

New study identifies economies that will suffer most as climate change imperils fisheries

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With climate change threatening to destroy coral reefs, push salt water into freshwater habitats and produce more coastal storms, millions of struggling people in fishery-dependent nations of Africa, Asia and South America could face unprecedented hardship, according to a new study published today in the February issue of the peer-reviewed journal *Fish and Fisheries*. The study, by a team of scientists at the WorldFish Center, the University of East Anglia, Simon Fraser University, the Centre for Environment, Fisheries and Aquaculture Science, the University of Bremen, and the Mekong River Commission, is the first to identify individual nations that are "highly vulnerable" to the impact of climate change on fisheries.

The authors of the report examined 132 national economies to determine which are the most vulnerable, based on environmental, fisheries, dietary and economic factors. Countries that need the most attention, they said, are not necessarily the places that will experience the greatest environmental impacts on their fisheries. Rather, they are countries where fish play a large role in diet, income and trade yet there is a lack of capacity to adapt to problems caused by climate change—such as loss of coral reef habitats to the bleaching effects of warmer waters and lakes parched by an increase in heat and a decrease in precipitation. For example, fish accounts for 27 percent or more of daily protein intake in vulnerable countries—compared to 13 percent in non-vulnerable nations—and there are scant resources for alternative sources of protein.

Both coastal and landlocked countries in Africa, including Malawi, Guinea, Senegal and Uganda, four Asian tropical countries—Bangladesh, Cambodia, Pakistan and Yemen—and two countries in South America, Peru and Colombia, were identified as the most economically vulnerable to the effects of global warming on fisheries. Overall, of the 33 countries that were considered highly vulnerable, 19 are already classified by the United Nations as "least developed" due to their particularly poor socioeconomic conditions.

The world's fisheries provide more than 2.6 billion people with at least 20 percent of their average annual per capita protein intake, according to the United Nation's Food and Agriculture Organization (FAO). The "highly vulnerable" countries identified in the WorldFish study, which was funded by the United Kingdom's Department for International Development (DFID), produce 20 percent of the world's fish exports (by value). The researchers note that these countries should be a priority for adaptation efforts that will allow them to endure the effects of climate change and maintain or enhance the contribution that fisheries can make to poverty reduction.

"From a strictly environmental perspective, countries in the higher latitudes will see the most pronounced impact from climate change on fishing," said Edward Allison, director of policy, economics and social science at WorldFish and the paper's lead author. "But economically, people in the tropics and subtropics likely will suffer most, because fish are so important in their diets and because they have limited capacity to develop other sources of income and food."

"We believe it is urgent to start identifying these vulnerable countries, because the damage will be greatly compounded unless national governments and international institutions like the World Bank act now to include the fish sector in plans for helping the poor cope with climate change," he added.

Two-thirds of the most vulnerable nations are in tropical Africa, where in many countries fish account for more than half of daily animal protein consumption and where research indicates that fish production in both coastal and inland waters is highly sensitive to climate variations.

In coastal regions, climate variations can significantly alter the flow of nutrient-rich waters—known as upwellings—which sustain fish populations that feed millions in sub-Saharan Africa. Meanwhile, in eastern and southern Africa, rising temperatures in freshwater lakes over the last century have already reduced fish stocks. Future climate change is expected to worsen this trend, while also leading to lower water levels due to decreased rain and increased evaporation.

In the vulnerable countries of South Asia, the potential problems include increased bleaching of coral reefs, caused by a rise in ocean temperatures. In addition, changes in river flows, resulting from reduced snowfall, and melting glaciers, present dangers to freshwater habitats. Scientists predict up to a two-thirds reduction in the summer flows of the Ganges River, which could diminish what are now highly productive river and floodplain fisheries. In addition, fish-dependent people of Bangladesh could see their coastal catch reduced, as a result of predicted increases in the frequency and intensity of tropical storms. Meanwhile, across Southeast Asia, inland freshwater habitats could be damaged by intrusions of salt water as sea levels rise.

In northern South America, the concern is that climate change will alter coastal upwellings, which sustain huge catches of anchovies, sardines and other varieties of small, "pelagic" fish. Evidence on changes induced by the warming effects of El Niño indicates that a rise in ocean temperatures can cause a decline in Peruvian anchovy populations (though sardines may tend to increase), according to the study.

"The problems driven by climate change are bad enough by themselves;

what will make them much worse are the economic and institutional weaknesses of the vulnerable countries identified in this study and their fishing communities," said Steve Hall, director general of WorldFish. "Fisheries are already under tremendous pressure from overfishing, habitat loss, pollution and a range of other factors. Climate adaptation measures must go hand in hand with efforts to confront other threats if these countries are to succeed in building sustainable livelihoods for fish-dependent people."

Adding weight to the report's findings is the fact that its co-authors include Neil Adger, who played a major role in drafting the 2007 UN report on climate change that was awarded the 2007 Nobel Peace Prize, and Ashley Halls, the fisheries advisor to the Mekong River Commission, which focuses on the health of one of the largest freshwater fisheries in the world.

The authors of the study see their research as a "useful starting point" for future initiatives aimed at predicting with greater precision the impact of climate change on fish-dependent populations. One of the many lessons learned, according to Allison, is that work in this area needs to consider both coastal and freshwater fisheries. Uganda, for example, though landlocked, depends greatly on freshwater fish, making it highly vulnerable to climate change impacts.

Allison added that he and his colleagues will continue to refine their ability to link climate change to fish productivity and to social and economic conditions. One of the shortcomings of this study, he said, is that there were not enough data on such variables as the social and economic impacts of fisheries at the country level. The scarcity of data was particularly evident for subsistence fishing and small island states, particularly in the Pacific Ocean. In fact, researchers were unable to calculate all the vulnerability components for 60 nations, so these could not be included among the study's list of potentially vulnerable countries.

Nevertheless, many of these excluded nations - like Kiribati, Myanmar, Somalia, and the Solomon Islands—most likely have a mix of economic, social and environmental conditions that make them highly vulnerable to the effects of climate change on their fisheries.

On the web: www.worldfishcenter.org

Source: WorldFish Center

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