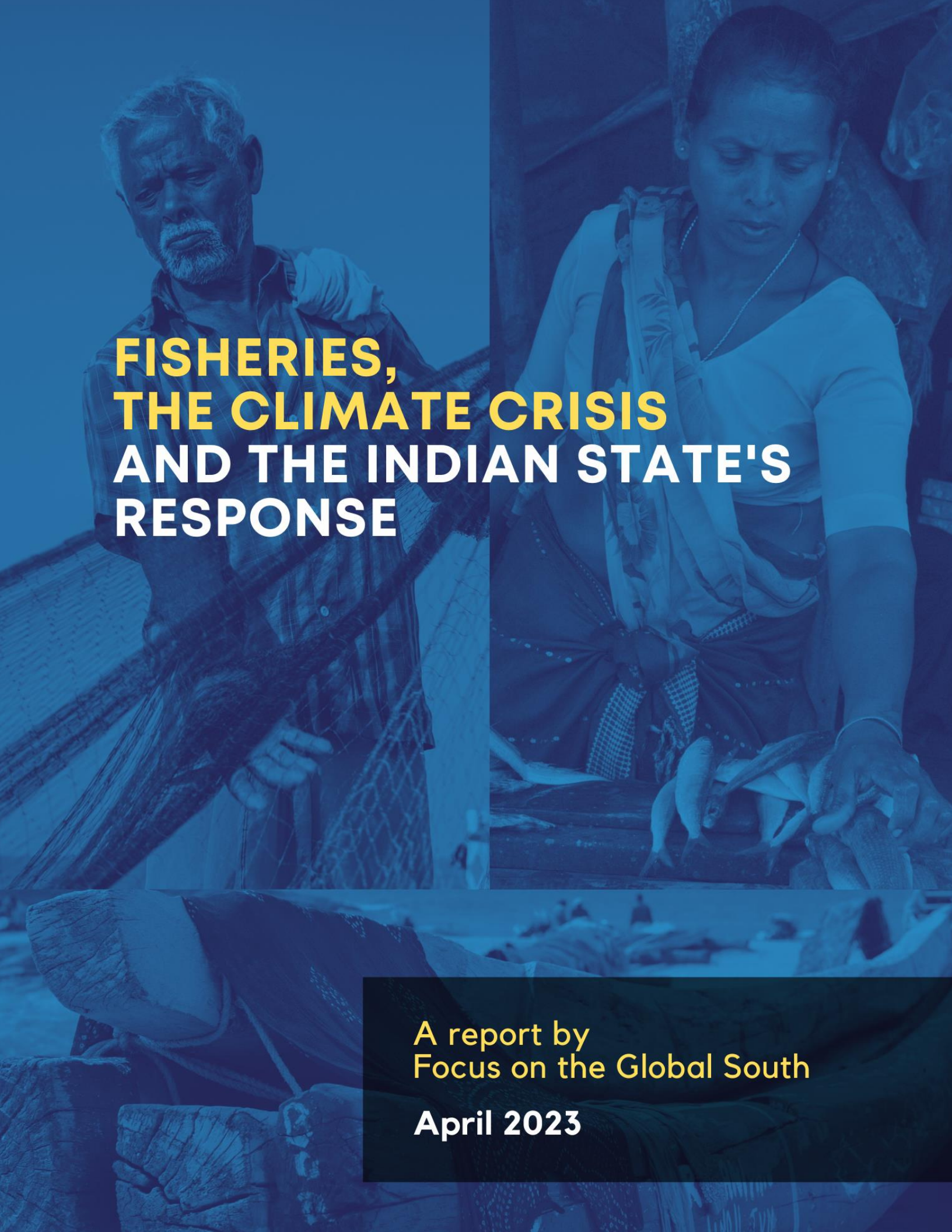

FISHERIES, THE CLIMATE CRISIS AND THE INDIAN STATE'S RESPONSE

A report by
Focus on the Global South

April 2023

This report on *Fisheries, the Climate Crisis and the Indian state's response* captures the discussions in a two part dialogue series on *Policy and Livelihood Challenges for India's Fishing Communities.*

