

# Taming the Fishing Blues

## Reforming the Marine Fishery Regulatory Regime in India

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Against the backdrop of a dwindling marine fisheries resource base, declining catch rates, and escalating conflicts about securing rights over oceanic resources, this paper emphasises the need to relook at the marine fisheries regulatory regime in the country with a view to better align it to address outstanding issues and emerging challenges. It proposes a number of interventions that include revisiting the marine fisheries regulatory acts, expanding regulation to areas beyond territorial waters, carrying out commensurate institutional reforms, harnessing technological advancements, facilitating co-governance along with relevant stakeholders, operationalising the FAO Code of Conduct for Responsible Fisheries, and garnering multilateral cooperation.

Marine fisheries, like any other common property resources, are amenable to over-exploitation. The myopic behaviour of individual fishermen to maximise profits through the continual intensification of fishing has been one of the classic cases that finds mention in Garrett Hardin's thesis of "the tragedy of the commons" (1968). The subsequent literature generated in this realm strongly supports the high degree of susceptibility of open access fisheries to human exploitation and the resultant collapse of overexploited stocks of fish species. A recent analysis of the dynamics of collapse in world fisheries has shown that nearly one in four fisheries have collapsed during the period 1950–2000, recurring at regular intervals (Mullon et al 2005). Pauli et al (2002) argued that fisheries historically have tended to be non-sustainable, and that fishing has induced serial depletions, long masked by improved technology, geographic expansion, and exploitation of previously spurned species lower down in the food web. Recent research findings also show that over-exploitation not only resulted in severe depletion, but also to the near extinction of some commercially important, high-value fish species that are slow to mature, have limited geographic range, and/or have sporadic recruitment (Casey and Myers 1998; Sadovy 2001).

For the above reasons, and given the scale of economic activities and livelihoods associated with oceanic resources, the governance and management of capture fisheries operations has been the subject of intense international discourse over the past several decades. Consequently, international organisations, regional fisheries management organisations (RFMOs), and maritime countries have put in place elaborate sets of regulations to seek to check unsustainable fishing practices, based on long-term experience and multilateral negotiations. In international parlance, violations of the above regulations have come to be known as illegal, unreported, and unregulated (IUU) fishing activities. Generally, the regulations within the exclusive economic zones (EEZs) of countries are governed by national laws of the respective countries and those in the high seas are governed by the concerned RFMOs or international agreements/treaties on specific issues. Nevertheless, for the global fisheries regulatory regime, it has not been smooth sailing, in general, as far as detections and compliance is concerned. Marine fisheries law enforcement and compliance therefore happens to be one of the most intensely studied subjects, with experts representing diverse fields such as economics, law, sociology, and psychology having looked for, and continuing to explore, perspectives pertaining to their fields of specialisation.

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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 EEZ of 2.02 million km<sup>2</sup> besides a continental shelf area of nearly 0.5 million km<sup>2</sup>. The capture fisheries sector in India, though, experienced a rapid expansion in recent decades with the advent of mechanised fishing during the 1980s, and has started showing signs of over-capitalisation and consequent crises. Experts have already highlighted impending problems such as declining catch rates and diminishing returns, over-fishing and juvenile fishing leading to depletion of fish stock, rampant destruction of marine biota due to high-intensity trawling, etc (Devaraj and Vivekanandan 1999; Ramachandran 2004). The imminent crisis is increasingly manifesting itself through frequent conflicts between various groups and factions of fisher people/vessel operators over their rights and share of the resources. These circumstances call for a strong regulatory and management regime for protecting and preserving the maritime resources of the subcontinent. Though India is not new to regulations in the fisheries sector—with a number of laws and rules in place for more than a century—the emerging scenario merits a relook at the existing regulatory framework. Against this backdrop, this paper seeks to review global approaches to marine fisheries regulations, their evolution and possible future directions, with a view to taking cues and lessons that may be of help in instilling fresh perspectives in India's marine fishery regulatory regime.

### Evolution of Global Fisheries Regulations

Though regulations in fishing were practised by many early civilisations over centuries, the real need for scientific regulations in marine fisheries was only felt after the onset of trawler-based industrial fishing in the early 19th century (Smith 1994). The North Sea Fishers Convention, signed in 1882, was one among early attempts to regulate fisheries. A number of similar treaties that followed include the treaty of Portsmouth signed in 1905 between Russia and Japan; the Convention for the Preservation of the Pacific Halibut Fishery signed between the United States (US), Canada and Great Britain in 1923; subsequent conventions in 1930, 1937, 1953, and other regulations that were established from time to time to protect the Halibut Fishery; the Magnuson–Stevens Fishery Conservation and Management Act, 1976, of the US; the Pacific Fishery Regulations, 1984, and Atlantic Fishery Regulations, 1985, issued by the Government of Canada to protect its salmon and herring fisheries, and so on (IPHC 1977).

