

ASSESSING SOCIAL SITUATIONS AND MANAGEMENT OF MARINE FISHERIES POLICY FRAMEWORKS

Shinoj Parappurathu and C. Ramachandran

*ICAR-Central Marine Fisheries Research Institute, Kochi
E-mail: pshinoj@gmail.com*

Introduction

India, being one of the largest marine fisheries in the world, has high stakes in managing its coastal and marine resources. The marine resources in India are highly diverse comprising an exclusive economic zone of 2.02 million km² besides a continental shelf area of nearly 0.50 million square kilometers. The capture fisheries sector in India, though it experienced a rapid expansion in recent decades with the advent of mechanized fishing during the 1980s, has started showing signs of over-capitalization and consequent crises. Experts in the field have already highlighted the impending problems such as declining catch rate and diminishing returns, overfishing and /juvenile fishing leading to depletion of fish stock, rampant destruction of marine biota due to high-intensity trawling, and so on (Devaraj and Vivekanandan, 1999; Ramachandran, 2004). The imminent crisis is increasingly reflected through frequent conflicts between various groups/factions of fishermen/vessel operators over their rights and shares of the resources. These circumstances echo the need for a strong regulatory and management regime for protecting and preserving the maritime resources of the sub-continent. Though India is not new to regulations in the fisheries sector with several laws and rules in place for more than a century, the emerging scenario merits a relook into the existing regulatory framework. Against this backdrop, this chapter reviews global approaches to assess the social situations of marine fisherfolk and presents a broad overview and critical appraisal of India's marine fishery regulations and policies aimed at conservation and sustainable development.

Approaches and tools to fishery regulations and policies

A wide variety of approaches and tools are used for regulating fisheries across the world. As the primary aim of regulating a marine fishery is to maintain a sustainable level of biomass and productivity in the wild stock, efforts in this direction are mainly directed to limit the rate of extraction. The basic scientific concept followed in this context is the 'maximum sustainable yield (MSY)' which is the maximum level at which a resource can be routinely exploited without long-term depletion. The idea evolved in fisheries in the early 1930s and attained popularity in the 1950s with the advent of 'surplus production models' capable of actually estimating the MSY based on oceanographic and marine data. However, subsequent assessments revealed that while establishing a sustainable level of harvest as a goal with intuitive appeal, the pursuit of MSY ignores many relevant economic and social factors that are critical to the sustainability of a fishery (Larkin *et al*, 2011). A new concept namely, maximum economic yield (MEY) was introduced that defined the level of harvest or effort that maximizes the sustainable net returns from fishing (Grafton *et al*, 2006). This approach picked up momentum with developments in the area of bio-economic modelling that combines the underlying stock dynamics with the harvest function the costs of harvest and the economic

value of the extracted resources. An illustration of how MSY and MEY compare with each other is presented in Fig. 1. Declaration of total allowable catch (TAC) limits, especially by temperate fisheries administrations, is generally based on any of the above two concepts. MSY/MEY can be achieved through alternative strategies such as limiting access to resources, setting caps on the quantity harvested, limiting the fishing efforts, manoeuvring the area and time of harvesting to avoid spawning and juvenile fish, and so on. These basic

