Activities of fisheries co-operative societies in India to boost up and optimise the resources and economy of farmers: a review

Tanmay Sanyal1 • Aloe Saha2 • Pronoy Mukherjee3

1 Department of Zoology, Krishnagar Government College, Krishnagar, West Bengal, India
2 Department of Zoology, University of Kalyani, Kalyani, Nadia, West Bengal, India
3 Department of Zoology, Rishi Bankim Chandra College, Naihati, West Bengal, India

Correspondence
Tanmay Sanyal; Department of Zoology, Krishnagar Government College, Krishnagar, West Bengal, India
tanmaysanyal@gmail.com

Manuscript history
Received 3 September 2022 | Accepted 8 June 2023 | Published online 27 August 2023

Citation
Sanyal T, Saha A, Mukherjee P (2023) Activities of fisheries co-operative societies in India to boost up and optimise the resources and economy of farmers: a review. Journal of Fisheries 11(2): 112301. DOI: 10.17017/j.fish.487

Abstract
Fisheries within India have significant financial, nutritional and socio-economic development prospects. The country has a diversified natural fishery resource. Fishermen have continuously undertaken fisheries activity throughout the country over decades and fisheries co-operatives have now been developed for cumulative production and effective regulation of fishery activities. It was observed that there have been many inconsistencies, mostly in the management of fisheries co-operatives; a few were effectively handled under active supervision and government backing, whereas many co-operatives are facing various problems for their existence. Effective administration of fisherman’s co-operatives is critical for increasing fishing productivity and the socio-economic growth of fishermen. Co-operatives can help fishermen develop their skills and gather information about technology, marketing, and management. Co-operatives can improve productivity, processing, storing and transportation capabilities while also meeting financial demands. As a result, co-operative organisations may contend with multinational corporations by integrating competent management abilities with co-operative power. To do this, a nationwide research project focusing on different elements of fisheries co-operatives is recommended. The need for appropriate policy implications for such sustainable management of fisheries co-operatives in accordance with current technical advancements in the sector of aquaculture, environmental degradation and global warming has been highlighted.

Keywords: fishermen; fishery co-operatives; Indian fishery; socio-economic development; sustainable development

1 INTRODUCTION
Ecosystems play a great role in the economy and different biotic agents in an ecosystem act as different factors of the economy. Fish production is one of the most important economic factors. If economic growth is the destination, then the fish production industry is a vehicle to reach the destiny and fisherman’s communities act as drivers to steer the vehicle on the right path (Curtis et al. 2017; Watson et al. 2021). In 2018, approximately 179 million tonnes of fish can be produced globally, with aquaculture accounting for 46% of total production and catchment fishery accounting for 54% (Maulu et al. 2021). Nearly 50% of the total fish production is achieved by small-scale fisheries (SSF) and in the case of catchment fisheries in developing countries, most of the people depend on SSF (Franz et al. 2017). In sustainable development, SSF play a significant role in different aspects such as hunger, economic growth, poverty, women’s empowerment and livelihood (Harper et al. 2013; Mukherjee et al. 2022). In India, the majority of fishermen (those who
make their living from fishing) come from low-income families (Karuppusamy and Karthikeyan 2017). Cooperatives protect the vulnerable, and in India, fishermen are one of the most vulnerable members of society. Significant problems include illiteracy and unemployment, as well as inadequate knowledge about current fishing technologies (Anwar et al. 2020). This deadly loop is complicated by the absence of adequate infrastructure, both in terms of logistics and funds. As a result, fishermen are being exploited by intermediaries who function as money lenders, dealers and subcontractors (Ahsan et al. 2016). India has extensive fishing reserves with promising prospects for developing the fishing industry and boosting fishermen’s socioeconomic conditions (Ekka et al. 2012; Bhandarkar et al. 2017). Despite possessing great potentiality in aquaculture, the fisherman could not really exploit it to significantly improve their socio-economic condition owing to the absence of organisational assistance such as infrastructure and funding (Ghosh et al. 2015). As a result, fishery co-operatives appear to be a more suitable institution to enhance the socio-economic position of fishermen throughout India (Jaini 2021; Ranicki 2012). According to FAO (2002), about 5.8 million fishermen belong below the poverty line. So-called fish cooperatives and SSF guidelines should focus on achieving zero hunger and poverty (Wilson et al. 2015). According to SSF guidelines, local fishermen can form organisations (known as co-operatives) to eliminate poverty (Kurien 2014). Some people believe that the fishery industry is facing critical threats and risks as a result of anthropological activities such as overfishing, which destroys aquatic ecosystems (Zeng et al. 2022). Another group believes that underdevelopment management is a major threat to the fishery industry (Karim et al. 2020). A top-down strategy can help maintain the resources of the fishery industry in most developing countries (Samian et al. 2017). This strategy mainly focuses on imposing different rules by the government on the fishery industry, but it is unable to prevent the overexploitation of fish resources (Hollup 2020). The World Bank (2006) introduced a new concept known as co-management, in which responsibilities are shared between government and fish resource users for managing the fishery industry (Samian et al. 2017).

