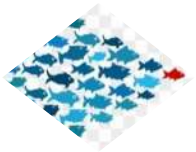
CHAPTER 1



Marine Fisheries in India: Outlook and Challenges Ahead

1.0 Introduction

India is endowed with a wide diversity of water resources, which sustain a large fisheries sector in the country. India has a coastline of 8,118 km with an Exclusive Economic Zone (EEZ) stretching over 2.02 million sq. km, and a continental shelf covering 0.53 million sq.km.

Fisheries have a very important role for food supply, nutritional security and livelihood in India. The sector is one of the important revenue-earning and employment-opportunity sectors, contributing significantly to the economy of the country. Marine fisheries in India are a shared responsibility between the national and state governments. In a legal and constitutional sense, state governments are responsible for waters inside the 12 nautical mile territorial limit (22 km) while the Government of India (GOI) is responsible for waters between 12 nautical miles and the country's 200 nautical mile (370 km) EEZ.

Fisheries represent the best example of the exploitation of living natural resources. One of the most important characteristics of capture fisheries is that the resources are a common property, the access to which is free and open. Irrespective of the type of exploiters: artisanal fishers or large fleet owners, their operation will not be limited until the zero profitability threshold is reached. Hence, there is a need for a manager to intervene and regulate their activity. The general objectives of fisheries management are to achieve nutritional security, maintain sustainability of the resources, and ensure gainful employment and economic benefits. To achieve this, a multidisciplinary approach involving biological, environmental, social, economic and administrative instruments is necessary. The present status of marine fisheries in India and the growing challenges call for early implementation of effective management measures to gradually shift the focus from harvesting increasing volumes of fish to a more holistic approach based on a long-term goal of maximising net economic, social and environment benefits from sustainable fish production.

2.0 Overview

During 1950 - 2010, marine fish production in India increased from 0.5 million tonnes (m t) to 3.3 m t. Contrary to global marine fish production, which decreased from the year 1970, the

production in India was increasing during the 60-year period. In the last 9 years (2011-2019), however, the annual marine fish catch in India fluctuated between 3.5 million tonnes in 2011 and 3.8 m t in 2019, without an increase (Fig. 1). While the catch stagnated, the value of the catch increased during this period from Rs 24,000 crore in 2011 to 60,800 crore in 2019 at the landing centre level (Fig. 2). The corresponding value at retail markets increased from Rs 39,000 crore to Rs 92.356 crore. This shows the increase in the unit price of fish from about Rs 70 per kg to Rs 160 per kg at landing centre level, and from Rs 111 per kg to Rs 243 per kg at retail level. The increase in the value without increase in the catch is the result of (i) decrease in the per capita fish supply with growing human population; (ii) increase in demand for marine fish among the people, and (ii) increase in the cost of fishing necessitating increase in the selling price.

Fig 1. Trend in estimated marine fish landings during 2011 – 2019 (Source: Annual Reports of ICAR-CMFRI)

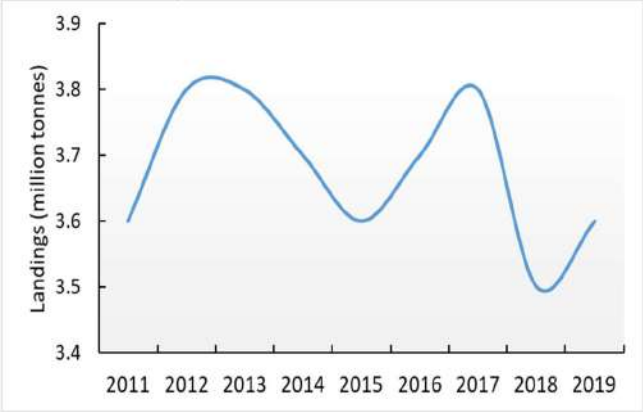
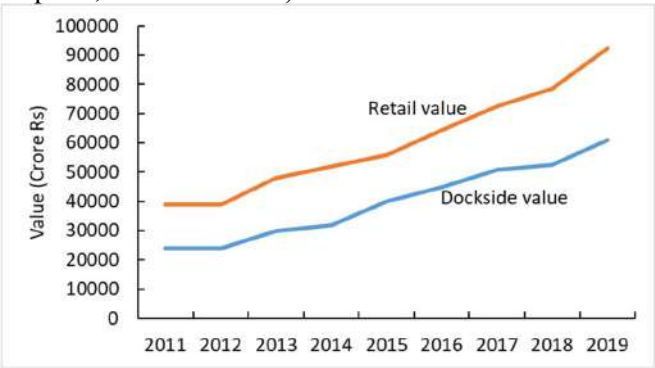