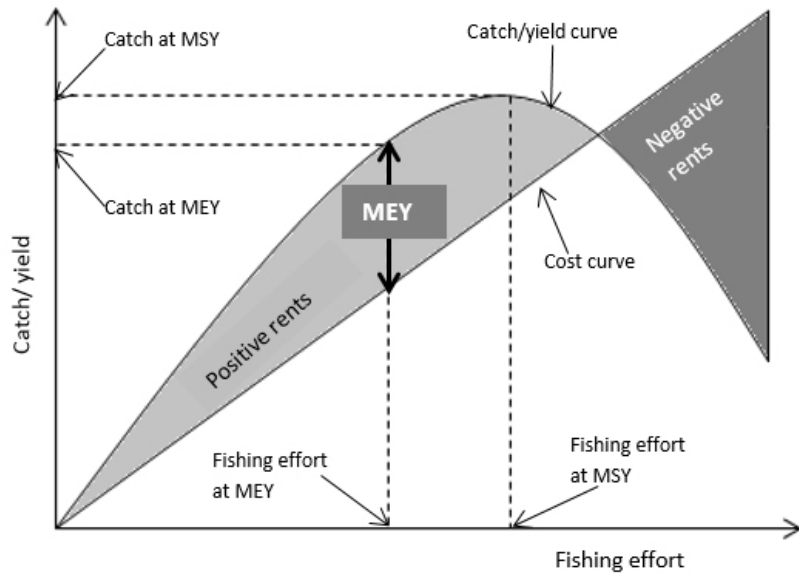


Fig. 1. Maximum sustainable yield (MSY) and maximum economic yield (MEY)
Source: World Bank (2009)

principles behind fishing regulations that form essential components of all major fisheries management programs in the world. Accordingly, approaches to fisheries regulation can be broadly classified into five categories, viz., (i) Access-control based (ii) Output/catch-based (iii) Input/effort-based (iv) Temporal and (v) Spatial. However, such a classification is not water-tight and is subject to changes depending upon contexts. While the first three approaches are primarily directed to limit the rate of extraction from the stock, temporal (mainly seasonal bans) and spatial approaches generally target to minimize destruction to sensitive stocks (endangered species, spawning and juvenile fish).

Among the various measures, access control is one of the most basic and easy-to-implement regulations that includes tools such as licensing and registration that limit fishing access based on a set of basic minimum requirements. It also includes options such as limited entry permits issued to impose severe access restrictions and those like group fishing rights and territorial use rights for fishing (TURFs) that are restricted to specific communities or beneficiary groups. Output-based regulatory tools include collective/individual catch quota, vessel catch limits and minimum size limits. Catch quotas are generally fixed based on TAC estimates derived based on the concepts of MSY/MEY and are subsequently rationed among beneficiaries based on certain qualifying criteria. The quotas are either transferable or non-transferable depending on the degree of regulation. Minimum size limits, another output-based regulation, are mainly set to prevent the harvesting of juvenile fish thereby hastening the rebuilding of excessively exploited stocks. Nevertheless, output control measures are data intensive and require a substantial amount of resources for their implementation, thus limited only to a handful of advanced fisheries. Input controls focus on restricting the types of inputs as well as effort involved in the stock extraction process and include gear restrictions that set limits on the type, designs and mesh size of the gears used, engine power restrictions, as well as size restrictions on fishing vessels. Though they are relatively easier and less costly to implement as compared to output-based measures, one major demerit is the difficulty associated with assessing the extent of control on each input to derive desired results (FAO, 1997). Temporal controls are widely adopted across the world, wherein, the idea is to regulate resource extraction during specified seasons of the year or to fix time limits to fishing. Seasonal fishing bans, a common temporal strategy, are adopted both in temperate and tropical waters to minimize the destruction of the spawning population.

The spatial restriction approach, on the other hand, includes alternative tools such as designating marine protected areas (MPAs), temporary area closures and spatial zoning. MPAs have received considerable attention in recent times and are increasingly employed worldwide as an ecosystem-based management strategy to conserve marine resources and to prevent the degradation of sensitive marine ecosystems through coastal protection, habitat restoration and biodiversity conservation (Halpern, 2003; Kaplan *et al*, 2015).

Global fishery policy administration

Globally, fishery regulations and policies are framed and administered at four levels: (i) regulatory frameworks developed at the level of International organizations based on multilateral negotiations and agreements (ii) regulatory approaches designed by RFMOs and administered within their sphere of influence (iii) national regulations developed and implemented by individual countries within their EEZ and (iv) regulations implemented at provincial/state governments within their territorial water limits. Such a demarcation is often notional, as the broad ideas and approaches behind a specific regulatory framework could be cross-cutting and may find reflections upstream or downstream with suitable customization at the respective levels. However, certain regulations could be applicable only at specific levels. For instance, an international agreement like the FAO compliance agreement that has its jurisdiction only in the deep seas need not have corresponding enforcement machinery at lower levels in a country. Similarly, a specific regulatory measure derived in response to an endemic problem limited to a particular area need not find its counterparts at higher levels. On the other hand, certain others such as the FAO Code of Conduct for Responsible Fisheries would be successful only if its provisions were reflected in the legislative frameworks at every level, top to bottom.