The collaborative dialogue series brought together representatives from small-scale fishing communities, trade unions, social movement networks, academics, researchers and civil society organisations to discuss the issues that affect the interests of India's small-scale fishing communities, and explore future courses of action to support and strengthen these communities as well as discuss ways to ensure ecologically sustainable fishing. The first part of this Consultation summarised in a report titled "The 2022 WTO Agreement on Fisheries Subsidies: Policy and Livelihood Challenges for India's Fishing Communities", discussed the implications of the recently concluded WTO Agreement on Fisheries Subsidies, the current provision of subsidies, beneficiaries of subsidies, and policy challenges at the global and national levels. This report focuses on the climate crisis, its impact on fishers, and the Indian state's response.

Collaborating Organisations:

National Fishworkers Forum (NFF)
National Platform for Small Scale Fish Workers (NPSSFW)
All India Fishers and Fisheries Workers' Federation (AIFFWF)
Delhi Forum
National Centre for Advocacy Studies (NCAS)
All India Peoples Science Network (AIPSN)
Focus on the Global South

Speakers:

D. Raghunandan, All India Peoples Science Network (Moderator)
Sugata Hazra, Jadavpur University
Supriya Vohra, Independent Journalist
A. Biju Kumar, University of Kerala

Report compiled by: Jai Vipra

Cover Images: Getty Images Signature

April 2023

Table of Contents

Introduction

India's fishing communities have had to grapple with multiple challenges over the past few years. These include the impacts of extreme weather events related to climate change that have directly affected their livelihoods, the ongoing economic and health impacts of the COVID-19 pandemic, and various policy battles at the national and international levels.

Fish workers' unions have voiced their concerns against the 2021 Draft Marine Fisheries Bill, as it was tabled by the Government without due consultation. In addition, the imminent adoption of the June 2022 WTO Agreement on Fisheries Subsidies will force countries such as India to curtail subsidies to the sector, which will further endanger the livelihood of these fishing communities.

In India, more than 28 million people are designated as fish workers, comprising nearly two percent of the total population. Of these about 12.4 million, that is, 44 percent, are women. The risk to livelihoods caused by the climate crisis is therefore enormous. According to the Food and Agriculture Organisation (FAO), in 2019, owing to various factors such as overfishing, climate change, among others, the fraction of fish stocks sustainably fished decreased to 64.6 percent, which is a 1.2 percent decline from 2017, implying that nearly 35 percent of stocks have reached unsustainable levels.

Studies have indicated that South Asia, especially India, will be particularly vulnerable to climate change impacts. In 2019, India was hit by a record nine cyclones which severely affected the livelihoods and homes of fish workers. Soon after, the COVID-19 pandemic struck a further blow. The pandemic also hit the export market for the fisheries sector. Experts note that multiple climate-related hazards, including tropical cyclones, extreme sea levels, flooding and marine heat waves, coastal erosion, rise in ocean temperature and salinity, are increasing. The Intergovernmental Panel on Climate Change (IPCC) in its 2022 report highlights that weather and climate extremes are causing economic and societal impacts across national boundaries, with the effects being passed through supply-chains, markets, and natural resource flows. Climate change causes redistribution of marine fish stocks, increasing risk of transboundary management conflicts among fisheries users, and negatively affecting equitable distribution of fish stocks.

In recognition of climate change posing immense challenges for India, the Union Government had introduced a National Action Plan on Climate Change in 2008 with 8 missions. Ironically, there was no specific mission on coastal areas. In the last decade while disasters have increased, the policy response has been slow, inadequate and with little consultation with affected communities.

This report summarises a dialogue amongst researchers, practitioners, reporters and fishers' unions to explore the implications of climate change and the challenges that it poses for fishing communities. It also discusses the Indian state's response in terms of mitigation and adaptation policies geared towards the fisheries sector. It recommends alternative policy formulations and approaches for a just and equitable fisheries sector.

