



# Market Reforms of Marine Fisheries During COVID-19 in Kerala: Implications for Sustainable Management

A. Suresh<sup>1\*</sup>, V. K. Sajesh<sup>2</sup>, A. K. Mohanty<sup>3</sup> and C. N. Ravishankar<sup>4</sup>

<sup>1</sup>ICAR-Central Institute of Fisheries Technology, Kochi, Kerala - 682 029

<sup>2</sup>ICAR-Indian Institute of Spices Research, Kozhikode, Kerala - 673 012

<sup>3</sup>ICAR-Agricultural Technology Application Research Institute, Umiam (Barapani) Ri-Bhoi District, Meghalaya - 793 103

<sup>4</sup>ICAR- Central Institute of Fisheries Education, Mumbai, Maharashtra - 400 061

## Abstract

Marine capture fishery in India is facing issues of unsustainability in terms of declining catch per unit effort and over-capitalization. Attempts to address the issue largely hovered around technology solutions and regulations on fishing activities. The role of stakeholder participation and market forces most prominently reflected by the income of the stakeholders are conspicuous by its absence. In this background, the study inquired the hypothesis that reforms in fish marketing regulations can serve a useful role in ensuring sustainable fishing. The hypothesis is tested by using field-level data on market intervention in marine fisheries by the Government of Kerala, India during the COVID-19, and the response of fishers towards it. The study points towards favourable attitude of fishers, particularly the traditional fishers, towards the new system. The results highlight that simultaneous reforms in fishing regulations and markets have generated income stream with less variability while reducing fishing pressure.

**Keywords:** Sustainable fisheries, COVID-19, fish marketing, livelihood security, maximum sustainable yield

## Introduction

Sustainable harvest of marine fish resources is considered as a critical strategy to maintain ocean health, to ensure continued livelihood security of

fishers and to maintain the nutritional security of consumers. The strategies followed to contain the COVID pandemic during the first wave in the fisheries sector offer valuable lessons that can be imbibed into action plans for implementing sustainable fishing practices. The results from a study on the impact of COVID-19 on marine fisheries in Kerala, India, provide insights in this direction.

The unsustainability issues in marine fishing owes largely to an increase in the mechanisation of fishing vessels and usage of fishing gears with large capacity. The number of fishing vessels operating in Indian waters has increased over the years. There is a gradual transition from traditional and low-level motorised fishing vessels to mechanised fishing vessels. Between the years 2000 and 2010, the mechanised fishing fleet size was in excess of 125% of the recommended fleet size (Suresh & Parappurathu, 2018). However, most of the Indian vessels are of less than 24m in size and fall under the small category. All the fishing vessels (except a few) operate within the Exclusive Economic Zone (EEZ) of India. This has resulted in a high level of competition within the EEZ, raising issues of unsustainability.

The unsustainability issues in marine fisheries have affected the life and livelihood of fishers across globe. These unsustainability issues are characterised by declining catch per effort ratio in fishing, reduced fish catch and increasing expenditure for fuel. The open property nature of fishery resources accentuates the unsustainability issues. The economic impact of the unsustainability issues falls disproportionately high on the traditional and artisanal small-scale fishers.

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\*Email: sureshcsuri@gmail.com

