

# PROFISH



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WORLD BANK AGRICULTURE AND RURAL DEVELOPMENT

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## Climate Change

### Fisheries and aquaculture in a changing climate

Profound climate-driven changes in aquatic ecosystems, fisheries and aquaculture will affect the food security and livelihoods of billions of fishers, fish farmers, and coastal inhabitants. With several international partners, PROFISH has developed a joint policy brief to highlight the key issues. The brief enables policy makers and climate change negotiators to consider aquatic ecosystems, fisheries and aquaculture both in international climate change initiatives and in their national programs.

Fishers, fish farmers and coastal inhabitants will bear the full force of these impacts through less stable livelihoods, changes in the availability and quality of fish for food, and rising risks to their health, safety and homes. Many fisheries-dependent communities already live a precarious and vulnerable existence because of poverty, lack of social services and essential infrastructure. The fragility of these communities is further undermined by overexploited fishery resources and degraded ecosystems. The implications of climate change for food security and livelihoods in small island states and many developing countries are profound.

Climate change (CC) is altering ocean temperatures and acidity, and the patterns and intensity of tropical cyclones. It is modifying the distribution and productivity of marine and freshwater species and is already affecting biological processes and altering food webs. The consequences for sustainability of aquatic ecosystems, fisheries and aquaculture, and the people that depend on them, are uncertain.

Investments are urgently needed not only to mitigate these growing threats and adapt to their impacts - but also to build our knowledge of complex ocean and aquatic processes.

The overarching requirement is to reduce global emissions of greenhouse gasses – the primary human driver of climate change.

Specific adaptation and mitigation measures are also needed to: 1) improve the management of fisheries and aquaculture and the integrity of aquatic ecosystems; 2) respond to the opportunities and threats to food and livelihood security due to CC impacts, and 3) create the opportunities for fisheries, aquaculture and ocean ecosystems to mitigate greenhouse gas emissions.

#### HEALTHY AQUATIC ECOSYSTEMS CONTRIBUTE TO FOOD SECURITY AND LIVELIHOODS

Fisheries and aquaculture depend on healthy aquatic ecosystems. They contribute significantly to food security and livelihoods, but these benefits are often unrecognized and undervalued.

- Fish (including shellfish) provides essential nutrition for 3 billion people and at least 50% of animal protein and minerals to 400 million people from the poorest countries;

- Over 500 million people in developing countries depend, directly or indirectly, on fisheries and aquaculture for their livelihoods;

- Aquaculture is the world's fastest growing food production system, growing at 7% annually;

- Fish products are among the most widely traded foods, with more than 37% (by volume) of world production traded internationally.

#### KEY POLICY MESSAGES

- (i) The oceans are on an **irreversible path of chemical and biological change** and there is a high level of uncertainty with regard to the consequences of this change for fish stocks, for coastal peoples and for the world's climate;
- (ii) **Emissions reduction** is fundamental;
- (iii) **Healthy aquatic ecosystems** may buffer and be more resilient to these changes. Efforts to create and maintain healthy aquatic ecosystem (including rebuilding of fish stocks) makes environmental and economic sense in addition to addressing CC adaptation and mitigation;
- (iv) In particular, **responsible fisheries management** is a 'no regrets' approach that will build resilience to CC for the fish populations, for sensitive habitats (such as coral reefs) and for dependent fishing and coastal communities. It has the added bonus of creating wealth and economic growth;
- (v) Investment decisions (whether for fishing vessels, landing sites, or aquaculture) require greater **awareness** of the trends in CC; the vulnerability of investments to the impacts of CC; and the options for low cost 'climate proof' solutions;
- (vi) In international climate change negotiations it is important to 'leave the door open' to the future use of **carbon financing** in relation to fisheries, aquaculture and oceans.
- (vii) Increased investment is required to improve the **scientific knowledge** on the role of the oceans in CC, for example to raise ocean carbon accounting to the level of forest or soil carbon accounting (both included in carbon finance mechanisms) – the ocean carbon sink is almost five times all other sinks combined.



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## SUSTAINABLE AQUATIC ECOSYSTEMS ARE CRUCIAL FOR CLIMATE CHANGE ADAPTATION

Healthy aquatic ecosystems are critical for production of wild fish, for some of the 'seed' and much of the feed for aquaculture. The productivity of coastal fisheries is closely tied to the health of coastal ecosystems, which provide food, habitats and nursery areas for fish. Estuaries, coral reefs, mangroves and sea grass beds are particularly important. In freshwater systems, ecosystem health and productivity is linked to water quality and flow, and the health of wetlands.

