

# Combating climate change: how prepared are poor fishing communities in South Asia?

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**C**limate change is a critical global challenge of recent times. Several events during the last two or three decades have dramatized our growing vulnerability to the phenomenon. Research shows that climate change may impact agriculture and endanger food security; trigger sea-level rise; accelerate the erosion of coastal zones; aggravate natural disasters; and quicken species extinction and the spread of vector-borne diseases.

Fish exemplify global biodiversity. The world's oceans, lakes and rivers harbour at least 27,000 known species. Some 140 million metric tonnes of fish are captured or raised each year, with humans eating more than 75 per cent of this catch. Worldwide, marine and freshwater fisheries generate over USD130 billion annually, employ at least 200 million people, and feed billions of people who rely on fish as their primary source of protein.



Image: S. Jayaraj

Too many fishing boats chasing too few fish: the overcrowded fishing harbour in Cox's Bazaar, Bangladesh

The global warming of seas, rivers and lakes threatens fish stocks, which are already under pressure from over-fishing, pollution and habitat loss. Such a decline in fish catch could devastate human populations, particularly in poorer countries that rely on fish for protein.

## The impact of climate change on climatic and oceanographic parameters in the South Asian seas

The Intergovernmental Panel on Climate Change (IPCC) has projected that the global annual seawater temperature and sea level will rise by 0.8 to 2.5°C and 8 to 25 centimetres respectively by 2050.<sup>1</sup>

In India, the sea-level rise for Cochin on the southwest coast during the past century has been estimated at two centimetres.<sup>2</sup> Future decades may see the rate of increase go up to five millimetres per year.

The data set on sea surface temperature (SST), obtained from various sources, clearly shows sea surface warming along the entire Indian coast.<sup>3</sup> During the 45 year period from 1961 to 2005, SST has increased by 0.2°C along the northwest, southwest and northeast coasts, and by 0.3°C along the southeast coast. In neighbouring Sri Lanka too, the surface temperature record clearly indicates sea surface warming.<sup>4</sup>

## Fish, fisheries and global warming

Sea warming and sea-level rise may strongly impact coastal fisheries in South Asia, aggravating the poverty of coastal communities. Countries in the region can't prevent climate change, but can adopt mitigation/preparedness strategies.

In relation to this, studies have been carried out in India, Bangladesh, Maldives and Sri Lanka — all are members of the Bay of Bengal Programme Intergovernmental Organisation (BOBP-IGO) — on the impact of climate change on fisheries and on mitigation/preparedness strategies to counter such impact.

## India

Marine capture fisheries are vital for food supply, food security and income generation in India. Some one million people in this sector produce three million tonnes of fish annually. The value of fish production



Image: S. Jayaraj

Over-exploited coastal resources and the adverse impacts of global warming are making life difficult for traditional fishers in Tamil Nadu, India

from a fleet of 59,000 mechanized craft, 76,000 motorized craft and 105,000 non-motorized craft is about USD2.8 billion. Recent scientific studies described below show that some commercially viable maritime fish species in India are adapting to climate change.

Small pelagics, especially the oil sardine, were at one time confined to the Malabar upwelling zone along the southwest coast of India, the area between latitude 8°N and 14°N and longitude 75°E and 77°E, where the annual average SST ranges from 27 to 29°C. Until 1985, almost the entire catch was from this area. In the last two decades, however, the catches from latitude 14°N to 20°N are increasing, indicating a positive correlation between the oil sardine catch and SST.<sup>5</sup> Catches from this area contribute to about 15 per cent of India's entire oil sardine catch during 2006.

The Indian mackerel, *Rastrelliger kanagurta*, is also showing signs of changing its habits. During the last two decades this species, which normally occupies surface and sub-surface waters, has not only moved north but has descended into deeper waters.<sup>6</sup> During 1985 to 1989, only two per cent of mackerel catch was from bottom trawlers, pelagic gear such as drift gillnet accounted for the rest of the catch. But from 2003 to 2007, bottom trawlers captured an estimated 15 per cent of the mackerel catch.

The threadfin breams *Nemipterus japonicus* and *N mesoprion* are distributed along the entire Indian coast at depths ranging from 10 to 100 metres. Data on the number of female spawners collected every month off Chennai on the southeast coast of India from 1981 to 2004 indicate wide monthly fluctuations. The spawning season used to occur in the warmer months from April to September, when mean SST ranges from 29.0°C to 29.5°C. It now occurs in relatively

cooler months — October to March, when mean SST is 27.5°C to 28°C.<sup>7</sup>

False trevally, *Lactarius lactarius*, is an economically and culturally important fish in India. It ranks as one of the most preferred, high-quality fish in the Gulf of Mannar region. Higher water temperatures and lower rainfall because of global warming, however, have led to a drastic decline in the numbers of this fish over the last few years.