Fig 2. Trend in estimated value of marine fish landings during 2011-2019 (Source: Annual Reports, ICAR-CMFRI)



Potential yield estimates indicate that the annual harvestable potential yield (PY) from the Indian EEZ is 5.31 m t (DAHDF, 2018). Besides the conventional resources, the PY for non-conventional resources has been estimated as oceanic squids (0.63 m t), myctophids (1 m t), jellyfish (0.2 m t) and marine algae (17,775 t). While the estimates on landings and PY indicate the potential to increase the catches from 3.65 m t to 5.31 m t, it is a challenge to close the gap of 1.66 m t due to the following reasons: (i) The unfished/underfished resources are in the oceanic/deep sea regions in India's EEZ and fishing in these waters will be expensive, and

requires improved fishing technologies. (ii) Many resources in the oceanic of waters do not have ready market demand (except tunas and tuna-like fishes and deepsea shrimps), and require improved processing technologies. Considering this, it may be stated that from the currently fished areas, the country has reached a stage in which further increase in fishing effort and production have to be viewed with caution.

India is a country with a large number of fishermen harvesting multispecies resources with an array of craft-gear combinations. The livelihood of fishermen directly depends upon the availability of natural resources. The number of fishermen involved in active fishing increased from an estimated 0.5 million in 1980 to 1.6 million in 2019 (DoF, 2020). This includes those involved in actual fishing on full-time and part-time basis. Though the fish catch increased from 1.5 m t to 3.6 m t during this period, the increase is not proportional to to that of active fishermen population. Irrespective of three-time increase in the dependent-population in 40 years, the annual catch per fisherman decreased from 3.0 t in 1980 to 2.3 t fish per year in 2019. In comparison, a fisherman in several European Union countries catches > 100 t in a year. In Norway, one of the advanced countries in fisheries and in best practices in fisheries management, for example, only 11,000 fishermen are engaged in fishing, and they catch 2.76 m t of fish (in 2018), *i.e*., each fisherman catches 250 t in a year (OECD, 2021). The number of fishing vessels are 5982 and 92% of boats are less than 15 m overall length. Though India and Norway have totally different biological, environmental, administrative and cultural setting, it is worth taking a note of the difference in the fisheries prevailing between these two countries. The comparison shows that in India (i) the population depending directly on fishing is so very great, (ii) large investments have gone into fishing in the form of fishing boats, and (iii) it would be a challenge to find quick solution to the problem of overcrowding in the sector. It would be difficult to achieve goals related to sustainability in this type of situation and long-term solutions are required.

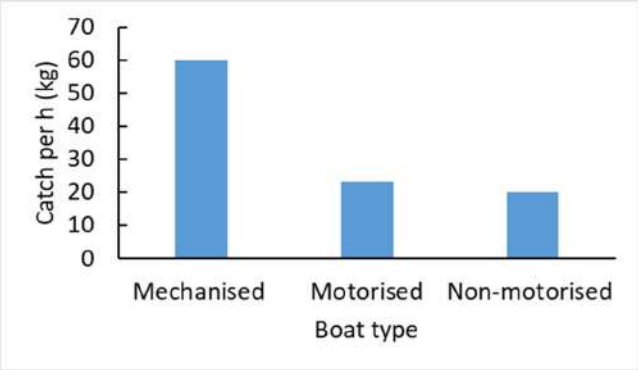
In the last 60 years, the number and efficiency of marine fishing boats have increased in India. Following introduction of mechanisation in the mid-1960s, there were 19,210 mechanised boats in 1980, 58,911 in 2005 and 74,059 in 2016 (Table 1). In addition to the number of boats, the efficiency of boats also increased in terms of boat size, engine power, sea endurance, etc. Motorisation of traditional boats was introduced in the mid-1980s, which became very popular immediately. In 2016, there were 64,449 motorised boats in addition to 25,689 non-motorised boats. Motorisation substantially increased the mobility of the smaller craft. These developments have helped extend fishing to deeper waters as well as into new geographical areas. At present, overcapacity is an issue in capital-intensive mechanised fishing sector as well as in the employment-oriented motorised sector. It has been estimated that optimum number of different types of fishing craft needed for exploiting the potential yield is 76,967 (DAHDF, 2018). At present, 1,64,197 boats of different categories are operating, showing that the number of prevailing boats is twice the required number of boats. In spite of overcapitalisation and overfishing, the catch has not declined, as additional resources from distant water fishing grounds are being harvested.