The Indian fishing industry is presently recognised as a rising star in terms of the nation’s economic growth. With the participation of advanced technologies as well as the usage of massive fishery ecosystems, Indian fishery has recently been turned into a big commercial industry. This industry has already played a significant role in the socio-economic development of the weaker communities (Ayyappan and Diwan 2006). Fisheries have the capacity to contribute to gross domestic product, food production, job prospects, progressive goals and exporting profits. The Indian fisheries industry is crucial since it employs and sustains approximately 16 million of individuals directly and plenty more informally (Agrawal et al. 2016). Throughout India, this industry has transformed from a subsistence farming sector to a fully grown, multifaceted, huge corporation with enormous development opportunities (Vasisht 2009; Suresh and Parappurathu 2018; Bureau 2019).

Indian fishery has evolved from a solely traditional activity to a significant commercial sector with huge opportunities. The fishery industry is currently one of our country’s biggest providers of export revenues (Ahmed and Ahmed 2022). India is presently one of the world’s biggest fishery exporters. India possesses rich and diversified fishery resources spanning from ocean waters to wetlands, marshes, and streams, accounting for even more than 10% of the overall world biodiversity in regards to freshwater and marine fish varieties (Rajeev and Bhandarkar 2022). India has a wide coastline (8118 km), 2.2 million square kilometres of exclusive economic zone (EEZ) and 0.53 million square kilometres of continental shelf region, which are home to abundant marine fishing sources (Desai et al. 1990; Ngasotter et al. 2020). Streams and channels, riverbank ponds, pools and tanks, basins, salt water, highly salinity-impacted regions and so on are examples of freshwater resources. Underused and neglected, this huge and diverse freshwater resource provides excellent prospects for socioeconomic improvement and productivity expansion (Ayyappan and Krishnan 2004).

Fishermen recognised that co-operatives may protect members from extortion while also improving their socioeconomic situation (Harper et al. 2013). Initiatives in this manner have generated positive outcomes in certain places, but the general image of fisheries co-operatives remains unfavourable. The fishing industry has experienced considerable growth in recent years (Lynch et al. 2016). Fishing farm development agencies have now been established in the inland fisheries industry and the inland fishing industry has expanded (Elliott et al. 2022). Landing and anchorage services have been expanded and ongoing attempts to enhance infrastructure and encourage exporting are now being made (Ranicki 2012). In this review, we investigate the development of Indian fisheries co-operatives and the issues that are affecting India’s cooperative fishery industry.

2 | THE DEFINITION AND CONCEPT OF FISHERY CO-OPERATIVE
Co-operatives help to achieve social, cultural and economic needs through their democratic and self-governing associations (Anbumani 2007). The significance of cooperatives, mostly in the goal of economic improvement for one of India’s oldest oppressed communities, especially fishermen, is widely recognised. Because most fishermen are from lower-income families, they need the essential financial means, technical capabilities and organi-
sational ability for improved capture fisheries, stockpiling, handling and commercialisation (Lynch et al. 2016). Because of their poor income, they generally take out loans at exorbitant interest rates from fish traders. As a result, there is indeed a continuous cycle of debt that promotes victimisation. Fisheries co-operative societies may resolve most of these challenges and fishermen in various states have chosen the collaborative method of working to enhance their fisheries in general and also their socioeconomic situations (Mahanayak and Panigrahi 2021). The Indian Fisheries Cooperative Programme was established to provide economic support to fishermen. Fishery co-operative organisations are governed by a different set of laws designed to channel support from the government associated with self-help and management and control. In India, the fishery co-operatives system is roughly three layered, with a basic co-operative for a regional or local level and another two that are basically district and state level federations (Chandrashekar 2014; Wasave et al. 2020).

Research undertaken by India’s Council for Social Development proved the usefulness of fisheries co-operatives as more than just a strategy for improving fishermen’s welfare (Mishra 1997). The research also emphasised the importance of integrating proactive fishermen into the co-operative as well as developing and motivating fisherman co-operative societies to fulfil multi-functional roles and encourage social rights for all individuals. The report proposed that “multi-functional primary fishermen co-operatives can be retained” to enable the establishment of a very well-developed and strong architecture of fisheries co-operatives in India (Mishra 1997).