The policy response toward the unsustainable fishing is mostly reflected in the Code of Conduct of Responsible Fisheries (CCRF) of Food and Agricultural Organisation (FAO), which recommended a slew of non-binding commitments to be adopted by the signatory nation states. India has largely followed suit. Several states in India have also promulgated Marine Fishery Regulation Acts (MFRAs), incorporating the spirit of the CCRF. In the state of Kerala, MFRA was revised in 2017, and rules were issued in 2018. The rules in general mentions about technology and regulatory solutions with regard to fishing, but is not linked with fish auctioning and marketing and fishermen income. The property rights affect the attitude of the stakeholders towards sustainable fishing and conservation efforts. Marine fish being a common property resource, where fishers trying to maximise their short-term self-interest, ends up in collapse of the resource, known as “tragedy of commons” (Hardin, 1968). In such a situation, fishers turn out to be both the causative agents and the victims. If the strategies to prevent over-exploitation of fishery is not assuring a relative benefit compared to non-adoption of the strategies, then the motive of the adoption collapses to altruism, a spirit which is easily fallible. The relative benefits, like generation of a stable income, could lead to adoption of sustainable technologies. In the case of fisheries, if the sustainability-oriented fishing reforms can be accompanied by marketing reforms, it could potentially trigger adoption of the sustainable practices. Role of markets in conservation efforts have been discussed in case of conservation of land races in case of crops as in case of rice (Gauchan et al., 2005; Gopi & Manjula, 2018; Mameno et al., 2021). The role of markets and prices in conservation in fisheries has been noted in some studies. Two strands of thought are prevalent in case of conservation fishery: one, exclusion from fishing activities and developing marine protected areas and, two, more of anthropocentric approaches as in case of usage of incentives (Hilborn, 2007). The efficacy markets and prices are highlighted by some research (Jacquet et al., 2010; Cramer & Kittinger, 2021). However, the literature in this area is limited.

During the first wave of COVID-19, the Government of Kerala introduced a bunch of reforms which included introduction of a marketing system where the fish was sold at a fixed price, depending upon the variety of fish (Government of Kerala, 2021; Ramachandran et al., 2020). A major reform in

marketing was introduction of a fixed price system of auctioning. Interactions with the fishermen and other stakeholders indicated that the fishers demanded continuance of the system, highlighting an income stream with relatively low variability. In this background, the present study was undertaken with the objective to analyse the perception of the fishers on the impact of COVID-19 in marine capture fisheries and its policy implications for sustainable fishery. The hypothesis is that sustainable fishery initiatives are more effective if it is coupled with reforms in the value chain/marketing system that economically benefit the primary producers. Empirical evidence to this could help to consider a market as a major instrument towards sustainable marine fisheries.

In India, COVID-19 was first reported in Kerala in the last week of January 2020. India adopted a slew of measures to contain the spread of the disease. A national lockdown was announced pan India on 25<sup>th</sup> March for a period of three weeks. This was further extended till May last week and gradually relaxed thereafter. While the lockdown measures have contributed to a reduction in the spread of the disease, it has disrupted the life and livelihood of millions and caused economic loss. The real GDP contracted by 15.7% during the first half of the financial year 2020-21 (Government of India, 2021). One of the sectors that was affected was the marine capture fisheries.

The COVID containment measures are reported to have both positive and negative impacts on the fish value chain globally. In India, disruptions in the supply chain of both inputs and outputs were reported. The daily loss in the marine fisheries sector was about Rs.225 crores (Suresh & Sajesh, 2020). However, COVID -19 had created a unique opportunity to facilitate the recovery of fish stock. Vessels were staying in ports and fishing was reduced to almost 80% (Korten, 2020). The lockdown and labour shortages caused a shrinkage of the Indian trawler and fishmeal industry (Jigeesh, 2020).

## Materials and Methods

The data for the study was collected from the Ernakulam district of Kerala, India. The total marine fish production is about 610 thousand tonnes in the year 2019 in Kerala, of which 11.1% is contributed by Ernakulam district (Government of Kerala, 2020). Ernakulam has a coastal length of 46km, with a marine fisherfolk population of over 73 thousand in

the year 2019-20, accounting for 9.2% of the total marine fisherfolk population of the state. Fishing operations in Ernakulam consist mainly of small-scale traditional (artisanal fishing), motorized and mechanized fishing. Trawl fishing, mini purse seining (also known as ring seine), gillnetting, and long lining are other major fishing practices.