Table 1. Number of marine fishing boats in India (Source: publications of ICAR-CMFRI & DoF)

Year	Mechanised	Motorised	Non-motorised
1961	6708	0	93099
1973	8086	0	106480
1980	19210	0	142669
1998	49070	50922	76596
2005	58911	75591	74270
2010	72559	71313	50618
2016	74059	64449	25689

For many years, the mechanised boats remain as the highest contributor (83.0% of total catch followed by the motorised boats (16.1%). The non-motorised boats contribute only 0.9% CMFRI, 2020). The catch rates in terms of per boat was high (2175 kg/trip) for the mechanised boats whereas it was only 144 kg/trip for motorised boats and 45 kg/trip for non-motorised boats. In terms of hours of operation also, the catch rates were high for mechanised boats (Fig. 3).

Fig. 3. Catch per h (kg) of boat types in 2020 (Source: CMFRI, 2020)



3.0 Opportunities

India's marine fisheries has the following broad opportunities to show a better performance (see also World Bank, 2010):

(i) Building more productive fish stocks by following best management practices;
(ii) Generating a higher level of sustainable net economic, social and environmental benefits in the future; and
(iii) Utilising and improving the distribution of these benefits by providing better equity among stakeholders.

The sector has the strengths provided by an experienced labour force, a long history of fishing and Indigenous Technical Knowledge, good local examples of fisheries management, and expanding global and domestic demand for high quality marine fish products.

4.0 Constraints

To seize the broad opportunities mentioned above, reforms are needed to guide improved biological, social and economic performances of the sector in both inshore and offshore fisheries. The following five key constraints need to be addressed to transform marine fisheries in India (see also World Bank, 2010):

(i) The current management system can serve only partially for reform and more progressive fisheries management system is required.

The policy on marine fisheries in India is informed by three key policy documents: (a) Five Year Plans developed by the Planning Commission from the year 1950, (b) Comprehensive Marine Fishing Policy (Government of India, 2004) defining various desired goals and identifying schemes on which the funds are spent, and (c) National Policy on Marine Fisheries, 2017 (NPMF, 2017) (DAHDF, 2017). The NPMF 2017 has defined the following major topics aimed at reform: Fisheries Management; Monitoring, Control and Surveillance; Fisheries Data and Research; Mariculture; Island Fisheries; Post-harvest and Processing; Trade; Marine Environment and Marine Pollution; Adaptation to Climate Change; Fisher Welfare, Social Security, Institutional Credits; Gender Equity; Additional/ Alternate Livelihoods; Blue Growth Initiative; International Agreements/Arrangements; Regional Cooperation; and Governance and Institutional Aspects.

The NPMF 2017, if implemented in full scale, will lead to far reaching reformation of the sector. To achieve this, it has to be supported by appropriate management system and management measures. Strengthening management and implementation mechanisms at the level of Government of India as well as State/Union Territory is necessary. At present, the State Governments and UTs implement Marine Fishing Regulation Act (MFRA), which needs to be revised to accommodate the transformation process. Coordination between national laws and authority (outside the 22 km territorial waters boundary) and state laws and authority (within the 22 km boundary) is another area where improvements could be made.

(ii) Biological and economic sustainability of marine fish stocks faces challenges.

There are many causes for the marine fisheries not yielding their full potential value. Overfishing occurs when more fish are caught than how much the fish population can replace through reproduction and growth. Gathering as many fish as possible may seem like a profitable practice, but overfishing has serious consequences. Increasing fishing effort, overfishing and overcapitalisation as well as unsustainable fishing practices over the years are pushing many fish stocks to the point of concern. Recently, it has been assessed that one-third of the marine fish stocks has been overfished (Sathianandan et al., 2021). The results not only affect the balance of life in the oceans, but also the social and economic well-being of the coastal communities who depend on fish for their way of life. Overcapacity contributes to fishing effort in excess of the effort required to harvest the biological Maximum Sustainable Yield (MSY), resulting in declining catches and lower net benefits. Hence, better implementation of appropriate reforms through consultative and analytical processes are needed that could lead to improved awareness, more efficient legal and policy frameworks, stronger institutions and stakeholder participation, and more effective fisheries management systems.

