

Extract from the DRAFT National Climate Change Action Plan for Fisheries and Aquaculture

Focus area 1: improving the adaptive capacity of the fisheries sectors

Fishing is inherently subject to variability and uncertainty. This arises from a variety of sources including fluctuations in fish stock abundance, weather patterns, operating conditions and markets. Although fishers already deal with, and adapt to such variability, climate change will add further complexity to operational and management decision-making, particularly in the medium to long-term. This will require monitoring, assessment, management and operational responses that are robust to increased uncertainty, irrespective of the cause.

Fishers, and those communities whose livelihoods or subsistence depend on fishing, may be particularly sensitive to the impacts of climate change. Changes in the abundance of target and non-target species, input costs and market prices, which arise from climate change, and from human responses to such changes, will affect the profitability and/or sustainability of fisheries operations. Preparing for climate change, for example by considering climate risks in planning processes, can help reduce vulnerability to negative effects and improve capacity to capitalise on any opportunities that may arise.

Species and stocks will differ in their vulnerability to environmental changes, although healthy fish stocks managed in an ecologically sustainable manner will generally be better placed to withstand increased environmental stresses. Similarly, efficient, profitable commercial operators in economically healthy fisheries, will generally have greater financial scope to adjust to changed fishery conditions.

While adaptation should be driven principally by the fisheries sectors, policy and management frameworks should be flexible, allowing fishers to respond in a timely manner, and where appropriate, should identify mechanisms to adapt. These frameworks should allow fishers to capitalise on new opportunities, as well as accommodate the management of stocks that are negatively impacted by climate change. Decision-support systems should ideally integrate biophysical, economic and social considerations to underpin sustainable resource use. Management frameworks should address issues such as access and property rights, and should remove impediments to adaptation without jeopardising long-term sustainability or productivity. Adaptation, will also be enhanced by effective communication and collaboration between fishers and governments.

Research and development will need to address environmental, social and economic needs. When properly targeted, communicated and applied, this will help provide the tools and knowledge to build resilience in a changing climate. However, although research into fisheries climate change issues is important, investment in this area must be considered in light of other research priorities.

Adaptation to climate change will be assisted by reliable projections of the likely timing, location and magnitude of impacts. Predictive tools can help fishers and managers understand how climate change might affect a particular fishery or associated infrastructure, and contribute to medium- to long-term planning and business risk-management. For example, fishers may use projections to take steps to limit their dependence on stocks that are likely to be threatened by climate change, or to position themselves to take advantage of new opportunities, such as range extensions or movements. Fisheries managers, on the other hand, might adapt spatial management to account for range-shifts.

In the absence of information on the productivity of stocks and the ecosystem impacts of fishing, management should apply an appropriately precautionary approach to establishing new, or expanding existing fishing activities. If harvesting of new fishery resources is to be viable over the longer-term, managers must implement appropriate controls to maintain catches of target and non-target species at sustainable levels, ensuring that an ecosystem-based approach is taken.

Many commercial fisheries have extensive historical datasets that are used to guide management decisions based on relationships between fish stocks, catches, and environmental factors. Climate change may disrupt these relationships, limiting the suitability of these data for this purpose, particularly where changes are abrupt (for example if a tipping point is reached). Climate-driven changes to fisheries productivity or to the validity of reference information (such as the theoretical unfished biomass of stocks), may also have implications for harvest strategies and other management responses that rely on pre-defined estimates or reference points.

Future management strategies may need to consider an increased reliance on fishery-independent data collection, although in many cases, the costs of collecting such data will be prohibitive. Innovative approaches to collecting data and establishing cost-effective monitoring systems could be useful. It will also be important to continue to use fishers' knowledge of the ecosystems in which they work, for example, to help identify shifting baselines in fisheries and the broader ecosystem.

