



## Review Article

# Marine Fisheries in Kerala, India: An Extension Perspective

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### Abstract

The marine fisheries sector of Kerala has an important role in the economy of the state in terms of food, nutrition, employment and export earnings. But, the sector is facing multitude of challenges that negatively impact the livelihood of fisherfolk. Consolidating the gains and mitigating the challenges requires a reinvented extension system in the marine fisheries sector, which goes beyond the traditional technology transfer paradigm to a broad-based extension-plus approach. The focus needs to be shifted from enhancing production to enhancing income of fishers and the development of sustainable livelihood. Concerted action of pluralistic actors across the value chain is required for the operationalization of the extension-plus approach.

**Keywords:** Marine fisheries, pluralistic extension, responsible fisheries, sustainable fisheries

### Introduction

Kerala, a maritime state in the Southwest part of India, is endowed with bountiful water and fish resources. With a coastline of over 590 km and inland water resources spreading over 0.4 million hectares, the fishery sector has a decisive role in providing livelihood opportunities to around 0.8 million fisherfolk engaged infishing, and related activities including marketing, processing and ancillary services. Fisheries and aquaculture in the state contribute significantly to the state economy with around 9.7 % of the Gross State Value Added (GSVA) in the primary sector during the year 2019-20. However, the share of the primary sector and

that of the fishery sector in the state income has been declining over a period of time (Kerala state planning board, 2021). Though technological innovations have revolutionised the marine fisheries sector of Kerala, the issue of sustainability is looming large. Technological advancements in the marine fisheries sector of Kerala include an improved fishing system through introduction of synthetic gear materials, mechanised fishing like trawling and increasing its efficiency overtime, improvement in size and other parameters of mechanised fishing vessels like trawlers, purse seiners, gillnetters and longliners for enabling multiday fishing, motorisation of traditional crafts, adoption of echo sounders and GPS, among many others (Bhushan, 1979; George, 2011; Sabu et al., 2018). But, competition for the open access resources often leads to overfishing and juvenile fishing causing resource depletion (George et al., 1980; Kurien & Achari, 1990; Swathi, 2018). Over capitalisation in the race for the common resources (Milne, 2010; Suresh & Shinoj, 2018) results in decline in catch per unit effort. The small and capital-constrained fishers, who constitute the majority in Kerala, are more vulnerable in such situations.

### Socio-economic issues in fisheries

The livelihood of the marine fisherfolk of Kerala has elements of vulnerability due to natural and socioeconomic factors. In addition to the vagaries of nature and issues related to sustainability mentioned above, the livelihood vulnerability is also influenced by socioeconomic factors such as the high level of exploitation at the market level, and the unorganised nature of the sector, to mention a few. Gopal et al. (2001) observed a very high price spread in retail markets in Cochin, especially during the periods of low price and high catch, where the benefit of price spread is reaped by the middlemen.

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Of the price spread, a significant share is appropriated by the auctioneers and other agencies working in the value chain. Inefficiency indicated by the low share of primary producers (fishers) in the consumer rupee is another concern. Aswathy et al. (2014) pointed out that fishermen's share in consumer rupee varies from 59 % in the case of oil sardine to 70 % in the case of seerfish. The lower margin at the fishermen's level leads to low savings, which in turn forces them to informal sources of credit like auctioneers for daily operations, where the hidden exploitive repayment modules leave them in the same ground.

Fluctuations in market price add to the worries of the fishermen. The price of the catch is often decided by auctioneers and traders, not by fishers. Fish, being a highly perishable commodity, is many times subjected to distress sale (Salim et al., 2017). This leads to a high level of income fluctuation for the fishermen. Due to occupational rigidities, fishermen are constrained to find alternative employment avenues. John & Sany (2019) pointed out the need for the fishermen to change the status quo and undertake marketing to avoid exploitation in the supply chain.

Access to formal sources of credit is often constrained due to a lack of collaterals and other rigidities (Shinoj et al., 2018). One major reason is that the formal credit instruments are not tuned to the credit needs of the fisherfolk (NABARD, 2018), which varies on a daily basis. Insurance is another weak link in the marine fisheries sector of Kerala. The development of an insurance system is an essential step to encourage fishermen to practice several safety-related behavioural patterns while fishing (Suresh et al., 2018). A very low level of adoption of insurance for crafts and gear owes it to the reasons like high premiums and poor claim settlement (Shinoj et al., 2017). Also, insurance coverage of fisher household assets is found to be very low despite their potential vulnerability to natural hazards.