In addition to overfishing, the fish resources are suffering mounting effects of environmental degradation, pollution and climate change (BOBLME, 2012; Vivekanandan et al., 2019). Hence, for sustaining marine fisheries, it is important to leave enough fish in the sea, respect habitats of fish populations and maintain livelihoods of dependent human populations.

(iii) Small scale fishers are losing their livelihoods and opportunities for development.

The current situation with marine fishing is affecting inshore fishers through declining catches, reduced incomes, and increasing conflicts. This is particularly true for smaller boat owners and crew who do not possess mechanised boats. They are unable to protect their resource access effectively, or shift to newer and more distant fishing areas. The rapid growth of the mechanised fleet, often with the benefit of public subsidies, has increased the competition for those fishing with smaller inshore vessels. Education levels tend to be low for the fishermen and their families owning motorised and non-motorised boats, making it difficult for them to take advantage of alternative employment opportunities in the expanding national economy.

(iv) Fisheries management needs to be strengthened for both inshore and offshore fisheries.

Marine fisheries management objectives in India are largely based on biological criteria. For waters within the 22 km limit, states generally provide a basic regulatory and licensing regime for fisheries management. Seasonal fishing ban is promulgated by the Government of India every year and implemented by the maritime states and Union Territories. For regulating mesh size, and zoning of fishing areas, many state fisheries departments lack working patrol vessels, and enforcing regulations is quite challenging. In spite of promulgation of MFRAs by maritime state governments, licensing of craft, mesh size regulation, catch declaration, ceiling on number and efficiency of fishing craft, monitoring, control and surveillance of fishing vessels remain as issues. There is increasing conflict as smaller inshore vessels and larger offshore mechanised trawlers compete for fish within the 22 km boundary, as the shallow waters are traditionally more productive. The situation exerts fishery resources under pressure. The major dilemma is that if access to fisheries resources is restricted, it would affect livelihoods of coastal communities, while if the access is open, the resources will sooner or later decline beyond recovery.

Among the several input control measures in the MFRA, seasonal fishing ban (SFB) is being followed diligently in all the maritime States and Union Territories. While Kerala started implementing SFB in 1988 other States and UTs began to implement it in different years from 1989 to 2001. Thus, the SFB is being followed every year across the maritime states of India for the last 20 to 32 years (Vivekanandan, 2019). All the mechanised boats (with a fixed engine and a wheelhouse) are covered by the SFB. Motorised boats (with outboard motor and open deck), are covered by the SFB based on the engine horsepower of the fishing vessels. In some States, boats operating with horsepower 10 and above and in others, those above 25 hp only, are covered by the SFB. When SFB was introduced it was observed for 45 to 47 days during the southwest monsoon period of June to August by the States and Union Territories (UTs) on the west coast and during April and May on the east coast. In 2015, based on the recommendations of an appointed Technical Committee, the Union Ministry of Agriculture (MoA), raised the fishing ban period to 61 days along both the west and east coasts. Since then, the SFB is followed for 61 days during southwest monsoon months from June 1 to July 31 along the west coast (including Lakshadweep Islands) and during summer months from April 15 to June 14 along the east coast (including Andaman & Nicobar Islands).

For waters under the authority of the Government of India, between 22 km (12 nautical miles) and the 370 km (200 nautical miles) Indian EEZ, more effective mechanisms are needed to set out conservation and management measures, and their enforcement.

(v) Market channels, particularly for small-scale fishers, are inefficient and hinder delivery of high quality products at optimal prices.

Domestic marine fish market chains in India are generally characterised by unhygienic conditions, poor handling of fish and loss of quality (from the boat to the final market), and a subsequent reduction in profits. High levels of product losses through wastage (up to 15 percent of harvest) are common. While new developments in marketing channels such as super markets are emerging in large cities with modern fish handling practices and facilities, small-scale fishermen are often unable to gain access to these marketing channels due to poor quality of their product. Major contributors to this problem are the lack of easily accessible and low-cost credit, and affordability of basic infrastructure such as ice, cold storage, and cold chain that would enable fishers to maintain better quality and obtain higher prices. While demand for fish products in India is projected to rise significantly in the future along with the expected increase in the population, the small-scale fishermen appear to lack adequate information about market requirements and emerging market opportunities. In contrast, Indian fish products export passing through European Union certified processing plants usually meet high international health and safety standards. However, trade barrier citing that fishing does not adhere to eco-friendly practices is looming large against marine products export to the USA.