The ability of fisheries to adjust may be affected by the adaptation strategies of other sectors. For example, responses of coastal developments to sea-level rise could impinge on inshore habitats, such as mangroves and seagrass beds, and on the fisheries they support, while any future shift in agricultural production systems to northern Australia may result in changes to river flows, resulting in potential competition between agricultural users and environmental needs (for example, flows for spawning cues).

Consideration should also be given to addressing non-climate stressors and how these may affect ecosystem function and fish populations. Factors including water quality, impediments to fish movement (particularly in inland waterways) and habitat integrity (including the availability of snags and integrity of nursery grounds such as mangroves and seagrass beds) may all affect populations of aquatic species and their ability to cope with the impacts of climate change.

The following table outlines a series of strategies and actions to guide adaptation to climate change.

STRATEGY Improving the resilience of fishing operations to climate change	
<p>Actions</p> <p>1.1 Incorporate climate change considerations in fisheries sector planning and management processes, and fishing operations. This could include:</p> <ul style="list-style-type: none"> ▪ adapting existing operations, such as through selective breeding of aquaculture species, or changes to gear and fishing practices (where compatible with management arrangements) ▪ investigating and taking advantage of new opportunities as a result of changing climates (e.g. new species) ▪ income and operational diversification ▪ incorporating climate change risk-management strategies into business plans ▪ considering likely changes to trade and market conditions as a result of climate change 	<p>Lead responsibility</p> <p>Fishers and research providers</p>

<p>1.2 Identify and address barriers to adapting fisheries operations to climate change, such as:</p> <ul style="list-style-type: none"> ▪ legislative, policy and management barriers and other fisheries-related factors, including fisher motivations and knowledge ▪ undertaking cost-benefit analysis of various adaptation options ▪ optimising the efficiency of fishing, for example by managing stocks at levels that produce cost-effective catch rates ▪ minimising the negative effects of non-climate stressors. <p>Addressing such barriers should not inadvertently impact on the sustainability, profitability, competitiveness or recreational/cultural values associated with fishing and fisheries resources.</p>	<p>Fishers, governments and research providers</p>
<p>STRATEGY Improving understanding and awareness of climate change impacts on fisheries</p>	
<p>Actions</p> <p>1.3 Deliver a research, development and extension (RD&E) program that coordinates and targets investment to address fisheries-climate change issues, and aims to:</p> <ul style="list-style-type: none"> ▪ encompass physical, biological, economic and social factors as appropriate ▪ capture synergies across fisheries, jurisdictions, regions and beyond, in order to maximise returns and avoid duplication ▪ bring together multiple investors to help identify such synergies and maximise leverage opportunities ▪ encourage end-user input throughout the process, to ensure that RD&E is appropriately targeted, prioritised, communicated and applied ▪ bring together expertise from multiple sources and disciplines ▪ encourage sharing of data, methodologies and results ▪ operationalise and extend results, and encourage uptake to maximise returns. 	<p>Lead responsibility</p> <p>Research providers, fishers and governments</p>
<p>1.4 Identify, prioritise and undertake integrated (environmental, economic and social) vulnerability and opportunity assessments at appropriate scales, which aim to:</p> <ul style="list-style-type: none"> ▪ assess habitats, species and communities within a risk-management framework ▪ inform policy, management and decision making ▪ identify and prioritise data-collection and analysis needs ▪ determine opportunities that deliver greatest returns on investment ▪ build understanding of the implications of climate change on fisheries and dependent communities ▪ improve understanding of how the effects of climate change on terrestrial systems may affect inland waterways, estuarine systems and inshore coastal habitats. 	<p>Research providers, fishers and governments</p>