3 | INDIA’S FISHERY SCENARIO

India is the world’s second largest fishing country, with significant potential in the fisheries and aquaculture sectors, producing about 14.16 million metric tonnes of fish in the year 2019–20 (Meena 2022). Nevertheless, considering its incredible natural wealth, India possesses unrealized potential as well as the ability to become a leading nation. Recognising the industry’s possibilities, the government remains committed to a nationwide goal of increasing fish output to 22 million metric tonnes by 2024–2025, which would benefit 28 million fishermen and producers and nearly twice that amount across fish-related economic activities (Meena 2022).

The EEZ’s marine resources in India include prawns, lobster, crustaceans, mackerel, jellyfish, pomfret and many other fish species. Inside the inland region, India possesses almost 27000 km of rivers, a 145000-km long network of waterways, reservoirs and lakes comprising 29 lakh hectares and freshwater reservoirs spanning approximately 1.5 million ha (Roonwal 1997). Recently, India has initiated a massive effort to enhance brackish water fisheries (Vohra 2020). Once fully completed, this might span a range of around 1 million ha. During the previous decade, this field has seen a tremendous increase in fisheries output. Apart from the local marketplace, the fisheries sector has made a significant contribution to India’s export revenues (Mahanayak and Panigrahi 2021).

According to Livemint [www.livemint.com], the government has offered economic assistance via many programmes in order to fulfill the goals such as the blue revolution with sustainable development, huge fishery exports, branding of the fishery industry and disease monitoring (Bhaskar et al. 2020). The Fisheries and Aquaculture Infrastructure Development Fund (FIDF) was established with a total asset value of 911.28 million USD to encourage the implementation of fishery infrastructure development in both the inland and marine sectors as well as to increase fishing output. In addition, the Pradhan Mantri Matsya Sampada Yojana (PMMSY) was inaugurated with a budget of 2429 million USD, the largest major expenditure there in the fishery sector. The PMMSY will be introduced throughout all states and union territories during a five-year period, between the financial years 2020–21 and 2024–25. Since around January 2022, projects amounting to 634 million USD have been approved, benefiting approximately 11.6 million people (Bhaskar et al. 2020).

4 | HISTORY OF FISHERY CO-OPERATIVE SOCIETIES IN INDIA

The concept of a fishery co-operative was mainly that fishermen would be organised at the community level for resolving their common problems and uplifting of socioeconomic status by incorporating easy and steady finance, marketing, communication with government and private partners, modern technology incorporation and storage and transport development. This thought process led to the formation of fisheries co-operative societies. The traditional co-operative organisation seems to have had its beginning in 1844 in England (Birchall 2004). In India, in the year 1913, the first fish farmers’ society named ‘Karla Machhimar Co-operative Society’ in Maharashtra started running (Tyagi et al. 2013). West Bengal was indeed the second state to establish co-operative societies in the fisheries sector in 1918 (Mahanayak et al. 2017). Tamil Nadu established one fishery co-operative association that year (Mahanayak et al. 2017). Though the fisheries co-operative movement in India began in 1913, development of co-operatives remained moderate there in the pre-independence period. Later in 1946, the Co- operative Planning Committee recommended state aid for the development of the fishery sector through co-operative societies (Mahanayak et al. 2017). Then later, the ‘Five-Year Plan’ made in 1950–51 by the erstwhile Planning Commission of India gave focus to the co-operative system’s finances and other issues. In India,
there has been a phenomenal improvement in the performance of all tiers of co-operative groups (Rao 1973).

According to the data retrieved from the National Federation of Fishermen Cooperatives (FISHCOOPFED), there are a total of 21 state-level co-operative societies and seven regional-level co-operative societies (Mahanayak and Panigrahi 2021). The number of fishery cooperatives at the district level is around 132, and at the primary level, it is around 21741 in number (Mahanayak and Panigrahi 2021). Currently, around 3353115 members are directly associated with the fishery co-operatives in India, and there are almost 3.3 million fishermen in India (Ranicki 2012). Fishery co-operative organisations in West Bengal are organised into three strata. Benfish is a state-level apex organisation. At the district level, there are Central Fishermen Co-operative Societies (CFCS), while at the local level, there are Primary Fishermen Co-operative Societies (PFCS). At present, West Bengal has 19 CFCS, 1162 PFCS, and 16 apex institutions (Mahanayak and Panigrahi 2021). According to the Department of Fisheries of West Bengal, the population of fishermen in West Bengal is almost 32362 (Mahanayak and Panigrahi 2021).

