University of Southampton

Sustainable Small-Scale Marine Fishing Resources and Communities in Kerala, India

Project team:

Dr Nikita Gopal, Dr Madhu V R, Dr Sandhya K M, Dr Rejula K
Indian Council of Agricultural Research
Central Institute of Fisheries Technology, Kerala

Dr Bindi Shah University of Southampton

Professor Paul Kemp University of Southampton

Dr Bethan O'Leary University of Exeter

Dr Deepayan Bhowmik University of Newcastle

Mr Richard James MacCowan
Founder, Biomimicry Innovation Lab

Context for the research project

Approximately 3.3 billion people rely on fish for ~20% of their protein intake; nearly 60 million people are employed in the primary sector of fisheries and aquaculture, associated value chains support over 100 million full and part-time jobs; and one in two fishworkers are women (FAO 2022). Yet globally wild fish stocks are in decline. The oceans and viability of marine fisheries are under threat from rapid declines in biodiversity and intensifying human impacts (IPBES 2022), and increasingly unsustainable and unequitable fisheries (FAO 2022). The vital importance of improving ocean health for people and nature is well-recognised in the United Nations Sustainable Development Goals 5, 10, 12 and 14, Convention on Biological Diversity, and in the current Decades of Ocean Science and Ecosystem Restoration.

In Kerala, fishing is a significant economic activity providing livelihoods to thousands of fisher men and women and supporting the state's economy. While the mechanized sector dominated by trawlers contributes significantly to fish catches, small-scale fisheries contribute to the bulk of catches of sardine, mackerel and anchovies (Abdussamad et al. 2015). However, the livelihoods of small-scale fishers had been affected by decline of Indian oil sardine landings in Kerala from 3,22,103 t in 2011 to a meagre 13,154 t in 2020, though there has been a subsequent increase in sardine landings.

The rich and unique coastal ecosystem of Kerala is impacted by: increasing frequency of extreme climatic events; and human factors such as increased presence of plastics and other litter (Damaris et.al., 2019; Lekshmi, 2023), overfishing and fishcatch of juveniles due to increased demand in local and international markets, and habitat degradation resulting from coastal development activities. Declining marine fishing livelihoods is resulting in fishers seeking alternative occupations and migration to urban centres.

The Kerala government has implemented various marine fisheries regulations since the 1980's with the aim of improving the condition of fisheries resources in the state, to promote sustainable fishing practices, and to promote alternative livelihoods for fishermen. Some of these regulations include:

- Stipulating the mesh sizes and the total dimension of the fishing gear used, including restrictions on the size and number of fishing vessels and the engine power
- Seasonal ban for certain class of vessels coinciding with the breeding season of fishes
- Zone wise demarcation for different classes of vessels
- Minimum legal sizes for fish that can be harvested

Also noteworthy in Kerala is the formation of State Fisheries Management Committees (SFMCs) at three different tiers, beginning at the village level up to the state level. This structure provides a vehicle to integrate needs from the grassroots level that can be considered through a regional focus at the state-level SFMCs, which meet every six months. This is the first initiative of its kind in the nation, and it has enormous potential for citizen involvement in fisheries management decision-making.

Despite these efforts, the fishing ecological system in Kerala continues to face significant challenges resulting from increasing demand for fish, the lack of effective enforcement of fishing regulations, and the degradation of marine habitats. Understanding local socio-economic, cultural and political contexts small-scale fisheries operate within, is vital to understanding opportunities and barriers to potential interventions to facilitate adaptation and build resilience among marine fishing communities in Kerala.

About the study

Research findings and key recommendations are based on the project 'Food, Gender, Enterprise: leveraging interdisciplinarity for sustainable small-scale fisheries'. The project leveraged engineering and social science methodologies to create understanding of the social and technological solutions needed to enhance capacities for adaptation, develop resilience and sustainably manage small-scale fisheries resources.

Acknowledgments

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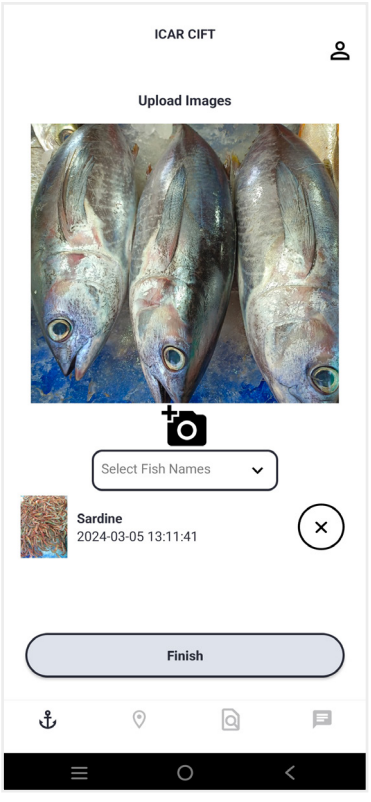


Image: The Fishing App

Key findings

Trends in the fishing ecological system in Kerala:

Historical fish stock data, from the ICAR-Central Marine Research Fisheries Institute (ICAR-CMFRI), on Indian oil Sardine and Indian Mackerel for the major fishing harbours of Ernakulum District, Kerala for the period 2002-2021 indicate substantial drop in certain years (Figures 1 and 2). Such variations can be explained by natural climate events (see Figure 3: infographic time- line). After any extreme climate event there is a sharp decline in fish catch, which take time for recovery.