Studies show that most maritime countries have some or other form of legislative and administrative mechanisms to regulate fishing within their territory. The recent legislation in this realm is following the principles of international law, as reflected in the relevant provisions of UNCLOS and other similar treaties. A recent FAO study notes that the majority of the maritime countries along the Pacific Ocean required their fisheries management decisions to be based on any of the following analyses: biological/stock assessments, economic analyses, social impact analyses or monitoring and enforcement analyses. Therefore, these countries enjoy a good amount of legal guidance and transparency in the process of taking management measures. On the other hand, only a few of the countries that shared their maritime boundaries along the Indian Ocean followed any scientific analyses for framing their fishery management legislations, thereby missing the interdisciplinary information necessary to develop sound management measures. In addition to scientific inputs, the participation of stakeholders is quite important while drafting management and regulatory approaches. It was revealed that over 50 per cent of the countries in the Pacific Ocean region and about 47 per cent of the countries in the Indian Ocean region practised stakeholder participation/consultation while designing legislative mechanisms for management and regulatory interventions (FAO, 2006; 2007).

Fishery regulations in India

Marine capture fishery in India is governed by several rules and regulations which are put in place from time to time with cross-cutting mandates and objectives. The pioneering attempt to regulate fishing in India was the introduction of The Indian Fisheries Act of 1897 by the then-British administration. This was followed by several local regulations promulgated by various princely states in the subsequent years of the British era. In the post-independence era, the enactment of two crucial laws, viz., The Territorial Waters,

Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act, 1976 and Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981 have significantly altered the way fishery in the country is regulated. These Acts which deal with the demarcation of maritime zones for fishing and ocean administration were the offshoots of the UNCLOS negotiations. Other important legislations/policies passed during the 1970s and afterwards and which are relevant for marine fishing activities include, Wildlife Protection Act, 1972; The Forest Conservation Act, 1980; The Environment (Protection) Act, 1986; The Coastal Regulation Zone (CRZ) notification, 1991; New Deep Sea Fishing Policy, 1991; Biological Diversity Act, 2002; Comprehensive Marine Fisheries Policy, 2004; notifications declaring selected coastal areas as MPAs from time to time, and so on. The latest effort in this direction is the National Policy on Marine Fisheries, 2017 which was notified on 28th April, 2017 (GoI, 2017).

As per the clauses under the Act of 1971, the areas up to 200 nautical miles from the territorial sea baseline are designated as the Exclusive Economic Zone (EEZ), wherein the country has sovereign rights for exploration, exploitation, conservation and management of the natural resources as well as for producing energy. Areas up to 12 nautical miles (nm) from the baseline are designated as territorial waters. As per the Seventh Schedule of the Constitution of India, the states have the jurisdiction to govern fishing and fisheries in the territorial waters, whereas the union government reserves its jurisdiction beyond territorial waters, i.e., between 12 nm and 200 nm. The marine fishing activities within the territorial waters of maritime states are governed by the respective Marine Fisheries Regulatory Acts (MFRAs). Kerala and Goa were the pioneering states to pass their MFRAs in the year 1980, which was followed suit by other maritime states in the subsequent years. The MFRAs contain several provisions to regulate, restrict or prohibit unsustainable/destructive fishing practices, to define access rights, to impose spatial and temporal fishing restrictions and to make licensing and registration of fishing vessels compulsory. Clauses to penalize non-compliance and appellate provisions are also built into them to ensure fair governance of fishing and related activities.