The primary data on livelihood impact was collected following a snowball sampling method (a non-probability sampling method) using a structured interview schedule (questionnaire), which was prepared based on consultation with fishers, academicians and development personnel engaged in the marine fisheries sector. The data collection has set a reference period of 6 months, starting from 25<sup>th</sup> March 2020, when the country went into full lockdown during first phase of COVID-19. The data collection was conducted during November- December 2020. The data was collected using a mixed method telephonic interview and personal interview, depending on the extant regulations and convenience of the data collection during the COVID period. The information from primary data was supplemented by discussions with opinion leaders of the fisher community, which helped to gain insights into the perception regarding impact of market regulations on income and fishing pressure. This idea has helped to deepen the understanding of markets in conservation efforts. The perception of catch of fish was further collaborated by using the catch reports available with Central Marine Fishery Research Institute (CMFRI). Tabular analysis was used for analyzing the data.

### Results and Discussion

The information gathered included the impact of COVID-19 on the social and economic life of fishers. The initial results showed that while the employment and income of fishers in general have declined, the impact differed across traditional/ artisanal fishers and mechanized fishers, particularly trawl fishery. This was mainly because of the restrictions on fisheries that have fallen proportionately higher in terms of employment loss and reduction in fish harvested on mechanized fishers. While the fishing activities resumed, the artisanal/ traditional fishers who used non-mechanized boats and employed less than 5 persons on board were allowed. The mechanized fishing operations were allowed to operate much later. Further, for mechanized fishing,

labour availability was a constraint when fishing operations were restored as the migrant workers in the sector returned to their home states.

Fig. 1 provides the impact of COVID-19 on various parameters, viz. fish harvested, employment, fish-based income, family income and fishing expenditure, across mechanised and motorised sectors. The catch data reported by Central Marine Fisheries Research Institute (CMFRI) also indicated that the fish catch had reduced in the COVID year compared to the previous years, but has gradually improved once the restrictions on social distancing was eased (Fig. 2). This could have reflections on stocks as well. The results indicated that in general, fish harvested, employment and income had reduced, for both mechanised and traditional sectors, at varying levels. While the new steps reduced the fishing pressure, it resulted in fishers realising better prices for their harvest. Historically, the prices the fishers realise in the landing centres are low, due to several issues including market imperfections lead by monopoly power of dominants financiers and traders. The market efficiency was also low as reflected in the lower share of producers in what consumers’ pay for fresh fish, particularly for low value (but nutritionally rich and widely consumed) fishes like sardines and mackerel (Aswathy et al., 2014). Fish marketing in the state is rooted in traditional methods and relations, where the auctioneers and other intermediaries appropriate a significant proportion of the retail prices of fish that the consumers pay. The private credit market is interlocked with the product market (fish) in such a way that the fishers who availed credit from the lenders have to pass the fish catch through the same person who acts as auctioneer too. The credit needs

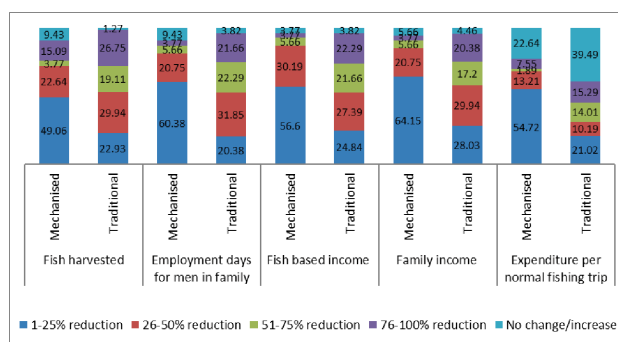


Fig 1. Change in fish harvested, employment, income and expenditure for fishing, across mechanized and motorized sectors, Kerala

Source: Primary survey by the authors

of the vessel owners, either partly or fully, is availed from private lenders who function as auctioneers too in the harbour/ landing centre. A share of the value realised is appropriated by the auctioneer-lender, in lieu of the loan repayment, a pure interest rate and service charges of auctioneering (Suresh, 2023). The share could involve an element of “exploitation” as well, which could vary depending on the structure and conduct of the market and local conditions. The share of actual fisher in the final price is low at 60% for oil sardines and 66% for mackerels, indicating poor marketing efficiency (Aswathy et al., 2014). The drive to reach the fishing ground and back to the auctioning centre at the earliest is a reason for increased mechanisation, increased fuel usage, usage of high-power engines and several unsustainability issues.