4.1 Other anthropogenic factors influencing fisheries

One of the often-ignored factors that causes degradation of environment and depletion of fish stocks is the anthropogenic interference other than fishing. The man-induced alteration of the physical, chemical, biological and radiological integrity of air, water, soil and other media is causing, in several cases, irreversible damage to the structure and function of ecosystems. Runoff from domestic, municipal and industrial wastewater discharges and agricultural fields, solid waste

disposals, discharge from ships, and oil spills from tankers, are some of the major sources that cause deterioration of water quality, and cause damage to the aquatic organisms, from phytoplankton to mammals. Dams divert nutrient-rich water from entering into the sea, and obstruct the migratory path of some fishes. Pollutants such as trace metals, plastics and organochlorine pesticides enter the biological systems through food webs. Animals in higher trophic levels experience the effects of bioaccumulation and biomagnification. Depending on the intensity of damage, the interferences affect the physiological processes of growth and reproduction of aquatic organisms, mass kills, biodiversity loss and displacement of species.

Fisheries management needs to be approached in an integrated way by considering the issues of all the anthropogenic interferences such as increasing fishing intensity and damage to the physical, chemical and biological integrity of the ecosystems. As fisheries are impacted by the developmental needs of several other important prime sectors such as agriculture, industries, power generation etc., it is not possible to find solution to the issues from fisheries sector alone. For instance, issues such as water contamination, enforcement of standards for water discharge, maintaining the quality of river runoff, and reducing greenhouse gas emissions and climate change, have to be addressed by non-fisheries sector.

4.1.1 Climate change implications for fisheries

It is often stated that the fisheries sector is dynamic and used to dealing with changes. However, the magnitude of future climate-driven changes indicate that global marine species redistribution and marine biodiversity reduction in sensitive regions will challenge fisheries productivity by the mid-twenty-first century. These changes will demand greater preparedness in responding to the changes as concluded by the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2014). The IPCC considered freshwater systems to be among the most threatened on the planet because of the multiple anthropogenic impacts they are subject to from hydropower infrastructure, water use for irrigation and agricultural land-use. It is expected that these stressors will continue to dominate as human demand for water resources grows, together with urbanization and agriculture expansion. This will have implications for the fisheries and aquaculture sector, throughout the value chain. Species productivity and fish growth are already changing with consequences for fishing and farming yields, as a result of shifts in the distribution of fish, alteration of larval transport or thermal tolerance of farmed fish (Barange et al., 2018). Operations of fishing and farming activities are also expected to be affected, whether by short-term events such as extreme weather events or medium to long-term changes such as lake levels or river flow that could affect the safety and working conditions of fishers and fish farmers. Food control procedures will undergo major reshaping to protect consumers from potential increase in contaminants and toxin levels resulting from changes in water conditions.

Using Dynamic Bioclimate Envelope Model (DBEM), the maximum marine catch potential in the world's Exclusive Economic Zones (EEZs) has been projected to decrease by 2.8 percent to 5.3 percent and 7.0 percent to 12.1 percent by 2050 relative to 2000 under the "strong mitigation" (RCP 2.6) and "business-as-usual" (RCP 8.5) greenhouse gas emission scenarios, respectively (Cheung et al., 2018). The projected decrease in catch under RCP 8.5 becomes 16.2 percent to 25.2 percent by the end of the twenty-first century. The projected changes in maximum catch potential varied substantially across EEZs in different regions, with EEZs in tropical countries showing the largest decrease. In India, the catch potential is projected to decrease by 10.3% and 17.0% in the mid-century under RCP 2.6 and 8.5 scenarios, respectively. The reduction will be 43.6% in RCP 8.5 by the end of the century.

Considering the multiplicity of issues negatively influencing fisheries, fisheries management has to be modernised with an expanded scope with multiple objectives and inclusive approach.

5.0 Definition of fisheries management

There are no clear and generally accepted definitions of fisheries management. A working definition, for the purposes, may be taken as: *"The integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives"* (Cochrane, 2002).