The above-mentioned factors are found to constrain the life and livelihood of marine fisher folk. Shinoj et al. (2020) pointed out a dip in the coastal fisherfolk population owing to outmigration to other areas in search of alternative income sources. They have also observed a decline in the number of fishing crafts and fish landing centres all over India, which further underscores an outward movement of

the labour force away from the coasts. Aswathy et al. (2014) have also pointed out a negative total factor productivity (TFP) growth in the case of the marine fisheries sector of Kerala, which needs to be corrected through policy intervention to augment the fisheries economy of the state.

In recent years, the safety and quality of the fish sold in the state have emerged as a major concern. Fish lots contaminated/ laced with chemicals like formaldehyde and ammonia were seized by the departments concerned. These chemicals are known to be deleterious to the health of consumers. This has created apprehensions among consumers about the safety and quality of the fish (Sajeev, 2018). The fishermen and other stakeholders in the value chain need to be sensitized to maintain the quality and safety of fish. This is particularly true in the case of multi-day fishing. Various technologies for enhancing its keeping quality are to be popularised. Innovative measures (like the Rapid detection test kit developed by ICAR-CIFT) need to be promoted among value chain actors to detect the presence of contaminants in different value chain nodes. The stakeholders in the sector should work together to undertake cost-effective mitigation strategies (Fox et al., 2018). Also, the adoption of appropriate technologies in harvest and post-harvest fisheries is to be geared up to ensure sustainable livelihood of fisherfolk. Innovations like resource conservation and fuel-efficient technologies can help in ensuring the sustainability of resources and reducing the cost of fishing (Edwin, 2018; Baiju, 2019). Further, promotion of small-scale processing technologies can help in supplementing the livelihood of coastal communities (Sreelakshmi et al., 2022).

### **Revamping extension system in marine fisheries**

The above-mentioned issues are to be addressed through a multitude of strategies like selective technologies, changes in institutions facilitating co-management and better governance systems and an enabling policy environment that promotes sustainable development of marine fisheries. Integral parts of such an approach are enhancing the biophysical health of the marine system, protecting the livelihood of the fisherfolk, improving their welfare and generating higher value out of the fish harvested. Added to this are the challenges posed by climate, newer pandemics and volatility in the market conditions. The promotion of technologies and

Table 1. Extension-plus: Key shifts

From	To	Strategies
Technology dissemination	Supporting rural livelihood	Enabling fishers to develop livelihood assets through skill development, facilitating access to capital, community mobilization, hazard mitigation and infrastructural development
Improving productivity	Improving income	Price information, market intervention, avoid exploitation by middlemen
Forming fishers group	Building independent fisher operated organisations	Reorienting existing fishers' organizations and apex agencies for upscaling and out scaling their efforts
Providing services	Enabling fishermen to access services from other agencies	Liaison with agencies in public, private and civil society segments for inputs, credit, research, technology extension, marketing and capacity building
Market information	Market development	Forge networking with supply chain actors, processors

(Adapted from Sulaiman & Hall, 2004)

policies in relation to responsible fisheries is the need of the hour to promote sustainability of the marine fisheries.

A dynamic extension system should be in place to consolidate the achievement and to propel the growth of the sector by addressing emerging issues. The state department of fisheries is the major actor in the fisheries extension system of Kerala. Apart from providing the information and services needed and demanded by fishers and other actors like processors in rural settings, the extension has the onus to carry out different activities to assist them in developing their own technical, organisational, and management skills and practices so as to improve their livelihoods and well-being (GFRAS, 2012). The scenario mentioned above points to the need for an 'extension-plus' approach synergising both technology and non-technology services demanded by the fishermen.

Operationalisation of shifts (Table 1) requires strategies like skill development, community mobilization, infrastructure development, market intervention, reorienting existing fishermen organizations for upscaling and outscoring their efforts, liaisoning with various agencies in public, private and civil society segments, forging linkage with processors and other supply chain actors etc.

