical sector of the European seas, namely:

i. the *European Union* which assumes overall responsibility for fisheries management of the combined EEZs of its member states; since the genesis of the concept of a common fisheries policy in the early 1970s, the EU has witnessed three phases of enlargement, each adding to the scale and complexity of its fisheries. A comprehensive and distinctive Common Fisheries Policy (CFP) was agreed in 1983 covering the Atlantic and North Sea fisheries but to date a common fisheries policy has not been developed for the Mediterranean.

ii. the *International Baltic Sea Fisheries Commission (IBSFC)* established in 1973 to develop a management strategy for the main commercial species. The Commission has been greatly affected by recent geopolitical changes with the break up of the eastern socialist bloc in the early 1990s and, in particular, by the creation of the independent states of Estonia, Latvia and Lithuania and later by the accession of Finland and Sweden to the EU, with the effect that the EU now represents its four Baltic Member States in the IBSFC's deliberations.

iii. the evolving *General Fisheries Commission for the Mediterranean* (GFCM) restructured in 1997 out of the pre-existing *Council* which had been established in 1949 under the auspices of the Food and Agriculture Organization. The GFCM will have responsibility for developing and co-ordinating management strategies for the 20 highly diverse coastal states that fringe the Mediterranean, half of which are located on the more economically developed northern or European shore – including the four EU Member States of Spain, France, Italy and Greece. The GFCM will also continue to oversee fisheries development in the Black Sea until such time as a separate Black Sea Fisheries Commission becomes operational (Breuil 1997; 1999).

And in addition to these supranational organisations, there are the three independent European fisheries 'superpowers' of Norway, Iceland and Russia. Norway and Iceland have vigorously resisted membership of the EU largely over misgivings concerning the implications of the CFP for their own fishing industries.

Apart from the Mediterranean, where management action is largely confined to technical measures and the piecemeal introduction of licensing systems, TACs and quotas form the cornerstone of fisheries management in Europe. Significantly, within the EU the institutional arrangements for the implementation of national catch quotas remain the responsibility of the individual member state. Thus far only two European states have opted for the introduction of rights-based management in the form of ITQs – independent Iceland and, within the EU, the Netherlands. But there is growing concern among several other countries, both within the EU and outside, that developments within the management systems amount to 'privatisation by stealth'. In Norway, for example, the introduction of individual vessel quotas for cod in the early 1990s (as a temporary expediency to control fishing effort during the Barents Sea cod crisis) appears to have become irreversible as the trawler owners seek to protect their newly acquired assets (Hersoug *et al.* 1999). Similarly, in the UK the decision to replace the system of individual vessel quotas based on rolling track records by fixed vessel allocations is seen as a further step along the road to the introduction of a fully fledged ITQ system – a situation which would appear to run counter to the wishes of the majority of UK fishermen. A recent House of Commons' report has pointed to the need for clarification of quota entitlements in the UK and the rules governing their transferability.

Inside the EU the situation is further complicated by questions concerning the legal authority for determining ownership rights – whether this is vested in the EU or resides with the individual Member State – and by the issue of 'quota hopping'. Significant and increasing

shares of some of the UK's most valuable quotas are now held by vessels owned and largely operated by non-UK nationals as a consequence of the sale of UK vessel licences abroad – a situation for which there is no redress because EU law insists on the free movement of goods, labour and capital within the single market.

At present further developments in quota management are likely to remain stalled as a result of the uncertainties over the outcome of the review of the CFP in 2002. There is, for example, an outside chance that reform of the CFP could move in the direction of a more centralised management system, reducing the level of discretion granted to Member States in the interpretation of the rules laid down by the EU and even leading to the creation of a centrally managed European fleet provoking even greater fears of an EU-wide quota market.

The issue of fisheries-dependent communities

Among all the complexity and uncertainty that attends European fisheries, perhaps the most telling argument for a cautious response to rights-based management is the overall importance of the small-boat sector and its dominant role in the local economies of many fishing communities found within fishing dependent regions. On one level, the small-boat sector still retains a strong influence in European fisheries in terms of the numbers of boats and fishermen, though today it is responsible for a relatively small and diminishing share of the catch. However, part of the problem associated with measuring the true economic and social significance of the small-boat sector is the lack of reliable and directly comparable data. Figures produced by the EU for a conference on coastal zone management in 1993 indicated that boats under 12m account for approximately two thirds of all fishing vessels in the EU and around 45% of seagoing employment. In Norway, data suggest a similar structural preponderance of small boats: out a total of 13 645 registered craft in 1997, 8859 were decked vessels and the remainder open boats – but the numbers of vessels over 8m fishing all-year-round was only 2936.

In a world which has come to regard scale economies, specialisation and technological sophistication as the hallmarks of progress, the artisanal sector has become something of an anathema to most administrators and economists – a fate which it shares with the small-farm sector in agriculture – but paradoxically in marked contrast to the respect shown for small and medium enterprises (SMEs) in the modern political economy. Comprising essentially family-based enterprises owned individually or through shares distributed mainly among kin members, the small boats retain a high degree of loyalty to the local community in terms of employment – crews are commonly drawn from among the residential household or the extended family – while catches were delivered to the local processing plant and repair work undertaken in the local boatyard. Fishing households form the basic operational unit in the fishing community. Traditionally fishermen's wives formed an integral part of the fishing enterprise working as part of the shore-based fishing crew. Today though, they may continue to act as secretaries and book-keepers for the family firm, but are just as likely to be found working in the local processing plant or in non-fishing related employment.

Full time engagement in fishing activity is almost inevitably based around a combination of fishing seasons for different species often using different gears. Flexibility in response to the inherent uncertainties of inshore fisheries symbolises the strategies adopted by the small-boat sector. In a majority of instances, however, the small-boat sector is closely linked to part time or seasonal fishing activity. In Norway, for example, 27% of all registered fishermen have fishing as their secondary occupation; over the past 50 years, when overall employment in fishing fell sharply, the proportion of part-time fishermen has in fact increased. The 'underclass' of part-time, or seasonal, fishermen not uncommonly provokes hostile comments from within the ranks of so-called 'professional' or full-time fishermen and frequently invites discriminatory action within modern management systems in terms of quota allocations and access to resources.

Viewed from within the fishing industry *per se*, it is perhaps easier to appreciate the contempt sometimes shown by professional organisations, administrators and economists for part-time or seasonal participation in the fisheries, the imperfect division of labour, inefficient use of capital, adverse impacts on market prices *etc.* But judged within the context of pluriactive local economies, which still sustain many of the remoter and geographically disadvantaged parts of Europe's coastal regions, the opportunity to be involved in fishing part-time or seasonally – alongside employment in agriculture, tourism, construction work or the service industries – becomes a key element in the survival strategies for fishing households and communities. It provides a means of maximising the returns on the exploitation of the local resource base.

The survival of the small-boat sector, within the context of a local pluriactive economy, becomes all the more logical if one is willing to accept that their objectives and values are not necessarily consonant with the conventional economic analysis of the firm, and cannot, therefore, be contained within the rationale of rights-based management. Life-mode analysis holds that simple commodity production, as exemplified by the small-boat sector in general, is characterised as resistant to market fluctuations and able to function for long periods without earning incomes commensurate with the value of the plant and equipment involved in production (Monrad Hansen and Høyrup 1999). Such enterprises can survive under conditions where business capital would normally be withdrawn from production and invested in other sectors. In family-based enterprises the prime concern may not be to make profit but to maintain production – the goal is to remain self-employed. The concept of 'work' assumes a different cultural content than it does for wage earners or for the owners of capital. Under conditions of a resource crisis, Pettersen (1996) found that diversification of employment and retrenchment are the most likely

strategies for the survival of fishing households; withdrawal and relocation are the actions of last resort.

The small-boat sector forms the backbone of the economy for many small fishing communities especially in the more disadvantaged fishing dependent areas (FDAs) in Europe. But the question remains why should we seek to protect the small-boat sector from market forces. Why not opt instead for a policy of economic reconversion for fishing dependent communities and for the rationalisation of an outdated coastal settlement pattern? To find an answer to these questions, we need to revisit the idea of contextualisation and to re-examine the geographical conditions of FDAs.

Attempts to define and identify FDAs within the European Union are fraught with difficulty. Nonetheless the EU commissioned a series of Regional Socio-Economic Studies in 1991 which sought, *inter alia,* to identify FDAs within the Community of 12 member states. A total of 289 coastal areas where fishing activity was present were identified. Of these the vast majority had dependency levels (% of total employment occurring in fishing-related jobs) below 2%; by no stretch of the imagination could these be classed as fisheries dependent. Bearing in mind that today it requires only a relatively small number of jobs in the productive sectors of the economy (agriculture, fisheries, manufacturing, *etc*) to sustain relatively large numbers in the private and public service sectors, values over 10% engaged in fishing related employment are probably sufficient to indicate that fishing is a major component of the local economic structure and that its collapse would reverberate throughout the whole economy. Only 37 areas – characteristically small in extent – recorded employment dependence in excess of 10%.

These were geographically concentrated in four regions – northwest Spain, southern Spain, eastern Italy and the north and west of Scotland – and, but for a quirk in the way in which coastal areas were defined, Brittany would also have been included (Symes 2000). Not all of these regions are associated exclusively with small-boat fishing. Outside the EU, major concentrations of FDAs are to be found in Iceland, the Faeroes and northern Norway. In the latter, the fishing economy has been quite specifically based on culture of the small boat (*sjark*), operating mainly in coastal waters and landing the catch into local processing plants (Lindkvist 2000).

Many of these areas have suffered from adverse effects of modernisation, globalisation and modern systems of management. Despite the evident economic, social and cultural importance attached to the small-boat sector, modern management systems do little to protect their interests and those of the fishing communities. Rights-based management is largely unsympathetic and a potentially dangerous accelerant of the decline faced by many FDAs. In arguing for reconversion strategies aimed at redirecting fishermen into alternative forms of employment, it is important to recognise that the scope for deploying the capital resources and skills closely identified with fishing or for creating new job opportunities is likely to be strictly limited (Symes, 2000). Many FDAs are remote from major urban markets and characterised by a highly fragmented physical geography, small concentrations of population and long local-journey times so those labour catchment areas tend to be severely restricted. Attracting development capital into such areas is bound to be difficult. The exploitation of local natural resources – fish stocks – thus remains the most appropriate basis for sustainable development; it may also be the most likely way of ensuring the sustainability of the resources themselves. Without some form of preferential access to the fisheries, many FDAs face a further spiral of decline, already identified in many parts of the Atlantic fringe (Sinclair 1996, Hanssen 2000, Brandáo *et al* 2000). A fairly consistent picture is emerging of outmigration, depopulation, ageing populations, insecure employment, low incomes, poor recruitment and low levels of aspiration, organisation and innovation.

4. SOLVING THE DILEMMAS OF RIGHTS-BASED MANAGEMENT

The tenor of the argument in this paper has been to suggest that rights-based management is not necessarily the most appropriate system when applied to coastal fisheries, the survival of the small boat sector and the sustainable development of the more remote FDAs. In this final section consideration is given to two complementary approaches which may serve to retain some of the economic advantages of rights-based management for the industry overall while affording a measure of protection for those sectors and regions most likely to be disadvantaged by the processes inherent in rights-based management.

The first approach envisages a zonal differentiation in the management of inshore and offshore fisheries. Significantly, the EU has so far determined that management of inshore waters should remain largely the responsibility of the individual Member State. In endorsing this derogation from a policy of non-discrimination and equal access within its waters, the EU is admitting the principle of preferential treatment for local inshore fishing interests. Though not an ideal solution, the 12nm territorial limits provide an adequate basis for separating the management regimes for inshore and offshore fisheries. In principle, the area within the 12nm limit should be reserved exclusively for inshore vessels under 10m in length and subject to a distinctive management regime based not on catch quotas but on restrictive licensing (which can, if necessary be designed to prevent the entry of non-local boats into a particular fishery), gear regulations, closed areas and, where appropriate, effort limitations. Regulation of the inshore waters should be undertaken locally through co-management institutions involving representation from the regional administration, the inshore fishing industry and the scientific and marine conservation communities – but the detailed design of such institutions should reflect

the prevailing political and fisheries cultures of the regions concerned.

Beyond the 12nm limits, the offshore fisheries would continue to be controlled mainly through systems of quota management and, indeed, rights-based management. However, quota markets should be regulated in such a way as to restrain the worst excesses of capital accumulation and concentration that threaten to disfigure the socio-economic landscapes of some FDAs, but without denying the benefits of an overall reduction in fishing capacity and restructuring of the fishing fleet in accordance with the requirements of sustainable fisheries. Several options are available including community quotas or group management of ITQs, as in the case of the Netherlands (Langstraat 1999).

Within the EU, the basic infrastructure for regional self-management of quotas exists in the form of Producer's Organisations (POs), originally established to organise the sales of member's catches but now recognised as offering opportunities for quota management. A system of sectoral quota-management already operates in the UK whereby POs manage the quotas on behalf of their members, adopting different approaches to suit the local context. Goodlad (1998) suggests that instead of going down the road of individual transferable quotas, an alternative might be for POs to be directly allocated a percentage share of the national quota which they would manage in the best short- and long-term interests of their members. Quota swaps, leasing arrangements and trading on the quota market would be undertaken by the PO rather than by the individual vessel owner. As managers of the quota, POs would also be better placed to ensure the effective marketing of the catches. Questions are, however, raised by Phillipson (1999) concerning the willingness and competence of some POs to extend their management responsibilities and to ensure the compliance of their members with PO rules.

5. CONCLUSIONS

This paper has tried to avoid the familiar ideological rebuttal of rights-based management. Instead, it has argued for a more cautious and discriminating approach when applied to the realities of particular situations. Although there are probably few social scientists who would argue that privatisation of use-rights has no place in modern fisheries management, even fewer would subscribe to privatisation as a universal solution. The rights-based management agenda tends to present too narrow a perspective on the underlying issues that presently confound attempts to manage fisheries in a truly sustainable way. It largely ignores the broader social, cultural and ecological concerns and it serves as a classic example of a reductionist approach, disembedding fishing activity from its local social, cultural and economic contexts. If the only issue at stake was the survival of an economically efficient fishing industry, then rights-based management would contain most, if not all, of the answers. If, however, we are concerned with the social and cultural ramifications of fishing – with the survival of fishing communities, with the generation of employment in FDAs and with the welfare of coastal populations – then rights-based management can provide only a few of the answers.

There is, however, a sense in which the privatisation of use-rights is seen as the culmination of a process establishing a system of rights-based management – the final piece in the jigsaw. Where do we go from here? What if, as some commentators predict, quota-based management is exposed as a fallacy and rights-based management is dismissed as providing the right answers to the wrong questions? What happens when – not if – fisheries management is drawn into a more holistic, ecosystem-based approach demanding answers to a very different set of questions which quota-management systems cannot answer? How then does one dismantle a system in which very considerable private capital has been invested and in which the public sector has very little stake?

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PROPERTY RIGHTS AND RECREATIONAL FISHING, A NEW ZEALAND PERSPECTIVE – PAST, PRESENT AND FUTURE

M. J. Hetherington
Secretary, New Zealand Recreational Fishing Council
PO Box 26-064, Newlands, Wellington, 6004 New Zealand
<rfcmax@xtra.co.nz>

1. INTRODUCTION

Let me commence by noting that discussions concerning property rights and recreational fisheries over a number of years indicates that the situation in New Zealand in respect of perspectives and attitudes is different from that in Australia and other places in the world. You therefore need to understand those perspectives and attitudes in the first instance.

New Zealanders consider it is a BIRTHRIGHT to go down to the sea and harvest a reasonable catch. They consider the fishery is a public resource owned by them and managed by the Crown. Research has already shown that around 80% of recreational fishing is not carried out for sport or recreation. It is carried out for SUSTENANCE of self and family. I am led to believe that in Australia the figure is reversed with 80% fishing for sport and recreation rather than sustenance.

Let me also make clear that the New Zealand recreational fisheries are considered a priority ranking for the use of the resource. Within this priority is first the resource itself: to protect it for future generations and to cover the exercise of the *kaitiakitanga* (guardianship) role. The second priority is for Māori customary take for the purpose of upholding the *mana*[1] of the *Marae*[2]. This covers the ability to provide *kaimoana*[3] to visitors and guests on the Marae. The public (recreational) fishers comes next with the ability to enjoy a feed of *kaimoana* (food) and to sustain themselves or achieve enjoyment from the resource. The last priority is take for commercial purposes. This is a priority that we believe needs to be set in the legislation but has not been achieved to date.

As the Secretary of the New Zealand Recreational Fishing Council I follow the mandate of my members and the public we represent. The Council has for many years had a mandated policy of "no licensing, no quota, crown to manage the fishery". This has been the case for at least the last ten years and is reconfirmed annually.

In July 1998 the membership empowered my executive to negotiate with the Crown on the defining of the public's right and reviewing that policy. This followed an address by Mr Stan Crothers of the Ministry of Fisheries who stated that the public's right was being eroded by the other rights created by the Crown and the lack of definition of the public right. Based on that address a Working Group of three recreational representatives (and two recreational advisors) was formed and in conjunction with the Ministry the Group has been discussing and negotiating the subject. I am a member of that Group.

2. OWNERSHIP

It is important to note the view that the fishery is a public resource belonging to the public of New Zealand. The Government in 1986 created, without consultation, a property right for commercial fishers, then gave that right to those fishers without recompense or payment. The issue of those rights was based purely on commercial catch-history. It ignored the similar public, recreational and Māori catch-history and ownership rights. In creating this commercial right the Crown also created for itself a grievance with the New Zealand public which has not been addressed to date.

Māori using the existence of the *Treaty of Waitangi* took the government to court. In doing so they protected and strengthened their commercial and customary rights. Since that time the Māori commercial right has been settled with the passing of the *1992 Treaty of Waitangi Fisheries Settlement Act* (commonly known as the Sealord's deal). The customary right has been settled using Customary Fishing regulations which are presently being implemented.

However, what happened to the public right? It has neither been protected or enhanced. Nor has it been properly defined. If the present discussions are unsuccessful the public may also have to take the government to court to force it to protect and manage the public resource.

At this stage the only published government policy on recreational fisheries is the National Policy for Marine Recreational Fisheries which states:

> *"One of the first national objectives is to ensure recreational users have access to a reasonable share of the fisheries resources. Where a species of fish is not sufficiently abundant to support both commercial and non-commercial fishing, preference will be given to the non-commercial fishing."*

This policy which was approved by the cabinet of the day has never been revoked or replaced.

The Government and Ministry continue on a course of "user pays, user says" and "devolution" of its

[1] Māori for authority, influence, prestige and power.
[2] A Marae is literally the meeting ground in front of the whare (house). Can be more loosely used to describe the dwellings where Māori meet.
[3] Food of the sea.

mandated role. I believe that several aspects of this are against the views and wishes of that public. Therefore, I predict that eventually the public will speak. They will do this through the ballot box and will take legal action through the courts.

3. HISTORY

Let me give a scenario for you to ponder. All the early New Zealanders were either born in the country or arrived by sea. Māori in canoe, Pakeha in ships. They are all "natives" of New Zealand. Back in 1840 Māori (the original inhabitants) entered into a treaty with the English (the settlers). The Treaty of Waitangi resulted. That Treaty has three articles:

Article one ceded to the English the "governorship and ability to make laws".

Article two protected for Māori their *taonga* (treasures) including the fisheries by the use of the words full, exclusive and undisturbed possession. It is this ownership right that was settled by the Sealord deal. Under that deal Māori relinquished their right in the commercial fishery in return for quota. They also released their customary right subject to the passing of customary regulations. They retained their customary right and *Kaitiakitanga* responsibilities in those regulations for *Marae* purposes.

Article three provided to all "natives of New Zealand" the royal protection and imparted all the rights and privileges of British subjects. It is under this article that all New Zealanders (Māori & Pakeha), descendants of the treaty partners, have the common law right of access to the fisheries resource.

This then leaves those born here since 1840, who are also "natives of New Zealand", or those who have arrived since and taken up New Zealand citizenship. They are also covered by the Treaty because they have accepted and are covered by the governorship covered by Article One and are "natives of New Zealand" accepting the protection of the crown and the rights and privileges referred to in Article Three.

I question where New Zealander's protection, rights and privileges are within the present and past legislation. I note that the "devolution of responsibility/management" is an abrogation of rights of the public and the Treaty obligations under Article one (by the government) that now needs to be addressed.

4. FUNDING

Another issue is the "level playing field" of fisheries management and consultations. My council survives on voluntary unpaid inputs. On the other hand we have a commercial fishing industry prospering on quota that was given to them in the first instance. That quota is being used for commercial gain. It is soul-destroying to attend consultative meetings to be confronted with upwards of 20 industry personnel, including qualified scientists, accountants, lawyers *etc., etc., etc.,* all funded to be there. Then there may be up to 20 Crown personnel also funded to be there. Sitting on the other side of the table are myself and maybe one other recreational fisherman representative and sometimes one or two environmentalists. Infrequently, one or two others may attend. And these are the official consultative meetings.

Therefore, for the future the playing field must be levelled. The participation of non-profit groups must be fully funded. You may suggest licensing as occurs in other places and in the New Zealand freshwater fishery. However recent research has confirmed that New Zealanders do not accept such an approach for using this public resource.

5. ENFORCEMENT

Another issue that needs addressing is that of enforcement. Illegal catches affect and impinge on all sectors' rights. All sectors have their rogues and this is not exclusive to fisheries. Some minor illegal activity can be resolved by education and therefore greater resources need to be put into education.

However, most illegal activity is carried out for commercial gain. We do not blame the commercial sector for it. The only way it can be described is "poaching, black market or fish-thieving". As it is deliberately undertaken for a commercial gain it will not be resolved by education. Whilst the government continues to fiddle with this issue and fails to provide sufficient resources, the problem will continue and escalate. Overall this is another major problem affecting the rights of all sectors of New Zealanders. Thieves have no rights to fishery resources.

6. MANAGEMENT LEVEL

Under our present legislation the resource is managed for "Sustainable Utilisation". The Minister is required to move all stocks towards a magical figure called BMSY (or in other words the biomass that will produce the maximum sustainable yield).

We question whether, for inshore fisheries, this is in fact the best level to manage the stocks. At that level the most efficient harvesting method (and usually a bulk method) will be used. Conflict will, and does, occur as fishers become unable to get what they want out of the resource. Scientific data is not available to ensure that the catch level is set correctly. Collapses in recruitment can affect the stock level adversely. Further, natural disasters and weather patterns can affect the stock. Conflict occurs where recreational fishers consider a stock is fished down too low. Examples can be given.