Climate change and fisheries along the Eastern coast of India

Prof. Sugata Hazra

The East Coast of India has been impacted severely by climate change. It battles anomalous rise in temperatures, oceanic heat waves, delayed or irregular monsoons, a rise in cyclone intensity and frequency, and habitat loss driven by a rise in sea levels. Fishers are unable to work when intense cyclones strike. The highest level of sea level rise is in the Sundarbans which is more than 5mm per year, as compared to about 2mm in Kochi and 1.8mm in Chennai.

Climate change has affected all major habitats of fisheries. This includes mangroves, such as in the Suderbans, Odisha, parts of Chennai, Andhra Pradesh and the Andaman Islands, as well as coral habitats. The health of the ocean is also adversely affected due to climate change: a rise in temperature leads to a reduction in oceanic oxygen levels. The Indian Ocean faces an alarming level of warming, with predictions of a 5 degrees Centigrade rise by the year 2100. The ocean also sees an enormous amount of plastic pollution, nitrogen pollution, and an increase in acidity because of a higher rate of dissolution of carbon dioxide in the water.

Pre-existing issues along the Eastern coast

Climate change is occurring while a large part of the marine fish stock of the Eastern Coast is already over-exploited. The over-exploitation has not been carried out by small-scale fishers who fish for subsistence or use small motorised boats. It has been carried out by large investors who buy large fishing crafts or trawlers. Assessing the impact of climate change on an already over-exploited fishery is a difficult task. The number of boats in the marine sector in West Bengal has gone up from about 2000 in 2002-03 to about 8000 in 2017-18. There has been no corresponding rise in fish catch. This means that there is a sharp decline in the catch per unit effort. This is why climate change adaptation must begin with arresting capital-driven overfishing to reduce the vulnerability of the fish stock. The catch volume of all commercially targeted fish varieties in West Bengal has reduced drastically.

Another aspect to consider is that of aquaculture, in particular, brackish water aquaculture in the coastal area.[1] The aquaculture area in the Sundarbans has increased to nearly 5.8 percent of the entire region in 2019, up from 3.59 percent in 1999. The growth of aquaculture has occurred at the expense of agricultural land (although such conversion is not legally permissible), mud flats, and mangroves. This growth has occurred away from the seafront, indicating that it is not caused by a rise in sea levels, but rather by market forces that have been trying to export prawns. These forces have led to the reduction in area covered by mangroves, something that is crucial for the blue economy[2].

[1] Aquaculture refers to the farming of aquatic organisms including both animals and plants. See this explanation by the Food and Agriculture Organization: https://www.fao.org/3/x6941e/x6941e04.htm Brackish water refers to water that has more salinity than freshwater but less salinity than seawater.

[2] United Nations defines the Blue Economy as an economy that "comprises a range of economic sectors and related policies that together determine whether the use of ocean resources is sustainable.

Mangroves are referred to as “nurseries” of fisheries in the eastern region. Climate change has also led to a loss of area under mangroves in the Sundarbans region. Between 2000 and 2020, there has been a net loss of 49 square kilometres from nine ocean-facing islands due to the rise in sea levels. About 110 square kilometres have been lost due to erosion, and only 81 square kilometres gained through plantation, in the Sundarbans region. This gain has transpired due to the efforts of communities and non-governmental organisations. These efforts need to be supplemented with government efforts as well. The composition of mangroves has also changed, and there is a high level of deterioration due to salinity, nutrient scarcity, and frequent cyclones.[3] From the Western coast, there are reports of unrelated infrastructure being built in mangrove areas designated as coastal regulation zones – which should legally see only restricted projects.[4]

The Hilsa fish is the prize catch of West Bengal. The number of boats has increased by about eight times from 2002 to 2017. Meanwhile, the average annual cash of Hilsa has declined by over 13 percent in the last ten years, while its market price has increased by about 5 times from 2005 to 2017.