Fisheries management is a process *of considering the following components to make* decisions and implement actions to achieve goals:

- Biological considerations
- Ecological and Environmental considerations
- Technological considerations
- Social and Cultural considerations
- Economic considerations
- Considerations imposed by 'other parties'.

'Other parties' would include, for example, tourism, conservation, oil and gas exploration and exploitation, offshore mining and shipping, aquaculture and mariculture, and coastal zone development for business or industry. All these can impose significant constraints on fishing activities and may be impacted by fishing activities.

Modern fisheries management is required to be familiar not only with the national legislation governing fisheries, but also with international legislations and voluntary instruments dealing directly with or impinging on fisheries. There has been a proliferation of such instruments in recent decades. This process shows the highly complex nature of management, and the need for considering the above-mentioned six different, but interconnected and perhaps equally important elements for developing a management framework.

5.1 Principles of fisheries management

A number of key principles can be identified which serve to focus attention on effective fisheries
management (Cochrane, 2002):

1. Fish resources are a common property resource.
2. Sustainability is paramount and ecological impacts must be considered.
3. Decisions must be made on best available information but absence of, or any uncertainty in, information should not be used as a reason for delaying or failing to make a decision.
4. A harvest level for each fishery should be determined.
6. The total harvest across all sectors should not exceed the allowable harvest level.
7. If this occurs, steps consistent with the impacts of each sector should be taken to reduce the removal.
8. Management decisions should aim to achieve the optimal benefit to the community and take account of economic, social, cultural and environmental factors.

5.2 Types of management

Examination of fisheries management framework currently existing in different countries shows that the following four approaches are being adopted:

(i) Input control approach
(ii) Output control approach
(iii) Precautionary approach
(iv) Ecosystem approach

5.2.1 Input control approach

Input controls are restrictions put on the intensity of use of gear to catch fish. Most common restrictions are on the number and size of fishing boats (fishing capacity control), the amount of time fishing boats are allowed to fish (effort control) or the combination of both capacity and effort. The input control measures may take various forms such as closed areas (including Marine Protected Areas), closed seasons, minimum mesh size, minimum legal size-at-capture, prohibiting destructive gears, etc (Table 2).

Table 2. Different types of input control measures

Methods	Specific measures	Desired effects
Restriction of fishing effort	Reduction of fishing boats, Regulating fishing efficiency, Strict registration and licensing	Relieving fishing pressure
Closure of fishing areas	Area allocation, MPAs, fish refugia, No-take zone, fish sanctuary	Improving fish abundance and biomass in closed areas
Closure of fishing season	Closure during spawning season	Protecting spawners, improving recruitment
Minimum mesh size/Minimum Legal Size (MLS)	Specification of minimum mesh size; Ban catch, landings and trade of species below MLS	Protection of juveniles; Reducing low-value bycatch
Prohibiting selected fishing practices	Ban harmful fishing gear and practices	Improving fish abundance/biomass and health of ecosystem
Species protection	Place Endangered, Threatened and Vulnerable (ETV) species under Protection Act	Recovery of ETV species and health of ecosystem

5.2.2 Output control approach

In well managed fisheries, Maximum Sustainable Yield (MSY) or Maximum Economic Yield (MEY) or yield-per Recruit (Y/R) is used as biological reference point (BRP) to derive thresholds and targets to arrive at sound fisheries management decisions (Cadima, 2003). Spawning-recruitment relationship (S-R) is used as a key element for formulating fisheries management advice. A few other empirical reference points such as long-term mean size-at-capture also can be used as BRPs. By using the MSY approach and BRPs, countries like the USA, Canada, New Zealand, and a few countries in the Europe are following advanced rights-based management approach to limit the catch equal to or within the total allowable catch by following catch quotas. In these countries, Total Allowable Catch (TAC) is set with reference to maintaining the biomass at or above a level that can produce the MSY. Output control measures also take the form of certification and trade restrictions (Table 3).