We believe that in the future the public will question this theoretical BMSY figure. They will want some inshore stocks fished at twice or three times the BMSY level in order to provide a cushion for all natural environmental variances. Conversely they will want some stocks declared bycatch species only.

7. MANAGEMENT STRUCTURES

The Council has a policy, expounded for a number of years of "national and regional management". This is in fact two structures one in the recreational area with the second jointly with other sectors, which is representative of all sectors working together with co-operation, consultation and where possible consensus. This structure could even come down to a local community level. We already have examples of national management. Our Council has such a structure covering the recreational area of management, and other similar structures also exist. This could be incorporated into any settlement of the recreational (public) right.

In the area of joint management there is the National Rock Lobster Management Group (NRLMG) on which I am one of the recreational representatives. There is provision in the legislation for a general national management structure in the form of the National Fisheries Advisory Council which can be appointed at the whim of the Minister. To date, no such committee has been appointed.

We are not well endowed on the regional front. Recreationally the Council has a structure and other structures also exist. In the Joint area a number of local and regional management structures are in the pipeline, some of which are representative whilst others are not. Reference is made to *Taiapure*[4] committees most of which have not yet been appointed despite the Taiapure gazetting having been in place for some time. Reference is also made to some in the Rock Lobster area where joint management committees are being formed.

For both recreational and joint management and for any devolution to work in New Zealand requires a national and regional management structure properly-funded and resourced. In the joint area it needs to be representative of all sectors. This can only occur when there exist mandated groups covering each sector individually. The whole area needs strengthening and enhancing and needs legislative backing to make it effective.

8. INSHORE ZONES AND CLOSED AREAS

New Zealand has a situation where numerous groups are attempting to close down larger and larger areas of the inshore fishery for their own reasons and purposes. Whilst the Quota Management System may be the best management system for commercial purposes, it does not meet the needs and aspirations of the public generally nor the specific-interest groups within that public, particularly those concerned about the inshore zone. All sectors see the depletion of the stocks within the inshore zone, and each in its own way is attempting to address those problems. As examples, I refer to the closing of areas as marine reserves, *taiapure*, *mataitai*[5], *rahui*[6], voluntary accords, regulations and many other means.

My Council considers that many of the proposed closure methods are too restrictive because of the legislation under which many of the closures are sought. For example marine reserves are supposed to be set up for scientific purposes, but are now being used to lock up areas permanently because of other perceived problems. The most common is the attempt to enhance stocks which are seen to be depleted locally. We are not opposed to closures, but we consider that they need to be in the right place for the right reasons and under the right legislation.

There is a solution that would meet everybody's wishes and which would place the appropriate costs where they should lie. It would solve the problem of indiscriminate closures for the wrong reasons and protect the inshore zone from spatial depletion issues. The solution has been suggested before but, the Minister and Ministry have failed to take it up. Reference is made to the report on "Sustainable Fisheries" of April 1992 commonly referred to as the Wheeler Task Force. The recommendation on pages 53 and 54 reads:

> *"A general coastal fishing zone be established to address the problem of spatial depletion and the loss of amenity affecting, in order of priority,* Mahinga kai[7]*, recreational fishers and commercial fishers. Within this zone the use of fishing methods would be restricted to the extent that they are unlikely to result in localised depletion of stocks:*
>
> *The coastal fisheries zone would comprise all areas within 1.5 nautical miles of the, coast and most enclosed harbours;*
>
> *Method restrictions under a coastal fisheries zone could not unduly affect the ability of quota holders to harvest their quota unless such quota holders agree;*
>
> *The restriction could only be triggered by an approved recreational group or Iwi. The party that triggers the zone would have an obligation to consult with other affected parties; and*
>
> *The initial terms of any coastal fisheries zone be ratified by the Minister of Fisheries, be registered and be available publicly."*

[4] A word created by the Māori language Commission in 1989 to describe the legislative provision that enabled Māori to denote areas of particular significance to them and establish a management committee for the area. Literally, it means *tai* (coastal) and *apure* (patch), a local fishery area.

[5] Place of seafood. The term is used in the customary regulations as Matatai reserves and are areas denoted as significant to the *tangata whenua* (local Māori people) who manage the fisheries in these areas.

[6] Closures for resource protection. Rahui are placed over areas or stocks for temporary protection in response to a variety of reasons, from a drowning to concern over depletion of stocks.

[7] This term can apply both to the process of cultivation and the foods themselves. Mahinga is a doing word that encapsulates all the traditions that go into the process of utilising the natural resources

This suggestion made by that Task Force places the onus and costs in the wrong area, but does provide the overall solution. The creation of a coastal fishing zone out to the 12-mile limit has been suggested and within that zone all commercial fishing should be banned initially. This is not to say that commercial fishing remain banned or that it cannot occur. Some important fisheries (particularly rock lobster and paua), which are low impact and high return, need to occur. What is envisaged is that those making the profit from the resource should then apply for areas to be opened for commercial take (and that it be accepted that this must occur).

This will in the longer-term solve all the spatial depletion issues. It will protect the inshore fisheries. It will remove the need for a proliferation of closures being sought for the wrong reasons. It will in time improve the stocks. It will meet the aspirations of local coastal *iwi* by improving the stocks within the zone. It will allow the "farming" of the inshore zone by means of opening and closing of areas as stocks improve. This method has been used successfully in the Nelson scallop fishery.

My friends from the commercial sector will be vehemently opposed to this suggestion. I suggest they consider it seriously. They will find the concept will grow on them in the future. It will also allow them to put their efforts into fishing rather than the confrontations that now occur.

9. CURRENT NEGOTIATIONS AND DISCUSSIONS

Reference was made earlier to the current discussions going on between the Crown and representatives of this Council. The working group is presently preparing a draft discussion paper for consultation with the public. This includes many of the issues that have been referred to above. It will be designed to seek the public's views. The present tentative timetable for this process is:

August 1999 to March 2000	Develop Public Discussion Document and have approved by Cabinet
April to July 2000	Public Consultation period
August to October 2000	Analysis of submissions and obtain Cabinet decision
December 2000	Draft legislation and introduce to Parliament
January 2001 to June 2001	Select Committee consideration
October 2001	Implementation.

The working group has to date consulted with, and received input and a mandate from the members of the Council itself. This process consists of seven discussion papers setting out the options and considerations. These can be made available on request.

10. THE OUTCOME

The outcome of the process plus the public's attitude creates a difficulty in my view. New Zealand presently has a government which is in the process of devolution and self management in all sectors in an endeavour to reduce government expenditure. The process is a form of privatisation of the public resource. It is designed to put costs onto the public without government itself meeting the costs. It has been tried in a number of areas with limited success. The question then arises whether this policy is correct and accepted by the public. The answer appears to be NO.

As part of the fisheries research process, a couple of years ago the Council promoted and had tendered, two research projects that are presently being carried out. The first is to reconfirm *the Value of Recreational Fishing in New Zealand.* This is being done by the South Australian Centre for Economic Studies. The second is the *Motivations and Perceptions of Marine Recreational Fishers.* This is being carried out by Ackroyd Walshe Ltd. Preliminary reports have recently been provided and these indicate some aspects of concern.

The latter project incorporated questions on the option of recreational fishers taking over some control of management. Only 37% considered this would have a benefit. 25% considered it disadvantageous and 19% were neutral. On the option of areas being managed by associations of fishers: 38% supported it whilst 41% wanted the *status quo* (Mfish Control) and 6% wanted joint management (Mfish/Association). On the issue of licensing only 29% considered it beneficial, whilst 42% were against with 16% neutral.

These figures cause me concern. They tell me that the Crown is on one course whilst the public is on the opposite course. I can see a situation where control will be lost completely with the public and the resource being the losers. The public will not have achieved its intent of protection of the resources for future generations nor its guardianship role. It has happened elsewhere but I do not wish to see it happen in New Zealand, either now or in the future.

COMMUNITY PROPERTY RIGHTS: RE-ESTABLISHING THEM FOR A SECURE FUTURE FOR SMALL-SCALE FISHERIES

J. Kurien
Centre for Development Studies, Thiruvananthapuram – 695 011 Kerala State, India
<jkurien@md3.vsnl.net.in>

"If we had anything of our own worth speaking about, it was an awareness of the community's rights and the place of the individual in it" Fisherman elder of the Temple Committee that once decided matters about sea tenure, gear restrictions and seasonal closures among other things.

1. INTRODUCTION

The need, as well as the urge, to move towards a sustainable and socially beneficial utilisation of fishery resources is now being felt world-wide. In the developing countries, and more particularly in the populous Asia-Pacific tropics, fishery resources constitute a major component of the real natural wealth of these nations. Long before the conception of the nation state, getting the most from this gift of nature for the greatest social good was always a priority in this part of the world. Coastal communities in this region have over the centuries evolved a variety of forms of collective relationships between fishery resources and themselves. These had served two ends. First, they helped the coastal communities to establish "rights" relationships with other communities who acknowledged their claims to the fishery resources. Second, it provided them the basis for a convivial life for themselves.

I contend in this paper that both these aspects have foundered as a result of the erosion of the property rights held by these coastal communities. This has been primarily a consequence of the enthusiasm of the nation state to "develop" these communities using the development paradigm of the West. A revival of the initial conditions, is neither totally feasible nor conducive. But equally inappropriate are the current efforts to mobilise opinion for consideration of individual private property rights to fishery resources. They are being touted as the panacea for setting out on the voyage towards sustainable coastal fisheries development and management.

In this paper I attempt to question this approach and urge for a re-discovery and re-establishment of the fundamental foundations of what we call a "community property right" in fisheries. Examining the steps being made in the maritime State of Kerala, India, to strive towards this goal provides a case study to examine the feasibility of the approach.

2. UNDERSTANDING PROPERTY RIGHTS

Property rights are the sanctioned relationships between human beings in their utilisation of resources. They provide a good example of an institution which Douglas North (1990) defines as "humanly devised constraints that shape interactions" and provide "a structure to everyday life". Human beings interact with natural resources and the environment through a variety of property rights that are embedded in particular ecological, social, political, cultural and economic contexts. The primary economic function of property rights, in the words of Demsetz (1967), "is that of guiding incentives to achieve a greater internalisation of externalities". In this process, management and governance of the resource attain direction and purpose.

By property I refer not to the thing, or object of our interest, (in this case the sea or fishery resources) but primarily to a secure claim to a future stream of benefits arising from it. By rights I imply the capacity of the claimants to the property to call upon "the others" without such claims, to acknowledge their duty to honour the claim. Such duty may be incorporated in written law or unwritten custom. One can therefore envision a property right regime to be composed of a triadic relationship involving (a) the benefit stream from the resource, (b) the claimant with rights and (c), the others who dutifully honour the rights of the claimants. Over time, socially sanctioned mechanisms - rules, regulations, norms, laws - gradually surround the triad to ensure the sustenance of the relationships. What needs to be stressed again is that property rights have more to do with relationships between people than claims over things or resources. There is no need for material proof of this (*i.e.* documents). It can be a social contract based on custom and trust. However, if this triad cannot be completed - usually because of the lack of "the other" - we then have a situation of "open-access". In an open-access regime there exists only *privilege of access and possession* but no property rights.

Basically therefore, one can talk about a spectrum of property right regimes for fishery resources: a "no property right" (NPR), or open-access regime, with only the privilege of possession; a state property right (SPR) regime; a private property right (PPR) regime and a common property right (CPR) regime. State property and private property right regimes are well defined and need no further elaboration here. These are the regimes with the greatest social sanction and accompanied by the most elaborate legal framework that specifies the rights and duties of each regime. There is little confusion about what they entail. However, in the oft-quoted popular literature on fishery resource management, the greatest source of confusion is with regard to the lack of distinction between the common property right regimes and open-access or no property-right regimes. Take for example the world famous piece by biologist Garret Hardin (1968) entitled

"Tragedy of the Commons," which is so often quoted in fisheries literature. It should rightly have been titled "Tragedy of Open Access" since the triadic structure of relationships necessary to establish property rights did not exist in the pasture described by him. Common property is basically private property of a group of co-owners who have both rights and duties with respect to the use rates and the management of the resource claimed by them. Baland and Platteau (1996) highlight a useful distinction between an unregulated common property right regime which tends towards open-access and a regulated common property right regime, which is akin to the private property of a group of co-owners.

3. DEFINING COMMUNITY PROPERTY RIGHTS

The issue of property rights over natural resources is of particular importance in Third World countries where many millions of people, often organised in small, location-specific and occupation-specific communities, depend directly on natural resources for their day-to-day survival. Such communities have been referred to by Dasmann (1988) as "ecosystem people/communities" highlighting their close relationship with nature and a deep socially embedded "connectedness" to it. This makes it necessary to view these communities differently. They are to be seen not merely as individuals who form groups, but as groups of people who, through discrete and evolving interactions, have formed exclusive and overlapping linkages, both within themselves and between themselves and other groups, to form larger "communities". Indeed, many nation states in the Asia-Pacific tropics can also be viewed as the grouping-together of such communities within certain defined geographic borders.

In this paper I wish to introduce the concept of a *community property right (COPR) regime* (see Kurien 1998a). One approach could be to treat this as a special case of the common property right regime. However, I follow a different tack. The reason for doing so is twofold:

i. There is a need to shift from viewing individuals working together *as individuals* to viewing individuals working together *as a group*. The latter work together in a context where their actions and choices are contextualised in the natural societal milieu to which they belong by virtue of inter-generational occupational and associational or geographic identity. They stay together because of a network of mutual obligations, responsibilities and duties.

ii. I wish to distinguish property which is merely claimed by a group, from property that has been in history and tradition held in trusteeship and stewardship by a group, which has related to it for their survival and livelihood and through this interaction has evolved advantageously into a coherent "ecosystem community".

Such a community property right in coastal fisheries by definition requires co-owners to engage in consultation and participation to seek common approval of certain actions that they may thereafter mutually agree to undertake individually. These would include, among other things, decisions on the nature and the quantum of capital to be invested in the harvesting activity in a particular area; the norms regarding the extent and the timing of the effort to be expended in this activity; and the manner in which the output is to be disposed of. Consequently, a community property right does not usurp the crucial role played by individuals. It only circumscribes it within the confines of collective norms. There is nothing unusual about this in ecosystem communities of the Asia-Pacific tropics. Since the basic motivation is pursuit of a good and decent livelihood the participants tend to have a longer time-horizon as regards their relationship to the resource and a keener ecosystem-perspective towards it.

Given the highly complex nature of fishery resources in the tropics, this combination of individual enterprise, under a rubric of community norms, helps to take advantage of the skill variations (innate human capital differences) among fishermen. It also acts as a great motivator of benign competition in coastal fishing. Yet it keeps in check the ills of unbridled freedom, which lead to excessive "capital stuffing" (the bane of even the ITQ systems which assign PPRs to fishermen). This certainly puts a cap on excessive private accumulation possibilities. However, the benefits in terms of equity of opportunity, and freedom to modulate effort in keeping with the highly diverse fishery resource in tropical waters, result in optimising the social accumulation of wealth from the coastal fishery.

4. EXISTENCE OF TRADITIONAL COMMUNITY PROPERTY RIGHTS

Social scientists who have studied ecosystem communities in coastal fisheries in the Asia-Pacific tropics will wholeheartedly endorse the existence of traditional community rights among them in a variety of forms. The recent compendium of Ruddle (1994) is most useful in this regard. It provides a broad-brush treatment of the evidence of rights in traditional community-based systems of fishery management from 21 countries varying in size and complexity from sub-continental India to the islands of Kiribati. Even this effort highlights how little we yet know about the institutional arrangements and the structure of rights as perceived, defined, delimited and defended by small-scale fishing communities of the region. The moot point, therefore, is that the triad of rights existed. Fishing communities made claims over coastal resources and the rest of society honoured these claims. There is therefore no need to produce written records as proof to establish their effective operation. Moreover, the earlier meticulous analysis of scholars like Johannes (1978) leave little doubt that all the resource rights and management measures propagated in the West today have nearly all existed in the Asia-Pacific tropics long before they were conceived in the temperate water fisheries.

It is my understanding that the basic foundation of these traditional community property rights focussed on four aspects:

i. ecological processes, which relate to the stock of fishery resources in the context of the wider ocean ecosystem and the means of accumulating and sharing information on this
ii. institutional and deterrent measures to ensure compliance with community regulations and protection of the resource against intruders
iii. arrangements for sharing and redistribution measures to ensure that none of the members are driven to a state of deprivation, which would motivate them to over-exploit the resource
iv. arrangements for sharing and redistribution measures to ensure that more of the members are driven to a state of deprivation that would motivate them to over-exploit the resource.

We need to draw special attention to the implicit entitlements that individual participants enjoyed in a COPR. These help to compensate for the inadequately functioning markets in credit, social security, insurance and employment. These entitlements in turn were at the basis of a complex set of rights and duties that fostered long-term personal relationships of trust between members of the group. This was the basis of moral norms that prevented free-riding and linked individuals together in a bond of assurance and cooperation. These factors, in fact, enhanced efficiency within the operation of these rights.

5. HOW TRADITIONAL COMMUNITY PROPERTY RIGHTS GOT ERODED

The post-World War II intervention of the nation state in bringing about fisheries development through the aegis of technological change and market expansion created a situation where these community rights to resources became highly insecure. The first casualty of this was the destruction of the informal mechanisms of cooperation and trust. These were further jeopardized when the traditional regulatory norms surrounding the COPRs were undermined and the social prestige of those who enforced them was belittled. This created an institutional vacuum. Into this entered a flood of new private (business) interests with an eye for making profits from the resource flows.

In the coastal fisheries of most developing Asian countries these community property rights were replaced, not by any form of State-regulated common property rights, but rather by a *de facto* unregulated common property context - an open-access or no property-rights (NPR) situation. Such an open-access resource, linked to a global market with unsatiable demands for the protein of the sea, created the ideal menu for resource depletion and ecosystem degradation. Undoubtedly this process was hastened by liberal State subsidies to promote capital intensive and environmentally over-efficient harvesting technologies that were inappropriate to the resource configuration of the tropical waters. [For an excellent case study in the Indian context of the gamut of issues raised here see Bavinck (in press)].

6. WHY PRIVATE PROPERTY RIGHTS ARE INAPPROPRIATE

It is against this backdrop that the present global propagation of private rights in fisheries needs to be viewed. First, it is being propagated in a manner that gives the mistaken impression that the concept of rights to the sea and its resource is alien to developing societies. Second, as with the earlier attempts at technology transfer in fisheries, individual PPRs are being promoted without reference to the history or current practice on these matters in the developing nations.

The global advocates of the individual Private Property Rights (PPR) claim to be promoting that arrangement in the light of what they observe to be the weaknesses of Common Property Rights (CPR). This is a false comparison. What they are really comparing is the idealised, textbook version of PPR with the anarchy which prevails in a No Property Rights (NPR) situation. Not only is this position scientifically illegitimate, it is also doing gross disservice by giving a bad name to the numerous elaborate traditional rights arrangements which existed in coastal fisheries in Asia and Pacific that were by no stretch of imagination NPR situations. Moreover, the efforts to propagate PPRs in fisheries have certain unstated assumptions that are difficult to obtain in the 'real world' of either developed or developing countries. These include *inter alia* an unambiguous definition of PPRs; the existence of perfect and competitive conditions for all markets; and no costs for enforcement of the PPR. Added to this there are certain context-specific factors about the countries where PPRs in fisheries have been implemented, which are not present in the developing countries and also unlikely to ever be obtained in the near future (see Appendix 1). These objective factors, though they are never explicitly mentioned, become barriers to the moves for implementation of PPRs in the developing world in general and the Asia-Pacific tropics in particular. These moves are therefore motivated more by blind ideological convictions and less by their being socio-economically and technically appropriate to the fishery context.

7. REDISCOVERING COMMUNITY PROPERTY RIGHTS

In many developing countries in the Asia-Pacific tropics, the crisis of fishery resource degradation and depletion has been creating social upheavals that make the administrative and political authorities anxious for long-term solutions. This is also coupled with a few important considerations and conclusions reached over the last five decades of conventional fisheries development and management.

i. Fishing communities still continue to be among the economically weaker sections in most of these

countries. Despite this, many of them represent culturally, ethnically or socially strategic segments of the society. Discontent among them, if ignored, can be politically inexpedient.

ii. The earlier "large-scale technology fix" approach to fisheries development cannot proceed much further. The physically separated and dispersed nature of the productive coastal waters (*e.g.* India, Indonesia, Philippines, *etc.*) combined with the innate characteristics of tropical fish species make large-scale, centralised harvesting inappropriate and uneconomical.

iii. There is a growing realisation that fostering sustainable development of the small-scale fishery – which is still the backbone of the fish economy – lies in first defining clearly the distributional objectives which are sought. Thereafter the technology and organisational structures can be tuned in accord with that requirement.

iv. For economic and socio-cultural considerations the importance of maintaining a viable, decentralised settlement pattern has been accorded a priority to prevent large-scale migration of fisher-people to urban settlements. This is also in keeping with the growing socio-political pressure for decentralisation of governance.

v. There is an unresolved dilemma between, on the one hand, promoting coastal fisheries as a major foreign exchange earner, and on the other, stressing its role as a provider of inexpensive fish for avid domestic consumers.

vi. In the context of globalisation, the inevitability and usefulness of markets has been acknowledged. However, the unbridled functioning of markets has been perceived to be inimical to the long-term interests of resource conservation.

vii. The centralised law-and-order approach to fisheries management, which has been tried in many big and small countries in the region, has reached its limit. It has proved inappropriate and expensive. The need to evolve cost-effective, and more stakeholder-participative monitoring and enforcement machinery, merits priority of action.

viii. There is a last opportunity for revival of the scaffolding of numerous community institutional arrangements which remain embedded as social capital in the fishing communities.

These perspectives taken together, point unequivocally to the need for a major structural change in the fishing economies of these countries. The need of the hour is for an institutional transition that will restore the primacy of property rights to coastal fishery resources giving central place to those who depend on it as their main means of livelihood. I therefore argue that a secure future for small-scale fishing communities in the Asia-Pacific tropics will require a re-discovery and a re-establishment of community property rights to coastal fisheries. The foundations will remain the same as those of the traditional community property rights mentioned earlier. The superstructure will necessarily have to be modified to take the new socio-economic and political realities into consideration. This superstructure will not *emerge autonomously.* It must be *consciously crafted* in the context of a triadic network where the community is the anchor that provides stability, the market acts as an oar to provide momentum and the State is the rudder to give direction (see Kurien 1998b). How this is being attempted in Kerala State, India is illustrated below.