These facts indicate that Hilsa fishing is no longer within sustainable limits. The Maximum Sustainable Yield (MSY) of Hilsa. is estimated to be in the range of 18,356 tonnes to 25,440 tonnes, but yields in 2002-05 regularly crossed this limit. The MSY is the largest annual harvest that a fish stock can produce over the long term. There are no policies to regulate overfishing in this manner. The implementation of any such policy requires allowing for the active participation of fishers.

Fisheries policies and climate change

Climate modelling shows that sea surface temperatures are predicted to rise 3-4 percent in the West Bengal coastal region by the end of the century.[5] Climate change is expected to reduce the GDP from fisheries by 17 percent by 2050.

Meanwhile, public investment in the marine sector has increased – in 2015-16, the allocation for management of Centrally Sponsored Fisheries Schemes was about INR 3000 crore. In 2018-19, INR 7522 crore was allocated as concessional credit for fisheries infrastructure for states and Union Territories. In 2019, a Central Ministry of Fisheries, Animal Husbandry & Dairying was created, fulfilling a long standing demand from various states. In 2020, INR 20,050 crore was allocated for the so-called Blue Revolution. The use of these funds is now in question in the context of the WTO Fisheries Subsidies Agreement (FSA), which imposes limits on subsidies. The FSA also creates incentives for directing government support towards large-scale fisheries

[3] Sourav Samanta, Sugata Hazra 1, Partho P. Mondal, Abhra Chanda, Sandip Giri, Jon R. French and Robert J. Nicholls. Assessment and Attribution of Mangrove Forest Changes in the Indian Sundarbans from 2000 to 2020. Remote Sensing. 2021, 13, 4957. https://doi.org/10.3390/rs13244957

[4] Leo Colaco, *and* Prayag Arora-Desai. NMMC moves to action over illegal construction on CRZ plot. 4 October, 2022. Hindustan Times. https://www.hindustantimes.com/cities/mumbai-news/nmmc-moves-to-action-over-illegal-construction-on-crz-plot-101664827023911.html

[5] Manob Das and Arijit Das. Assessing the relationship between local climatic zones (LCZs) and land surface temperature (LST) – A case study of Sriniketan-Santiniketan Planning Area (SSPA), West Bengal, India. Urban Climate. June 2020, 32, 100591. https://doi.org/10.1016/j.uclim.2020.100591

to create a globally competitive industry. The focus has shifted from the unorganised small-scale fisheries sector which comprises over 40 percent of fishing communities in India. These changes will come at a time when most subsidies in the fishing sector are already cornered by large-scale industrial fisheries.[6] Fishers' unions have stated their concern at the implementation of the Blue Economy policy and the WTO regulations, which will together work in concert to drive fishers and other inhabitants of coastal areas away from their homes by prioritising industrial fishing.[7]

Top-down planning in fisheries has led to certain gaps and constraints. There is no data sharing among states that could help in forecasting issues for fisheries. The spatial variability of stock exploitation is not incorporated into fisheries policies; in other words, there is little difference in policies for areas where fish stocks are over- and under-exploited. There is no effort to regulate fishing by large trawlers which causes an unsustainable decline in stock. There is no provision for knowledge management and participatory management of sanctuaries and conservatory sites. There is no policy for climate change adaptation in the context of fisheries.

Climate change in the Andaman Islands

The Andaman Islands differ from the Eastern coast in that the fisheries sector in the former is still under-exploited. There is great potential to develop tuna fisheries in this region. However, there is very little investment available in the Andamans to exploit these resources for development. The government, along with local fishers and fishers from Tamil Nadu and Andhra Pradesh, can begin work on creating such tuna fisheries.

Climate change is expected to, and already does, adversely affect coral reefs and coral fisheries. The marine fisheries of the Andaman Islands are intrinsically related to the health of the coral-mangrove system. Indian coral reefs have experienced 29 widespread bleaching events since 1989, when the sea surface temperature was higher than the summer maximum.[8] Coral bleaching refers to the whitening of corals, resulting from environmental stressors, and associated with the destruction of coral reefs.[9] It is predicted that bleaching will become an annual or bi-annual event for almost all reef regions along the Indian coast in 30 to 50 years.[10] Bleaching events are predicted to have serious impacts on marine fisheries in the Andamans. In the 2016 bleaching event, the catch per unit effort declined sharply. A predictive model shows a significant rise in sea surface temperatures and increase in bleaching events in 2030, 2040, and between 2050-60. However, it is possible that due to under-fishing in the Andamans, bleaching events can be accommodated to some extent without serious loss to fisheries.