Efforts to establish a substantial proportion of co-operatives in the fisheries and aquaculture sectors have achieved positive outcomes in certain places, but the actual quality of fisheries co-operatives remains unimpressive. Only a few co-operative organisations are effective and capable of meeting their shareholders’ requirements. Most of the fishing co-operatives are still ineffective or dormant due to organisational, administrative and functional shortcomings (Kumar et al. 2008). In a broad sense, fishery management co-operatives have not yet achieved the desired threshold due to poor planning, a dearth of specialised training mechanisms, depressing productivity and performance patterns, a dearth of infrastructural development, troublesome funding and financial management and poor interconnections with relevant organisations (Prakash 2000; Kumar et al. 2008; Upadhyay et al. 2013).

5 | NATIONAL ORGANIZATIONS AND THEIR EFFORTS IN STRENGTHENING OF FISHERY CO-OPERATIVES IN INDIA

5.1 National Co-operative Development Corporation (NCDC)
The NCDC was established in 1968 and its headquarters are situated in New Delhi, India. NCDC played an important role in developing fishery co-operatives by assisting members in increasing their shareholding, establishing maintenance and repair centres for sailboats, establishing packing plants, fish oils and meals factories, net manufacturing plants, constructing warehouses and drying grounds and so on (Sundararajan 1991).

To aid in the growth of fisheries co-operatives, the NCDC has developed an integrated strategy for giving support to fisheries co-operatives for a number of reasons, including helping in the purchase of fishing equipment (boats, nets, etc.), creation of infrastructure for marketing, establishment of processing facilities, such as ice factories and cold storage facilities, improvement of freshwater fisheries, seed farms, as well as hatcheries, preparation of feasibility studies, appointment of experts under technical and promotional cell schemes and integrated fisheries project development (marine, inland, and brackish water) (Sapovadia 2007).

5.2 National Fisheries Development Board (NFDB)
The NFDB was established in 2006 whose headquarter is situated in Hyderabad, India (Ayyappan and Diwan 2007). Its main functions are to promote the underdeveloped fisheries sector, develop the processing and marketing infrastructure, conduct research and development on fish production and give special care to women and the weaker section (also less developed) of fish farmers.

5.3 National Federation of Fishers Co-operatives Limited (FISHCOFED)
It was established in the year 1980 as the All India Federation of Fishers Cooperatives, and later in 1982 it was renamed the National Federation of Fishery Co-operatives Limited. Its headquarters are situated in Haryana, India (Sapovadia 2007). Its main functions are: bringing the fishermen under insurance; helping with training and education for fish farmers; surveying and creating a database of nationwide primary fishery co-operatives; and promoting publications, workshops, seminars, etc. (Nair et al. 2010).

5.4 National Bank for Agricultural & Rural Development (NABARD)
The NABARD was established in 1982 and its headquarters are situated in Mumbai, India (Shah and Soni 2022). Its primary functions are to provide an easy loan facility for co-operatives, to boost rural areas and to help meet long-term development goals.

6 | STRUCTURE OF FISHERY CO-OPERATIVES IN INDIA AND THEIR FUNCTIONS
Co-operatives are bound by the seventh schedule under Indian constitutional law. The organisational structure of co-operatives differs by state. Co-operatives are typically organised into four-layer structures: the National Federation of Fishermen’s Cooperatives, the State Federation of Fishermen’s Cooperatives, Central Fishermen’s Cooperative Societies, and Primary Fishermen’s Cooperative Societies. The primary activities of fisheries co-operatives at
various organisational levels are listed here (Sapovadia 2004; Sapovadia 2007).

6.1 National Federation of Fishermen’s Cooperative Limited
The main functions of the National Federation of Fishermen’s Cooperative Limited are to manage the distribution of fishery materials and tools, to promote innovation among fishermen through co-operatives, ensuring safety for fishermen, acquire ponds or reservoirs on a rental basis for developing fish breeds, selling fish at a fair price, offer consulting assistance for people of fisheries co-operatives, putting together the instructional and demonstration sections, commercialising fish seed as well as facilitating trade fisheries cooperation, development and consultation, publications, collaboration and partnership with the government and other co-operative organisations and international co-operatives (Mahanayak and Panigrahi 2021).

6.2 State Federation of Fishermen’s Co-operatives
The main functions are to support and establish state-wide fishery co-operatives; collect funds through the sale of stock, investments and term loans; acquire and distribute necessary fishery materials and apparatus; sell fish at affordable prices; engage in the packaging and exporting of fishery products; and provide technical advice and collaborate with both the government and other organisations (Sapovadia 2004).

6.3 Central Fisherman’s Co-operative Societies
Main functions are to encourage fishermen to develop co-operatives, gather fish from members, offer a good platform or market for fish selling, supply fish larvae, fingerlings and nets, as well as other necessary materials and apparatus and provide technical assistance to members (Sapovadia 2004).