However, the new marketing system with fixed price enabled fishers to realise better prices for their catch, as reported by 69% of fishermen in the present survey. Further, the incentive for “race for fish” at the sea was much less leading to a reduction in fuel used by motorised fishing vessels (vessels with inboard and outboard engines undertaking the manual operation of fishing gear). Once fishers realised better prices, the demand for continuing the reformed marketing system was visible from such fishers. The discussion with the fishers and the opinion leaders also indicated that the fishing expenditure had declined and the fishers were not continuing in sea for longer time. Further, the frequency of having a quicker fish catch had increased, perhaps due to better stock of fish in near shores. The secondary data from CMFRI, as shown in Fig. 2 also pointed towards increased stock during post-COVID period.

The lessons from the study have implications for the approaches and strategies followed for regulating marine fisheries. The basic idea is to set a rate of harvest that ensures a critical minimum level of stock that can yield a sustainable harvest or capture. This approach known as “Maximum Sustainable Yield” (MSY) has remained the cornerstone of the policies designed for ensuring sustainable fishing (Gordon, 1954). The common approaches used in the management of marine fishing fall under 5 categories- access to fishing, output /fish catch, fishing effort and other inputs, temporal restrictions and spatial restrictions (Parappurathu & Ramachandran, 2017). All these approaches are adopted by several state governments in India to

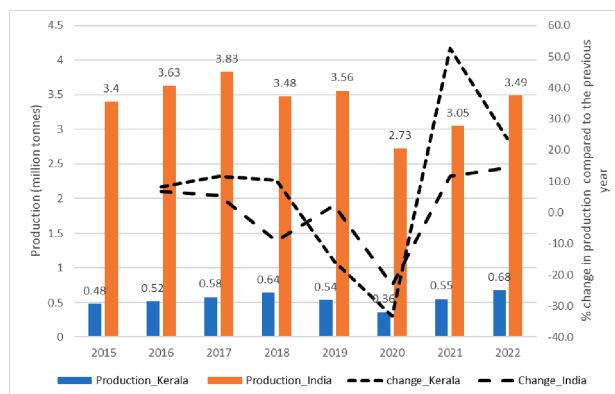


Fig. 2. Levels of fish production and its changes compared to the previous year, Kerala and India, 2015-2022

Source: CMFRI (2023)

varying degrees. All maritime states passed Marine Fisheries Regulation Acts (MFRAs) to regulate their fishing activities. Some of the common measures used are registrations and licensing of fishing vessels (access management), seasonal fishing bans (temporal control), gear and mesh size regulations (input control), identifying zones based on distance from shore and/or depth of fishing separately for artisanal, motorised and mechanised fishing (spatial control) and prescription of minimal legal size for fishes (output control). The seasonal fishing ban is one of the most widely practised measures by all the states. By the spatial restrictions, MFRA intends to reduce the competition among various categories of fishermen (artisanal and others) for the same fishing ground.

Even though these measures have contributed largely to regulating marine fishing activities, the success has been patchy. Fishers compete to harvest the maximum from the allowed fishing ground during the permitted period by using powerful engines and sophisticated gears. One reason for the low success rate in implementation of regulations is that these measures are implemented as a “command and control” method without adequate involvement of fishers and paying less attention to livelihood concerns of fishers. Fish auctioning and marketing are key elements of the livelihood concerns. Further, the short-term economic loss of adopting conservation oriented sustainable fishing strategies could be valued more severely than the long-term economic gains of those conservation efforts.



In the present case, only the traditional fishers were allowed to operate in the marine waters, and operations of mechanised fishers were restricted for some time. Further, there was labour shortage for the mechanised fishers. Overall, this could have given an advantage to the traditional fishers over the mechanised fishers. The reforms in marketing gave a fair price to the fishers, a sharp departure from the existing condition. This could be partly attributed to reduced supply of fish. The incentive for the fishes to spend more time in the sea is reduced, as they had to return before a certain time as fixed by the harbour authorities. The producers' share in the price the consumers pay has increased to as high as 80-90%. This created a demand among the fishers to continue the reformed marketing even though there was a reduction in fish catch.