---

[6] Leo Colaco, Chairperson, NFF.

[7] G. Mamatha, Treasurer, AIFFWF.

[8] Sayani Datta Majumdar, Sugata Hazra, Sandip Giri, Abhra Chanda, Kaushik Gupta, Anirban Mukhopadhyay and S. Dam Roy. Threats to coral reef diversity of Andaman Islands, India: A review. Regional Studies in Marine Science. November 2018, 24, 237-250. https://doi.org/10.1016/j.rsma.2018.08.011

[9] Coral Bleaching. Britannica. https://www.britannica.com/science/coral-bleaching

[10] E. Vivekanandan, M. Hussain Ali, B. Jasper and M. Rajagopalan. Vulnerability of corals to warming of the Indian seas: a projection for the 21st century. Current Science. December 2009, 97, 11, 1654-1658. https://www.jstor.org/stable/24107307

To prepare ourselves for climate adaptation, we must first fully understand the diversity of our fishing regions, thereby preparing a differentiated response. A considered and differentiated response requires that we take fishers, their unions and fisheries' organisations on board. Such participation is required not only to regulate fishing, but also to explore under-explored areas.

Climate change and fisheries along the Western coast of India

Prof. Biju Kumar

A fishery is composed of three elements – the resource, the habitat, and the people who are involved in capture, processing and sale of the resource. In the last decade, marine fisheries' catch has plateaued. The productivity of artisanal fisheries is in decline, and the total increase in marine fish commodity production in India is primarily due to industrial fishing and multi-day trawling. Even in Kerala, which was once the leader in marine fish landings, the last two decades have seen a decline in total marine fish landings.[11] Over-harvesting of resources has led to some specific groups of fish being at risk of local extinction. This includes Psettodes erumei and other species of flatfishes.

Pre-existing issues along the Western coast

Along with climate change, there are a whole host of issues that affect fisheries along the Western coast. This includes overcapacity of vessels, overexploitation of resources, coastal development activities (which drive traditional fishers out of their habitats) and pollution. Upstream activities, such as river pollution being discharged into seas, also affect fisheries along the Indian coast. The disappearance of mud bank fisheries in Kerala can be connected to the reduction of river inputs into coastal waters. The gap between backwaters and coastal waters is also reducing every year. Therefore, climate change cannot be analysed in isolation while considering the issue of resource availability in coastal regions.

Just like the Eastern coast, the Western coast has also seen a considerable decline in the area covered by mangroves. There is also a large incidence of maladaptation, or adaptation that leads to unintended consequences. Maladaptation affects the most disadvantaged groups with the most intensity. Climate change has also led to increasing eutrophication[12] all along coastal waters, most prominently along the Western coast, affecting fisheries resources adversely. An indicator of this phenomenon is that jellyfish now bloom abundantly along the Indian coast, because they thrive in nutrient rich waters.

Impact of climate change on the Western coast

There are three major impacts of climate change on fisheries along the Western coast. The first set of impacts is ecological. Yields change, species distribution patterns are affected, the variability of catches increases, and there are changes in the seasonality of production. The second set of impacts is direct. Gears are damaged, there are increased risks at sea, navigation routes change, and fishing communities experience floods. The third set of impacts is socio-economic in nature. This includes an influx of migrant fishers, increasing fuel costs, deteriorating health conditions, and reduced security.