8. KERALA STATE: SHOWING THE WAY

8.1 Antecedents

Kerala State in South India has a coastline of 600km along the Arabian Sea. It is home to an 800 000-strong fishing community scattered across 220 coastal villages. Out of them 170 000 are active fishermen netting annually about 600 000t of fish. Kerala has been a pioneer in many aspects of fisheries development and management in India. Today, Kerala is making the first strides in moving towards community property rights for coastal resources. This realisation, however, comes after over four decades of the "business as usual" approach to fisheries development and management. This included, *inter alia*, an international fisheries aid project; transfer of temperate-water harvesting technologies with liberal subsidies in the name of making fishing more "efficient"; linking up with the export market; State-initiated cooperatives; and zoning regulations. This piece-meal approach did not lead to either sustainable management of the fishery resources or to enhanced socio-economic welfare of the fishing communities.

Kerala needs to regain its prominence on the fishery map of India. The need to define rights and do this in the context of a community-market-state framework is the ethos of the moment. This has the enthusiastic support of the unions and associations of the small-scale fishworkers, NGOs, community leaders, the planners and many political parties.

8.2 Community

The participants of the small-scale fishery in Kerala have always been rooted in the community. The autonomy of the individual and the household or family are circumscribed by the welter of both traditions (history) and aspirations (future) provided by the community. Based on the hierarchy of the caste-system, their occupation puts them very much at the bottom of the social ladder. In the past this was the main cementing force. It has acted as a barrier for entry of other people and capital into the fishery. These initial conditions have changed rapidly. Improved technology, and enhanced market demand and the State created open access to the fishery which has broken this isolation. Clearly, the new community cannot be defined along the lines of caste and creed, which have been the major criteria of the past. The consensus is that change can be brought about with an 'aquarian' reform. Community property rights should devolve to the local-level community that resides in a defined coastal settlement. Its core should consist of all

who, irrespective of caste or creed, are willing to labour at sea – working owners and workers. It is this new core group that will provide the anchoring role for the community.

At an operational level these community property rights in Kerala should be organised at the level of the lowest constitutionally-valid administrative unit of governance. This is at the village level and is a feature common to many Asia-Pacific nations. In Kerala it is called the *panchayat*. The organisational concept of the *panchayat* "Matsya Bhavan" (Fish House) will bring together under one roof the various arms of the State that deal with fisheries and fishworkers issues. To start with, in each *panchayat*, the seaward littoral zone contiguous to the land boundary out to a distance of 2km, will be community property. This necklace-like structure of community regimes along the coast will be coordinated at the larger level of the district *panchayat* which is 'coterminous' to a larger natural ecosystem and therefrom to the level of the State (Government of Kerala 1997)

8.3 Market

Markets are not new institutions for small-scale fishing communities in Kerala, or for that matter anywhere; in fact between State and markets, it is the role of the State that is newer in these communities. Exchange, and consequently the compulsions of the market, enter into small-scale fishing communities even at a low level of development of the productive forces. In Kerala State, there has been, and continues to be, a vibrant domestic market for all species of fish and a strong export market for some selected varieties. The market is like a paddle providing momentum to the economy. Initially, the market facilitates the expansion of economic opportunities for the community as a whole. However, with the emergence of the specialised role of the trader and the development of a buyers' market, the leverage of the producer is greatly diminished. A credit market develops and its consequent interlocking with the output-market results in greater dependency on intermediaries. In the context of Kerala State, it was the opening of the post-World War II export markets (USA, Japan and Europe), which provided the motive force for excessive exploitation of the open-access fishery. Market forces, therefore, can never be wished away in the development of any form of property rights in a fishery. The issue is, the extent to which market forces will be permitted free play.

8.4 State

Proponents of private property rights in fisheries tend to picture the State in a bad light. Our vision here is of a State that invigorates rather than steam-rolls; a State that bolsters capability rather than stifles initiative; a State that defines the broad contours of economic action rather than strait-jacket it. The transition of the coastal waters from an open-access realm to one of community property rights can materialise only if the State plays the role of rudder, giving direction for the voyage into the future. The legislative support for aquarian reforms fall within this purview. As a first component legislation is being drafted permitting ownership of coastal fishing crafts only to those willing to work at sea. This measure will ensure limited entry of sorts. It will remove the phenomenon of absentee capitalists (this is the bane of small-scale fisheries in many other countries too). The result will be an immediate reduction in excess capacity.

The second component of the aquarian reform package gives the State a regulatory role to ensure that markets are modulated to become friendly to communities rather than *vice versa*. There is the proposed legislation to give the right of deciding the mode and the floor-price of the first sales transaction of fish to the members of the fishing community. This is an all-important measure to de-link the output market from its most exploitative link with the credit market. This is the only way that the enhanced physical productivity gains from establishing community property rights will translate into tangible economic gains. It will also be a good insurance against "collective overfishing".

A third measure is the desirability of greater social control over the export of fish and fishery products. This will be an important step to ensure that resources within the community property regime are not subjected to excessive market pressure from investors in the export processing sector.

Another important function of the State will lie in coordination of community rights, their monitoring and enforcement. This will be arranged by a co-management contract between State machinery and the *district panchayats*. This will be an attempt to institutionalise cooperation between State and user-community by using their comparative strengths at different levels in a complementary way.

8.5 Barriers to implementation

The barriers to implementation of community property rights and co-management of the fishery resources will be numerous. Trying to alter the *status quo* of open-access is always difficult because of the vested interest of the stakeholders. In Kerala, the opposition to change will come from several quarters. Prime among them will be the non-working owners of fishing boats (mainly the fleet of small shrimp-trawlers) and the big shrimp-export firms since they have been the main beneficiaries of the four decades of State-initiated open-access to the coastal waters. Then come merchants. Any attempt to tamper with their hitherto-unchallenged rights to set prices and regulate their unbridled freedom to exercise non-price control over fishworkers rarely go unopposed. Firms that have benefited from the unregulated demand for boats, engines and nets will resent the curtailment of their business. Political parties used to distributing largesse to the fishery sector will support this restricted access proposal only if they are convinced that the costs of not doing so outweigh the benefits of the *status quo*. The Department of Fisheries officials are likely to be unenthusiastic about the proposal at the outset because decentralisation will imply more work for them at the beginning. Fishery scientists

will feel challenged by the decentralised community rights since it will call for more accuracy in their work and greater risk of being proven to be wrong. In the ultimate analysis, the struggle against such opposition and initial lack of support can be overcome only by the firm resolve of the fishworkers to stand united in the face of it. In this mission they have support from empathetic social activists and a progressive group of political parties in power.

9. CONCLUSION

Re-establishing property rights over coastal fishery resources is the most important need of the hour to ensure a secure future for small-scale fishing communities in the Asia-Pacific tropics. In many countries in this region, small-scale fishing communities have asserted their claims regarding this. On balance, a review of over two decades of these initiatives indicates that the response to these moves, from the State and other stake-holders in the fishery, have been mixed. Happily, there is a growing recognition and greater appreciation of the close interaction between rights to a resource and its successful management and governance. In many countries the positive experiences from agriculture and forestry are spilling over into the fishery. This will provide an important impetus for coming to terms with the assertions and aspirations of small-scale fishworkers on this matter. For the numerous reasons enumerated in this paper the attempt to propagate the appropriateness of private property rights in forms such as individual transferable quotas needs to be viewed with considerable circumspection. The death-knell for open-access to coastal fisheries needs to be rung. A robust framework of community property rights must occupy its place. These are more appropriate to the Asia-Pacific tropics from the socio-cultural, techno-ecological and political economy perspectives.

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Appendix 1

Characteristic features in developed countries where private property rights in fisheries have been implemented

(Note that theses are not applicable in the context of developing countries in the Asia-Pacific Tropics)

- Westerners had totally colonised these large resource-rich countries/continents (*e.g.* Australia, Canada, South Africa, New Zealand, USA, Iceland) more often than not trampling over the values and property right regimes of the existing indigenous communities (all the above except Iceland) with respect to the sea and its resources The coastal fisheries were then turned into an open-access realm.
- The threats of stock collapse are real and have been experienced in recent history
- Democratic traditions exist and the institutional arrangements of formal market economy are well established
- The economy is labour-scarce and capital-abundant
- The overall levels of economic development are high
- The levels of social development (literacy, basic quality of life, social security measures, *etc*) are high and widespread and those engaged in fisheries are not a deprived section of the society.
- The numbers of persons involved in the fishery are relatively small – usually in the 100s, on occasions in the 1000s and very rarely in the 10,000s
- The preoccupation is with restricting the overall entry of capital and labour without giving any consideration for priority rights to those who actually labour at sea.
- Single-species fishery is possible and the biological information on the resource is well communicated to government and industry, and such research and information is an essential input in the political decision-making process of management
- The need to maintain a decentralised settlement pattern is not a socio-economic or political compulsion, but centralisation is seen to be advantageous.
- The organisational arrangements for basic, proper and honest monitoring of fish landings and the governance structures for this exist.
- The adverse interlocking of factor markets is non-existent, investment funds and credit are easily available.
- The choice of fish-export versus domestic-consumption is not a major concern for the internal food-security of the country.

MANAGING ARTISANAL/SMALL-SCALE FISHERIES IN DEVELOPING COUNTRIES: THE NEED FOR A COMPLEMENTARY APPROACH

S. Mathew
International Collective in Support of Fishworkers
27 College Road, Chennai 600 006, India
<icsf@md3.vsnl.net.in>

1. THE CONTEXT

Six out of the top ten fish-producing countries in the world are classed as developing countries (China, Peru, Chile, Indonesia, India and Thailand). About 56 million tonnes, or 60%, of total global capture fishery production comes from developing and low income food deficit (LIFD) countries and they account for about $US 26 billion, or abut 49% of global export revenue (1996 figures).

There are about 30 million fishers in the world and about 95% of them live in developing countries. About 85% live in Asia alone of which China, India, Vietnam, Indonesia, Bangladesh and the Philippines are the most important countries.

In contrast, counting all the fishers in the countries with ITQ regimes (Iceland, New Zealand, Australia and Canada), they account for just 0.004% of the world fishers' population. The annual per-capita production of fish in China, the biggest producer of fish in the world, is just two tonnes, whereas that of Iceland is about 280 tonnes.

Fisheries management in developing countries is primarily a human problem. While employment in agriculture grew by 35% in the last 25 years, employment in fisheries and aquaculture has more than doubled. There has been an expansion of labour-intensive fishing capacity in response to growing 'commoditification' of fish, both domestically and internationally. Fishing communities are characterized by high population growth rates and there is a lack of alternative employment opportunities in the coastal areas. This situation is exacerbated by the migration of farmers, peasants, agricultural labourers and other rural unemployed into the fisheries sector due to lack of income-earning opportunities in the hinterland.

There are several reasons why this labour moves into the coastal fisheries. Most important is the prevalence of open-access or quasi-open access regimes, and unregulated common property rights regimes.

The situation leads to the problems of over-fishing, over-capacity and under-employment and conflicts between the small-scale and large-scale sectors in the industry.

2. WHAT IS TO BE DONE?

First, there is a need to separate artisanal small-scale fisheries from those that are large-scale and industrial. There is a need to create an exclusive fisheries zone for artisanal and small-scale fisheries in the coastal waters. This was a demand of the International Conference of Fishworkers and their Supporters (Rome, July 4-8, 1984). This was further recognized in the outcome of the 1992 Rio Conference on Environment and Development (UNCED).

Paragraph 17.82 (b) of 1992 Agenda 21, the outcome of the UNCED conference, noted that management should "*recognize the rights of small-scale fishworkers including their rights to utilization and protection of their habitats on a sustainable basis*".

Another international agreement (the 1995 UN Fish Stocks Agreement, Article 24(2) (b)) highlights "*the need to avoid adverse impacts on, and ensure access to fisheries by, subsistence, small-scale and artisanal fishers and women fishworkers*".

The FAO also has been cognizant of this need: Article 6.18 of the 1995 Code of Conduct for Responsible Fisheries states: "*Recognizing the important contributions of artisanal and small-scale fisheries to employment, income and food security, States should appropriately protect the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction*".

Second, there is a need for a **vertical** and **horizontal** approaches to fisheries management, especially in coastal fisheries with large human populations.

A vertical approach requires regulation of access to a fishery, with participation in a fishery restricted to owners who work on board their vessels and to workers. And, institutional arrangements should be set up to manage entry into the fishery and, wherever possible, build upon existing traditional access control mechanisms.

There is a need to build up organizations of fishworkers and train them to meaningfully address problems in fisheries and to enhance their capacity to undertake fisheries management functions. Input-control mechanisms must be developed to allow for equitable access to fishing grounds and for effective conservation of fishery resources, including phasing-out of destructive fishing technologies such as bottom trawling.

At the international level, there is a need to prevent the export of excess fishing capacity from the North to the South under the guise of fisheries agreements and joint ventures that have strong negative implications for distribution of fisheries resources between the industrial

and artisanal sectors. And, there is a need to adopt output-control mechanisms to ensure sustainability of fisheries resources.

The vertical approach must be complemented by a horizontal one. One of the keys to success with the vertical approach is in developing alternative income-generation opportunities for redundant and underemployed fishworkers, *i.e.* to move them out of the fisheries sector. And it is important to adopt an integrated coastal area management framework to regulate and minimize the adverse impact of land- and seaward activities that affect the coastal fisheries.

SALTWATER PEOPLE, CAPE YORK: *MARE NULLIUS*[1] AND MANAGING FOR NATIVE TITLE

C. Roberts* and A. Tanna**
* Cape York Land Council
PO Box 2496, Cairns, QLD 4870 Australia
< crr@balkanu.com.au>
** Balkanu Cape York Development Corporation

1. INTRODUCTION

Cape York people would like to acknowledge the traditional Aboriginal people of land and sea country[2] here in Western Australia. And we thank the organisers for giving us the opportunity to speak. We were surprised at the title of the conference (Fishrights 99) and did not quite believe that the conference was talking about "our kind" of sea rights, and perhaps we have the wrong impression. The rights contested by Aboriginal people are to do with geographical areas, or what, in fisheries jargon, are described as "turfs". These ironically, do not differ all that much from those held by the Saxons 1000 years ago. (Nonie Sharp, pers. comm.). This history is largely forgotten in the current debate in Australia, while Aboriginal people follow the same line of argument that they always have.

There are several kinds of rights in our minds. There are inherited rights passed down by Aboriginal law, there are bestowed rights (Ben Cruse[3], pers. comm.) or granted permissions, there are Native Title rights discovered in Australian common law in 1992, and a suite of other rights, some yet to be explained to the beneficiaries. There is an important difference between grants and rights. Grants could be described as charity but rights are entitlements. The tension between these traditional and contemporary rights and culturally foreign grants, has formed a major component of the argument between indigenous people and European law in Australia.

The legally-sanctioned commercial rights being dealt with at the conference are a long way from where indigenous people find themselves, and commercial rights might be seen as a luxury item from an Aboriginal perspective. Aboriginal people are nowhere near the status achieved by indigenous people of Canada and New Zealand. Dutch records indicate that as early as 1451 Macassan[4] trepang (beche de mer) fishermen were doing business with Aboriginal people of northern Australia which involved reciprocal arrangements between parties (Horton, 1994). Participating in the spoils of modern-day marine harvests is a world away from the urgency for recognition of basic human rights being fought for on land and sea by the indigenous peoples of many nations. Indigenous people from Cape York face many challenges both within their cultures and around their cultures at local and broader political scales. This includes social, health, development and economic issues.

The most frustrating and enduring of these challenges has been and remains, the battle for recognition of the Aboriginal right to be attached to, or, to be a part of, land and sea country. At this point the "here we go again" reflex from some sections of the audience is often encountered; usually from those who have rights and are uncomfortable with the idea of others having them. The fact of the matter is that "SSD", *spiritually sustainable development* has the same, or more relevance, than ESD (*environmentally sustainable development*) and more relevance than economically sustainable development (Richard Aken[5] pers.comm.) in the indigenous view. Those on the top of the "rights pile" have little reason to complain. The issues of resource allocation and rights of access are not purely about commercial right, nor the commercial "first come first served" mentality that has driven so called "progress". The export dollar argument has worn thin with real sustainable use becoming a more serious consideration for long-term survival of even the privileged. Presence or absence of rights really tests the character of those on both sides of the fence. Rights test patience for the *have nots*, generosity of spirit for the *haves* and the sense of justice of both.

While an economic model for survival of the Australian lifestyle seems to be the sterile vision it should by now be plain to everyone that economics cannot be the total answer in a world of finite resources. Photographs from space show our earth floating around in nothingness. Yet on the surface of the planet the most thoughtless acts are being perpetrated on our living and fossil

[1] *Mare* refers to the Latin word for sea and *nullius* , "of no-one" or belonging to no-one". (Jackson 1995)> It is used here in the sense that "terra nullius" is used in the land mark Mabo Native Title case, applying to land, in which *terra nullius* was found not to exist over Murray Island.

[2] Country is a holistic term used widely among Aboriginal people to describe both land and sea as well as spiritual connections to it in this paper.

[3] Member of the now disbanded Aboriginal and Torres Strait Islander Coastal Reference Group

[4] Macassan people come from Ujung Pandang in Sulawesi (formerly Celebes) approx. 1000km NE of Bali. (Macknight 1986).

[5] Chairman of the Balkanu Cape York Development Corporation board.

resources, not to mention the earth's cultural diversity. A forward vision is required. This vision must be shared or it will not be implementable. All people must subscribe to it and all must have rights to use resources in a fair way that is good for all not good for just a few. This is not currently the case. (Examples near to hand of unsustainable exploitation are the Orange Roughy and Patagonian toothfish fisheries, and continental shelf fossil-fuel resources).

For indigenous people, Native Title Rights (or their equivalent in other parts of the world) are crucial for survival of cultures and for providing an avenue for serious planning caveats on resource use that might otherwise proceed unchecked. The presence of a right can protect the resource (*e.g.* The Future Acts, notifications processes in the Native Title Act). To have proponents of resource extraction (including fishing) justify their activities is generally resented by such resource users because it often leads to the reversal of the onus of proof. In short, the latter means that instead of governments, managers and scientists proving that an activity is sustainable, the users might have to do it. If resource use is meant to be fair (derived from existing law) and environmentally sustainable (precautionary in nature) why are minorities derided to the degree that they are? (Conservation lobbyists are included here). These debates are healthy and good for sustainability.

Aboriginal people have been left out of the economic and management loops for so long that their capacity to participate is lagging behind their new-found rights. It appears that these legal rights are still invisible to many in this country with disbelief being expressed every time rights are legally recognised and exercised by indigenous people. This is evident at all levels of society. Aboriginal people seem to be contesting a logic that says "indigenous people haven't been involved in the past, why should they be involved now?"

2. THE BELIEF

The existence of at least two "ways" of getting on in the world is a universal dilemma. One "side" frequently doesn't understand the other. A reconciliation of these views is taking place in Australia but it has been slow, painful and even now, obstructed by blinkered visions. As a product of learning and teaching, different sectors are variously convinced that they are right and rarely does the opportunity of experiencing others' values arise apart from the superficial material extravagances on offer to some, such as television sets and other material goods.

If there is one thing that should be clearly understood by all, it is the following concept. Particular Aboriginal groups belong to particular country (some portion of land or sea or both). This is a reality for Aboriginal people. Their country is their responsibility to protect and their right to use by tradition. It is this right that forms the basis of battles, be they philosophical or physical. The strength of a fishing right like an Individual Transferable Quota (ITQ) effectively lies in 4 domains namely security, exclusivity, permanence and transferability. The obligation of Aboriginal people to remain attached to their country has serious consequences when transferability of rights is considered. The "new" law for Aboriginal people on the other hand works on a principle of the sea commons where he who has the ability to take advantage, does so. The Aboriginal position is that traditional owners, not public servants, should be the gatekeepers of traditional country.

The above paragraph encapsulates much of the cultural clash that exists between Aboriginal people and the explorers, pioneers, developers or whatever the "competition" might be called. Outsiders came in and took country away, expropriated resources, displaced people and generally took over. Instead of bringing Aboriginal people with them indigenous people were left behind where they remain in many ways.

3. *MARE NULLIUS*

This is a term derived from *terra nullius* which gained popular status during the Mabo hearing where on "Mer" (Murray Island) *terra nullius* (the land of no-one) did not exist (see footnote 1). The high court of Australia found that the land did belong to some-one, that it was occupied and that the traditional owners held Native Title to the island. This finding was made **within** the existing common law of Australia. It was not concocted by smart *blackfellas* as many might believe. It is a fact of law.

The reality that absolutely critical concepts for indigenous people are being expressed in Latin legalese is perhaps symptomatic of the predicament in which indigenous people find themselves. It is well known that the Islanders of Mer have well established sea estates and that they are as much sea people as they are islanders, if not more so. Why were sea issues left out of the proceedings at that time? It appears that the legal strategy initially determined that it would be best to base arguments on individual ownership of particular parcels of land on the islands, rather than a community approach. Inclusion of sea and reef (being community owned) in this strategy would weaken the land case, so sea issues were left aside. Later the strategy changed when lawyers were advised that the community approach might be more appropriate for the land. By this time the sea issue was out of contention where theoretically it could have been put to the court in the first place. It is frightening to know that Aboriginal and Islander rights might stand or fall on such "technical advice."

The next test for the marine Native Title came with the Croker Island case in the Northern Territory. The proposed decision reads as follows.

i. Communal native title exists in relation to the sea and sea-bed within the claimed area.
ii. The native title is held by the Aboriginal peoples who are *yuwurrumu* members of the Mandilarri-Ildugij, the Mangalara, the

Murran, the Gadura-Minaga and the Ngaynjaharr clans (the common law holders).

iii. The native title rights and interests do not confer possession, occupation, use and enjoyment of the sea and sea-bed within the claimed area to the exclusion of all others.

iv. The native title rights and interests which the Court considers to be of importance are the rights of the common law holders, in accordance with and subject to their traditional laws and customs to have free access to the sea and sea-bed within the claimed area for all or any of the following purposes:

(a) to travel through or within the claimed area;
(b) to fish and hunt for the purpose of satisfying their personal, domestic or **non-commercial** communal needs including the purpose of observing traditional, cultural, ritual and spiritual laws and customs;
(c) to visit and protect places which are of cultural and spiritual importance;
(d) to safeguard their cultural and spiritual knowledge.