Coastal ecosystems that support fisheries also help protect communities from the impacts of natural disasters and hazards such as coastal erosion and saltwater intrusion.

Mangroves create barriers to destructive waves from storms and hold sediments in place within their root systems, reducing coastal erosion. Healthy coral reefs, sea grass beds and wetlands provide similar benefits. Climate change imperils the structure and function of these already stressed ecosystems.

## FISHERIES AND AQUACULTURE CAN SUPPORT MITIGATION AND ADAPTATION

Adaptation measures are well known by managers and decision makers, but political will and action is often lacking. To build resilience to the effects of climate change and derive sustainable benefits, fisheries and aquaculture managers need to adopt and adhere to best practices such as those described in the FAO Code of Conduct for Responsible Fisheries. These practices need to be integrated more effectively with the management of river basins, watersheds and coastal zones.

Many capture fisheries and their supporting ecosystems have been poorly managed and the economic losses due to overfishing, pollution and habitat loss are estimated to exceed \$50 billion per year. Improved governance, innovative technologies and more responsible practices can generate increased and sustainable benefits from fisheries. Currently there are more fossil fuel consuming fishing vessels operating than necessary to catch the available fish resources efficiently. Reducing the fleet overcapacity will not only help rebuild fish stocks and sustain global catches, but can substantially reduce carbon emissions from the sector.

By focusing on herbivorous species aquaculture can provide nutritious food with a small ecological footprint. Farming of shellfish, such as oysters and mussels is not only good business, but also helps clean coastal waters, while culturing aquatic plants helps remove wastes from polluted

waters. In contrast to the potential declines in agricultural yields in many areas of the world, climate change opens new opportunities for aquaculture as increasing numbers of species are cultured; as the sea encroaches on coastal lands; as more dams and impoundments are constructed in river basins to buffer changing rainfall patterns; and as urban waste demands more innovative disposal using biological processes.

Fisheries and aquaculture need to be blended into national climate change adaptation strategies. Without careful planning, aquatic ecosystems, fisheries and aquaculture can potentially suffer as a result of adaptation measures applied by other sectors, such as increased use of dams and hydropower in catchments with high rainfall, construction of artificial coastal defenses or marine wind farms.

Mitigation solutions require innovative approaches such as the recent inclusion of mangrove conservation as eligible for REDD funding. Another approach is to link vessel decommissioning with emissions reduction funding schemes. Other opportunities include: development of environmentally safe ways to sequester carbon in aquatic ecosystems; biofuels from algae (seaweeds); and development of low-carbon aquaculture production systems.

## OCEANS OF CARBON

The vast scale of the ocean carbon sink - some five times all other sinks combined - means that even minor unpredicted changes in ocean function could render insignificant and devalue the efforts made to reduce terrestrial emissions.

In international climate discussions the oceans have remained a peripheral policy issue. It is time that the global community took a closer look at this vital carbon store.

- to consider a healthy and resilient ocean as an instrument of climate policy;
- to raise the awareness of the climate change community regarding the global threats posed by the loss of vital functions of an increasingly fragile ocean;
- to place a true value on maintaining a healthy ocean; and
- to draw on a more robust ocean science for policy guidance.

## PROFISH, THE WORLD BANK AND CLIMATE CHANGE

PROFISH will continue to work with key international partners (FAO, WorldFish Center, UNEP, SPC and others) to develop a collaborative program of work including:

- contributions to major technical meetings;
- a focus on key policy issues and financing of relevant climate change activities in the marine, fisheries and aquaculture sectors;
- the inclusion of aquatic and fisheries CC initiatives into Bank projects and processes as appropriate.

### Crucial Role of Oceans in CC

- Oceans and coastal ecosystems are the earth's main buffer to climate change and will likely bear the greatest burden of impacts;

- Oceans have removed about 25% of carbon dioxide emitted by human activities from 2000-2007;

- Oceans provide 'every second breath we breathe' as the ocean's plankton produce half the earth's oxygen;

- Oceans absorb more than 95% of the sun's radiation, making air temperatures tolerable for life on land;

- Oceans provide 85% of water vapor in the atmosphere, these clouds are key to regulating climate on land and sea;

- Ocean health influences the capacity of oceans to absorb carbon.