---

[11] Fish landings are defined as the catches of marine fish landed in foreign or domestic ports. See OECD iLibrary: https://www.oecd-ilibrary.org/agriculture-and-food/fish-landings/indicator/english_93a69a82-en

[12] Eutrophication refers to pollution where there is a harmful enrichment of nutrients in a water body, leading to overgrowth of algae and other aquatic plants. See the European Environment Agency: https://www.eea.europa.eu/archived/archived-content-water-topic/wise-help-centre/glossary-definitions/eutrophication

The case of sardine fish is instructive in how climate change combined with other causes can affect resources. Stocks of *sardinella longiceps* have been decreasing all along the Western coast due to an outward migration of the fish. During 2011-15, this fish contributed to 15 percent of the national marine production. By 2018, its catch had declined by 54 percent. A mix of factors has been responsible for this change, including rainfall, over-saturation of nutrients in the water, El Nino[13], an abundance of jellyfish, and overfishing, especially of juveniles. However, sardines have been migrating not only outwards from the Western coast, but also eastwards. This has led to an increase in the catch along the Eastern coast, all the way up to Andhra Pradesh and Odisha. This case demonstrates that sometimes an increase in catch along one coast might be supported by resource depletion along the other coast.

Climate change is pushing some fish to deeper waters, ensuring they can be caught only by trawlers. It is also changing the reproductive patterns of many fish species. It is reducing the number of predatory fishes, leading to the capture of fish at lower levels of the food web. We can now also observe the phenomenon of fishers fishing *for* the bycatch, which refers to unwanted fish captured in nets while capturing other fish. Fishing for bycatch occurs because of the high demand from feed manufacturers, leading to increased exploitation of fisheries.

Responding to climate change along the Western coast

There is a need to increase awareness about the impacts of climate change, coupled with capacity building. Fishers' own perspectives on adaptation and sustainable fisheries must be incorporated into such capacity building. For instance, fishers' unions point out that sea erosion is a growing concern across all coastal states, as it leads to the reduction of the area available for small artisanal fishers to dry their nets and park their boats. They recommend the construction of sea walls, a solution that is much talked about but hardly implemented.[14] They also recommend climate-resilient fish drying systems along the coast, because fish can rot while drying.[15] Many such solutions can only be implemented with the participation of local fishers.

In the same vein, regional organisations should be strengthened to tackle climate change related issues. India needs to address transboundary fishing issues and implement a deep-sea fishing policy that prioritises domestic fishers. There is also an urgent need to create common platforms for understanding the impact of climate change and sharing best practices.

As the government plans massive investment in the "blue economy", it must keep in mind that blue growth must be accompanied by blue justice. Blue growth can lead to several injustices, including dispossession, displacement, ocean grabbing, pollution, environmental degradation, undermining of the livelihoods of small-scale fishers, inequitable distribution of economic benefits,

[13] El Niño is a climate pattern that describes the unusual warming of surface waters in the central and eastern tropical Pacific Ocean. El Niño events can disrupt normal weather patterns. It has an impact on ocean temperatures, the speed and strength of ocean currents, the health of coastal fisheries, and local weather.

[14] G. Mamatha, Treasurer, AIFFWF.

[15] Pradip Chatterjee, National Convenor, NPSSFW.

abuse of human rights, abuse of indigenous persons' rights, and so on. The government must stimulate a rigorous dialogue on achieving a more just and inclusive ocean economy. Acknowledging the recognitional, procedural and distributional concerns listed above might require a complete rethinking of the blue growth paradigm.

The government should also heed calls to "green the blue", i.e., to take seriously the environmental concerns raised in the context of fisheries. This should include the removal of harmful subsidies to industrial fishing, collecting better data on the impact of climate change, and measuring the costs and benefits of economic activity in the sector. It can also include a climate tax imposed on large-scale players.[16]

Oceans now appear as a new commodity frontier for capital accumulation, and against this backdrop, blue "degrowth" approaches should also be considered. Such approaches compel us to look for alternative ways to use and access seas and oceans.

[16] Pradip Chatterjee, National Convenor, NPSSFW .