Figures 1 and 2 also indicate a gradual decline in sardine and mackerel fish stocks after 2015. Despite measures introduced since the 1980s by Kerala state to improve fisheries resources and promote sustainable fishing, the decline of fisheries resources in Kerala suggests the influence of other environmental factors, such as changes in water temperature, salinity, ocean currents, and pollution, which can lead to drastic changes in the catches of Indian sardine and its population dynamics.

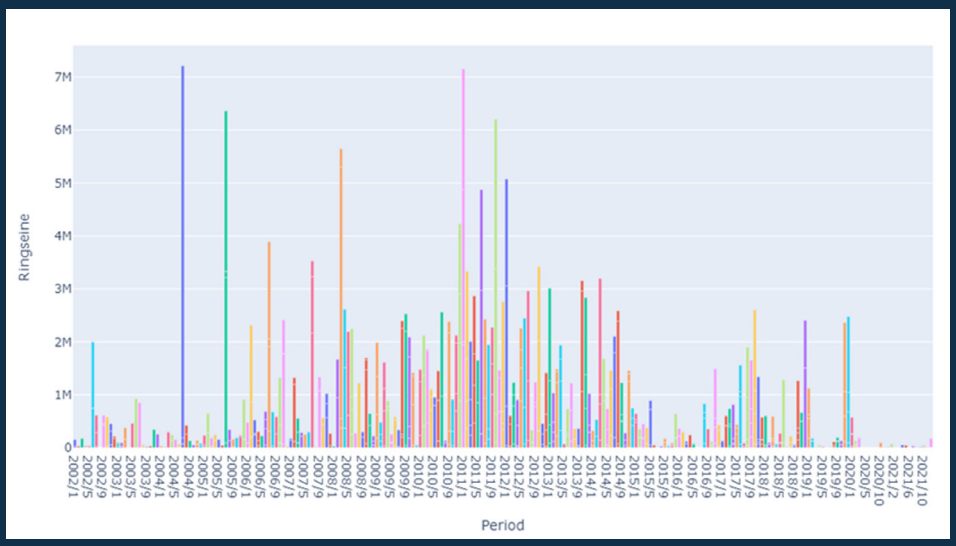


Figure 1: Oil sardine catch (kg) from Ringseiners in Ernakulam, between 2002-2021 (data source: CMFRI).

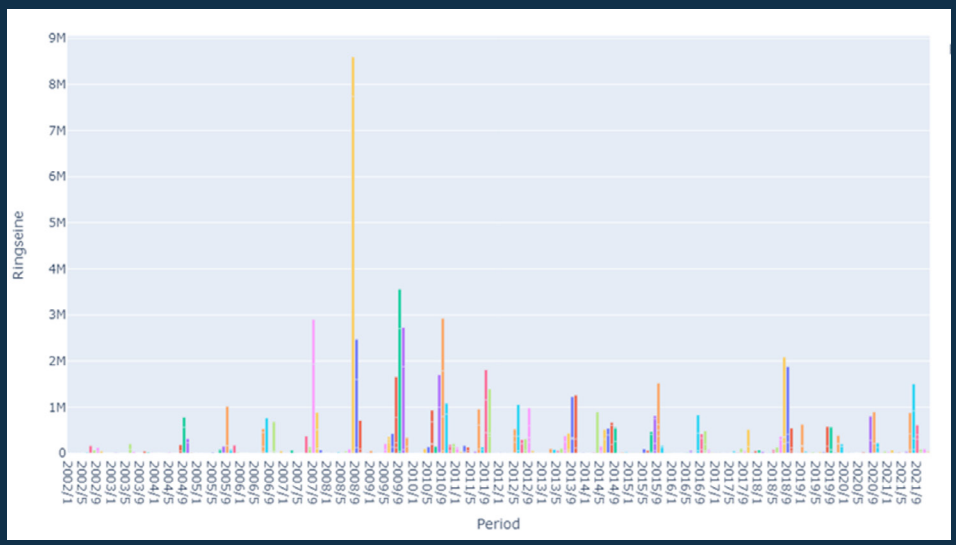


Figure 2: Mackerel catch from Ringseiners in Ernakulam, between 2002-2021 (data source: CMFRI).

2000
Introduction of inboard vessels

2004
Tsnunami

2015
North Indian Ocean cyclone season

2017
Tropical cyclone Ockchi

2018
Kerala flood

2020-21
COVID-19 and cyclone Tauktae

Figure 3: Infographic time-line indicating key extreme weather events.