7 | COMMON TYPES OF FISHERY CO-OPERATIVES IN INDIA
According to their functional aspects, the Indian Fishery Co-operatives can be classified into the following types: producer co-operatives, consumer co-operatives, credit co-operatives, marketing co-operatives, insurance co-operatives, transport co-operatives and storage co-operatives (Chidambaram and Dabhi 1964). Producer co-operatives deal with the production of fish crops with proper utilisation of labour and allied production-related issues, if any. Consumer co-operatives include some stores that purchase fish at wholesale rates and sell it to common consumers. Credit co-operatives are beneficial to low-capital-bearing fishermen. They can access quick and low-interest credit for their fish farming and business. They buy the fishing crafts and gears this way (Dubey et al. 2009). Marketing co-operatives minimise the intervention of middlemen in the dealing of fish, and in that way, it helps obtain maximum profit for the fish farmer itself. Insurance co-operatives help minimise the life risks of fishermen while catching fish in the deep sea and rivers by providing the facility to include them under insurance (Zheng et al. 2018; Wei et al. 2021). These help them cover their big boats and trawlers under insurance so that, in case of damage, they get protection (Parappurathu et al. 2017). Transport co-operatives generally help the fishermen transport the fish to areas where demand is high. Fast transport helps to retain the good freshness quality of the fish for longer (Smith and Basurto 2019). Storage co-operatives generally help to build up or ease up the process of storing catch fish in the form of cold storage or other storage units (Lakshmi Devi 2012).

8 | ROLES OF FISHERY CO-OPERATIVES IN GROWTH OF FISHERY IN INDIA
The basic fisheries co-operatives are intended to serve as a multipurpose organisation, giving loans, equipment, assistance, monitoring and debt utilisation, as well as gathering and shipping fish to marketing hubs, whereas central societies provide equipment and services, processing and market research (Sapovadia 2007). The apex authority is also meant to act as a bridge between the government and society. Furthermore, it is discovered that there has been significant overlap in the duties of various groups, with no clear delineation or appropriate interconnection (Nair et al. 2010; Jeyanthi et al. 2018; Nazir et al. 2018).

8.1 Low interest loan for fishing craft and gear
The fishermen of India are mostly from the poorer section of society. They lack the funds needed to buy several costly crafts and gears for fishing and some of the crafts are so costly that they need to share buyers (Sakib et al. 2020). The poor fishermen generally take loans from local people, which are mostly unauthorised (Sapovadia 2007). The high interest rate and conditions create problems in their profession. But due to the formation of fishery co-operatives, they are able to take out loans at a very low interest rate and without any prior complex conditions (Smith and Basurto 2019). The co-operatives also form a well-organised group of fishermen, which leads to the simplicity of share purchases of some necessary things (like big fishing boats, trawlers, big seine nets, etc.) for their needs (Nazir et al. 2018).

8.2 Self-reliance to women
Fish co-operative societies can play an important role in promoting self-reliance among women in fishing communities (Freeman and Svels 2022). By providing women with access to training, resources and support networks,
co-operatives can help them build the skills and confidence needed to participate more fully in the industry (Sapovadia 2007). This can include training in fishing techniques, business management and financial planning, as well as access to loans and other financial services (Haqiqiansyah and Sugiharto 2018). By empowering women in this way, fish co-operatives can help to create more equitable and inclusive fishing communities, where women are valued and respected for their contributions (McDougall et al. 2022). This can also help to promote the long-term sustainability of the industry by ensuring that all members of the community have a stake in its success (Gopal et al. 2020).

8.3 High quality fish seed availability
In the case of India, the fishery is being practised by people who generally lack the touch of academics. Due to this reason, farming often includes unscientific methods, which generally hampers production in a very drastic way (Sapovadia 2007). But the fishery co-operatives play a vital role in being facilitators and allowing the fish farmers to have regular or frequent meetings with district fish departments (Shoko et al. 2023). The fishery department always tries to boost production by promoting the inclusion of several high-producing fish seeds, disease-resistant varieties and others (Nyimbili and Musuka 2017). The co-operative being a constant partner between the fish farmers and government authorities makes it easy for the farmers to include the needed one for fish farmers (Thakur 2018; Roy 2019).

8.4 Modern technology orientation project
The fishery co-operatives always try to help the fish farmers accommodate new technologies. The fish farmers sometimes get allured by advertisements for chemical fertilisers and pesticides promising high production (Pathak et al. 2022). The co-operative always monitors and guides them with the help of the district fisheries department. The government officials and scientists then always break the misunderstandings of the fish farmers and make them enlightened about bioaccumulation and biomagnification and make them aware of the long-term perishes of soil like decreasing soil fertility of the water body (Damalas and Eleftherohorinos 2011; Pathak et al. 2022). These restraints prevent the fishery from using chemical fertilisers and pesticides and they use alternative bio-fertilisers and bio-pesticides, which are equally effective for the growth of their production (Nandan 2017).