Climate change and marine fishers' welfare

Supriya Vohra

Climate change has led to a rise in the frequency of tropical cyclones along both the coasts. This has had three broad and immediate impacts on fishers. First, it has led to fewer viable fishing days in a year. In Kerala, for example, the 2017 cyclone led to an estimated 46 percent decline in the number of fishing days. In West Bengal, fishers report that at least 40 to 50 days in a year are unviable for fishing, in addition to the monsoon months when fishing is banned. Second, there is damage to boats, nets and equipment. When such destruction occurs, government compensation is usually insufficient to repair damage, and fishers resort to local money lenders for loans. The interest on such loans is sometimes high enough that fishers have to forgo self-employment and work for other fishers, and even working supplementarily in other sectors, for instance construction. Third, there is a decline in fish catch. This decline means that fishers have little incentive to go out to sea every day. Fuel costs are high and rising, making a daily calculation of cost versus benefit of going out to sea necessary.

It is important to note that the decline in fish catch is taking place due to multiple reasons. Several studies have shown that industrial pollution has wreaked havoc along the coast of Gujarat, destroying marine life and forcing fishers to fish deeper and deeper into the sea. Infrastructure development along the coastline is another major reason for the decline in fish catch. For example, a 2021 study shows how the construction of the Adani-owned Vizhinjam International Multipurpose Deep Sea Port in Kerala damages marine biodiversity in the region, and has led to a steep and immediate decline in the fish stock, destroying the local fisheries economy.[17] The port itself has created no-fishing zones that keep out fishers, most of whom are artisanal fishers. About 2,000 fishers were compensated with a meagre amount, coming up to about Rs. 300 per day for five years, for the loss of their livelihood. Women who used to sell fish now travel to the city to work as domestic workers. In the Konkan region, fishers have similarly been protesting against the Vadhavan port, a project that is likely to affect the livelihoods of at least 20,000 fishers.[18] However, the government has termed these protests against the port as anti-people.

Fishers' unions report that there is an increase in the migration of small-scale fishers as the occupation rapidly becomes unviable due to increasing push to go farther out to sea, and rising fuel costs. In addition, mechanised fishing is now estimated to capture more than 82 percent of the total catch in India.[19] Viability for small-scale fishers can only result when there are restrictions on large-scale fishing in near shore areas, because open access to the seas exacerbates the impact of climate change.

---

[17] Kumar Sahayaraju and Johnson Jament. Loss of marine fish stock in south west India: Examining the causes from the perspective of indigenous fishermen. International Journal of Fisheries and Aquatic Studies. August 2021, 9, 5, 23-29. https://doi.org/10.22271/fish.2021.v9.i5a.2559

[18] Prayag Arora-Desai. Fisherfolk call for black flag protest against Vadhavan Port on Oct 2. Hindustan Times. 25 September 2022. https://www.hindustantimes.com/cities/mumbai-news/fisherfolk-call-for-black-flag-protest-against-vadhavan-port-on-oct-2-101664046328378.html

[19] Pradip Chatterjee, National Convenor, NPSSFW.

Climate change and the inadequacy of government welfare policy

Policies related to fishing in India purport to keep fishers in front and centre, but in substance only deal with fisheries, infrastructure development and increasing fish stocks. What fishers need today is a strong social safety net, due to conditions created by the pandemic and economic shocks. However, the government's priority has been to push for an export-oriented, production-driven policy which shows a preference for allocating budgets to deep-sea fishing, aquaculture, and infrastructure, instead of covering welfare schemes. Only about eight percent of the fisheries budget has been allocated to welfare schemes. With increasing natural disasters, fishers need insurance policies to secure boats, nets and other equipment. Current compensation payouts in case of disasters are also paltry – for instance, after the Amphan cyclone struck the east coast of India in May 2020, the compensation per boat was merely INR 5000.[20]

A 2021 analysis of two government schemes for fishers in all nine coastal states shows the disparity in their implementation. The two schemes include a savings-cum-relief scheme provided to cover losses resulting from monsoon fishing bans, and group insurance against accidents. The analysis found that in Gujarat and Maharashtra, these schemes are inaccessible. In Odisha, some districts have a fishing ban for up to seven months to protect the nests of Olive Ridley turtles. Fishers in this case receive a compensation of only INR 7,500 for the whole season. In Andhra Pradesh, Karnataka and Goa, the implementation of these schemes is patchy. The only two states in which these two schemes seem to be functioning well are Tamil Nadu and Kerala.[21]