The native title rights and interests of the common law holders in relation to the sea and sea-bed within the claimed are affected by, and to the extent of any inconsistency **must yield to all rights and interests in relation to the sea and sea-bed within the claimed area which exist pursuant to valid laws of the Commonwealth of Australia and of the Northern Territory of Australia** including the rights and interests of the lessee of the Crown Term Lease No. 1034.

IN THE FEDERAL COURT OF AUSTRALIA NORTHERN TERRITORY DISTRICT REGISTRY dg no 6001 of 1996

The outcomes of that case contained some good and bad news for Aboriginal people but as a fishing right it is extremely weak. The good news was that Native Title was recognised in the sea. This is a first and represents a quantum leap in the Aboriginal argument for sea rights. The Commonwealth and Northern Territory governments retain a "sea commons" position. As Aboriginal people have repeatedly learned, changes in legal position are not necessarily accompanied by changes in attitude. The bad news was that the Native Title established in the case was conditional on a number of restrictions amounting to an in-built marine version of the Wik[6] "ten point plan" delivered on the spot. The next phase of the debate is an appeal by the Commonwealth, Territory and the Croker Island people to be held in late 1999. It is clear that the Native Title fishing right is weak when measured against the standard criteria used for assessing the quality of such rights, these being, security, exclusivity, permanence and transferability. (See Scott 2000, Arnason 2000, Burke 2000, Iyambo 2000).

To return to the frustrating issue mentioned earlier. As far as Aboriginal people are concerned, they have rights in the sea and on land: always have had, always will have. The fact that these rights exist is contingent on what Aboriginal people see as strange and difficult legal process and not the cultural understanding that indigenous people accept as the way resources are used and shared. Commercial and recreational resource users respond to the letter of the law and seem to have little patience for anything other than legally endorsed concessions. This leads to contrary views in traditional Aboriginal law and people supporting them being marginalized, discounted and pilloried for contesting decisions which are clearly unfair in spirit even if they are "legal."

It is not as if Aboriginal people have suddenly chosen to dissent. The land and sea rights movements were under way well before Native Title was discovered in a dusty corner of Australian law. The principle of having rights in particular areas is built into Aboriginal lineage and stories. These rights existed then as they do now. It is high time that Aboriginal people were valued rather than being seen as impediments to the march of progress. It may well be that Aboriginal rights will "save" marine resources from over-exploitation if those rights are respected and if those rights are empowered by funding, training and support.

The fundamental belief by white people that the sea is common property, creates a barrier to the recognition of Aboriginal people being part of seascapes and landscapes and that indigenous people have a legitimate role in controlling activities in their homelands. The "sea commons" belief is simply not true for Aboriginal and Islander people. This kind of statement scares the wits out of governments, weekend fishermen who exploit their surroundings, commercial fishermen and the like. These are issues we must face up to.

On current form it is unlikely that Aboriginal people will ever be in control because that is not the way it works under what Sir Tipene O'Regan[7] calls the "power culture". What Aboriginal people do want is a voice, a voice that is resourced, a voice that can visit and consult with people on the ground, and a voice that will be taken seriously.

[6] The Wik case centred around the Aboriginal people of the Aurukun region of western Cape York where the High Court of Australia found that Native Title coexisted with pastoral leases. The decision was subsequently "varied" by the "ten point plan" driven by the Federal (Liberal/National) coalition.

[7] Chairman of Waitangi Fisheries Commission/Te Ohu Kai Moana.

4. LOOKING AFTER THE RESOURCE

Aboriginal people have a long-term view of food, sustainability, grandchildren and family. They also have a desire to keep pace with the mainstream. For many reasons they have had to watch others doing things they would either wish to, or would not wish done in their country. In fairness, many management agencies and industries have concerns about fishing effort, closed areas, etc. There is necessarily a need to protect marine and other resources. These protected areas are governed by rules, by closures at different times and so on. It is recognized necessary that all resource users to be responsible about demands they make on both management and the resource itself. This can be achieved through mutual information exchange.

5. CULTURAL BIODIVERSITY AND PROTECTED AREAS

Protected areas, while being a crowd-pleaser in the political sense, often impinge on access to resources (because most votes lie in the cities and conservation is popular there). Here follows a brief discussion of the implications that representative, or protected areas, might have on indigenous people, mindful of the fact that other resource users will have their own problems.

A pressing concern of indigenous people is the manner in which bio-regionalisation or bio-diversity models are co-opted as the rationale for establishing protected or "no take" areas. Without getting too long winded about the issue, nationally, an Interim Biogeographic Regionalisation of Australia (IBRA) has been put in place as the template for protected areas. This divides Australia into 81 bio-regions based on climate, geology, vegetation and other criteria. The government aspiration (through the National Reserves System or NRS) is to protect samples of each of these bioregions. This process is repeated in the sea through the Interim Marine and Coastal Regionalisation of Australia. (The latter two documents are available from Environment Australia in Canberra.)

This is all well and good until it comes time to implement the rules pertaining to these protected areas. We have the Commonwealth, States and Territories coveting management rights, we have territorial arguments about whether IUCN categories, Nature Conservation Acts, Marine Park Acts or Fisheries Acts are more or less appropriate. More often than not we have a clumsy approach to deciding who the best people are to enforce such rules and look after the country. To Aboriginal people it is plain. The bioregional approach is based on biodiversity or an essentially Darwinian model with no sign of the people who live on the ground under the colours shown on the maps.

If we consider a rough map of Aboriginal language groups we see an interesting picture (Horton 1994).

i. there are about 350 distinct groups
ii. all the bioregions are covered by the various language groups
iii. there are no sea estates marked.

The IMCRA (Interim Marine and Coastal Regionalisation of Australia), which is the "wet" version of the IBRA, has been created in Canberra in an effort to rationalise the method of choosing representative marine environments. One of the criticisms of the IMCRA is that it does not provide a fine-scale identification of regional types (the resolution) which is much used in the design and placement of protected areas. The superimposition of cultural units could well provide a higher resolution protected area regime and provide for Aboriginal rights regardless of what biodiversity exists.

We are convinced that an essential element of good management is to be able to *walk the talk*, the "talk" being the legislation that applies to protected areas or conservation areas under any act or legal process. If we cannot police the plan what good is the plan? Who are the right people to deliver and see that the intentions of the plan actually happen on the ground or sea in this case?

It is not difficult to work out where this argument is heading. If we have 350 Aboriginal groups that belong to land and 140 that belong to the land and sea (those around the edge of the landmass), these have the makings of a formidable cultural capacity to care for the country and provide the rights identified in existing law. If management was based on cultural affiliation (which is for Aboriginal people, the only realistic management unit) Aboriginal people could provide:

i. A high resolution framework for looking after resources
ii. A consistent consultation base (by way of regional and sub-regional stakeholders) for the consideration of all resource issues to do with a certain area.
iii. A resident group of people who are happy to look after their country both for themselves and in the national interest.

This seems to be an achievable goal on paper. For this to happen Aboriginal people will have to be regarded as legitimate parts of the environment and to have legitimate claims and ability to use their country. Most importantly Native Title rights and more pertinently, property rights, will have to be accepted as a baseline reality instead of indigenous people having to argue the toss every time.

6. REPRESENTATIVE STRUCTURES

A key element of successful negotiation of rights is fair representation where it is needed. But, the experiences in Cape York have been mixed. In relation to marine issues (within the indigenous network) the channels of communication are at best tenuous with land matters consuming the bulk of resources available to indigenous organisations. The tendency for indigenous leaders to focus on land is logical enough but leaves little to do battle on what is an important part of salt water people's

lives, the sea. This a consequence of inadequate and prescriptive resourcing. Indigenous peoples' ability to pursue such priorities are limited.

While indigenous people are without power their rights are eroded even if those rights have been established. There is no specifically marine reference group for indigenous Australia. In some ways this reflects the view that land and sea are one in an indigenous sense but more by default than purpose in a government sense. The law forces indigenous people to separate them (land and sea) because different rules apply to each under legislation. It is not enough for governments that "the country belongs" to such and such a group.

The Cape York Land Council had a very good attempt at establishing a Sea Committee to operate under the established CYLC governing committee, first through Coastcare and then through NHT (National Heritage Trust initiative). The governing committee is made up of one man and one woman from each community on Cape York. The aim of the exercise was to establish some way of reconciling resource management with Indigenous sea rights. A point was reached where the Land Council was requested by Canberra to gear up, inform prospective members, identify a secretary and generally get ready for the establishment of this committee. Four months later the offer was withdrawn.

Cape York Land Council gained a place on the National Aboriginal and Torres Strait Islander Coastal Reference Group which was set up by the Labour Government to address marine and coastal issues. This was a consequence of a recommendation by the Coastal Zone Inquiry of 1993. The initial small group later expanded to 13. One of the initiatives of the group was to develop an Aboriginal and Torres Strait Islander Fishing Strategy. After 2 and a half years the CYLC was instrumental in levering some funds out of Canberra and the 4 Queensland meetings have been convened with report and recommendations on the Queensland Fisheries Management Authority's board table.

The last time Cape York people visited Perth they came to attend the Coast to Coast Conference where a paper on clan estate-based management was presented (Roberts and Tanna 1998). The National Indigenous Coastal Reference Group was asked to come a day early by Canberra where they were informed by the Minister's staff that the Coastal Reference Group had been disbanded and that they would be consulted on an *ad hoc* basis if necessary.

Balkanu (in brief, a partner of the CYLC) sits on the Queensland Fisheries Management Authority Zonal Advisory Committee where their member represents Aboriginal issues from the top of Cape York to Tully a distance of 1400km by the coast. This is something but does not provide the leverage, resources nor profile required to drive the change required for marine resource users to learn about the recently recognised rights of Aboriginal people. This circumstance requires a dedicated capacity to challenge current practices and management directions which are primarily biodiversity focussed.

A Sea Forum has been established by the traditional owners of country between Cairns and the Queensland border and has been active in pursuing rights and developing partnerships with researchers over the last 12 months.

The opportunity for us to work between states is limited because of lack of funding and qualified staff. The federal government has found it difficult to embrace Aboriginal ideas on sea issues on Cape York.

7. CONCLUSION

Indigenous people should not be accused of misunderstanding biodiversity nor economic rationalism, but the gross dominance of the latter two over culture is not warranted, particularly as indigenous rights are established in law.

The issue of rights needs to be taken in context. Those whose rights are recognised and those whose rights are not. The difference between established rights and perceived rights must also be recognised. Until indigenous people have the capacity to compete on an equal footing, and have the rights and capacity to manage their own homelands, sea resource users need to be aware that the general rules of humanitarian behaviour apply regardless of the law. Many of the problems we face are solvable by us together as caretakers of our heritage in a holistic and mutually respectful way.

It is time for the indigenous peoples of this country to be recognised as an integral and valued part of the country. The key to successful management of both land and sea can be based on a cultural underlay that pre-exists and requires little modification apart from the recognition of the reality and the rights that flow from it.

The writing is on the wall. The sensible course of action is to accommodate those things that will not change, namely that people belong to places and the responsibility of those people to look after their places. Where governments and industry frustrate efforts to be heard, indigenous people will contest their rights with greater resolve.

Further information on related subjects can be accessed through the Balkanu Web site: www.balkanu.com.au.

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COMMUNITY-BASED FISHERIES MANAGEMENT IN SAMOA

J. Kallie, A. Taua and U. Faasili
Ministry of Agriculture, Forests, Fisheries and Meteorology
Apia, Samoa
<mking @samoa.ws>

1. INTRODUCTION

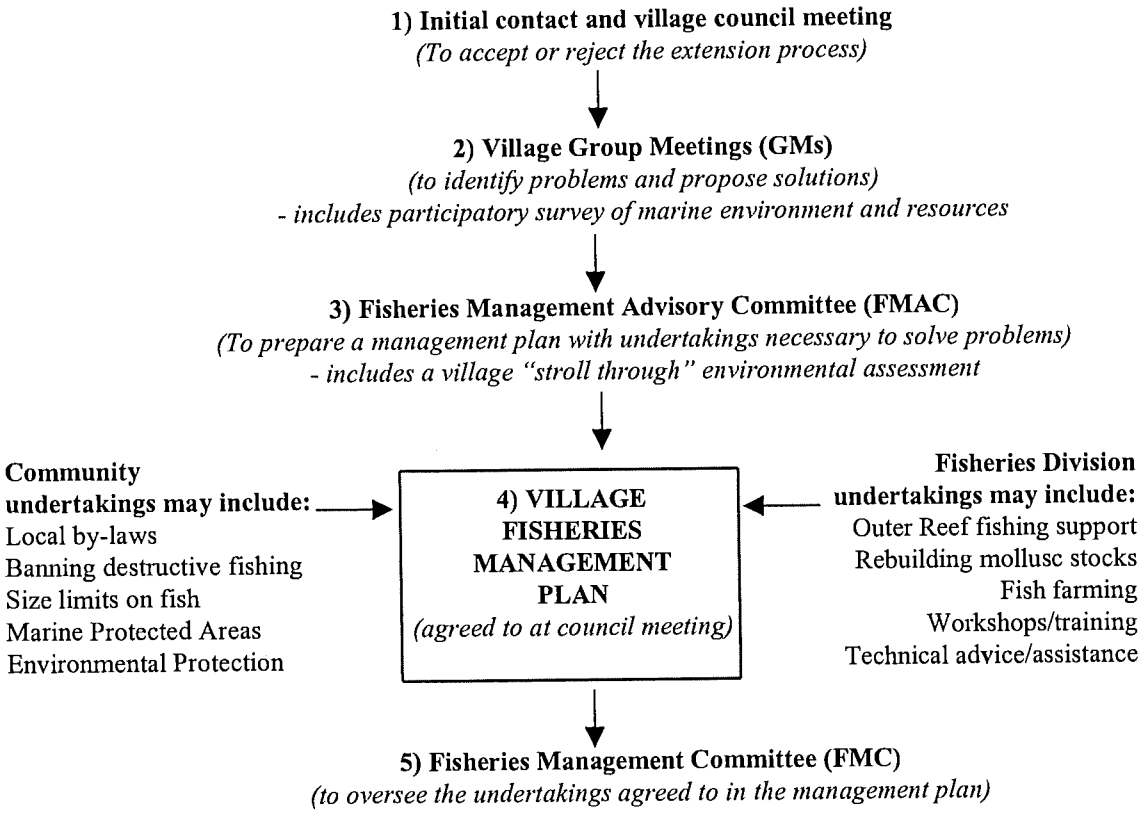
1.1 Background

The decline in inshore catches of fish and shellfish in Samoa because of human activities, over-exploitation, destructive fishing methods and the aftermath of two recent major cyclones, has greatly reduced the availability of marine protein resources, causing concern for the nutritional status of coastal village communities. Government actions and national laws to protect fish stocks have not previously proved successful. Wise practice involves using a culturally-appropriate extension process to encourage and motivate village communities to manage their own marine resources. Communities incorporate a range of resource management undertakings and conservation measures into their own management plans. These measures have also included the establishment of small marine reserves (Marine Protected Areas - MPAs) within traditional fishing grounds.

By mid-1999, 62 village communities had their own fisheries management plans and 57 of these declared small fish reserves within their traditional fishing grounds. Reserves ranged in size from 5000 to 1 500 000m^2.

This achievement occurred over 4 years, using a staged induction process. Recently however, three villages have elected to withdraw from the programme because of ongoing and unresolved inter-village disputes. Lamentably, all three villages also had fish reserves. Nevertheless, several individual village management plans have now been in operation for over 40 months, attesting to the overall success and sustainability of the programme.

Figure 1
The Fisheries Extension Process in Samoan villages



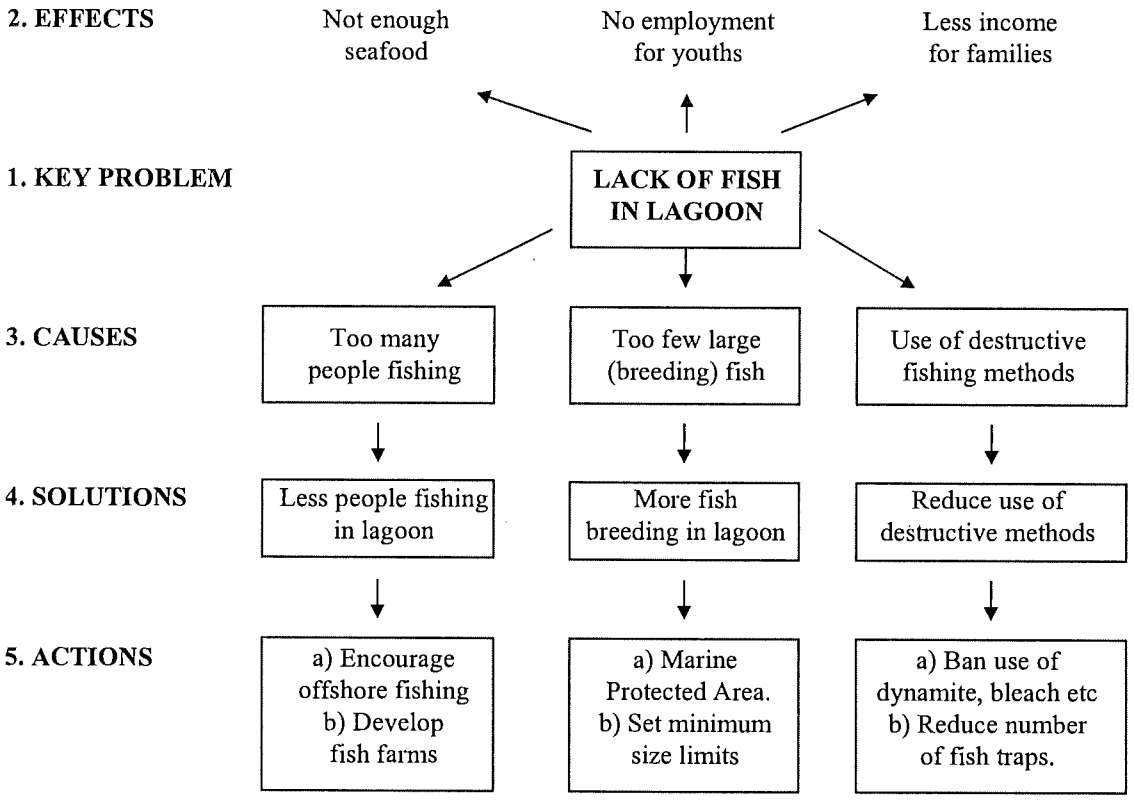
2. THE EXTENSION PROCESS

A summary of the extension process is presented in Figure 1. The process recognises the village *fono* (council meeting) and chiefs as the prime instigators of change, but allows ample opportunity for all community groups to participate. After an initial expression of interest, a meeting *(fono)* is arranged with the village and extension staff from the Fisheries Division. During the *fono*, the community is provided with information to allow them to either accept or reject the extension programme. If the *fono* decides to accept the process, arrangements are made for separate meetings of several village groups, including women *(faletua ma tausi, aualuma),* untitled men *(aumaga),* fishers and titled men *(matai).* In this way, particular sections of the community are free to express opinions, which they otherwise may not do in large groups dominated by titled people. Participants are encouraged to analyze the condition of their marine environment and fish stocks and to assess the degree of change that fishing, seafood catches and the marine environment has undergone over recent years. Each group then decides on key problems, determines causes, proposes solutions and plans remedial actions.

A trained extension facilitator records the discussion as a problem/solution tree, on a portable white board (Figure 2). At a second meeting, more in-depth examination of the most practical solutions to identified problems, is undertaken. Finally, a village Fisheries Management Advisory Committee (FMAC) is formed with three representatives nominated from each group. The extension process culminates in the production of a unique and specific Village Fisheries Management Plan. Printed-and-bound copies in Samoan are then distributed to the community. A smaller, representative Fisheries Management Committee (FMC) subsequently takes responsibility for community adherence to the fisheries and conservation undertakings detailed in the village management plan.

Figure 2

A simplified example of a problem/solution tree as constructed by a village community. The process begins with step 1 (Key Problem) before proceeding in the numerical order shown. All information is provided by the community, with a facilitator acting as a recorder.



3. VILLAGE MANAGEMENT UNDERTAKINGS

Village management actions have variously included (a) banning numerous destructive fishing methods, such as chemicals, explosives, plant-derived fish poisons *(ava niukini)*, and smashing corals *(fa'amo'a* and *tuiga)*; (b) enforcing national laws on fish-size regulations; (c) controlling the use of nets and underwater torches for fishing at night; (d) collecting and removing crown-of-thorns starfish, *Acanthaster planci* (L); and (e) preventing the removal of beach sand and the dumping of rubbish in lagoon waters. Table 1 summarises village subscription to specific undertakings.

Table 1
Percent distribution of village undertakings by classification

Undertakings	% of villages
ban on dynamite and bleach	100
ban on fish poisons	96
ban on smashing coral	82
remove crown of thorns	79
ban dumping of rubbish	75
mesh size limits	73
set fish size limits	39
ban export coral	39
ban clearing mangroves	30
ban underwater torches	16
ban taking sand	13
control fish fences	7

4. THE FISHERIES DIVISION EXTENSION SERVICE

The Fisheries Division has undertaken to provide various forms of assistance to support community undertakings. For example, to relieve inshore fishing pressure, communities have been assisted to purchase small aluminium boats for outer reef slope (ORS) fishing; tilapia stock *(Oreochromis niloticus)* have been introduced to villages with suitable natural lakes or ponds; and giant clams *(Tridacna derasa)* have been supplied to restock lagoon fish reserves.

The extension service includes monthly visits to provide assistance with fisheries management issues, to collect data on growth and survival rates of giant clams and tilapia, and to collect artisanal fishing catch and effort data. In addition, regular demand-driven technical workshops are held to meet village needs for training in tilapia and clam aquaculture, fishing methods, gear technology, sea safety, fish handling and small business management.

The Fisheries Division has also undertaken to review all management plans to verify their sustainability objectives. A recently-revised quantitative assessment method is used to measure community management competency.

5. THE USE OF VILLAGE BY-LAWS IN MARINE CONSERVATION AND FISHERIES MANAGEMENT

Village rules are made and enforced by each village council (*fono*). However, they are applicable only to members of that particular village. In most cases, communities have been concerned that people from outside the village were likely to fish in their waters. Therefore, the Fisheries Division has assisted most villages in the programme, to work through the process of declaring their village rules into fisheries by-laws. Hence, Village Fisheries by-laws are village rules that have been prepared in accordance with the relevant provisions of national Fisheries legislation and are accorded legal recognition in a court of law. The advantage is that the village *fono* can still apply traditional fines such as the provision of pigs and taro, as well as resort to legal action against outside transgressors.