Table 3. Different types of output control measures

Methods	Specific measures	Desired effects

Catch quality	Ban on landing and trade of low quality fish	Improving the quality of traded fish; protecting health of consumer health
Total Allowable Catch and Individual Quotas	Establishing maximum fishing limits during a timeframe and for each one of the species	Maintaining fish stocks at or above MSY
Certification/ Labelling	Linking fisheries products to their production process	Encouraging eco-friendly and sustainable fishing practices
Trade restrictions	Restricting import/export of fish from illegal, harmful fishing practices	Maintaining fish stocks at or above MSY

5.2.3 Precautionary approach

Although MSY is an appropriate basis for reference points, there are limitations of applying MSY approach in fisheries management in the absence of key BRPs like the S-R. However, non-availability of a whole range of scientific information should not deter taking management decisions. In this situation, precautionary approach should be the backbone of fisheries management. The UN Conference on Straddling Fish Stocks and Highly Migratory Stocks (UN 1995) first articulated the principle for fisheries under the following definition: *"The absence of scientific data shall not be used as a reason for postponing or failing to take conservation and management measures".* The precautionary approach requires, *inter alia*, maintenance of a flexible, resilient fishery system including the fish stock, the associated species, the fleet and the management agency regulating it. The precautionary approach emphasizes that, greater the information gaps and the amount of uncertainty, the management measures should be more cautious to avoid risks.

Whatever is the approach, stakeholder engagement in various levels of fisheries management and co-management systems are becoming popular in many parts of the world and demonstrating considerable levels of success. In its simplest form, co-management can be described as fisheries management where roles and responsibilities are shared between the government and resource users (Pomeroy, 1994).

5.2.4 Ecosystem approach

In recent years, it has been recognized that effective fisheries management could be achieved by following ecosystem approach, in which multiple regulatory measures and management actions could be applied in full consideration of aquatic species, the ecosystems in which they live and the developmental systems that degrade the ecosystems. The ecosystem approach to fisheries management (EAFM) offers a practical and effective means to manage fisheries more holistically. It represents a move away from conventional fisheries management that focuses on target species, towards systems and decision-making processes that balance environmental, human and social well-being within improved governance frameworks. In recent years, decentralization policies have left local units with the challenging task of developing management plans that not only work locally, but also fit into broader fishery/ecosystem strategies. EAFM caters for all levels, ensuring that local level plans align with higher level strategic decision-making. The features of EAFM are as follows *(www.eafmlearn.org)*:

- EAFM is an integrated management approach across land, water and natural resources that promotes both sustainable use and conservation of the systems that are already connected in the nature/environment;
- EAFM looks at the bigger picture. It recognises that fish and fisheries are part of a broader ecosystem that includes where fish live as well as the people who benefit from catching, trading and eating fish.
- EAFM recognizes the reality that fisheries depend on healthy ecosystems and that different components in an ecosystem, such as fish, habitats, fishers and other users are all connected and can impact each other.
- EAFM strives to find a balance between improving the well-being of the people and building or maintaining a healthy environment so that the benefits derived from fishing are sustained.
- EAFM strives to increase the benefits derived from catching fish without destroying the environment on which fish depend.
- EAFM considers the broader ecological, social and economic dimensions of sustainable development in fisheries and the interactions among ecosystem components. Examples include fish and fishing, post-harvest processing, habitats, pollution and other users;
- EAFM provides a framework to proactively address the underlying issues in a fishery by taking a more thoughtful long-term perspective to planning and management.
- EAFM provides a fisheries relevant framework to help you bring different management strategies/approaches/tools (e.g. co-management, coastal zone management, MPAs etc) together in a clear, logical and structured approach
- EAFM allows the threats to the long-term sustainability of the fishery to be viewed alongside shorter-term economic needs. Trade-offs and compromise agreements can be reached on actions to reduce impacts and enhance compliance.
- EAFM recognises that complex problems facing fisheries may require solutions outside the fishery sector. The use of an EAFM allows outside factors to be recognized and potentially opens the way for constructive dialogue. It also helps find solutions for mitigating negative impacts in different sectors, (e.g. labour and working conditions; vessel registration and licensing; interactions with tourism; improved sewage treatment; zoning of dredging to avoid nursery grounds).

Applying an ecosystem approach to fisheries management (EAFM) is considered the preferred option and the best practice for long-term sustainability of fisheries and the services that fisheries ecosystems provide to the society.

6.0 Conclusion

Marine fisheries can generate greater net benefits and become a stronger engine for rural economic growth and social development in India. However, to achieve this potential, carefully implemented management plan over an extended period of time at both national and state levels must address core policy, legal, institutional and fisheries management issues. It is important that the managers adopt a broader approach and recognise that adopting an inclusive approach with multiple objectives is a priority to fisheries sustainability to fulfil the aspirations of Blue Economy, Marine Spatial Planning, and Target 14 of Sustainable Development Goal.

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