These studies show that there is a clear disconnect between what fishers want and what the government provides. This points towards the need for a mechanism to create a dialogue between the government and traditional fishers. There is also a need for better journalism in this sector to connect the dots between science, policy, and ground realities. There needs to be more site-specific research into the fisheries economy. While climate change is damaging, it sometimes only accelerates the damage that has been a long time coming because of the government's preference for extractive growth.

[20] Pradip Chatterjee, National Convenor, NPSSFW.

[21] Supriya Vohra. During Monsoon Fishing Ban, India's Small-scale Fishers Flounder at the Deep End. The Wire Science. 12 November 2021. https://science.thewire.in/politics/rights/india-monsoon-fishing-ban-small-scale-fishers-insufficient-relief-coverage/

Conclusion

A fact long recognised by the Intergovernmental Panel on Climate Change (IPCC) is that climate change exacerbates pre-existing vulnerability. This phenomenon is stark in the marine fisheries sector. Along both coasts, overcapacity and overfishing are rife by large trawlers. Data also demonstrates that overfishing along the Indian coast is for the most part caused by domestic vessels; however, since 2015-16, there has been an increasing presence of foreign vessels on the border of the Exclusive Economic Zone (EEZ).[22]

In either case, the burden of this overfishing and overcapacity is created primarily by industrial fleets and mechanised vessels, and is borne by small-scale fishers. Small-scale fishers today are being squeezed between these mechanised vessels on one side, and inland activities such as by ports and infrastructure construction, on the other. As the impacts of climate change on the ecosystem become clear, it is important for policymakers to realise that small-scale fishers are an inherent part of this very ecosystem. Small-scale fishers unfortunately now face dispossession and displacement.

The effects of climate change, including acidification and temperature changes, are faced by small scale agriculturists as well. Like fish migrate due to environmental changes, disrupting livelihoods, so do crops – a change in environmental conditions can change optimal locations cultivating certain crops. Thus for the entire primary sector, adaptation is crucial. Adaptation measures can be fine-tuned to protect the habitat of small-scale fishers and also increase the potential catch in these areas.

While this report focused on marine fisheries, it is worthwhile to note that inland fisheries also face unpredictable droughts and floods due to climate change. They face additional challenges of river pollution and water diversion, leading to the desertion of many fishing villages.

It is quite clear that in India, policies related to fishing are not based on data. In fact, there is no comprehensive policy framework that assigns rights and obligations in this sector. In the absence of a policy framework, those who can capture resources establish their own rules in their own interests. Thus, preparing and implementing a policy framework is of the utmost importance.

To ensure that this policy framework holds the interests of small-scale fishers as primary, an alternative charter is required. Such a charter ought to examine the questions of sustainability and livelihoods from the lens of blue justice.

[22] Global Fishing Watch data analysed by Ganesh N., participant. See: https://globalfishingwatch.org/map

The fisheries sector contributes nearly one percent to India's GDP and is termed as a sunrise sector. Despite this, fishworkers' future continues to remain in jeopardy. Small-scale fishers in particular are plagued by depleting fish stock as waters are overfished by large-scale fishers with mechanised vessels. Rising fuel costs, environmental degradation, and volatile markets all contribute to inequity and distress migration in this sector.

Climate change exacerbates these pre-existing issues. An increasing number of environmental hazards, changing fish habitats, coastal erosion, etc., all work together to make fishers' occupation insecure and unpredictable.

Policymaking has not kept up with these changes, and seeks to promote "blue growth" over blue justice – which, in other words, is a continuation of the status quo. This report examines the impacts of climate change on both coasts in India, as well as the adequacy of the Indian state's policy response to climate change. It brings together views of researchers, practitioners, reporters and fishers' unions as a first step towards the creation of an alternative charter for a just and sustainable fisheries sector.