6. MANAGEMENT APPRAISAL

An integral part of the Division's service to villages, has always included the review of a village's fisheries management plan and an assessment of the village management committee's capacity to manage the community's fishery. Until recently, assessment of management performance was an ongoing process, carried out at approximately 12-monthly intervals if a village rated over 70% in the initial assessment, or more frequently if the initial assessment was less than 70%.

However the strong move by the Division, to expand the extension services to ten additional coastal villages per year for the next three years, combined with limited staffing and material resources, has necessitated some rationalizations. Extension services are now viewed as finite. New management plans will continue to be reviewed and an assessment made of management competence, after six months of management operation. A second assessment will be conducted approximately six months later. It is then intended to advance those villages with two consistently high scores (*over 85%*), to complete self-management of their fishery with minimal government assistance. Two poor performances *(below 55%)* will incur withdrawal of services. It is presumed that these combined actions will free-up sufficient staff time for the servicing of the additional villages into the programme. Villages with scores of 56-84% on their first assessment will be encouraged to consolidate their management actions in a 12-month *clemency* period. Extension services will be concentrated on these villages to facilitate their autonomy. Thus, new villages will have a maximum of eighteen months of extension service time.

The process of increasing staff availability for services to new villages commenced in August 1999. Existing villages in the programme are been assessed using a newly reviewed quantitative assessment instrument. A robust and defensible method to differentiate *poor performance*, *average performance* and *good/competent performance* was seen as imperative if rational decisions were to be made to withdraw services from some village communities. The new assessment method is described in Kallie, Taua and Faasili (1999).

7. THE ASSESSMENT PROCESS

The assessment and review process has three components; two in the village itself, (involving interviews with the management committee and with village people) and the third requiring input from research staff in the Division, so that aquaculture and outer reef fishing outcomes can be appraised. The same procedure is followed for all villages. Extension staff are confident and competent in the process.

At a prearranged time, two Fisheries Division staff (district extension officers) meet with the Village Mayor (*Pulinuu*) and the other Management Committee members. One extension officer asks a standardised set of questions, while the other notes responses. The assessment takes approximately 2 hours and is followed by a walk around the village to enable the random selection of 5 villagers for interview. Their individual responses to a further set of questions are also recorded. The response form is then completed and scored in the Division, after input from research staff, regarding aquaculture and outer reef fishing undertakings. A database, tracking management progress, is updated regularly to facilitate scheduling and content of discussion during monthly visits and subsequent reviews.

8. DISCUSSION

The community-based Fisheries Management Programme attracts considerable interest from new coastal village communities and the waiting list is increasing because of word-of-mouth support from existing participants. The success of community-based management in Samoa is also evidenced by the growing interest by other islands around the Pacific. The Secretariat of the Pacific Community (SPC) is currently producing a manual promoting community-based fisheries management (King and Lambeth, in press) and the South Pacific Regional Environment Programme (SPREP) is conducting regional workshops on community owned Marine Protected Areas (MPAs), using methodology based on the Samoan model.

The Fisheries Division Annual Plan to increase the number of participating communities has required a timely appraisal of how best to deploy limited government resources and services for the future. The decision to empower Villages with high management competence to completely self-manage their fisheries resources with minimal government assistance, is a positive and logical step. The withdrawal of support to poor- performing villages should also be viewed in a positive light. Firstly, it facilitates the participation of additional villages potentially more ready to self-manage their subsistence fisheries, and secondly it acknowledges that human behaviour is often fallible; successful fisheries management and marine conservation being totally reliant on people *doing the right thing.*

The results thus far indicate that approximately 20% of communities perform poorly for various reasons. Some Management Committees fail to hold meetings, some do not enforce village rules, many do not care for restocked clams, others fail to maintain shorelines, reserve signs and markers. The readiness of a community for a long-term commitment with few immediate rewards is an unknown variable in the initial years of a community-based programme. Nevertheless, that at least 25% of communities are managing their own fisheries very effectively, indicates that communities are ready for self-management and indeed, value the opportunity.

In conclusion, the major long-term benefit of community-based fisheries management is the sustainability of inshore fisheries resources and the marine environment through community action. The Samoan programme promotes the reinstatement of customary marine tenure and tradition-based controls on fishing. With cultural modifications, it is also highly likely to be transferable to other tropical countries. A culturally respectful process, which deliberately involves all community groups in outlining problems and proposing solutions, is used. Fisheries management decisions are made by communities with a direct interest in the continuation and success of their fisheries resources. In this way prospects for continued compliance and commitment are maximised. Results confirm our belief that the responsible management of marine resources will be achieved only when fishing communities themselves accept it as their responsibility.

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COMMUNITY PERSPECTIVES – EXCLUSIVITY OF RIGHTS

K.K. Viswanathan
Center for Living Aquatic Resources Management (ICLARM), Bloomingdale Building, 205 Salcedo St.
Legaspi Village, 122 Makati City, Metro Manila, 1229 Philippines
<k.viswanathan@cgiar.org>

1. INTRODUCTION

The idea of imposing exclusive rights on coastal resources is emerging as an approach for managing coastal fisheries. Along with this is also the attempt to industrialize and privatize small-scale fisheries. The means for achieving this is through the provision of exclusive property rights to fishers over the fishing grounds they operate. This approach could however lead to serious equity problems for traditional fishing communities who have had customary rights of access and rights of harvest to local fish stocks. These rights have often lead to economic dependence of coastal communities on the fisheries resources. The movement towards individual rights of access and rights of harvest tends to ignore the role of the community in fisheries management and is an outcome of the "Tragedy of the Commons" argument for the securing of private property rights to fisheries.

The community approach on the other hand regards the community as a system of symbiotic relationships where fishers and community members are mutually dependent and supportive and where individuals regard each other as a group. It is the premise of this paper that the role of communities is vital for maintaining healthy fish stocks thus fisheries management must consist of more than just rules and regulations that curb fishing effort; the community must be an important part of fisheries management. Management must also aim at building communities. Resource-management rights should therefore be vested in communities and should not focus only on individual fisher rights.

An important feature of small-scale fisheries is that they are labour and local-skill intensive and thus generally capital and fuel-efficient in their capture technology. They are also generally more equitable than the larger-scale commercial fisheries. These positive aspects of small-scale fisheries should be kept in mind when talking about property rights to small-scale fisheries. The negative aspect of small-scale fisheries is that the fishers often do not have alternative employment opportunities for their labour or fishing inputs. And, they often do not have the resources to defend their rights over coastal waters when intruded by commercial fishers using more advanced fishing technologies.

2. EFFECTIVE PROPERTY RIGHTS SYSTEMS

The conventional belief that fisheries resources that are held as communal property are subject to eventual overexploitation and degradation and that centralized management authority is needed to manage resources is now being challenged by a number of empirical studies. Traditional community-based management systems play an important role in the management of coastal fisheries, see for example Ruddle *et al.* (1992), Johannes (1982), Pomeroy (1995), Sen (1996), Katon, Pomeroy and Garces (1998), Nikijuluw (1998), Novaczek and Harkes (1998). The role of stakeholders and governments are important in setting up effective property rights systems. For the case of small-scale coastal fisheries in much of Asia and Africa the idea of individual rights to fisheries is not feasible given the poor state of the resources, the large number of fishers dependent on the resource, and the numerous landing points at which landings take place. The lack of capacity of governments to enforce property rights will be an important factor for moving towards community rights rather than individual property rights in small-scale fisheries. The plight of small-scale fishing communities in developing countries is both serious and complex (Mustapha and Kuperan 1992, Williams 1994). Population densities are high, open-access to the fishery attracts large numbers of impoverished landless workers. Small-scale fishing communities are often the poorest of the poor. The resultant over-fishing may be further aggravated by the use of destructive fishing techniques such as dynamite, poison and nets with ultra-small mesh sizes. Given these conditions, it would appear that the option for governance of the resource has to be in the direction of legitimizing and legalizing of traditional rights and the recognition of community rights.

3. COMMUNITY BASED CO-MANAGEMENT

It is in the context discussed above and the problems faced by small-scale fisheries in most developing countries that the approach towards community-based co-management would appear to be an option with greater chances of success in dealing with some of the problems. The co-management approach involves a partnership arrangement in which government, the community of local resource users (fishers), external agents (non-governmental organizations, academic and research institutions), and other fisheries and coastal resource stakeholders (such as boat owners, fish traders, money lenders, tourism establishments) share responsibility for decision making over the management of a fishery (Pomeroy *et al.* 1999). The partners develop an agreement that specifies their roles, responsibilities and rights in management. Co-management covers various partnership arrangements and degrees of power-sharing and integration of local (informal, traditional, customary) and centralized government management systems.

Although not all responsibility and authority is vested at the local level, the amount of responsibility and/or authority that the state-level and various local levels have will differ and depends upon country and site-specific conditions. How much, what kind of responsibility, and/or authority, is to be allocated to the local level is largely a political decision depending on the strengths of local level organizations and the laws of the county.

4. EVIDENCE FROM RESEARCH

In 1994 the International Center for Living Aquatic Resources Management (ICLARM) in Manila, Philippines, and the Institute for Fisheries Management (IFM) at the North Sea Centre, Hirtshals, Denmark together with National research partners in Asia (Philippines, Vietnam, Thailand, Malaysia, Indonesia, Bangladesh) and Africa (Malawi, Zambia, Zimbabwe, Mozambique, South Africa, Benin, Cote d'Ivoire, Senegal) initiated a five-year fisheries Co-management project. One of the objectives of the project was to demonstrate the applicability of co-management as a sustainable, equitable and efficient strategy for managing the fisheries, especially small-scale fisheries. A series of 13 case studies undertaken in Asia under various resource situations provided evidence on the outcomes of co-management in terms of equity, efficiency and sustainability of the fisheries resources. These are summarized in Appendix 1. As this table shows, the case studies indicate that in 9 out of the 10 case studies, respondents indicated improvements in their equity situation. Equity in these case studies is measured as a perception by the respondents of their participation in community affairs, fisheries management, control over fisheries resources, fair allocation of access-rights and overall household well-being. Efficiency is measured in terms of the perception of respondents on changes experienced with regard to collective decision making on policies and rules governing fishery resource uses and conflict resolution. In some cases increases in landings per trip is also used as indicators of improvement in efficiency. In 11 out of the 14 studies there appear to be improvements in the efficiency outcome of the community-based co-management approach. In terms of the other important indicators of sustainability, in 9 out of the 13 studies evidence supports the view that the resource situation improved and rule compliance increased.

The case studies from Africa (Appendix 2), however, provided mixed results. In terms of equity, in three of the case studies, fisher representation in decision-making increased while in the other five, representation was still limited to chiefs and gear owners and male stakeholders. In terms of process clarity, there appear to be more transparency and more information dissemination through the co-management arrangements. In terms of efficiency, as measured by the reduction in conflict resolution, four of the eight cases indicate improvements in conflict resolution and increased compliance with rules and regulations. In terms of sustainability four of the eight case studies indicate improvements in terms of control on destructive fishing and enforcement of regulations on gear and harmful fishing practices. In two of the case studies there is strong support for villages committees and co-management arrangements. These results overall tend to provide sufficient support for community based co-management as an approach for defining rights to fishing and providing entitlements to fishers that provide positive outcomes in terms of equity, efficiency and sustainability.

5. CONCLUSION

In most small-scale fisheries there is little control over the entry into the fisheries other than that controlled by the community dependent on the resource. Control is often difficult when fishing is the employer of last resort. Attempts to create private individual property rights may prove to be futile as it is not possible to provide alternatives to those displaced or to those denied entitlement to the resource. In such situations it will be difficult for the state to enforce the rights and a significant gap between *de facto* and *de jure* rights will emerge. The logical approach under such circumstances will be a move towards community rights or group rights. This is also supported by the fact that current fishers have acquired informal rights which the introduction of fishing rights merely formalizes. The community based co-management approach provides one way of reducing the conflicts and equity problems that may arise if private individual fishing rights are introduced into coastal small-scale fisheries.

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Appendix 1

Studies documenting the outcomes of fisheries co-management in Asia in terms of equity, efficiency and sustainability: Fisheries co-management research project, Phase 1 (1994-1998)

Study	Equity	Efficiency	Sustainability
1989-1997 Institutional Arrangements in the Fisheries Co-management of Malalison Island, Central Philippines by Baticados and Agbayani (1998)	Fishers' perceived positive and statistically significant changes ($p<0.01$) in participation in community affairs in general, participation in fisheries management, influence in community affairs, influence in fisheries management; control over fisheries resources; fair allocation of access rights, overall household well-being and household income.	Fishers perceived positive and statistically significant changes ($p< 0.01$) in collective decision-making on policies and rules governing fishery resource uses and conflict resolution.	Fishers perceived positive and statistically significant changes ($p<0.01$) in the overall well-being of fisheries, compliance with fishery-related rules, knowledge of fisheries, and information exchange on fisheries management.
1988-1996 The Marine Conservation Project of San Salvador: A Case Study of Fisheries Co-management in the Philippines by Katon *et al.* (1997)	Fishers perceived positive and statistically significant changes ($p<0.01$) in participation in community affairs, participation in fisheries management, influence in community affairs, influence in fisheries management, control over fisheries, fair allocation of access rights and satisfaction with fishery-related arrangements. Benefits from the marine reserve, household well-being and household income were also statistically significant in San Salvador.	Fishers perceived positive and statistically significant changes ($p<0.01$) in collective decision-making on fisheries management and ease in resolving conflicts on resource uses.	Fishers perceived positive and statistically significant changes ($p<0.01$) in the overall well-being of the fishery, rule compliance, knowledge of fisheries and information exchange on fisheries.
1998 An Assessment of the Status of Coral Reefs and Reef Fish Abundance in San Salvador Marine Reserve by Garces and Dones (1998) (a biological study to supplement the San Salvador case study).	Not applicable	Nor applicable	The extent of living coral cover more than doubled from 23% in 1988 to 57% in 1998. The number of fish species also increased by 47%.
1988-1997 Mangrove Rehabilitation and Coastal Resource Management of Mabini-Candijay: A Case Study of Fisheries Co-management in Cogtong Bay, Philippines by Katon *et al.* (1998)	Fishers perceived positive and statistically significant changes ($p<0.01$) as in San Salvador (see item 2).	Fishers perceived positive and statistically significant changes ($p<0.01$) as in San Salvador (see item 2).	Fishers perceived positive and statistically significant changes ($p<0.01$) as in San Salvador. The only exception was in the overall well-being of coastal resources, which improved but was not statistically significant. This may have been influenced by weaker enforcement of fishery laws in the post-project phase due to funding constraints. This, however, was not true of mangrove areas, where

Study	Equity	Efficiency	Sustainability
			monitoring of illegal cutting was relatively easier because of the smaller areas involved. A mangrove assessment in 1997 confirmed that mangrove growth at the reforested area was relatively good. Its total basal area of 6.82 m^2 per hectare was slightly higher than mangrove growth at San Miguel Bay, an area with similar mangrove denudation problems.
1990-1998 Community-Based Coastal Resource Management in Orion, Bataan, Philippines by Van Mulekom and Tria (1999)	Fishers perceived positive and statistically significant changes ($p<0.01$) in all foregoing indicators, except household income. This lack of improvement in household income may be attributed to the El Nino phenomenon, overfishing and red tide occurrence.	Fishers perceived positive and statistically significant changes ($p<0.01$) in collective decision-making on fisheries management and conflict resolution.	Fishers perceived positive and statistically significant changes ($p<0.01$) in rule compliance, knowledge of fisheries and information exchange on fisheries. There was a perceived worsening of the overall well-being of the fishery, but this was not statistically significant. Since Orion fishers use Manila Bay as their fishing ground (not just Orion fishing grounds which cover only a portion of the Bay), they are aware of pollution problems that besiege the Bay as a whole.
1989-1997 Fisheries Co-management in the Oxbow Lakes of Bangladesh by Khan and Apu (1998)	Access to the fishery improved, along with participation in lake fisheries management and influence in fisheries management. Fishing income posted a statistically significant increase ($p<0.05$).	The average fish yield improved from 450 kg/ha to almost 700 kg/ha. Fisher members are now involved in collective decision-making, unlike before when the elite and traditional leaders controlled the lake fisheries. (Note: statistical significance is not given in the study).	New and more sustainable practices were adopted on stocking and harvesting. Information exchange on lake fisheries management improved (Note: statistical significance is not given in the study).
1989-1997 Community-Based Management of Hamil Beel: A Case Study of Fisheries Co-management in Bangladesh by Thompson *et al.* (1998)	Fishers are now represented in local management committees. Access to production loans improved. There is now a more equitable sharing of operating costs and fish harvest, unlike in the past. (Note: statistical significance is not given in the study).	The average fish yield is about 900 kg/ha (baseline data not given). Decision-making has become more accountable and disputes are now less frequent. (Note: statistical significance is not available).	A substantial natural fishery has survived despite many years of stocking. The present management system appears to be biologically sustainable. Fishers have a clear understanding of the benefits of protecting fish while they grow. Large scale poaching of stocked fish has stopped.
1984-1998 An Analysis of Fisheries Co-management Arrangements: The Case of Ban Laem Makham, South Thailand by Masae *et al.* (1998)	Fishers perceived positive and statistically significant changes ($p<0.01$) in participation (i.e., in community affairs, in fisheries management, in mangrove management); influence (in community affairs, in fisheries management, in mangrove management); and in the allocation of access rights to mangrove areas.	Fishers perceived a statistically significant improvement in conflict resolution ($p<0.01$).	Fishers perceived statistically significant gains in information exchange and knowledge of fisheries ($p<0.01$) for each indicator. Moreover, improvements were perceived in rule compliance and in resource abundance ($p<0.05$) for each indicator.

Study	Equity	Efficiency	Sustainability
1990-1995 Co-management of Coastal Resources in Bali Island, Indonesia by Nikijuluw (1996)	The income of fishers increased due to higher fish landings, higher fish prices and extra earnings from tourism. The price of fish rose by 400% for demersal fish and 240% for pelagic fish. Small coefficients of variation in fish production suggest an equitable sharing of benefits.	The landings per trip of demersal fish increased from 3.9 kg in 1990 to 13.3 kg in 1994/95 while those of pelagic fish remained relatively stable at 35 kg. After the deployment of artificial reefs, fishers operated motorized boats and used gill nets. They were able to enter offshore fishing grounds which offer more fish. Competition among fishers was not as tight as before.	Fish abundance improved from 5 pieces per cubic meter in 1991 to 61 pieces per cubic meter in 1992. Data on other years are not available
1982-1997 An Institutional Analysis of *Sasi* in Central Maluku, Indonesia by Novaczek and Harkes (1998)	There are high levels of interaction around community issues and a strong tradition of collective action. Fishers perceive tight control over resource management, but they do not complain about individual harvesting rights when resources are harvested as a communal crop. Women, however, are excluded from decision-making due to cultural norms.	Few conflicts occur among resource users.	Ecological benefits emanate from rules that restrict access and limit harvest seasons during certain periods. Through *sasi*, fishers are introduced to fundamental management concepts packaged in a culturally acceptable way.
1988-1997 Case Study of Community-Based Coastal Resource Management in Vietnam by Pham and Phung (1999)	Resource users perceived positive and statistically significant changes ($p<0.01$) in : resource access, control over resource use, household income, overall well-being of the household, participation in community affairs, influence in community affairs, and involvement in resource management.	Resource users perceived statistically significant improvements in conflict resolution ($p<0.01$) and in collective decision-making on mangrove policies and rules ($p<0.05$).	Resource users perceived statistically significant gains ($p<0.01$) in information exchange on mangrove management, knowledge of mangroves, and monitoring of mangrove uses.
1988-1997 Measuring Transaction Costs of Fisheries Co-management by Kuperan *et. al.* (1998)	Not applicable/not within the coverage of the study.	Monitoring cost, a major component of transaction cost, tends to decline over time as community acceptance of the rules and regulations is legitimized. In general, transaction cost appears lower in a co-managed system than in a centralized system.	Not applicable/not within the coverage of the study.
1995 Enforcement and Compliance with Fisheries Regulations in Malaysia, Indonesia and the Philippines by Kuperan *et al.* (1997)	Not applicable	The ability to enforce fisheries-related rules partly depends on whether or not zoning regulations can result in higher catch per unit effort in the offshore regions. If this does not happen, the pressure on enforcement resources will increase as trawl fishers	The normative perspective on compliance behavior which emphasizes the role of legitimacy of enforcement institutions in securing and sustaining compliance is partly supported by the study. Co-management is likely to receive greater legitimacy from fishing

Study	Equity	Efficiency	Sustainability
		attempt to violate regulations to make up for the difference in the stock in the two zones.	as the communities are closely involved in the process and outcome aspects of the governing system. In a co-managed fishery, there is a greater moral obligation on individuals to comply with the rules since the fishers themselves are involved in rule formulation and rationalization.
1994 and 1995 Economics of Regulatory Compliance in the Fisheries of Indonesia, Malaysia and the Philippines by Susilowati (1998)	Not applicable	Fishers tend to choose activities that bring more benefits than losses. When fishing in the designated zone brings positive net benefits to violators, they will tend to take the risk and fish there. Therefore, surveillance and monitoring are necessary.	Linking resource overexploitation and degradation to moral rules and issues can help secure rule compliance. Morality tends to have a strong influence on law breaking behavior and compliance. Moreover, adequate enforcement and severe penalties are important in enhancing fishers' regard for the law and law enforcement institutions.

These studies form part of the outputs in Asia of the Fisheries Co-management Research Project, Phase 1. They exclude other studies that do not have an explicit discussion of co-management outcomes in terms of equity, efficiency and sustainability. Other studies focus on analytical frameworks and methods, policy briefs, analysis of policies and legislation, baseline studies for co-management pilot sites, management plans, conference proceedings, reviews of community-based management projects, and traditional fishing organizations).