The logic can be applied to mechanised fishers as well. If the conservation measures can be combined with reforms in fish marketing and value chain so as to provide a fair share to the fishers, sustainable fishery strategies could be better implemented. Thus, marketing reforms could serve as a support for conservation activities. How that could be achieved and the forces of demand and supply could be reckoned with is a different issue to be discussed here. However, the interlocked nature of credit-market system is the one that currently acts as a major credit supplier and is responsible for financial buoyancy. Therefore, reforming markets in the specific context has to consider the informal credit markets also.

This argument can resonate with some other market-oriented initiatives for conservation, including certification and labeling and involvement of bigger sellers like supermarkets. Certification and labeling to the effect of ensuring better price for sustainably harvested fish is widely practiced. Market-based conservation instruments could be beneficial, but might not be appropriate in every situation, as context and history matter (Chobotová, 2013). Reforming the marketing system to benefit the fishers has the potential to strengthen conservation efforts. The reforms could involve both traditional/artisanal fishers and mechanised fishers. One issue about the fixed price system was managing the demand-supply equilibrium and absorbing the shocks, arising mainly out of excess supply (though the short supply also could act as an incentive for fishers to move out of the fixed price system). The fixed price system may have to absorb

financial shocks- which can be considered as a penalty or trade-off for price stability- in case of excess supply. However, there could be options to moderate it through supply chain management in the form of cold storages, better transportation, extension of the supply chain covering more and remote areas, processing and value addition. The success of such an attempt is a matter of empirical evidence.

Market-based conservation methods of marine fisheries have attracted attention in some countries (OECD, 2011). The reforms in fishing and practices towards sustainability have to take into consideration the institutional factors and involve the stakeholders, to attain greater social good in a common property regime. Studies have pointed out that communal proprietorships effectively solve a wide diversity of social problems with relatively low transaction costs (Ostrom, 2003).

The study has implications for policy particularly in devising regulations for implementing sustainable fishery. Concerns of fisheries on markets, prices and income is to be reckoned with along with other regulations on fishing. Stakeholder consolation is an integral element in the approach. One approach is to run pilots at the initial stage, and imbibing the lessons learnt in further course.

Reforming markets to the effect of generating income with reduced variability can serve as an important tool for sustainable fishery. The present study points to reduced fishing effort during the lockdown period due to stringent COVID protocols, which resulted in reduced fish catch for both traditional and mechanised fishers the effect has been more on the latter. Most probably, the physical stocks of fish also might have increased due to reduced fishing efforts. The operation of mechanised fishing was regulated more strictly during the lockdown period. However, as far as those who were allowed to fish, the market interventions seem to have helped to realise better prices, avoid/reduce competition at sea and improve market efficiency, without effecting an overall increase in the retail prices. The fishers have indicated their willingness to continue with the new marketing system. Thus, market intervention also becomes a critical element in devising various strategies for regulating marine fisheries towards sustainability. A mechanism that would provide a remunerative price to all categories of fishers while being sensitive to market forces

turns crucial in devising strategies for sustainable fisheries management. As fishers respond to incentives to shape their response, market reforms could serve as an important tool for sustainable fishery. A comparable level of income along with reduced variability could be the incentive. This could take care the short-term livelihood issues while attaining the objectives of sustainable harvest and resource conservation. Given high demand for fish, the fish market is largely determined by supply. While implementing the policy, managing the supply-demand balance of fish and consequent price rise in case of short supply or price crash and stock management in case of excess supply could be an issue. One option is to manage these issues contextually and selectively by using various approaches. At the implementation level, running pilots could be a strategy to test the veracity. The lesson learnt on the usefulness and role of markets and other institutions during COVID-19 could aid in developing strategies for sustainable fisheries management.

The study is conducted during the COVID-Period. During the data collection, the precautions and regulations implemented by the Government during time to time were followed. However, visits on several harbours and landing centres could not be carried out, due to the restrictions and precautions. However, care have been taken to ensure the quality of the data collected.

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