<p>1.5 Provide climate change information for fisheries that is relevant, understandable and easily accessible:</p> <ul style="list-style-type: none"> ▪ ensure that researchers, fisheries managers and policy makers understand fishers' information needs ▪ communicate the outcomes of climate change RD&E to help realise the benefits of research and inform decisions ▪ engage fishers at national, regional and fishery levels as appropriate ▪ raise awareness and attract fisheries stakeholder buy-in and leadership on climate change, for example through communicating and showcasing fisher initiatives in response to climate change ▪ ensure information is accessible to stakeholders outside the fisheries realm such as catchment management and landcare groups. 	<p>Fishers, research providers and governments</p>
<p>STRATEGY Facilitate ongoing assessment and monitoring of climate change impacts at suitable scales</p>	
<p>Actions</p> <p>1.6 Inform management and business decision-making of the likely impacts of climate change through physical and biological predictive modelling. The models should:</p> <ul style="list-style-type: none"> ▪ be delivered at appropriate (e.g. regional or fishery) scales ▪ inform existing fisheries tools/models ▪ describe the probabilities and risks associated with model outputs. 	<p>Lead responsibility</p> <p>Research providers and governments</p>
<p>1.7 Improve the understanding of how non-climate change stressors interact with climate change, and how they might reduce ecosystem resilience at a local or regional scale:</p> <ul style="list-style-type: none"> ▪ distinguish climate change impacts from the effects of other environmental and management factors, such as natural variability and the effects of fishing, including illegal, unreported and unregulated catch ▪ identify risks from new and existing pests and diseases in changing ecosystems ▪ assess cumulative impacts from a range of sources (e.g. habitat loss through coastal and catchment development). 	<p>Research providers and governments</p>
<p>1.8 Monitor changes in indicators of ecosystem structure. This may include:</p> <ul style="list-style-type: none"> ▪ changes in catch rates and composition including, to the extent practicable, non-target species ▪ changes to environmental factors, including benthos and infauna around aquaculture sites ▪ fishers' responses to such changes and interactions, including changes to fishing effort and methods. <p>In doing so:</p> <ul style="list-style-type: none"> ▪ consider governments' and fishers' roles in data collection for fishery and ecosystem monitoring <ul style="list-style-type: none"> – this includes considering new, cost effective methods for collecting data ▪ capture information from all fishing sectors to the extent practicable. 	<p>Governments, research providers and fishers</p>

<p>1.9 Expand data and information frameworks, where practicable, to:</p> <ul style="list-style-type: none"> ▪ take into account data needs, at suitable scales, for the assessment of climate change impacts on fisheries <ul style="list-style-type: none"> – store relevant physical, biological, economic and social data for long-term, ongoing assessment of climate change, following established standards. 	<p>Governments and research providers</p>
<p>STRATEGY Management and policy frameworks that are informed, agile and consistent</p>	
<p>Actions</p> <p>1.10 Ensure fisheries management strategies account for climate change. Management strategies should:</p> <ul style="list-style-type: none"> ▪ be collaborative and allow flexibility for adaptation ▪ consider biophysical and socio-economic factors (for fishers and communities), including understanding fisher motivations now, and in response to likely climate-driven changes ▪ incorporate an ecosystem-based fisheries management approach ▪ allow for shifting ‘baseline’ assumptions, appropriate to new climatic conditions ▪ consider the suitability and effectiveness of spatial and other management arrangements, now and in the future. 	<p>Lead responsibility</p> <p>Governments, fishers</p>
<p>1.11 Incorporate climate change into fisheries management-scenario modelling and management strategy evaluations, recognising the need to:</p> <ul style="list-style-type: none"> ▪ understand impacts on, and engage regional communities ▪ understand the economic and social, as well as the biological impacts of adaptation options. 	<p>Research providers and governments</p>
<p>1.12 Coordinate fisheries-related responses to climate change within and across agencies and governments:</p> <ul style="list-style-type: none"> ▪ align climate change policy objectives across government portfolios ▪ establish and maintain links to parallel climate change initiatives ▪ engage agencies involved in broader planning processes (e.g. local government land-use planning, state planning processes) as appropriate ▪ ensure policy regimes and legislation are flexible and do not unnecessarily impede adaptation. 	<p>Governments and fishers</p>