Appendix 2

Case studies on fisheries co-management in Africa,
Fisheries Co-management Project, Phase 1 (1994-1998)

	Malombe	Chiuta	Kariba, ZIM	Kariba, ZAM	Kwirikwidge	Olifant	Nokoue	Aby Lagoon
Process								
Legal status	Revised Fisheries Act, which allows community participation, but remains to be made operational	Same as in Malombe	Act for devolution of rights to users has been enacted	No change, but zonal committees are in process of being registered as welfare association	Co-man is seen as the instrument to regulate artisanal fisheries in the Master Plan, which was approved in 1994	***National*** New Acts provide legal vehicle for formalizing co-man agreements ***Olifant*** Draft co-man agreement developed. Draft Fisher Org. constitution in place.	Fisheries com-mittees at village, district and national level legally recognized since 1997	Formal recognition and funding missing
Management Institutions	BVCs falling (apart), because of no support from fishing communities	BVCs well supported by fishing communities	District level institutions created	Zonal and local structures have been created	Committees formed at local and district levels		More committees established	Committee formed to deal with issues at lagoon level
Outcomes								
Equity								
Representation	Poor fisher representation	High level of fisher representation	Fishers represented at district level	Dominated by well organized organizations	Increased participation by fishers in decision making, but chiefs and gear owners dominate committees	Inadequate representation of fishers	Very limited representation of other stakeholders than the male fishers	Female stake-Holder representation in the committees missing
Process clarity	Lack of transparency	Transparent process within communities, but not between DoF and BVCs and BVCs and fishers	Limited information exchange with fishers	Unclear	Use of radio and dancing groups to spread information	Lack of transparency and accountability of Fisher Committee.	High level of participation in information activities organized by local committees	Many informative meetings organized by the village committees

	Malombe	Chiuta	Kariba, ZIM	Kariba, ZAM	Kwirikwidge	Olifant	Nokoue	Aby Lagoon
Expectations	Divergent in both objectives and incentives	Divergent in objectives	Increased cohesion, but still different expectations	Different groups have different expectations		Project created expectations, which were met until end of 1997. Present fishers are very disappointed	Expectations on outcome are high with both co-management partners	Fishing communities have high expectations of outcomes
Distributive Effects	Not assessed	Not assessed	More equal access to resources	The well organized groups (kapenta) have benefited the most	Access to local fishing grounds has become restricted	Improved access to resources		
Sustainability								
Stewardship	CPUE increased	Stable	Premature to evaluate	Premature to evaluate	Gear restrictions adopted; mosquito nets abandoned	Improved awareness for conservation issues	Rules and regulation on gear and fishing practices have been strengthened and implemented	Gear restrictions adopted and implemented Control System reinforced
Resiliency	Low. High dependence on DoF/donor support	Self dependence	Premature to evaluate	Premature to evaluate	Lack of legal status and recognition hamper development	Institutional structures not firmly established. lack of funds.	Survey shows strong support for co-man arrangements from most fishers and from government	Survey has shown strong local support for the village committees
Compliance	Reduced compliance due to short term benefits of non-compliance	High	Still poor	Improved, when co-man was introduced, but has since been lower	No. of offences diminished	Certain rules and regulations supported, other not (restricted areas)	Compliance has increased. "Outlaws" are increasingly being prosecuted	Widespread knowledge of decisions made and high level of compliance
Conflict resolution	Heavily depending on guidance and support from DoF	Undertaken by BVCs in consultation with VHs	Structures for conflict management proposed, but not functional	Mechanism exist to discuss conflict, although several have not been resolved	No. of conflicts reduced. No. of thefts reduced	Co-man arrangement created forum to address conflicts, but since 1998 not been operational	No. of conflicts reduced. Fishing committees provide a new mechanism for conflict resolution	Village committees have shown "new ways" for handling of conflicts

Source: Summarized from Normann *et al.* (1998).

THE IMPLICATIONS OF ITQS: THEORY AND CONTEXT

G. Pálsson
Institute of Anthropology, University of Iceland, Reykjavik 101, Iceland
<gpals@rhi.hi.is>

1. INTRODUCTION

Many statements about the efficiency of Individual Fisheries Quota (IFQ) systems echo the tautology of the Chinese official who defined the results of the policy experiments of the socialist system in the following terms: "those that work we call socialism, and those that don't work we call capitalism"; the successes of Individual Transferable Quotas (ITQ) are attributed to the power of the liberal market while the failures are attributed to some kind of "externalities", usually some form of community constraints. Critics of ITQs sometimes make the same error, reversing the terms of the Chinese argument. So, it is important to move beyond ideological rhetoric to empirical results and realistic accounts.

ITQ systems are potentially powerful management regimes in fisheries, depending on their design, the manner in which they are introduced and the context where they are applied. They may work well in some contexts while they may have important drawbacks elsewhere so generalizations are difficult if not meaningless. An important task, therefore, on the research and management agenda is to specify the conditions for successful application of ITQs as well as the conditions for the alternatives to ITQs.

Other equally important tasks on the agenda are:

i. to outline the tacit assumptions of ITQ theory and to examine their validity, and
ii. explore the implications of ITQ regimes in the light of actual experiences, not the least their social consequences since these tend to be undertheorized in ITQ theory.

This paper addresses both issues, focusing on the Icelandic experience.

2. THE TACIT ASSUMPTIONS OF ITQS

Much of the criticism of ITQs emphasizes the tacit assumptions of IFQ theory and the tension between the "textbook" and the real world. Indeed, in my view the textbooks are biased.

The dominant paradigm in fisheries management in the West might be characterized as the paradigm of the aquarium. This paradigm underlines, first of all, a conceptual distinction between nature and society. Also, it emphasizes the notion of control and captivity. One species occupies a privileged position, the position of the observer and manipulator. Aquaria usually owe their construction to the fascination with single species and individual animals. Like keepers of aquaria, marine biologists have typically focused on one species at a time, modeling recruitment, growth rates, and stock sizes, although recently they have paid increasing attention to analyses of interactions in multi-species fisheries. Not only does the paradigm of the aquarium underline the boundary between the inside and the outside, observers and observed, it fails to appreciate the nature and role of practical knowledge. ITQs represent an apt example. Under ITQs fishers tend to be relegated to the margin.

Another tacit assumption concerning IFQ systems relates to their potential implications for stewardship and sustainability. The argument about the ecological benefits of privatization in fisheries is one of the key reasons for the political support of IFQs, and, indeed, it is frequently reproduced in fisheries literature and political rhetoric. Usually such an argument is usually informed by Hardin's thesis (1968) of the "tragedy of the commons". According to Hardin, it is rational for a herder on a common pasture to add extra animals to the pasture although this will collectively result in a "tragedy" of overgrazing: the positive utility for the individual herder of adding an extra animal to the pastures is +1 while his negative utility (as a result of ecological degradation) is only a fraction of -1. Privatization of the grazing land, it is argued, will ensure that it becomes irrational for the herder to add an extra animal to the pasture, beyond the carrying capacity of the land; the landowner will have a vested interest in refraining from practices that undermine the capacity of the land to renew itself since he or she alone bears all the costs of ecologically harmful practices. Extending the Hardinian argument to fisheries, the economic theory of IFQs simply assumes that quota holders will be encouraged to sustain the stocks they exploit, much like a herder on a privatized agrarian pasture. And many fisheries managers are similarly driven by faith in the postulation that privatization will foster ecological sensibility, preventing the tragedy of common property fisheries.

Quota shares, however, are not rights in particular fish. Moreover, fish usually invite particular problems of monitoring and enforcement, unsympathetic as they are towards any kind of artificial, agrarian boundaries. As a result, a quota-holder has no assurance that other quota-holders will refrain from practices that prevent the sustainable use of fishing stocks. If the Hardinian argument applies to herders and pastures (and that should not be taken for granted as I argue later on) it should, indeed, also apply to quota-holders. For the quota-holder, the positive utility of cheating-overfishing of quota ("quota busting"), discarding immature fish ("high-grading"), and illegal fishing on "closed" areas and protected breading grounds-is +1 while the negative

utility of such practices is only a fraction of -1. It is rational, in other words, for the quota-holder, following Hardin, to cheat although, again, this may collectively result in an environmental tragedy. The incentive for responsible resource use and collective stewardship is just as weak, then, as in the case of herders on common pastures. The Hardinian argument about the ecological benefits of privatization in fisheries may be a valid one in fisheries with a single quota-holder, since, as in the case of the landowner, the costs of irresponsible resource use are born by the user himself, or herself. Such a totalitarian situation, however, is unlikely and, moreover, it invites profound problems of corruption and irresponsibility, problems that have been endemic in socialist experiments.

There is good reason, then, to expect that the argument about the ecological benefits of privatizing land does not generally apply to fisheries. The contrary argument, in fact, may be developed that IFQs encourage irresponsible fishing practices. The problem of high-grading, in particular, is likely to escalate with IFQs. Illegal catches, which in the absence of IFQs would be landed and used for human purposes, are likely to be dumped into the sea since the quota-holder, entitled to a fixed share of the total catch, is eager to maximize the value of his or her shares. Much evidence in the Icelandic context supports such a conclusion.

This is not to say that quota-holders will inevitably act irresponsibly. Quota-holders may collectively conclude that it is rational to agree on refraining from quota-busting and high-grading, although, individually, they are likely to engage in practices that violate concerns with stewardship for the reason outlined above. But so can the herders on common pastures. Why should we assume that sociality only emerges with institutions of private property? It may be argued, in fact, that the Hardinian thesis is seriously flawed in that it assumes that users of common-pool resources live in a social vacuum, in the absence of interaction, sociality, community values and cultural norms (McCay and Acheson 1987, Pálsson 1991); "The farmers on Hardin's pasture", as McEvoy aptly puts it, "do not seem to talk to one another" (1988: 226). It is well established ethnographically that in many cases common pool resources have been rationally managed for centuries. The likelihood of an effective agreement on resource use will depend on the commons in question, the chances of effective monitoring and enforcement and the sense of community among resource users. In the final analysis, then IFQs, or the institution of private property, cannot on its own be expected to maintain or improve the condition of the marine habitat, contrary to the tacit assumption of much fisheries economics. What matters, just as in the case of the Hardinian herder, is the particular articulation of ecology, technology, and community.

A further fundamental bias in ITQ theory concerns the notion of "fishing history", the key variable on which quota allocations are normally based. Usually this has been narrowly defined in terms of boat ownership, leaving out crews and communities, sometimes on the ground that "the data are not available". In the Icelandic case, for instance, although the issue was debated for some time (and continues to be debated), eventually only boat-owners were entitled to quotas. It needs to be recognized, however, that fishing history is the cumulative result of a community of practice, involving, beside boat-owners, a whole range of other actors - skippers, crews, fleets and communities. Existing levels of fishing are not only the consequences of the application of machinery, capital, and the skills of boat-owners to the resource-base, also of fundamental importance are the human skills acquired in a particular social context at sea. Therefore, to grant privileges to boat-owners in the allocation of quota shares is to ignore the facts of fishing history. Sometimes it is difficult to establish the extent to which individual crew have contributed to fishing in the course of recent history. In other cases, however, it is no less difficult to estimate crew participation than to document boat-ownership. Despite the availability of the necessary data on crew participation, crew have sometimes been left out in the initial allocation (in Iceland, for instance). There seems, therefore, to be an in-built bias towards boat-owners among managers and politicians and in much of the management literature. Significantly, some of the data-banks constructed for the purpose of documenting fishing history ignore, in particular, the participation of crew. Ignoring crews and communities in the allocation of quota shares may violate the doctrine of public trust.

Having modeled the real world, the modelers often seek to reinforce the order postulated by their analyses. As a result, reality resonates with the models. This is usually referred to nowadays as "virtualism". Despite their rhetoric of detachment, objectivity, and the hidden hand, in practice economists tend to constitute the economies they study, naming it in the process of analysis. Presently, the act of naming is the privileged exercise of economists.

Economic life is considerably more complex than supposed by neo-classical theorising. More importantly, attempts to promote economically efficient outcomes through the realisation of models arrived at from neo-classical theoretical assumptions and reasoning can create more problems than they solve. A more empirically based approach to prescriptive economic policy-making, one that takes heed of the social context for which policies are destined, would undoubtedly have helped to avoid many of the controversies associated with IFQ management in many places, including Iceland and the US. Contrary to the economic and social success story predicted by economists, IFQ systems have become a highly contentious and tumultuous issue. Whilst the fate of these systems depends on an ongoing rhetorical and political contest, the IFQ system remains for its adherents and architects a "panglossian virtual reality".

3. SOME OF THE IMPLICATIONS OF THE ICELANDIC ITQ SYSTEM

3.1 Fleet size

Whether or not IFQs have reduced the excessive capacity of the fleet in the IFQ fisheries is still an open question. The size of the entire Icelandic fishing fleet in terms of GRT has increased continuously since the introduction of the system. Some of the increase in capacity may, however, be justified because of increased distant-water fishing (to the Barents Sea and Flemish Cap), which requires large vessels that can make long trips.

3.2 Conservation

Discarding of small and immature fish during fishing operations and the "high-grading" of the catch seem to continue to be a serious problem in the Icelandic fishery. Possibly, the problems have escalated with IFQs. Since quotas are fixed and excessive catch is a violation of the law and subject to prosecution, a quota holder tends to land only the portion of the catch that generates the highest income. It is difficult to estimate the scale of such practices, but the Icelandic Parliament expressed grave concerns and passed strict laws on the "treatment" of fishing catches in June 1996.

3.3 Relations of power

Recently, formalized modes of IFQ-leasing have begun to emerge. These transactions involve long-term contracts between large IFQ-holders and smaller operators, where the former provide the latter with IFQs in return for the catch and a proportion of the proceeds. One such arrangement is habitually referred to as "fishing for others". Invariably, in such transactions, the supplier of the IFQs is a large vertically-integrated company. The smaller operator's boat fishes the IFQs and delivers the catch to the suppliers' processing plant in return for a payment. There is much concern with the emergence of the *relations of dependency* associated with "fishing for others". Often, heavily-loaded feudal metaphors are used to describe this state of affairs. In public discussion, the large firms that have been accumulating IFQs are habitually referred to as "quota-kings" or "lords of the sea". The lessor "quota-kings" are likened to medieval landlords and, conversely, small-scale leasees become "tenants" or "serfs".

3.4 Community aspects

Some communities have lost most of their quota and have virtually become bankrupt as quota-holders have sold, or leased their shares, to other communities. Meanwhile, other communities have accumulated quotas. The pattern of changes in the regional distribution of quotas, however, is a complex one. The main accumulators of quotas are companies in the larger towns of the northern part of Iceland. Small communities with less than 500 inhabitants have lost a much larger share of their quotas than the bigger communities.

3.5 Safety

Studies of fishing in Iceland and several other contexts - including the United States (notably Alaska), Canada, New Zealand, and Great Britain) - have found an excess of work-related deaths and injuries in marine fisheries. As for Iceland, interviews with the people responsible for recording and analyzing accidents at sea do not indicate significant changes in terms of safety and accidents with the introduction of the IFQ system.

3.6 Initial allocation

In some contexts, in the Alaskan Pacific halibut and sablefish fisheries, for instance, the allocation of crew shares would meet with practical difficulties, due to inadequate records on the fishing history of crew men. In Iceland, such difficulties were negligible if not non-existent. Records on crews are just as good as those on boat ownership. The fact that crews have been left out in the initial allocation in many cases, in Iceland as elsewhere, seems to reflect a common bias towards capital ownership in the theorizing on IFQs.

3.7 Inequality

In the Icelandic case, there has been a sizable increase in the level of inequality in the distribution of quotas from the onset of the IFQ system. Many boat owners have been dropping out of the system, and a large majority of these were the smallest operators. At the same time, quotas are becoming concentrated in the hands of fewer boat owners and companies (see Figures 1-3). Many Icelanders are wary of the rapid concentration of IFQs in the hands of large vertically-integrated companies.

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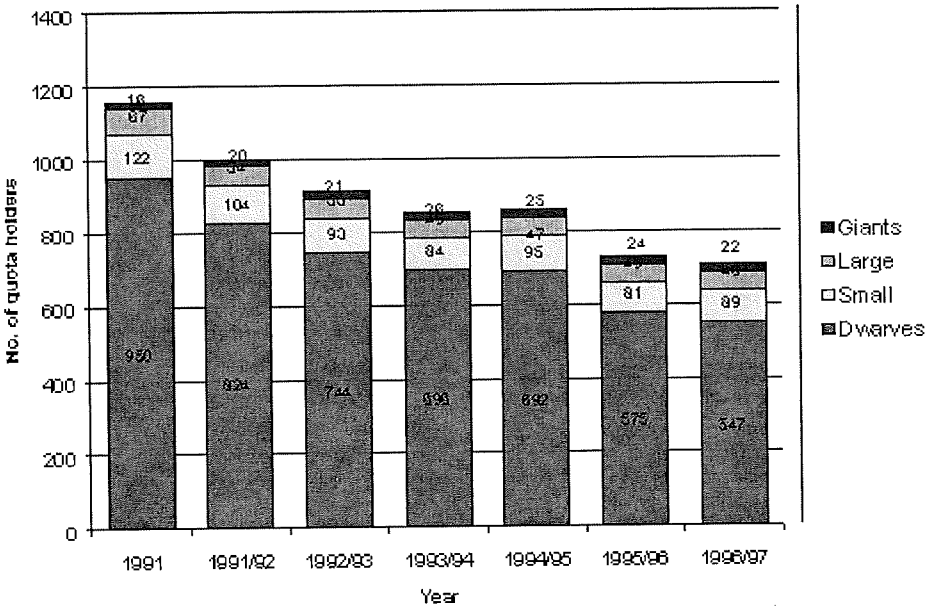
Figure 1
Number of quota holders in Iceland 1991-1997



"dwarves": 0 to 0.1%
"small": 0.1 to 0.3%
"large": 0.3 to 1%
"giants": more than 1%

Figure 2
The distribution of quota shares in Iceland 1991-1997

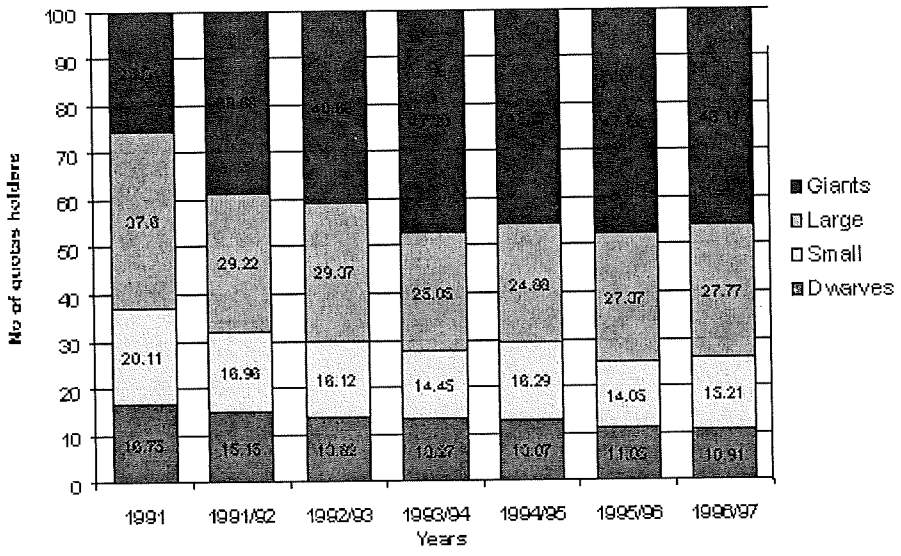
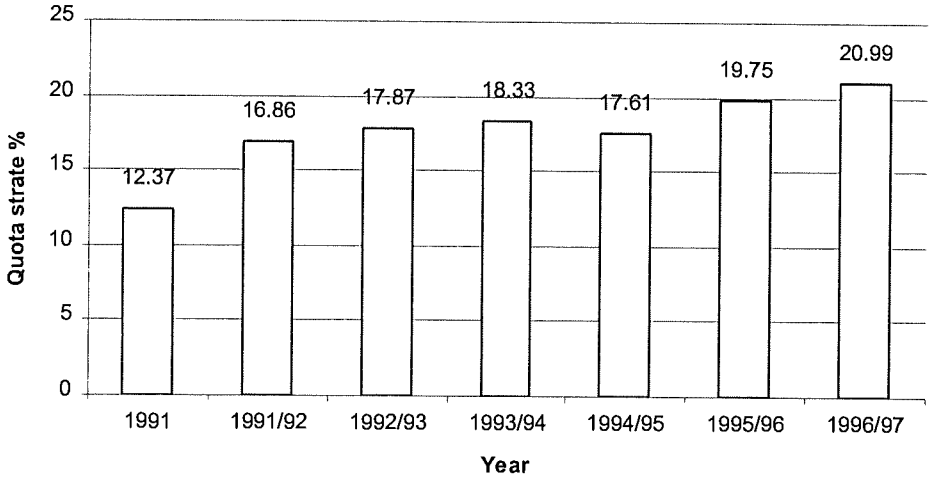


Figure 3
The relative size of the five largest Icelandic quota holders 1991-1997



NGĀI TAHU CUSTOMARY FISHERIES MANAGEMENT: IMPLEMENTATION OF A COMMON LANGUAGE

M. Cassidy
Fisheries & Communications Consultant
AMURI, 248 Poranahau, Waipukurau, New Zealand
<mcass@clear.net.nz>

1. INTRODUCTION

At a certain level everyone attending this conference would agree that our aim in fisheries management is to manage the fisheries resources sustainably. Divergence as to what this means is rapidly achieved with any discussion goes beyond the agreed level of the term 'sustainability'. This divergence results from the lack of a common language with which to approach fisheries management.

This is not to say there is a lack of fisheries language. On the contrary the field of fisheries management is renown for its substantive and often peculiar terminology. Examples such as 'resource rents', 'TAC', 'carrying capacity' and 'fishing down' are just a few that readily come to mind. These terms are widely bandied about by those involved in fisheries management. But what do they really mean and how often has the lack of common understanding for the language of fisheries management led to disastrous results for both the fisheries and the people who rely on this natural resource?

This paper will briefly clarify the meanings I understood by the terms 'sovereignty', 'patrimony' and 'privatisation' within the context of customary fisheries management in New Zealand. The paper will then sketch the path taken by New Zealand in grappling with the language of Māori fisheries in the context of a rights-based fisheries management system. The remainder of the paper will then describe how the Māori tribe, Ngāi Tahu, implemented their customary fisheries management system and how they communicated the language of this system to the rest of New Zealand.

2. CLARIFICATION OF LANGUAGE

An oft-misunderstood concept is that of property and how it relates to the fisheries resource of indigenous peoples. Implicit in much of the discourse surrounding property rights and fisheries is the idea that the fisheries resource are an asset that can be owned, divided and transferred. Linked to this presupposition is the idea of the state being the owner of the asset on behalf of the public.

The indigenous people of New Zealand (Māori) have a different interpretation of the relationship between people and the fisheries resource. It is widely held by Māori that people do not, and cannot, own the fisheries resource, rather it is the responsibility of people to steward the resource. They have the authority, confirmed by genealogy, to define boundaries, to determine seasons and methods and any other measure to manage the fishing. Thus, the access to the fisheries that Māori had exercised over generations was a right undertaken in intimate relationship with their responsibilities to look after the resource.