Regulatory provisions under the MFRAs: A critical appraisal

MFRAs have been found effective to a great extent in regulating fishing within territorial waters. These legislations make use of a variety of regulatory approaches such as access control, input/effort-based restrictions, and spatial as well as temporal restrictions outlined above. However, output/catch-based controls have been sparsely used by the states (except in Kerala, where MLS for fish species was notified in 2015). Provisions for compulsory registration and licensing of fishing vessels, which are the basic access control measures used the world over, find a place in the MFRAs of all maritime states and UTs. Temporal restriction of mechanized fishing or seasonal fishing ban (SFB) is another tool adopted across the maritime regions of India. The basic rationale is to restrict fishing activities when most marine fish species undergo peak spawning to ensure the natural replenishment of fish stock. Gujarat, Goa, Maharashtra, Kerala and Karnataka have been diligently practising SFB for more than 2 decades and other states have joined force during the later years. The criteria for fixing the closure periods and the type of fishing activities restricted during SFB varied across states. However, to avoid conflicts between fishermen from different states, the Union Government appointed a committee in May 2013 under the Chairmanship of the Director, CMFRI to suggest a uniform closure period for India's EEZ. The committee, based on scientific facts on spawning periods and other relevant details as well as stakeholder consultations across states, recommended a seasonal closure for 61 days (GoI, 2014). Based on this, the government fixed the ban period from April 15 to June 14 on the East Coast and from June 1 to July 31 on the West Coast, since 2015. However, within their territorial waters, the States reserve the right to decide on the fishing ban 'period' and its applicability

to 'type of boats'. Several studies have shown the positive impacts of SFB in terms of reduction in fishing effort and short-term stock replenishments of major marine fish species (Vivekandnan *et al*, 2010; Thomas and Dineshbabu, 2014). Further, SFB is proven to improve the inter-sectoral catch distribution in favour of artisanal fishermen, as the closure is more or less in alignment with the spawning and recruitment of species like sardines and mackerels which form the backbone of the traditional sector (Joe, 2008). Though conclusive evidence on the impact of SFB in improving the long-term sustainability of stocks is yet to come, it continues to hold promise as one of the important fishery management measures that has stood the test of time in India.

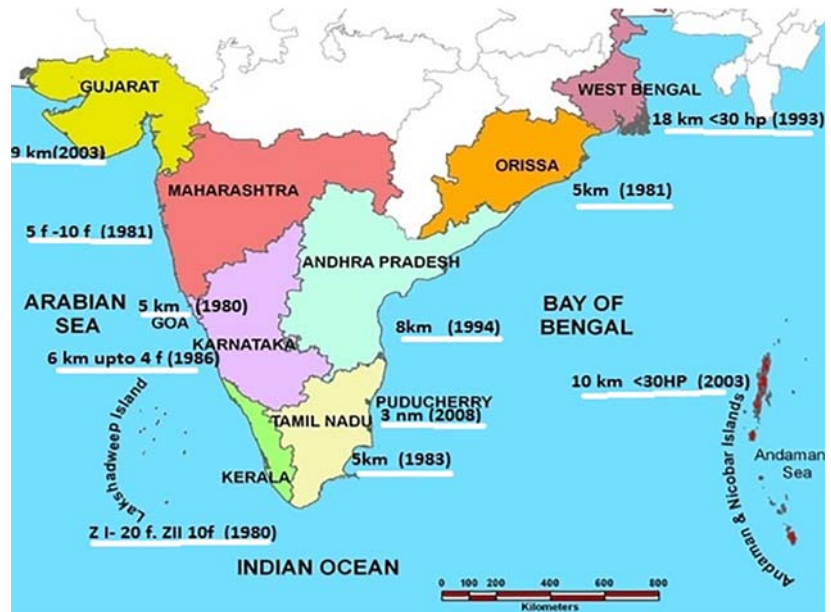


Fig. 2. An illustration of spatial zoning wherein in-shore areas are reserved for artisanal fishing in India's territorial waters (Source: Parappurathu and Ramachandran, 2017)