8.5 Storage capacity and procurement centre building
The Indian fishery is capable enough to produce the fish wealth more than is needed to feed India and also to export. But the Indian fishery is related to the problem of fish storage. Many parts generally get damaged due to not having any nearby high-capacity cold storage units (Ps et al. 2022). This generally decreases the profit share of the fish farmers and sometimes it even causes losses. The Indian fishery also lacks the point-based procurement centre for catching fish, which generally speeds up fish spoilage (Getu and Misganaw 2015; Sampels 2015). The fishery co-operatives help the fish farmers by approaching the government in a systematic way to facilitate easy, available transport mechanisms for fish transport and the setting up of government or private sector investments in setting up cold storages or fish processing centres in the prospecting areas (Tsoukalas et al. 2022). The majority of the co-operatives have ice plants and cold storages for fisheries preservation. Selling of fish has become a critical function of societies, with the majority of cultures involved in promotion (Sapovadia 2004; Nair et al. 2010).

8.6 Procurement of ice, petrol, ropes, as well as other fishing necessities
Fish co-operative societies play a critical role in the procurement of ice, petrol, ropes and other fishing necessities for their members. By pooling their resources and purchasing these items in bulk, co-operative societies can negotiate better prices and secure reliable access to these essential supplies (Yapanto et al. 2020). This enables fishers to operate more efficiently and effectively, reducing their operating costs and increasing their profits. In addition to the procurement of fishing necessities, co-operative societies can also provide their members with access to financing, training and marketing support, helping them to improve their livelihoods and build more sustainable fishing businesses (Nair et al. 2010).

8.7 Insurance for equipment and life, as well as assistance from the Distress Charitable Foundation
Fish co-operative societies also play a critical role in providing insurance for equipment and life, as well as assistance from the Distress Charitable Foundation for their members. Insurance for fishing equipment and vessels is essential for protecting the livelihoods of fishers, who often face significant financial risks due to damage or loss of their equipment (Parappurathu et al. 2017). Similarly, life insurance provides a safety net for the families of fishers in case of accidents or fatalities at sea (Mumford et al. 2009). The Distress Charitable Foundation provides emergency assistance to fishers and their families in times of crisis, such as natural disasters, accidents or illness (Zheng et al. 2018). By providing these essential services, co-operative societies can help to protect the well-being and financial security of their members, supporting the sustainability of fishing communities (Wei et al. 2021). Considering the potential and volatility in the industry, the National Federation of Fishermen’s Cooperatives Ltd. (FISHCOPPED) has developed a group accident scheme, sponsored by the central government, and is being
adopted by almost all of the co-operative societies (Nair et al. 2010).

8.8 Supply of consumption items through the stores of society
A fish co-operative society is an organisation owned and operated by fishers who work together to market and sell their catch. The society can provide a range of services, including buying and selling fish, providing financial assistance to its members and advocating for the interests of fishers (Samian et al. 2017). In addition to fish, some co-operatives also supply other consumption items through their stores, such as groceries, household items and even fuel. This can provide a convenient and affordable option for community members who may have limited access to these goods otherwise (Samian et al. 2017). By working together, fish co-operative societies can help support the livelihoods of fishers and contribute to the local economy (Nair et al. 2010).

8.9 Organising workshops
In addition to their core activities of marketing and selling fish, fish co-operative societies can also organise workshops for their members. These workshops can cover a range of topics, such as fishing techniques, safety practices and business management (Sajesh et al. 2021). By providing these educational opportunities, the society can help its members improve their skills and increase their profitability. Workshops can also provide an opportunity for members to network and share knowledge with one another (Tan et al. 2023). Overall, organising workshops can be a valuable way for fish co-operative societies to support the growth and success of their members, while also promoting the sustainable use of fisheries resources (Turgeon et al. 2018). Most co-operatives provide six months of fisherman training for their participants at regional Fisheries Training Institutes (Bradley et al. 2019). Cooperative Training Institutes provide management training to a small number of co-operative members, including board members and workers (Nair et al. 2010).