With these beliefs guiding their access and use of the fisheries resource Māori were understandably aghast at the action of the state to introduce a Quota Management System (QMS) over the fisheries resources in New Zealand's EEZ. In response, Māori challenged the very presupposition of patrimony being adopted by the state and launched the successful litigation that led to the settlement of the Māori fisheries claims.

Details as to the path this litigation and the resulting negotiations took are sketched Section 3 below. It is noted now, however, that a basis of the litigation was that the state did not have the patrimonial right to allocate the fisheries resources as an asset. The state did not have this right, as there was a pre-existing relationship of rights and responsibilities held by Māori for the fisheries resource.

The aim of Māori throughout the years of litigation, negotiation and now implementation of fisheries settlement legislation is to have sovereignty over their rights and responsibilities. That is, to determine for themselves how to manage their access to the fisheries resource and how best to fulfil their responsibilities in looking after the resource.

The term 'privatisation' with its accompanying presuppositions, such as the transition from public responsibilities and social values to the personal and private activities of individuals, is not applicable to the context of this paper. Rather, it is the processes of definition that are relevant, the processes by which the rights and responsibilities of individuals impacting on fisheries resource are defined into a common language for all to understand and follow.

Thus, for the purposes of this paper:

i. Sovereignty shall refer to the ability to self manage.
ii. Patrimony shall refer to the rights and responsibilities inherited from one generation and passed to the next.
iii. The process of defining the rights and responsibilities of individuals replaces the term privatisation.

3. PATH TO UNDERSTANDING THE LANGUAGE OF MĀORI FISHERIES

Legislation governing fisheries management in New Zealand has, since the late 1800s, made reference to the 'Māori fishing right'. The legislative references did not define or describe what this right was in the context of the fisheries management of the day, rather the references maintained recognition of the relationship of rights and responsibilities held by Māori for the fisheries resource.

It was to these legislative references that Māori turned when faced with the introduction of a QMS in the mid 1980s. The State, by acting on the presupposition that it could allocate the fisheries resource as an asset, had contravened legislation and directly affected the recognised Māori fishing right. The language understood by the state had run headlong into the language understood by Māori. Māori resorted to litigation to put their message across, which resulted in the Court directing the parties, Māori and state, to negotiate a way through the impasse.

The challenge facing the parties was how to reach a common language with which the intentions of both parties could be achieved. In more detail, the key question facing the parties was how did the Māori fishing right work in the context of the current fisheries management system in New Zealand? It was at this juncture that a crucial decision was made. The Māori fishing right was separated into commercial and customary non-commercial facets. The commercial aspect of the right could then be easily aligned with the language of property rights as understood by the state. That is, the fisheries resource could be regarded as an asset. The customary non-commercial aspects of the right would need to be further defined and articulated by legislation to enable a common language and understanding.

With the decision to separate the Māori fishing right in this manner, the path was cleared for subsequent negotiations to proceed and the two settlements of 1989 and 1992 to be reached. The 1989 legislation was an interim settlement that provided for 10% of quota currently in the QMS and $NZ 10 million in cash to be transferred to Māori via a Commission specifically set up for the role. This legislation also provided for areas to be established that had customarily been of special significance to a tribe as a source of food or for spiritual or cultural reasons. A management committee would then be established to give advice to the Minister of Fisheries on how best to manage the fisheries in the area.

The 1992 legislation built on the earlier interim settlement and provided additional assets to the renamed Commission of a 50% share of the fishing company, Sealord Ltd and guaranteed 20% of the quota of future species to the QMS. Provision was also made for regulations to be established that would confirm the customary non-commercial rights of Māori.

Progress on implementation of the commercial aspect of the fisheries settlements was rapidly undertaken and today Māori interests control (through ownership, lease or pre-emptive right) approximately 57% of the commercial quota in the New Zealand QMS. Final delivery of this control to individual tribes has yet to be completed with internal disagreements amongst Māori as how best to allocate the assets.

Progress on implementation of legislation defining the customary non-commercial aspect of the fisheries settlements was less rapid and it was six years before legislation was promulgated for customary fisheries in the South Island of New Zealand. In 1998 the *Fisheries (South Island Customary Fishing) Regulations* were passed. These regulations were soon followed by similar legislation for the North Island of New Zealand. The promulgation of customary regulations completed the legislative process of defining the customary non-commercial rights that was initiated with the interim settlement of 1989.

Modest work has been undertaken in the review of the *Fisheries Act 1996* to better integrate the Māori fishing right with the overall management system. It is anticipated that with the upcoming definition of a recreational fishing right, additional consideration will be given to the relationships between the various rights holders in the New Zealand fisheries management system. This consideration will likely include a revisiting of the best way to give effect to the Māori fishing right.

4. IMPLEMENTATION OF THE NGĀI TAHU CUSTOMARY FISHERIES MANAGEMENT SYSTEM

Ngāi Tahu, being the largest Māori tribe in the South Island and one with the largest amount of coastline, is an important player in the management of fisheries in New Zealand. The initiatives that Ngāi Tahu has taken in the last few years with customary fisheries management are without doubt vanguard material for the rest of the world to consider.

It was Ngāi Tahu, along with the eight tribes at the top of the South Island, that initiated the final round of negotiations with the state to agree on a set of regulations governing customary fisheries. The national negotiations had grown stale after years of mismatching language between the state and Māori negotiators. The negotiations between the state and the tribes of the South Island were successful and in 1998 a set of regulations were promulgated. These regulations defined and articulated the customary non-commercial fishing right within the context of the New Zealand fisheries management system.

Regulations alone, however, are not enough to communicate a common language to all people involved in fisheries management. Ngāi Tahu decided to take a strategic approach to the challenge of communicating their understanding and language of customary fisheries management. The underlying philosophy, or mission statement, for all Ngāi Tahu customary fisheries management is "to secure and develop Ngāi Tahu customary fishing rights within a context of sustainable use of the

fisheries resource, empowering Ngāi Tahu *whānui* to take up their responsibilities in fisheries management."

Ngāi Tahu then identified six key areas to be their strategic framework for customary fisheries management:

i. Organisation
ii. Research
iii. Information management
iv. Education and empowerment
v. External relations
vi. Compliance and monitoring.

Organisation

The aim of the customary fisheries organisation is to have in place the necessary legislation, structures, processes and resources to be responsive to the needs of the tribe and to achieve the mission statement. This work area is the foundation for all other work undertaken in customary fisheries management. There can only be success for Ngāi Tahu in customary fisheries management when the legislation, structures and processes support the desired outcome.

A customary fisheries management team was developed within Ngāi Tahu Development Corporation. The team comprises of:

- Customary Fisheries Manager
  - manages the whole team, facilitates activities and investigates additional funding
  - internally funded position
- Customary Fisheries Policy Analyst
  - assists the Manager and other staff in all activities
  - internally funded position
- *Mahinga Kai Tikanga* o *Ngāi Tahu*
  - Committee of 18 members (from each *papatipu runanga*)
  - internally funded committee
- *Kai Tohutohu*
  - political adviser to the team
  - internally funded (part-time) position
- Five *Kai Arahi* (or Regional Compliance Coordinators)
  - dual role of supporting *Tangata Whenua* and pro moting voluntary compliance
  - funded by contract of service with MFish
- Customary Fisheries Administrator
  - administers the *Tangata Tiaki* provisions of the regulations
  - funded by contract of service with Mfish (the New Zealand Ministry of Fisheries).

The key role of the team is to support the role of *Tangata Tiaki,* who are those people with recognised authority under the customary fishing regulations to manage the customary fisheries. Of the nine positions in the customary fisheries team six are funded by contracts of service with the Ministry of Fisheries. The remaining three positions and the support for the Committee are funded by Ngāi Tahu internal funds. This is a crucial aspect of the robust management structure. Without the capability to manage contracts I doubt whether the MFish would have entered into the contracts of service. Equally, the ability to secure service contracts provides the necessary motivation for continuing internal funding. I believe these contracts are a new way for indigenous people to achieve the outcomes they want in a manner they approve of and be supported by the government.

Fundamental to success in the organisational framework is well written legislation that supports the activities of *Tangata Whenua* in fisheries management. *The Fisheries Act 1996* has a number of references that provide for *Tangata Whenua* input and participation in fisheries management. More importantly, Ngāi Tahu and other South Island *iwi* were able to negotiate and implement the *Fisheries (South Island Customary Fishing) Regulations 1998*. These regulations give a framework through which Ngāi Tahu can exercise their customary fishing right.

Research

The objective of the research work area is to establish priorities for research, identify and support key human resources within Ngāi Tahu for undertaking research and support projects that address Ngāi Tahu research priorities. Ngāi Tahu are well aware that information is power and the more information they can acquire on the fisheries resources, the better the *Tangata Tiaki* can manage the resource.

Research into customary fisheries has traditionally been badly supported by the research process in New Zealand, both by MFish and more broadly by research organisations. Ngāi Tahu has participated in the MFish research process for some years with some isolated cases of success and it is now time to take up a meaningful role in research. The intended outcome is to build their capacity to become an important research provider in fisheries research.

Information management

Directly linked to undertaking research into information on fisheries is the ability to hold and manage this information. The objective in the information management area for Ngāi Tahu is to establish a user friendly and secure Geographic Information System (GIS) that will support and inform tribal developments in customary fisheries management. Spatial mapping technology is eminently suitable for the nature of customary fisheries management and the highly visual characteristics of GIS appealing to *Tangata Whenua.*

Ngāi Tahu commissioned a New Zealand-based GIS company, whose managing director is of Ngāi Tahu descent, to design a GIS specifically for the needs of customary fisheries management. The result is a user-friendly system that tracks the activities of the customary fishers, the *Tangata Tiaki* and any other people connected to the customary fisheries management system. The GIS was designed to be extendable and it is anticipated that in time the system will be utilised by other fisheries managers.

Education and empowerment

The most effective message is one that is well understood. The objective in this area is to widely promote the role and function of customary fisheries management, empowering and assisting *Tangata Whenua* to identify and pursue their aspirations. This work area has been a priority of the customary fisheries management system, as it is believed that if people understand the principles and need for customary fisheries management, they will support management initiatives.

It has been important to encourage a sense of ownership by *Tangata Whenua* for their customary fisheries and to educate and empower *Tangata Whenua* first then broaden the focus to educate others to support customary fisheries management. In other words, ensure the language is well understood at home and then together take it to others to understand.

The initiatives undertaken to spread the common language of customary fisheries management have ranged from production of media resources (video, booklet, stickers for the children and t-shirts) through to training programmes. A comprehensive two-day training course is available for all the established *Tangata Tiaki.*

The common characteristics of all the initiatives have been their simplicity, creativity and fun, which has allowed the information to be easily understood. Where possible, the customary fisheries team has sought the financial support of other agencies. Such sponsorship has proven effective in widening the support-base for customary fisheries management.

External relations

The message of Ngāi Tahu needs continual promotion and discussion to be fully understood as a language of fisheries management. The objective in the external relations area is for Ngāi Tahu to be proactive in developing their external relations and ensure their strategic objectives are reflected in the work programmes of all fisheries management groups and agencies.

In some cases relationship agreements are developed between the parties as a way of confirming the common language is understood. Ngāi Tahu has found that strategic alliances with other stakeholders are a path to smoother relations and successful outcomes.

Compliance and monitoring

The aim of the compliance work is to encourage voluntary compliance with fisheries laws and monitor the effectiveness of customary fisheries management. Ngāi Tahu is well aware that the language of customary fisheries management is constantly evolving.

To ensure adherence with the current understanding of the language and monitor any changes, Ngāi Tahu entered into a compliance contract with the government. It was a leap of faith for the government and Ngāi Tahu to enter into the compliance contract yet it was a leap that has been well rewarded. This contract enabled the employment of the five *Kai Arahi* and triggered the formation of the entire customary fisheries team. It has also given visible and tangible proof to all watching that the language of customary fisheries management can be commonly understood regardless of one's cultural background.

5. SUMMARY

The experiences and methods described in this paper are the proof that the example of Ngāi Tahu customary fisheries management a model for others to study and possibly follow. This model demonstrates how a language incomprehensible to many, a language of spiritual beliefs and connections to the natural environment, was interpreted, articulated and defined in such a way that people could understand. That is not to say every individual understands the language of customary fisheries management in the same way. After all, every individual reads the world in a unique way that is bound by their beliefs. Yet, the language of Ngāi Tahu and customary fisheries management has been communicated sufficiently well for people to understand and support the common intention.

USE RIGHTS AND SOCIAL OBLIGATIONS: QUESTIONS OF RESPONSIBILITY AND GOVERNANCE

D. Symes
Department of Geography, University of Hull,
Hull HU67RX, UK
<geo@hull.ac.uk>

1. INTRODUCTION

This brief and intentionally polemic commentary on privatised use rights and the social obligations that attend them should be seen as the opinion of one who cannot easily reconcile the abrogation of traditional common use rights - and their redistribution to individuals for the purpose of private profit - with the notion of natural justice, and one who is therefore cautious when it comes to granting such rights as a short term expediency and even more sceptical about the role of rights-based management in enhancing the opportunities for sustainable development in the longer term. Instead of regarding the creation of private use rights as a gift of ownership, such actions are more accurately interpreted as the granting of a concession, held in trust for the benefit of society, which carries with it certain social obligations imposed by the state on behalf of society rather than responsibilities assumed by the rights-holder. Should the rights-holder be discovered to be in neglect of these obligations then the concession should be liable to forfeit.

There have been suggestions in some elements of the literature that one of the advantages to be gained from rights-based management in fisheries is that it may significantly reduce the need for other forms of intervention and regulation by the state; management can largely rely on the self-regulating mechanisms of the market. On the contrary, as in any situation where there is a potential conflict between public and private interests, the state must retain its role as a public regulating-body whose responsibility it is to define the social obligations and to set the standards for the conduct of the fishery. The onus is on the state to ensure that the social obligations attached to the granting of private use rights are fully understood by the industry and for the state and industry, working in partnership, to formulate and implement appropriate mechanisms for guaranteeing that those obligations are fully met.

The aim of the paper is twofold:

i. to identify two critical areas in which the state should set the standards, namely in matters of social justice and ecosystem sustainability – areas in which the social obligations implicit in the fisheries are adequately identified in the FAO's *Code of Conduct for Responsible Fisheries* (see Articles 6.18 and 6.1 - 6.2 respectively);
ii. to outline the relationships between the individual, the community and the state necessary for ensuring that the standards and social obligations are fulfilled.

2. SOCIAL JUSTICE

Social issues underlying the development of responsible fisheries are given rather less prominence in the FAO's *Code of Conduct* than issues concerning the marine ecosystem. Nonetheless, Article 6.18 states that:

> "Recognizing the important contributions of artisanal and small-scale fisheries to employment, income and food security, States should appropriately protect the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction."

Several aspects of the need to protect the rights of artisanal fisheries have been dealt with previously in the paper prepared for the plenary session on 'Community Perspectives' (Symes 2000). Here it is necessary only to identify more precisely the issues of social justice and to comment briefly on how these issues might be handled. In the context of privatised use rights there are perhaps four or five main obligations:

i. the particular conditions relating to the *rights of indigenous peoples* (First Nation rights), discussed elsewhere in the programme
ii. the *distributional effects of privatisation*, both in terms of the initial allocation and the subsequent operation of the quota market, which generally discriminate against the local small boat sector; such discrimination can be prevented or at least moderated by (a) making a separate, non-transferable allocation of quota to the small boat sector; (b) implementing zonal management systems for inshore waters; and/or (c) adopting community quota systems
iii. the guarantee of *access to the fisheries for 'non-professional' fishermen, i.e.* for part-time, seasonal or casual commercial fishermen and for recreational fishermen
iv. the guarantee of *opportunities for new entrants* (inter-generational justice) which may otherwise be denied simply as a result of the high costs of purchasing quotas on the open market
v. *compensation for the loss of employment and income* for crew members caused by the sale or lease of quotas; normally windfall profits accrue mainly, if not exclusively, to the quota owner – usually the

vessel owner; this is especially unjust in cases where remuneration has customarily been based on a share system and where fishermen are considered self-employed and, therefore, not normally liable to receive redundancy payments.

In most cases these obligations can be fully satisfied through the development of comprehensive and well ordered community, or group quota, management schemes, though central governments may need to appoint a watchdog to oversee the arrangements and an *ombudsman* to deal with allegations of unfair practice.

3. ENVIRONMENTAL JUSTICE

It is much less likely that adequate safeguards for the protection of society's interests in the health of the marine ecosystem can be left in the hands of the fishing industry. According to Article 6.1 FAO's *Code of Conduct:*

> "The right to fish carries with it the obligation to do so in a responsible manner so as to ensure effective conservation and management of the living aquatic resources" And, "fisheries management should promote the maintenance of the quality, diversity and availability of fishing resources in sufficient quantities for present and future generations in the context of food security, poverty alleviation and sustainable development. Management measures should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species" (Article 6.2).

There are, in effect, two different but related elements of concern for the sustainability of the marine ecosystem – namely, the impacts of fishing activity on commercial species, which should be dealt with directly through fisheries policy, and second, on the wider marine environment which lies partly within and partly beyond the realm of fisheries management. To date concern has been primarily confined to the unsustainability of commercial fish stocks through overfishing and the pernicious practice of discarding. One of the most serious indictments against modern fishing methods is the massive wastage of the biological resources resulting from discards, caused either by contradictions within the regulatory policy or by commercial practice *e.g.* high grading. There appears to be little consensus over whether the introduction of rights-based management alleviates, or exacerbates, this particular problem.

But society's concern is not confined to the sustainability of commercial fish species. It extends to a concern for the ecosystem as a whole and for its general service functions whose value greatly exceeds that of the commercial fisheries (Constanza *et al.* 1997). There is growing evidence that fishing damages the marine environment through direct and indirect effects on habitats, the structural characteristics of the biological communities and the patterns of interaction within the ecosystem (Jennings and Kaiser 1998) and threatens to diminish the productivity, diversity and integrity of the ecosystem and to impair its service functions. These problems are most pronounced in the more heavily exploited areas, like the North Sea. They cannot be adequately addressed through conventional forms of fisheries management.

In such areas we are witnessing the early stages in the development of an ecosystem-based approach to fisheries management as part of a longer term strategy for securing a sustainable future for commercial fisheries within a sustainable marine ecosystem (IMM 1997, National Marine Fisheries Service 1999). Although the details of how an ecosystem-approach to management will function have still to be worked out, it seems likely it will:

i. challenge the assumptions underlying the notion of TACs and quotas as the principal tools of management;
ii. demand significant reductions in fishing effort
iii. require that limit reference points be set for non-target species and that these be incorporated within fishing plans
iv. impose further restrictions on particular fishing gears which damage the habitats of target and non-target species or which pose risks of incidental capture of non-target species and
v. involve the introduction of extensive No Take Zones (NTZs).

Cumulatively, these developments could well lead to a gradual replacement of established quota-based management by systems based on the principles of parametric management and possibly the introduction of stringent financial measures (entry fees, fines and incentives) in order to regulate fishing effort and encourage the adoption of more ecologically benign fishing methods. According to Wilson and Dickie (1995), parametric management involves a more sophisticated deployment of technical conservation measures carefully calibrated to the life-cycle behaviour of target (and non-target) species to ensure that the right precautionary measures are adopted in the right places at the right time.

Clearly these are not the kinds of actions that can reasonably be left to the fishing industry to formulate and implement. They require instead an independent regulatory authority. Moreover they are likely to impose a heavy burden of regulation on the rights-holders and significantly limit the value of their rights. Ultimately, if quota based management were to be abandoned in favour of parametric management then it would imply a direct threat to the privatisation agenda.

4. GOVERNANCE

Consideration of these two sets of issues raises some crucial questions in terms of who should govern the rights-holders. Where should responsibility for defining, formulating and implementing the detailed codes of conduct for responsible fisheries lie in the case of rights-

based management? Can issues of social and environmental justice be entrusted to rights-holders acting individually or collectively through their own responsible organisations? Can the inevitable conflicts between economic efficiency, social equity and ecological integrity be satisfactorily resolved within a market based system, so that rights-based management can become self-regulating? Or is the concept of co-responsibility in the form of a partnership between the state and the fishing industry's own organisations the only secure path for ensuring that the social obligations attached to privatised use rights are properly honoured?

Elsewhere, I have argued that the process associated with the 'hollowing out of the state' - devolution, deregulation and privatisation - which have already been applied to many other areas of governance in western market economies - should be extended to fisheries (Symes 1997). In particular, there is a need to replace the current hierarchical, centralised, 'command-and-control' forms of fisheries management by systems of co-management involving consultation over the framing of policy and the delegation of specific management responsibilities to fishermen's organisations (see Jentoft and McCay 1995, Sen and Raakjaer Nielsen 1996, Symes and Phillipson 1999). I have also suggested that privatisation and co-management, which may initially appear as conflicting agendas, are reconcilable (Symes 1997), as for example in the case of collective management of ITQs in the Dutch 'Biesheuvel' system.

But when it comes to ensuring that the social obligations in respect of environmental sustainability are properly observed, I begin to have some doubts as to how effective a genuine co-management approach would be. There are certainly no grounds for arguing for self-regulation. The notion of 'stewardship' seems somewhat misplaced when applied to fisheries. Drawing parallels with farming is inappropriate, for in agriculture the owner occupier has the title to the basic means of production (the land) as well as to the product; whereas in fisheries, through ITQs, title is granted only in respect of a share of the annual product. Fish stocks remain a public good entrusted to the care of the state. Thus the individual fisherman has no independent means of ensuring the annual value of his assets – he remains at the mercy of other fishermen who exploit the same stocks or fish the same grounds. As a result, he has little individual incentive to practise 'good husbandry'. His goal is to maximise the value of his assets through the market, irrespective of whether this means using environmentally-damaging gear or discarding part of the catch through high-grading.

In matters of environmental responsibility, therefore, the state must act as the regulating authority. Certainly there should be consultation with the industry – but there can be little room for compromise; again, responsible fishermen's organisations should have a role to play in the implementation of agreed conservation measures – but the final responsibility for monitoring and enforcement must rest with the state. The result would therefore be an unequal partnership between industry and the state rather than the balance of responsbility implied in the term co-management.