Technology dissemination should be the core, but the focus has to be broadened. There need to be a range of objectives like mobilisation and strengthening of producer collectives, promotion of linkage with various agencies in the public, private and civil society segments, and entrepreneurship development while being sensitive to the ecosystem and environmental protection. In addition to technology transfer, it is important to strengthen locally relevant innovation processes and knowledge systems (Sulaiman & Hall, 2004). Innovations can be in the realms of technology (e.g., technologies for responsible fisheries), organization (e.g., group mobilization or restructuring), institutions or decision-making (e.g., decision to adopt) and need not be promoted by research or extension systems. The innovation capacity of the fishers and other actors in rural settings depends on the skills to develop and assimilate internal and external resources for problem-solving and to leverage opportunities (World Bank, 2012), which in turn requires harnessing the synergy of pluralistic stakeholders in a complementary manner. It starts with the identification of multiple actors and their roles as well as the ways by which they can be effectively converged for the larger goal of making fishermen better managers of the sector and organizations.

The concept of *extension-plus* is less studied, but field-level evidence is there. Key points of *extension-plus* are a wider range of service provision, forging linkages and partnerships to achieve the broadened objectives, continuous interaction and negotiation with various service providers for working out a framework for effective service provision and making the programme demand-driven as per the client's requirements. The Vegetables and Fruits Promotion Council of Kerala (VFPCCK) (erstwhile Kerala Horticultural Development Programme) is a successful example of the *extension-plus* approach. VFPCCK mobilizes farmers into Self Help Groups (SHGs) and federates them for better access to inputs, technology and market. VFPCCK is registered as a company where shareholders include Self Help Groups of farmers (50 % of shares), the Government of Kerala (30 % shares) and other related institutions (20 % of shares) (Sivaraman, 2018). The SHGs act as the platform for interventions in the realm of extension, credit, marketing and participatory action. Selected farmers from each group were trained as master farmers for facilitating farmer-to-farmer extension in production and marketing. Group Marketing, linkage with financial institutions etc. were added features of VFPCCK's extension strategy.

### Contextualising extension-plus in marine fisheries of Kerala

Presently, various agencies under the state department of fisheries are working on different aspects like input marketing, credit and insurance provision, entrepreneurship development, implementation of schemes related to technologies, policies and livelihood development etc. Matsyafed, an agency under the Department of Fisheries and the apex body of primary fishermen welfare development cooperative societies, provides financial assistance to fishers for procuring fishing inputs, working capital funding and subsidies for the motorisation of country crafts and suitable components of fishing gear (Thrishma & Veerakumaran, 2020). It has also established microfinance groups under primary cooperative societies to facilitate hassle-free access to institutional credit (Mathews & Nair, 2019). Further, interest-free loan is provided to women fish vendors. It has established 27 outlets established in different parts of the state for the sale of fresh fish. Manufacturing and marketing of fishing nets, sale and maintenance of outboard motors, manufacturing and marketing of chitin and chitosan from prawn shell waste, operation of diesel bunks and

sale of quality fishing equipment are some of the other major activities undertaken by the Kerala State Co-operative Federation for Fisheries Development Ltd. (Matsyafed). But it was observed that these efforts are mainly restricted to traditional (non-motorised and motorised) sector only. Jeyanthi et al. (2018) observed very high efficiency in the performance of fishermen cooperatives in terms of the amount of loan disbursed, repayment and income from fish marketing services. They also suggested to expand the cooperative services by providing technical support on advanced fishing technologies to stakeholders and effective fisheries management. John & Sany (2019) recommended a more decentralised approach to the functioning of Matsyafed and to enhance the role of cooperatives in the marketing of fish.

The society for assistance to fisherwomen (SAF), under the department of fisheries of the Government of Kerala, has internalised elements of *extension-plus* by initiating entrepreneurship development through institutions of fisherwomen. In addition to micro-enterprises and eateries based on fish and fishery products, women's groups are running enterprises related to food products, garments, coir products, crafts etc. for sustaining their livelihood. Fisherwomen have joined the micro-enterprise groups for their social and economic well-being through which the fisherwomen community could handhold themselves (Shyam et al., 2019). Kerala State Coastal Area Development Corporation Limited (KSCADC) facilitates coastal and fisheries infrastructure coupled with technological support. KSCADC had ventured into fish processing also with the production and marketing of dry fish products. Of late, the agency has launched a livelihood development project, namely 'Parivartanam', to train the youth in the coastal area in fishery-based enterprises (The Hindu, 2020).

