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The impact of climate change on Pacific fisheries

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REGIONAL STUDY ON THE IMPACT OF CLIMATE CHANGE ON FISHERIES

Purpose

1. The purpose of this paper is to inform Heads of Fisheries about:
 - i. the potential risks posed by climate change to the plans embodied in the Vava'au Declaration on Pacific Fisheries Resources to sustain optimal future benefits from fisheries for the region, and
 - ii. a comprehensive assessment of the vulnerability of fisheries and aquaculture in the Pacific to climate change. The vulnerability assessment will provide the basis for assisting the region to make the adaptations needed to maintain the vital contributions of fisheries to economic growth, food security and livelihoods in the face of changing climatic and oceanographic conditions.

Background

2. Pacific Leaders recognize that fisheries resources contribute substantially to the economic growth of the region; that they are essential to the future security of countries; and that they underpin food security [1] and support a wide range of livelihoods. The Leaders have committed to maximize the sustainable returns from fisheries and have directed the Forum Fisheries Agency (FFA) and SPC to intensify their collective efforts to develop and apply a long-term strategic approach to Pacific fisheries.

3. Key elements of this approach were outlined in the Vava'au Declaration on Pacific Fisheries Resources, reiterated at the Special Theme of the 5th Pacific Conference on the 'Future of Pacific Fisheries', and discussed further at the 4th Annual Forum Fisheries Committee Ministerial Meeting. The approach centres around assessing sustainable production from oceanic, coastal and freshwater fisheries, and aquaculture, and harmonizing the use of these resources to optimize economic growth, food security and livelihoods.

Risks to Plans for Fisheries from Climate Change

4. The Pacific Islands Framework for Action on Climate Change (PIFACC) 2006-2015 explicitly recognizes the need to identify vulnerable sectors to better design and target adaptation measures. Several consequences of the build-up of greenhouse gases threaten to derail the plans outlined above for optimizing the benefits from fisheries. Heads of Fisheries need to understand the extent of these threats, identify their implications for national revenue, food security and livelihoods, and adapt fisheries and aquaculture to maintain their vital contributions to the economies, societies and cultures of the Pacific in the face of climate change.

5. Preliminary analysis indicates that the key threats to fisheries and aquaculture in the Pacific from climate change are:

- i. **Changes to the distribution and abundance of tuna.** Alterations in ocean temperatures and currents, and changes to the primary productivity and oxygen levels in some areas of the tropical Pacific, are expected to affect the food chain that supports oceanic fisheries and, in turn, stocks of tuna [2]. The extent of these effects is still unknown but preliminary analyses indicate that there could be substantial changes in the tuna available to some countries in the future due to altered patterns of production and migration.
- ii. **Decline in coral reefs and associated fisheries.** Rising sea surface temperatures and ocean acidification will inhibit corals from forming complex reefs [3]. And the reefs they do build will be damaged more easily by stronger wave surge expected from more intense storms [4]. Increased nutrients released from coasts eroded by rising sea level and larger waves will also impede development of coral reefs. Once atmospheric concentrations of CO₂ reach 450-500 ppm, reefs will have lost much of their structural complexity and be dominated by seaweed [3]. Under this scenario, the types and numbers of fish associated with reefs will change [5] – catches of many species harvested today will decrease. Ciguatera fish poisoning is predicted to increase [6].
- iii. **Decreases to other coastal fisheries.** Higher sea levels, combined with stronger wave surge and increased ‘runoff’ from more intense storms is expected to reduce the seagrass, and possibly mangrove, habitats on which several coastal fisheries species depend [4].
- iv. **Damage to infrastructure.** More intense storms will increase the risk of damage to wharfs and essential infrastructure, jeopardizing the profitability of national fishing operations [7,8]. The financial risks associated with coastal aquaculture will also increase due to more frequent damage to equipment [8].
- v. **Safety at sea.** Storm intensity, combined with increasing fuel costs, may affect plans to ‘domesticate’ tuna fisheries. The cost of vessels required for safe fishing operations under more arduous conditions, and/or loss of days at sea due to bad weather, may become prohibitive for some countries [7,8].
- vi. **Difficulties in planning development of freshwater aquaculture.** Changing patterns of rainfall and more intense storms may flood aquaculture ponds in some places, and make small-pond farming impractical in others due to more frequent droughts [7,8].

Urgent Need for a Vulnerability Assessment

6. The way these threats will affect different Pacific countries is not yet clear, as recognized by the FAO Expert Consultation on Climate Change for Fisheries and Aquaculture [8] assembled to advise the 'High-Level Conference on Food Security: The Challenges of climate Change and Bioenergy. To assist Leaders to understand the vulnerability of the region to these threats, SPC has launched a project, with the assistance of AusAID, to assess the impact of climate change on Pacific fisheries. This project brings together the best scientists from the region to determine: the observed and projected changes to Pacific climate and oceanography; the effects of these changes on the ecosystems that support fisheries; and then the projected changes to fish stocks themselves. Collectively, this information will provide a sound basis for assessing the vulnerability of oceanic, coastal and freshwater fisheries, and aquaculture, to climate change. The project will be guided by a Technical Working Group, comprising relevant experts and representatives from CROP agencies and national fisheries departments.

Outputs

7. The vulnerability assessment will enable SPC to advise Heads of Fisheries about:
- i. implications of climate change for plans to optimise the use of fish for food security, livelihoods and economic growth.
 - ii. adaptation and management measures needed to maintain the benefits of fisheries in the face of climate change;
 - iii. current regional capacity to forecast and mitigate the effects of climate change on fisheries and aquaculture; and
 - iv. priorities for cost-effective development assistance to address the effects of climate change on fisheries.
8. In addition to reports designed to guide policy makers and managers about the actions needed to maintain the productivity of fisheries, the project will produce an authoritative book that compiles all the relevant information on the likely impacts of climate change on oceanic, coastal and inland fisheries and aquaculture in the Pacific. The book will provide an important regional input to the 5th Inter-governmental Panel on Climate Change (IPCC) Assessment Report.

Issues/Policy Advice

9. Although the Secretariat of the Pacific Regional Environment Programme (SPREP) is leading the process for translating PIFACC into action, SPC and FFA will help countries identify and implement the management and policy adaptations needed to maintain production of the fish they require.

10. Policies to help communities adapt to the anticipated impact of climate change on Pacific fisheries that can be applied immediately include:

- i. Assisting any natural resilience that coastal fish stocks may have to climate change by reducing the existing stresses associated with overfishing of these fragile resources to meet increased demand for fish from the rapidly growing populations, and degradation of essential fish habitats due to careless land use.
- ii. Developing more options to produce food and create livelihoods, including new forms of agriculture and aquaculture. Diversifying food production systems will help maintain food security because communities can switch from systems affected adversely to those favoured by the changing environmental conditions [1,7,8]. In rural areas, practical ways of diversifying fish production are the installation and maintenance of low-cost inshore fish aggregation devices (FADs) to provide subsistence fishers with better access to tuna, and the scaling-up of small pond aquaculture [1]. Retaining and distributing fish normally discarded by industrial tuna fleets will help meet the demand for fish from rapidly growing urban populations.

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