8.10 Revenue sharing among members
One of the key benefits of participating in a fish co-operative society is the opportunity for revenue sharing among members. When the society sells fish or other products, the profits are distributed among members according to a predetermined formula (Cashion et al. 2018). This can help to ensure that all members receive a fair share of the benefits of their collective work, regardless of their individual contributions (Kasperski and Holland 2013). Revenue sharing can also provide an incentive for members to work together and support one another, as everyone benefits when the society is successful (Ashraf et al. 2021). By distributing profits in a fair and transparent way, fish co-operative societies can help to build trust and promote the long-term sustainability of their operations (Hendrik et al. 2020). Many co-operatives in India generate a huge amount of revenue, and those profit-making co-operatives usually share the dividend among the members, and the percentage of the dividend varies according to the net profit earned (Nair et al. 2010).

8.11 Fishery co-operative society and Sustainable Development Goal (SDG)
Fish co-operative societies can contribute significantly to the achievement of Sustainable Development Goal (SDG) 17, which is focused on strengthening the means of implementation and revitalising the global partnership for sustainable development (Lynch et al. 2020). This goal emphasizes the importance of collaboration, partnership and cooperation between countries, stakeholders and different sectors of society.

Fish co-operative societies can contribute to the achievement of SDG 17 in various ways. Fish co-operative societies can facilitate partnerships and collaborations between fishers, fishing communities, private sector actors, governments and other stakeholders (Contreras Loera and Zulawska 2013). This can lead to the development of sustainable fisheries management practices, access to financing and technology and the establishment of markets for fish and fishery products (Bradley et al. 2019).

It can also promote sustainable economic growth by providing economic opportunities to fishing communities, creating jobs and generating income (Habib and Jan 2021). This can help to reduce poverty, increase food security, and promote economic development (Mary and Kalasam 2015). Fish co-operative societies can provide capacity building opportunities for their members, including training and education on sustainable fishing practices, resource management and entrepreneurship. This can enhance the skills of fishers and fishing communities and promote the development of sustainable fishing practices (Sajesh et al. 2021).

Fish co-operative societies can mobilise resources from different sources to support sustainable fishing practices, including financing from development partners, private sector investments and government funding. Fish co-operative societies can promote knowledge sharing and learning between fishing communities, scientists and other stakeholders. This can help to improve understanding of the marine environment, fisheries management and sustainable fishing practices. Fish co-operative societies can contribute significantly to the achievement of SDG 17 by facilitating partnerships, promoting sustainable economic growth, providing capacity building, mobilising resources and promoting knowledge sharing (Elliott et al. 2022). These efforts can help to promote sustainable fisheries management practices, reduce poverty and support economic development.
Fishermen and fish farmers are the foundation of the Indian fishery sector. Fishermen belong to a lower socioeconomic class; they are typically behind us in terms of economics, politics, literacy and socialisation (Das et al. 2022). They are established as inhabitants in the riverine areas while using fishing as their traditional occupation to earn an income (Ayyappan and Krishnan 2004). Fishermen have scarce resources and they are very unfamiliar with technologies. Local resident fishermen aggregated their resources with assistance from the government as well as other public organisations to create a reciprocal consideration co-operative (Johnson and Van Densen 2007). According to research done by the National Cooperative Union of India (NCUI), just 4% of fishermen completed their education up to the undergraduate level (Junare 1999; Tewary 2001; Sapovadia 2004).

Fishery co-operatives and integrated fish farming can play an important role in women’s empowerment by providing women with access to economic opportunities and financial independence (Torre et al. 2019). Fishery co-operatives are collective enterprises owned and managed by a group of fishermen who work together to improve their livelihoods (Freeman and Svels 2022). Women who are engaged in fishing, fish processing and marketing can join these co-operatives and benefit from shared resources and knowledge (Adam and Njogu 2023). On the other hand, integrated fish farming involves combining different aquaculture activities such as fish farming, shrimp farming and crab farming with agriculture activities such as vegetable farming and rice cultivation, along with poultry, piggery, apiary, goat and dairy farming (Gebru 2021). This provides extra opportunities for women to engage in multiple income-generating activities, as they can participate in both aquaculture and agriculture activities (Gonzalez Parrao et al. 2021). Women can benefit from fishery co-operatives and integrated fish farming in several ways (Haqiqiansyah and Sugiharto 2018). Co-operatives can provide women with access to credit and other financial services, which can help them to invest in their businesses and improve their income (Dadabhau and Kisan 2013). Co-operatives and integrated fish farming provide women with training and knowledge on best practises in fish farming, processing, and marketing. This can help women improve their productivity and the quality of their products (Haqiqiansyah and Sugiharto 2018). Women who join co-operatives can benefit from increased bargaining power, as they can negotiate better prices for their products and access to markets (Kumar 2018). Women who are engaged in fishery co-operatives and integrated fish farming can improve their social status within their communities as they become more economically independent and contribute to the local economy (Soni et al. 2014; Chaubey et al. 2018). Overall, fishery co-operatives and integrated fish farming can provide women with opportunities for economic empowerment, skills development and social status improvement, making them an important tool for women’s empowerment in the fisheries sector (Al Mamun et al. 2012; McDougall et al. 2022).