To ward off the complications of sustainability-production trade-off, it is important to devise participatory action at the community level in order to inculcate the importance of long-term gains. Further, facilitating access to credit, insurance, technology, marketing, information and capacity building can help in combating the vulnerability to large extent. Fishers' collectives can play a major role in these aspects. Microfinance options in both credit and insurance need to be explored. An example of collective action in fish marketing is *The Norwegian Fishermen's Sales Organization* (Norges Råfisklag),

which is owned and operated by fishermen (Jentoft & Finstad, 2018). This organisation handles the seafood trade and provides remunerative income for the fishermen.

Processing activities especially drying, curing, peeling etc. are largely unorganised and constrained by the lack of or low adoption of technologies (Shyam et al., 2016; Sreelakshmi et al., 2022). Extension has a major role to play here to make it ready with the emerging food safety and quality regime. Community-level intervention integrating joint liability groups, *panchayatraj* institutions and agencies like SAF, Matsyafed and KSCADC can play a major role in this. Positive changes in this sub-sector will contribute to the well-being of fisherfolk community. Integration of processing and marketing in the purview of extension requires a value chain orientation, which in turn requires the development of diverse strategies suiting the needs and requirements of the fisherfolk. Apart from the agencies in the public sector, it is important to identify and integrate the agencies in private and civil society segments.

For *Extension-plus* approach to be effective, the convergence of various agencies and schemes to optimise their contribution towards the welfare of the fisherfolk is required. This, in turn, requires a suitable platform for harnessing the strength of diverse actors across the value chain. As discussed earlier, collectives like fishermen/fisherwomen groups have the potential to act as such platforms. The efficacy of such collectives depends on the extent of self-mobilization. Kurien (1985) pointed out from a study of externally assisted fisheries development projects in Kerala that there is a significant difference in the organization of and for fishers. The collectives should be linked to larger innovation networks composed of fishermen, fishermen organizations, private and public firms, researchers, extension agents, government agencies, funding agencies and financial agencies. Major activities to foster the emergence of innovation networks include creating trust among potential partners, identifying common goals, establishing the bases of collaboration and developing innovation capabilities (Ekboir, 2012). The extension has an important role to carry out these activities as well as to enhance the ability of other actors to support fishermen in an integrated way. Reorienting the fisheries extension system to address the varied concerns of the sector requires policy-level interven-

tions in terms of human and financial resources (Sajesh et al., 2018) and organisational innovations.

Supply chain modification is the most urgent requirement to bring the fisherfolk out of the clutches of middlemen. Further improvement in the income and well-being of fishers depends on increasing the share of fisherfolks in the consumer rupee (Shinoj & Ramachandran, 2018). The Government of Kerala has initiated an alternative supply chain during the lockdown period during COVID-19. The sale of the catch was carried out without auction but as per the price decided by harbour management committees. These prices were decided based on the quality of the fish and the price in the preceding period. Also, a mobile application was developed for the sale of fish by booking in advance. For the small retailers, the Matsyafed ensured the required quality of fish in selected market points (Business Line, 3 April 2020). The report, 'Streamlining fisheries supply chain in Kerala' (Ramachandran et al., 2020) recommended two types of auctioning. The traditional system is recommended for lots less than 5 quintals, where beneficiaries are artisanal/motorised traditional fishermen. In the proposed system, the auction would deal with large individual lots above 5 quintals and would involve electronic bidding/quotations using a smart auction/mobile-based platform. This is recommended to avoid the credit-market transaction existing in the value chain.

## Conclusions and implications

Marine fisheries sector of Kerala is facing many challenges spanning from the sustainability of fishing to low profitability in marketing. The extension system of the state comprising mainly public sector agencies is undertaking a number of activities including the provision of technological inputs and livelihood assistance. It is important to upscale and outscale the present initiatives of the extension system to enhance the outreach and hence to benefit most of the fisherfolk. Attaining sustainability of the entire marine fishing system and value chain requires multipronged strategies. Synergistic action of actors from different streams is required to enhance the livelihood and well-being of fisherfolk. Considering the diversity of the issues and possibilities in the marine fisheries sector, *extension-plus* approaches have to be devised as broad-based collaborative actions required to address the issues in a holistic manner. The conver-

gence of various agencies in the public, private and civil society segments within a large innovation network of research, extension, fishers, fishers' collectives, and marketing and financial agencies are required for the inclusive growth and development of the sector. Such an *extension-plus* approach should focus on developing the technical, organizational, managerial and entrepreneurial capacities of the fisherfolk. Major role of extension lies in creation of an enabling environment through facilitation and skill development.

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