In the Indian seas, coral reefs are found in the Gulf of Mannar, Gulf of Kutch, Palk Bay, Andaman Sea and Lakshadweep Sea. Indian coral reefs have experienced 29 bleaching events since 1989. Intense bleaching occurred in 1998 and 2002 when SST was higher than the usual summer maxima.

Given the warning that reefs will not be able to sustain catastrophic events more than three times a decade, reef-building corals are likely to disappear as dominant organisms on coral reefs between 2020 and 2040. Reefs are likely to become remnants between 2030 and 2040 in the Lakshadweep Sea and between 2050 and 2060 in other regions in the Indian seas.<sup>8</sup>

On 30 June 2008, India released its first National Action Plan on Climate Change outlining current and future policies on climate mitigation and adaptation. The plan identifies eight core 'national missions' running through 2017. The plan identifies measures that promote development objectives and reap the benefits of combating climate change.

### Bangladesh

For Bangladesh, climate change may cause even more of the floods, cyclones, storm surges and droughts that have devastated it in the past. In September 2008, the government developed the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), a ten-year programme to build the capacity and resilience of the country to meet the challenge of climate change over the next 20 to 25 years.

BCCSAP claims that climate change will damage freshwater and marine fisheries in many ways — the spawning of freshwater species will be impaired; water temperatures in ponds and inland fisheries will go up; the ingress of saline water inland further south will affect the aquatic ecosystem and hit fish production; and turbulent weather will impact on fishing livelihoods. It is critical, therefore, that all potential impacts are identified and measures are put in place to conduct the research and development of management strategies.

### Maldives

The Maldives is also particularly vulnerable to climate change and the many scientific and technical assessments of the region, which have taken place since 1987, have stressed the need for long-term adaptation to climate change.

Fishing is at the heart of the Maldivian economy. More than 20 per cent of the population depends on it. It is a dominant employer with more than 15,000 fisher-





Image: Y S Yadava

Skipjack tuna forms the mainstay of fisheries in Maldives. Global warming will have adverse impact on pelagic species such as tuna



Image: Y S Yadava

Declining fish resources are making life difficult for fishermen in Bangladesh – Chittagong Fishing Harbour, Bangladesh

men, and contributes to 7 per cent of the country's gross domestic product output. In addition, fish is the primary source of protein for the population — tuna is served daily at every meal.<sup>8</sup>

Climate change has the potential to devastate the fishing industry. Tuna is very sensitive to biophysical conditions of the pelagic environment, particularly changes in SST, and pole-and-line tuna fishery is highly dependent on live bait, making it particularly vulnerable to climate change. In addition, the Marine Research Centre in Malé, Maldives, has determined that rising temperature is a key factor in the health and growth of coral reefs.

In 2006, the Maldives adopted the National Adaptation Programme of Action (NAPA). Its goal is to enhance the resilience of natural, human, and social systems and their sustainability in the face of predicted climate hazards. NAPA strives for synergy with Vision 2020, the Seventh National Development Plan and the Millennium Development Goals.

### Sri Lanka

The coastline of Sri Lanka measures approximately 1,760 kilometres, the third longest in South Asia. Some 4.6 million people (about one quarter of the population) live along the coast. The coastline is geographically very diverse, with more than 1,337 fishing villages and 131,000 households.

A study by the National Aquatic Resources Research and Development Agency discusses the impact of climate change on coastal resources. It says that the most sensitive habitats in the country suffer different degrees of degradation owing to a combination of human activity and climatic change. It recommends a slew

of projects to battle climate change including: culture of seaweed; oyster farming; crab fattening; artificial production of marine ornamental fish; value addition to agriculture and fisheries products; and use of fish aggregating devices.

### Going forward

A general understanding of the impact of temperature rise on fish populations is limited at present because of a lack of long-term research. However, with coastal fishery resources already under pressure because of overfishing, the possible impact of climate change is a serious worry.

BOBP-IGO has already initiated some sensitization activities in member-countries with an aim to collect and compile scientific information and share it within the regional and global community. Capacity building programmes are also being taken up to create a cadre of fishery personnel that are aware of the impacts of climate change and are capable of communicating related issues to all stakeholders, including of course the fishers.

Since the fishery sector alone can't prevent climate change, BOBP-IGO will strive to study precautionary measures undertaken elsewhere and adapt them to the region. The result will be a regional status document on the impact of climate change on fisheries and a regional action plan for South Asia.