Trends in socio-economic and cultural changes in small-scale fishing in Kerala:

We employed qualitative research methods to understand the socio-economic and cultural changes that the small-scale fishing community of Chellanam, on the coast of Kerala, has experienced. Chellanam is a major small-scale fish landing centre of Kerala with about 150 motorized ring seine fishing boats, followed by fishers using gill netting and cast netting. Fishermen are mainly dependent on marine fisheries for their livelihood, but during the lean period they also depend on the brackish water resources.

Convergence of the challenges highlighted below has led to a decrease in incomes for small-scale fishers (Natarajan et al. 2023) and has prompted a shift of local labour away from the fishing sector to other occupations in urban areas in recent years.

CHALLENGES: FISHERMEN

Ring seine fishing

- Increasing incidence of dolphins cause damage to fishing gear, which results in loss of fishing days.
- High incidence of plastics, including Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG), and from terrigenous sources affect the efficiency of fishing operations.
- Increased prevalence of jellyfish in the grounds clog fishing nets and affect the efficiency of fishing operations.

Equipment and fuel

- Scarcity due to market shortages and limited physical access to the fuel (kerosene) bunks contribute to higher than market prices for fuel.
- Increase in price of fishing net material and other fishing equipment force fishermen to seek more affordable, but potentially less durable, alternatives. This significantly reduces the overall profitability of their fishing operations.

Marketing

- There is a direct correlation between fish prices and fish supply; the vessels that land fish first consistently command higher prices, creating a competitive disadvantage for others.
- Prevalence of middlemen in fish value chains is high and often deemed exploitative. Charging a commission of 10% on the total fish price, these intermediaries further exacerbate the situation by not allowing other vendors to operate within their territory.

Financial

- Access to convenient loans and government subsidies are limited.
- Enforcement of tax for use of harbour increases the operational costs for fishers and the taxes levied on different classes of vessels are perceived as excessively high. Paying extra toll charge for ice boxes and fish storage boxes also increases costs.
- Ensuring adequate insurance coverage for fishing vessels and their equipment in case of loss is a recurring concern.
- Potential delays or non-receipt of monthly pension payments for fishers is also of concern.

Infrastructure

- The lack of sufficient landing and berthing facilities, including basic amenities such as toilets, is a recurring issue.
- The effects of inadequate dredging in harbours, combined with run-off from other dredging sites, pose a significant challenge to fishing activities.

Climate change

- Increased frequency of cyclones significantly reduces total number of effective fishing days and lead to loss of income from fishing.
- Increased frequency of extreme weather events requires improvement in the accuracy of the prediction system for adverse weather conditions.
- Extensive areas of mangrove forests, which are crucial habitats for the juveniles of fish and shrimp development, have suffered destruction due to siltation and activities associated with shrimp farming and construction.

CHALLENGES: FISHERWOMEN

Cultural

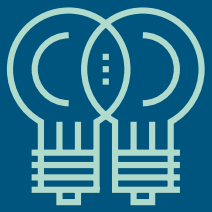
- Accessibility of beach landings for fisherwomen has undergone a significant transformation. Technological advancements have led to the relocation of most fish landings to harbours (Gopal et al. 2023). This shift restricts access as the male-dominated nature of harbour spaces and activities marginalizes fisherwomen.
- Limited resources available to fisherwomen also hinder their ability to participate effectively in the fish auction process.

Climate Change

- Increasing unpredictability of weather, notably inconsistent or inadequate sunlight availability during fish drying leads to reduced shelf life for fish with high fat content.
- Drying fish also needs regular monitoring to prevent fish spoilage due to unexpected rainfall.
- The challenges associated with climate change coupled with fluctuating availability of fish, impact income and undermine any attempts at economic planning.

Financial

- Most households in this community are below the official poverty line for rural areas.
- Lack of capital amongst fisherwomen acts as a barrier to initiating and sustaining businesses.
- Women face high prices for raw materials in fish processing, especially shrimp..



Key policy recommendations

Direct support for small-scale fishing communities:

- Providing compensation to fishers for loss of catch and nets/gear, and fishing days due to occupational hazards and inclement weather.
- Incentivising bringing back used plastics to shore.
- Rationalising taxes levied and registration fees imposed on fishing vessels.
- Developing an alternate marketing mechanism in which producers are assured with minimum support price for their fish.
- Provision of insurance coverage for fishing vessels and gear.
- Formulating programmes for enhancing financial literacy and access to credit.

Infrastructure development:

- Formulating a long-term plan for holistic development of harbour and associated infrastructure.
- Establishing kerosene bunks in the proximity of the landing centres and link supply with easy credit system.
- Establishing community-based dryers for women.

Climate change mitigation:

- Implementing measures to enhance climate mitigation efforts in fishing communities, including targeted financial support for such projects and the allocation of government grants specifically for women-led initiatives.
- Implementing mangrove replanting projects involving the community, especially women's groups to restore habitats as a climate adaptation and mitigation measure.

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