Spatial controls have been another set of fishing regulations that are widely being used to restrict unsustainable and destructive fishing activities in the seas. Spatial zoning is one such measure used across states to designate specific zones in the coastal waters within which the use of certain types of fishing vessels/gears/practices are restricted or prohibited. Zoning as a practice in India targets two major outcomes: (i) to minimize excessive damage of marine biota through destructive fishing methods (eg: bottom trawling) in the in-shore waters and (ii) to maintain inter-sectoral distribution of fish caught by reserving in-shore areas for traditional/artisanal fishermen. The zones are specified either based on the distance from shore or in terms of depth of water. In general, in-shore areas for a distance of 5-10 km are reserved for artisanal fishermen who do not use any mechanized fishing activities or vessels beyond a certain specified tonnage/engine power (Figure 2). However, such access restrictions are not revised from time to time based on the changes in fishing technology and practices, thereby losing relevance over time. For instance, the inboard motorized vessels used for ring seine operations in Kerala and elsewhere are often comparable with mechanized boats in terms of catch volumes thus violating the basic objectives of the policy.

Controlling the type/level of inputs/ fishing efforts is also hailed as a practical solution to regulate the excessive exploitation of oceanic resources. The main tools presently being used include a blanket ban on certain types of destructive fishing gears, mesh-size regulations, hook-size controls, turtle exclusion devices (TED), a ban on fish aggregating devices (FADs) and so on. Gear restrictions are mainly targeted to minimize juvenile fishing to allow fish to mature. However, these restrictions have largely been rendered insufficient due to poor enforcement mechanisms as well as the difficulty of judging the maturity of fish just based on body sizes. With this realization, the Kerala government notified the minimum legal sizes of 58 species of fish/shellfish in 2015 based on technical inputs from CMFRI, Kochi. This is the first of its kind of output-based regulation to have been introduced under the MFRA framework of any maritime state so far. However, the effectiveness of this measure also depends on the level of enforcement that the state can achieve within economically viable limits.

***Sui generis*, community-based regulatory systems**

Along with formal and institutional regulatory mechanisms, several *sui generis* regulatory and co-management systems have co-existed in various parts of coastal India. Most of these informal, community-based governance models have evolved and have limited administrative jurisdictions in the concerned locales. These traditional management systems have proved to be highly dynamic by continuously adapting to changing technological paradigms and emerging challenges, retaining their relevance even now. Some such widely documented cases include the *padu* system being followed in parts of Kerala and Tamil Nadu (Lobe and Berkes, 2004); *Kadakodi* system in northern Kerala (Ramachandran and Sathiadhas, 2006); the traditional *panchayat* system along the Coromandel Coast of Tamil Nadu (Bavinck, 2001) and alternate-day fishing systems in Gulf of Mannar and Palk Bay areas. The primary concerns of all these systems are resource conservation and sustainable fishery management with community control of access rights and regulations of certain kinds of harmful fishing practices. Access rights are generally determined by collective decisions based on an accepted set of criteria and norms within the community. For instance, in the case of *padu* system, access to designated fishing grounds is limited to members of a specific caste group in the locality based on a lottery system for harvest site allocation. The *kadakkody* system is much more elaborate with executive and legislative functions and acts as a regulator of resources, protector of livelihoods and a mediator of social conflicts (Baiju, 2011). The *panchayat* system along the Coromandel Coast is a similar community-based governance system that regulates access and usage of fishing resources, besides discharging conflict resolution among community members. However, none of the above systems are officially recognized and continue to function as parallel systems of governance with little legal sanctity.

Conclusions

This chapter throws light on the various regulatory provisions and policies for the sustainable development of India's capture fishery sector. The chapter discusses in detail the access-based, temporal, spatial, input/effort-based and output/catch-based approaches for regulating fishing efforts so that the resources are exploited at optimum level. Further, the chapter also undertakes a critical appraisal of the various above provisions as enforced under the purview of MFRA of maritime states as well as other *sui-generis* modes of regulations and their limitations. The chapter underscores the fact that, though sectarian interests and lack of institutional will have held back regulatory consolidation of the sector so far, the fast depletion of the natural resource base in the region warrants joint action propelled by farsighted vision, common interests and shared responsibilities.

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