Fishermen’s co-operatives are more than just a source of income; most of them are involved in community fields such as education, healthcare, public distribution, cultural change and charities in both normal and abnormal times, such as catastrophic or man-made disasters (Figure 1). Outside the gross revenue earned per each calendar year, most of the co-operatives spend money on charity and philanthropic activities such as weddings, youth centre construction and so on (Nandan 2017; Saman et al. 2017). The Veesava Fisheries Cooperative is a socioeconomic reformation and humanitarian group that has implemented initiatives for superstitions removal, schooling, healthcare and other community programmes (Junare 1999; Tewary 2001).

India is among the few nations on earth with massive resources and a suitable agro-climate for fisheries management operations (Ngasotter et al. 2020). Notwithstanding its plentiful resources, the fishing industry contributes little to total gross domestic product development. As a result, the fishing industry is anticipated to contribute more towards economic growth (NCBA Clusa 2015).

**FIGURE 1** The role of co-operative fisheries in socioeconomic development.

**10 | FISHCOPFED DATABASE**

The National Federation of Fishers Cooperatives Ltd. (NFCC or FISHCOPFED) published some statistical data regarding fisheries co-operatives in their website (www.fishcopfed.in) which are presented in Figures 2–4.
neurship in the fishing sector were the lack of accessibility of credit from banking sectors, the absence of sufficient training centres, the inadequacy of timely proper support, etc. According to the survey, the key restrictions faced by fisherman co-operatives comprised an underdeveloped selling system, insufficient distribution networks, late delivery of seedlings, a high intensity of fish thievery, insufficient water depth inside the water body during the winter and summer seasons, etc.

Bhaumik et al. (2005) investigated the obstacles faced by fisheries co-operatives in boosting fish productivity. According to the research, the main obstacles confronted by the co-operative societies seemed to be increased levels of contamination, mainly in urban regions due to the arrival of contaminants into waterways from inadequately treated municipal wastewater canals, and in rural locations due to the entry of contaminants in the form of agrochemicals, outbreaks of fish pathogens, illegal fishing or overexploitation, the unavailability of funding from government agencies, and the high intensity of invasive alien species of weeds.

De and Saha (2006) investigated various obstacles affecting co-operative fisheries. Their research observed that the primary restrictions of co-operative fisheries were always the predominance of several persons in making choices or policies in general, as well as the lack of public engagement and co-operative collaboration. Researchers further found restrictions such as disagreements over benefit sharing between shareholders of fisheries co-operatives, inadequate technological ability of fishers and the existence of trade middlemen.

ONFLICT OF INTEREST
The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION
TS Design & conceptualisation, secondary data collection, checklist preparation, manuscript editing; AS manuscript writing, manuscript formatting, framework preparation; PM framework preparation, reference & in-text citation formatting.

DATA AVAILABILITY STATEMENT
Data sharing is not applicable to this article as no new data were created or analysed in this study.

REFERENCES


Bureau ET (2019) Fisheries sector registered more than double growth in past 5 years; emerged largest group in agri export. The Economic Times, accessed on 10 June 2022.


Elliott VL, Lynch AJ, Phang SC, Cooke SJ, Cowx IG, ... Stokes GL (2022) A future for the inland fish and fisheries hidden within the sustainable development goals. Frontiers in Environmental Science 10:


Jaini M (2021) India’s fisheries: past, present, and future. India Development Review. IDRonline, Bandra West, India.


Lynch AJ, Elliott V, Phang SC, Clausen JE, Harrison I, ... Stokes GL (2020) Inland fish and fisheries integral to achieving the Sustainable Development Goals. Na-
ture Sustainability 3(8): 579–587.
Meena S (2022) India continues to maintain its position as the world’s second-largest fish producer. Krishi Jagran, India.
Ranicki C (2012) Uniting India’s fishing cooperatives. StoriesCoop, India.
Rao PS (1973) Problems of management of fish marketing and co-operatives. FAO/ SIDA course on the management of fishermen’s co-operative in collaboration with the Govt. of India and the International Cooperative Alliance (ICA) Bombay, FIE/MFC 10: 1–8.
Sajesh VK, Suresh A, Mohanty AK, Singh V, Ravishankar CN (2021) Skill development in marine fisheries:
Fisheries 7(6): 693–702.

T Sanyal https://orcid.org/0000-0002-0046-1080
A Saha https://orcid.org/0000-0001-9985-3481
P Mukherjee https://orcid.org/0000-0002-4901-0141