5. CONCLUSION

There is a price to be paid for the granting of exclusive use rights to individuals and many of the rights and responsibilities normally associated with the concept of private property are likely to be withheld from the individual. The significance attached to the social obligations of ensuring a sustainable future for fishing populations and communities, on the one hand, and for the marine ecosystem, on the other, places a continuing burden on the state to guarantee that its fisheries are conducted in a socially responsible manner, in line with the FAO *Code of Conduct.*

This will require the cooperation and compliance of the fishing industry and it is, therefore, expedient that the state's responsibilities and actions are mediated, as far as possible, through systems of co-management in which fishermen's organisations are well represented and given active roles in the implementation of policy. But ultimately responsibility and appropriate powers of sanction can only reside with the state. Only the state has the final sanction of withdrawing private use rights where the social obligations are breached. In consequence it would seem that the granting of exclusive fishing rights in the form of ITQs confers relatively little real independence and freedom of action on the rights holder and it offers him no real guarantees of security in the medium or long term.

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THE USE OF FIXED GEAR AS A BASIS FOR PROPERTY RIGHTS MANAGEMENT

F.T. Christy
IMARIBA, 2853 Ontario Road NW#619
Washington DC 0009, USA
<imariba@sprynet.com>

1. INTRODUCTION

In the future, the outlook for fisheries management is good. Property rights are likely to be available for most fisheries and, even though there may be many imperfections in the rights, they will provide the basis for improvements in the derivation of net benefits from the resources. The challenge for fishery administrators and other stake-holders is that of reaching that stage as expeditiously as possible and with minimum imperfections.

There are several tasks that need to be undertaken including: political decisions on the distribution of wealth through the provision of exclusive use-rights; administrative decisions to devolve management authority to the local level (user groups or communities); and actions by governments to provide the incentives and conditions that will encourage fishermen to take control of the resources.

The last item holds some opportunities that have not been given much consideration so far. There appear to be three kinds of motivation that can lead to collective behaviour by communities, or groups of fishermen, who already have exclusive use rights, or to their assertion of exclusive use-rights (Christy 1993). These include: (a) equity, (b) efficiency and (c) enhancement. The desire to achieve equity among community members can induce collective behavior when individualistic behavior threatens the stability of the community. This generally depends upon the community already having asserted a territorial use-right. The other two motivations may be effective in inducing the development of property rights.

Efficiency, in the sense of producing and capturing a net gain, can be important. The net gain can be in the form of economic rents, as in the historic case when the feudal lords in Japan asserted exclusive rights to an area of the sea for the purposes of taxing the fishermen. Or it can be within a traditional community when controls are exercised as a means for ensuring that there will be ample fish for a future feast. There are also situations where groups of fishermen agree to mutual controls in order to ensure satisfactory market prices. Attempts to acquire market control may be quite common. However, in some countries this may be prohibited through anti-trust legislation and dismantled when discovered. Since the costs to economies of open access to fisheries may outweigh the costs of price-fixing, consideration might be given to allowing, or even encouraging, such collective action to take place. Rules might be specified to prevent the worst aspects of monopoly-pricing from taking effect.

A third motivation is that of the enhancement of yields from a fishery resource. Where the yield from a stock can be increased by an investment of some kind, this investment will not be made unless the investors can receive a satisfactory return. To receive a satisfactory return they will have to be assured of a right to a sufficient share of the stock. Although aquaculture is a prime example of this, there are many other situations which provide an incentive for a user, or group of users, to claim some form and degree of exclusivity.

I suggested that governments could take advantage of the efficiency and enhancement motivations to facilitate and encourage communities, or fishermen groups, to move towards systems of property rights and to take on management responsibilities. A means for doing this would be through the use of fixed fishing gear devices and techniques such as gill nets, trammel nets, pots, fish traps, artificial reefs, fish aggregation devices, longlines and others. In general, there has been a tendency for governments to prohibit or impede the use of some of these gears, largely because the principle of open- access has predominated. The history of this is discussed briefly and is followed by a description of some of the kinds of devices and gears that might be employed. It is, of course, obvious that only certain kinds of fisheries lend themselves to the use of this approach and that mobile gear will still have an important role. But it may be that the opportunities for the use of fixed gear are larger than is generally considered. These opportunities are discussed in terms of their use as a basis for property rights management and as a means for reducing fishing and management costs.

2. HISTORY

The history of opposition to the use of fixed nets is long. One of the most interesting examples is found in the Report of the Baird Commission in 1871 and 1872 (Baird 1873). This report stated that "the supply [of fish], which formerly greatly exceeded the demand, now, to a certain extent at least and in some localities, has failed; and the impression has become prevalent that the fish themselves are diminishing, and that in time some kinds, at least, will be almost or quite exterminated ... The cause assigned by those who complained most ... was the multiplication of 'traps' and 'pounds' which captured fish of all kinds in great numbers and, as was supposed, in greater quantity than the natural fecundity of the fish could make good year by year ...".

This voluminous report (over 800 pages) contains testimony of numerous fishermen from New England, divided between those using traps, weirs and other fixed gear and those using handlines and mobile gear. Although

Baird did not recommend abolition of the fixed gears provided that there were closures during the spawning season, the testimony was largely in opposition and often emotional. "Even supposing, for the sake of argument, that these wholesale methods of taking fish (traps, weirs, etc.) do not, on the whole, injure the fisheries, by what right does any man, or set of men, take all the fishes of the sea which they can catch as his or theirs? Have the public no rights? Has not every individual some rights which these monopolists are bound to respect?... See the hundreds of thousands of barrels of fish which they testified annually to have taken in their traps for market at home and abroad, for fertilizing phosphates, for bait for the mackerel and cod fisheries, the profits of which they pocketed, and to which they had no legal or moral right if their modes of fishing deprived the poorer fishermen of what was legally and morally theirs" (George Palmer in Baird 1873). It is interesting to note that Mr. Palmer identified three "monopolists" (the William L. Bradley Manufacturing Co., the Pacific Guano Company of Wood's Hole, and the Cape Cod Railroad Company). This is not dissimilar to the three villains identified by Greenpeace in their diatribe against factory trawlers: Tyson Foods, Inc., ConAgra, and KPMG Peat Marwick (Greer 1993).

Another example of the opposition to the use of fixed gear can be found in the history of salmon traps in Alaska and Washington State. Although such traps are highly efficient ways for taking most of the salmon in Alaska (though not all strains), "the traps were legislated out of existence in Puget Sound by 1935 and in Alaska in 1959" (Crutchfield and Pontecorvo 1969).

The struggle in New England, and elsewhere, between users of fixed and mobile gear was generally a struggle that can be characterized in various ways. It might be considered a struggle between corporations and individual fishermen; between those with relatively easy access to capital and those without; or between capitalists and workers. My hypothesis is that the use of fixed gear attracted those with capital because they assumed, perhaps tacitly, that they would acquire a *de facto* property right to the site for the gear, and that the property right would allow them to capture satisfactory returns from their investments. Those with mobile gear were opposed not only because the fixed gear might interfere with their fishing activities but also because the implicit property right would attract big business. Under the condition of open-access, the opponents to fixed gear tended to win the battles and fixed gear has usually, though not always, been banned.

3. KINDS OF FIXED GEAR, DEVICES AND TECHNIQUES

I include a wide variety of devices and techniques within the heading of fixed gear. Many of these, described in the Baird Commission report, are still used today. These include nets, such as gill nets and trammel nets fixed to the bottom; fish traps, weirs, pounds and fykes also fixed to the bottom; longlines and trot lines; and pots for lobster and bottom fish. For my purposes other devices should also be included such as artificial reefs and fish aggregation devices (FADs). All of these are site specific and fixed in place.

Various kinds of fish can be taken by these kinds of gear. The relative efficiency of different gears is presented below in Table 1. As can be seen, gill nets, tangle nets, longlines and traps can be used for a wide variety of types of fish (although it should be noted that for some uses, *e.g.* squid, the gears are not fixed in place).

Artificial reefs and FADs are not fishing gears, as such, but they serve to attract fish to specific locations. The former tend to primarily attract demersal species, and the latter to attract pelagic fishes. The latter are increasingly being used in tuna fisheries.

It is useful to cite some examples of the ways in which fixed gear and devices have provided a basis for property rights. Much has been written about the lobster trap fisheries in Maine and the ways in which the local fishermen have worked out a rudimentary system of property rights. In the Philippines, tuna fishermen use FADs (*payaos*) to attract the fish. Recognizing that placement of these in too close proximity to each other would be mutually damaging, they agreed among themselves with regard to their placement. This implies that the user- group has acquired a form of exclusive use right, since such agreements would not work if "outsiders" were to enter with their own FADs. In India off the state of Kerala, artificial reefs have been implanted by fishing communities (Kurien 1991). In one community, the reef was constructed by a group of fishers who then controlled access, limiting it to those who had invested in the construction. However, in another community, the investment was made by the community as a whole on the basis of "whatever each one can give happily". In this case, access to the reef was open to all community members. The difference in approach by the two communities reflected religious differences but the critical point in both cases was the use of a fixed fishing device as a basis for claiming property rights; by a user group in the former situation and a community in the latter.

4. ADVANTAGES AND DISADVANTAGES

Fixed gear and devices will not, of course, work in all fisheries. In some cases this may be for technical reasons; *e.g.* variable movements of the stocks from year to year; being located in deep waters and not responsive to aggregation devices; size of the individuals, *etc.* In other cases, the economic aspects may be important.

However, as far as I know, the comparative economic advantages and disadvantages between fixed and mobile gear have not been examined for most fisheries. With regard to shallow water traps, trot lines, and trammel nets, it would seem that they would have lower capital and fuel costs than mobile gear used for the same stocks. Pots for lobsters and crabs are already in common

Table 1
Indexes of efficiency/selectivity

(1 = low index, 5 = maximum index)

Gear type/ Target species	Demersal fish	Small pelagic fish	Large pelagic fish	Shrimps	Molluscs	Crustaceans	Squid	Flatfish
Bottom trawl	5	2	0	2	1	1	1	
Mid Water trawl	3	4	2	1	0	0	2	0
Beam trawl	3	1	0	1	1	1	0	5
Shrimp trawl	3	1	0	5	1	1	0	3
Danish Seine	5	2	0	1	0	0	1	3
Purse Seine	2	5	5	1	0	0	3	0
Dredge	0	0	0	0	0	5	0	2
Jig/Handline	3	3	2	0	0	0	5	0
Gill net	3	3	3	0	0	0	0	0
Tangle net	3	3	3	3	3	0	4	3
Long line	3	0	3	0	0	0	0	2
Trolling	0	3	4	0	0	0	0	0
Traps	3	1	2	1	4	1	0	0
Hand collection	0	0	0	0	3	3	0	0

(from Smith, in press)

use. Pots are also used for some fin-fish and may be advantageous for others. There are relatively high capital costs for the implantation of artificial reefs but they produce high returns. The establishment of FADs is generally not very costly although maintenance costs may be high. But they significantly reduce search costs and, thereby, fuel consumption. Although these are speculations at best, they indicate that there may be many fisheries which could be conducted through the use of fixed gear and fixed devices more efficiently than through the use of mobile gear. Certainly, it seems that further analysis of comparative advantages would be desirable.

5. APPROACHES

The current paradigm shift from open-access to property rights does not, at present, seem to have had much effect on thinking with regard to the use of alternative gears and the opportunity for the use of fixed gear within property rights systems. Fixed gear has received little attention because the condition of open-access is largely based on the concept of gear mobility and because the open-access mentality continues to dominate fishery management.

However, I suggest that there are considerable opportunities for facilitating the enlargement of property rights systems through the use of fixed fishing gear and devices. Governments could first determine those situations where fisheries can be efficiently conducted through the use of traps, stake nets, pots, FADs and artificial reefs. They could then identify and plot the sites for the use of these gears and techniques. Exclusive use-rights to these sites could then be allocated, by various means, to fishermen groups or communities. They can be auctioned off, leased, or granted to the users. A proposal along these lines was made to the Maldives government with regard to the use of FADs in the tuna fisheries (Christy *et al.* 1981).

Once acquired, the holders of the rights would then be responsible for determining how the rights should be used. They would essentially assume much of the management authority, making decisions on how much of what kind of gear to use; rate of use (closed seasons or days); who will do the fishing; how to distribute the benefits, revenues or products and how to ensure compliance within the community or group. The government would still have some responsibilities. The primary one would be ensuring the integrity of the groups' exclusive rights and preventing intrusion from outside. But it may also have to impose some regulations for stocks that migrate between sites, to prevent excessive use by any one group.

In order to proceed with this suggestion, there needs to be a major change in attitude with regard to fixed gear. This change is emerging as governments turn to consideration of property rights in fisheries. Perhaps this conference will help in expediting the change.

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SOME IDEAS ON THE FUTURE OF PROPERTY RIGHTS IN THE FISHERIES

U. Wijkström
Fisheries Policy and Planning Division, Food And Agriculture Organisation,
Viale delle Terme di Caracalla, Rome, Italy
<ulf.wijkstrom@fao.org>

Colleagues, Friends, Ladies and Gentlemen,

We will all move forwards – into the future. So will fishermen and their families. I will share with you some personal thoughts about their future and in particular about what might happen to fishing rights. What I will say is in no way normative. I will tell you what I expect may happen – in parts based on very tentative exploratory calculations.

The reason for doing this is, of course, that we need to be pro-active instead of reactive. We as public-private managers, bureaucrats and fishermen will influence the context within which fisheries will be carried out. Our influence is likely to be positive if we are prepared, if we have reflected on what seems likely to happen. On the one hand we need to have an understanding of how fishermen react to their environment. And, on the other, we need to have an idea of how the social, economic, political and biological environments of fishermen can change.

Given my rather narrow purpose – to generate an idea of future fish rights – I need only a simple proposition: the one that says that fishermen are keen to obtain secure rights to fishing and that in the event that they do – the fishermen will develop an attitude of stewardship towards the resource. Whether or not the fisherman actually has property rights or not is not all that important. It is important that they believe they do and that outsiders respect that belief.

Thus fisherman are likely ask that their rights – preferably of exclusive access to resources - be protected where they exist and that they be introduced where they do not exist. Are governments likely to agree to improve their rights? And, what will move governments to do so?

In order to develop an idea let us look briefly at the market, at technological developments and at the spread of democracy.

The market

In 1997 just below 6 billion individuals consumed about 90 million tonnes of fish (crustaceans). That is equivalent to an average of just above 15kg (live-weight equivalent) per person and year. By 2015 there will be a bit more than 7 billion inhabitants on earth. At a bit more than 15 kgs/person/year would imply a demand of between 105 and 110 million tonnes for food. However, in Asia, Africa and parts of Latin America economic growth will continue to stimulate an increased per capita consumption. Thus at 17 kg/person/year the supply in 2015 would have to be of the order of 120 to 125 million tonnes for food. Will this much fish be available at that time? The consensus so far seems to be that capture fisheries will not exceed 100 million tonnes per year; and if fish meal production continues at present levels, only some 70 million tonnes would be available for human food.

On Hampton Street here in Fremantle, there is a shop with a large sign proclaiming: "Think fish, think aquaculture". This message has spread in Western Australia. The Sunday newspaper (14 November, The Western Australian) reported that Fisheries, Western Australia, expects aquaculture production in the state to increase from a value of about $A 10 million per year at present, to $A 200 million by 2010 (pearls excluded). This amounts to a growth rate of just above 30% per year.

It would not be realistic to apply such growth rates to allthe world's aquaculture production. However, if we apply a growth rate of 2.5% per year to the Chinese production (not including aquatic plants) and 5% per year to the rest of the world, then production would reach some 55 million tonnes (again not including aquatic plants) by the year 2015. Adding the capture fishery production of 70 million tonnes we would indeed reach the 125 million tonnes needed to provide 17kg/person/year in 2015.

Aquaculture produce on the average is higher-priced than capture-fishery landings. This means that the increasing share of aquaculture produce in the total production will tend to keep "a lid" on fish prices overall. But, there will be little room for any increase in real prices. Capture fishermen will try to differentiate their fish from those of aquaculturists in order to achieve higher prices for the wild produce. However, it seems likely that capture fisheries will generally need higher productivity, which – at stable prices – means higher CPUEs, in order to survive. Thus, they will be dependent upon the rebuilding of stocks, and that will be possible only if the access to the resources is controlled and reserved for some fishermen only. Fishery administrators and managers agree with this argument.

Technological developments

The market, however, is not all. Technology will continue to modify the context within which fisheries are carried out. It is clear that technological developments will make it easier for fishermen to increase their CPUEs. But developments in the technology of communications, computation, *etc.* will also make it easier to see further, faster and with more accuracy at sea and below the sea-surface, and at a declining cost. This will affect the costs that society bears in order to make certain that holders of fishing rights respect their obligations. These costs will decrease. This, in turn will make it more economically feasible to grant stronger fishing rights to fishermen.

The democratic process

Finally a word about public policies. Open market economies are now gradually becoming the norm every-

where. They seem to prosper most where there is political democracy. In many political democracies there is a tendency towards devolution of powers to regions, districts, municipalities and towns. There would not seem to be any reason why fishing communities could not benefit from this devolution. So in summary, I believe that overall there are good prospects for a general strengthening of fishermen's rights of exclusive access to fish resources.

So far I have spoken about fisheries taking place within EEZs. What about fisheries outside the EEZ, fisheries on the high seas? How to control fisheries on the high seas? It is clear that for control to come about all nations must agree to the control scheme. They are likely to agree if the scheme is such that it preserves their possibility to participate and ensures that no nation – or group of nations – threatens the continued existence of the flora and fauna of the oceans.

I would not be surprised if such a scheme took the form of a "Global High Seas Fisheries Corporation". All UN member nations and fishing entities would be invited to become shareholders of the Corporation; shares in which could be freely traded amongst governments. The Corporation would have two tasks – to ensure that fishing operations on the high-seas do not threaten the oceanic eco-systems, and that they earn as high a net income as possible. The Corporation would not itself undertake any fishing operations. It would sell, lease, and franchise the rights of fishing to the highest bidders. All the expenses of the Corporation should be paid for by revenues obtained through income from the sale of rights to conduct fishing operations. Naturally such a Corporation could not be established overnight – a transition period – probably measured in decades – would be necessary for its introduction.

Ladies and Gentlemen, thank you for your attention.

THE WAY FORWARD

P.P. Rogers
Fisheries WA, S G I O Atrium, Level 3, 170 St George's Terrace
Perth, WA 6000 Australia
< progers@fish.wa.gov.au>

I would like to offer a few of my thoughts as we move from the Core of Fishrights99, *the Fremantle Conference,* to the Workshop sessions.

Over the last three days and, indeed, over the past week, I have heard a great deal of discussion about the issues facing a variety of communities – be they:

i. the communities of regulated users such as commercial and recreational fishers, community and conservation interests
ii. indigenous or aboriginal communities
iii. virtual communities
iv. or even communities of regulators.

Whoever and wherever, we all face similar types of issues, which brings me to my second point. In sharing our knowledge and discovering our mutual experiences, I want to pick up the challenge of moving forward so that this, *the Fremantle Conference*, is not an end but, rather, a beginning, a springboard which moves us ahead. If we are going to move forward, we need to get serious about how and when we do so.

How we move forward, as I think we know, is up to each and every one of us. It is clear that the diversity of communities demands innovative thinking and solutions to achieve concrete and clearly enunciated objectives.

As Bonnie McCay asked today, how can all resource users come together as a new community which drives the change from "traditional" management to broader, more holistic, more adaptive, and more collaborative systems of stewardship, guardianship and management?

To be very practical, we need to try to get a handle on our "Scott spiders", our "Rights-Characteristics starbursts", and to fully understand the importance of what is drawing us towards ITQs as one of the forms of property rights used in fisheries management.

One way of doing this is to come together in technical consultations that focus on particular aspects of the discussions we have heard these past few days. In fact, this is exactly what we are going to do in the next two days with the Workshops on co-management, globalization, and applied, legal, and local community issues. But this is *not* enough. These discussions are only a beginning.

So it is with great pleasure that I am able to announce that, already, northern and southern hemisphere countries have come forward with the offer that they, during the next three years, are willing to host 3-day technical consultations where they could then use the gathered participants for another two days after the consultations themselves, to work on both global and local issues.

The topics identified at this point, and in no any particular order of priority, are:

i. social implications and responsibilities
ii. historically disadvantaged stakeholders
iii. duties and responsibilities of industries
iv. legal foundations
v. initial allocations and
vi. economics.

But even this will not be enough, unless we share these developments and keep our discussions and our exchanges dynamic.

So it is with this thought that I also put forward the challenge that - having had these consultations and generated an explicit understanding of the objectives and priorities we want to achieve - we should return here in four years (and, yes, I am very well aware that this is very soon) to again share the knowledge and information of these additional experiences.

We want your views and directions on how best to do this, so please take the opportunity while you are here to convey your suggestions to Ross Shotton and Rebecca Metzner. I believe this will allow us to continue to move forward together so as to ensure that we do, in fact, have fish for our future.

To those of you who are leaving the Conference at this time, I wish you speedy and safe journeys to your destinations. For those of you who are staying, I look forward to your continued and active participation.

To conclude, it is with these thoughts that, as we move from the core to the Workshop portions of this *Fremantle Conference*, I thank you for the past few days and look forward to the next two days *and* to the next few years.

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SUBJECT INDEX

Part I of these proceedings consists of two major sections, the Mini-course lectures and the presentations presented during the Core Conference (Mini-course). The lectures presented during the two-day Mini-course were grouped in two sections. The first dealt with the concepts, theory and practice relating to the use of property rights in fisheries management. Subjects covered in the first part of the Mini-course included the historical development of the introduction of property in fishery management; property rights as a means of economic organization; selection of a property rights management system; resistance to changes in property rights or, whether to use Individual Transferable Quotas (ITQs); current property rights systems in fisheries management; and group and community-based fishing rights. Topics covered in the second part of the Mini-course included management infrastructure for rights-based fishing; legal planning for management of fisheries using property rights; the administration of fisheries managed by property rights; the administration of enforcement mechanisms for rights-based fisheries management systems; and fisher participation in rights-based fisheries management: the New Zealand experience.

The second major section of Part I of the proceedings consists of the papers presented during the three-day Core Conference. These papers covered the perspectives of governments in introducing and administering such methods of management and the political, conservation, social and economic consequences; industry; and the wider community and other involved stakeholders. The topics covered in the Core Conference were introduced by two major perspectives: moving through the narrows – from open access to ITQs; and self-government and common property rights – an alternative to ITQs.

The conference papers addressed the theory and application of property rights in fisheries management with an emphasis on national applications and experience. The presentations included those made from the perspective of the fishing industry, government policy-makers and administrators and the legal implications as a consequence of national systems of law.

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