In due course, several intergovernmental fishery management platforms such as RFMOs emerged in response to over-exploitation and stock collapses of important fisheries. Most of them were formed with the mandate of conservation, regulation and management of a fishery of a specific region (for example, the Western and Central Pacific Fisheries Commission) or that of a particular species of fish (the International Commission for the Conservation of Atlantic Tunas). A significant milestone in global fisheries regulation was the launch of the 1982 United Nations Convention on the Law of the Sea (UNCLOS), an

international agreement that was the culmination of a series of deliberations (United Nations Conference on the Law of the Sea I, II and III) that took place between 1956 and 1983. Though UNCLOS dealt with a wide range of subjects such as international maritime boundaries, oceanic pollution and control, scientific research in the oceans, management of marine natural resources, settlement of disputes, and so on, one of its key foci was fisheries management. The treaty, which came into force in 1994, established a limit of 200 nautical miles as EEZs, within which countries have the exclusive right to regulate their fishing activities.

Another significant development in this direction was the UN Fish Stock Agreement of December 2001. It sets out principles for the conservation and management of straddling and highly migratory fish stocks and establishes that such management must be based on the precautionary approach and the best available scientific information. The Food and Agriculture Organization (FAO) has played a significant role in ensuring sustainable management and regulation of fisheries through the formulation of the FAO Code of Conduct for Responsible Fisheries, 1995 (CCRF) and the FAO Compliance Agreement, 2003. The CCRF promotes a “precautionary approach” in fisheries management and is voluntary rather than mandatory. It consists of a collection of principles, goals and elements for action, and expects governments to translate them into national fishery policies and legislations (FAO 1995). Within the framework of the Code, four International Programmes of Action (IPOAs) were launched subsequently as voluntary instruments for compliance. Other recent initiatives of FAO include the introduction of “Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, 2012” (Tenure Guidelines) as well as “Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication, 2015” (SSF Guidelines). The Tenure Guidelines mainly offer a set of guiding principles and procedures regarding legal recognition and allocation, transfers as well as administration of tenurial rights and duties over land, fisheries and forests (FAO 2012). It has special relevance to fisheries as it recognises the basic tenurial rights of fisher persons on the seas and other waterbodies for livelihood-based resource extraction. The SSF Guidelines is a similar, internationally-agreed instrument that prioritises the realisation of human rights for the vulnerable and marginalised small-scale fishers. It addresses governance of tenure, sustainable resource management, gender equality, social development, development of market value chains, and mechanisms to effectively deal with disaster risk and climate change (FAO 2015).

Apart from the above, a number of multilateral environment agreements (MEAs) have a direct or indirect bearing on how the global marine and coastal fishery is managed and regulated. The UN Convention on Biological Diversity, 1992 (CBD) is one such MEA that has substantial relevance for the governance of marine and coastal fishery areas and its related national instruments. CBD emphasises thematic issues such as integrated marine and coastal area management; marine and coastal protected areas; sustainable use of marine and coastal

living resources; mariculture and alien species; and leveraging the importance of local and traditional knowledge in ensuring the protection of biodiversity (Wolfrum and Matz 2000). The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is another multilateral treaty for regulating the trade of marine organisms.

### Approaches and Tools to Fishery Regulation

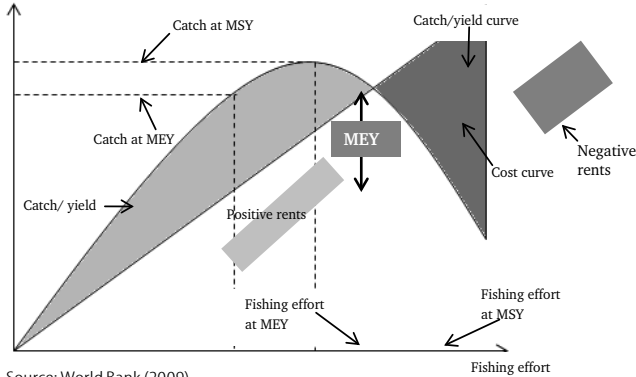
A wide variety of approaches and tools are used for regulating fisheries across the world. As the primary aim of regulating a marine fishery is to maintain a sustainable level of biomass and productivity in the wild stock, efforts in this direction are mainly directed at limiting the rate of extraction. 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 was 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 was a goal with intuitive appeal, the pursuit of MSY ignored many relevant economic and social factors critical to the sustainability of a fishery (Larkin et al 2011). A new concept, namely maximum economic yield (MEY) was introduced that identified the level of harvest or effort that maximised the sustainable net returns from fishing (Grafton et al 2006). This approach picked up momentum with developments in the area of bioeconomic modelling, which combines the underlying stock dynamics with the harvest function and the costs of harvest and economic value of the extracted resources. An illustration on how MSY and MEY compare with each other is presented in Figure 1 (p 76). The declaration of total allowable catch (TAC) limits, especially by temperate fisheries administrations, is

**Table 1: Major Tools for Regulating Capture Fisheries**

Regulatory Approach	Specific Tool	Description	Major Examples and Year Introduced
Access controls	Licence	The basic access requirement for a fisher to undertake fishing	Almost all major fisheries in the world
	Registration	Registration of fishing vessels for identification purpose is mandatory by law in most fisheries	Almost all major fisheries in the world
	Limited entry permits	Holder of individual entry permits are only allowed to compete for harvests from a common pool	Salmon fishing licences (Alaska, 1974; British Columbia, 1968); Western Australia rock lobster (1963)
	Group fishing rights/fishing cooperatives	Limited entry permit holders agree on a harvesting system usually by written contract	Pacific Whiting Conservation Cooperative (1998); Bering Sea Pollock Co-ops (1999).
	Territorial use rights for fishing (TURF)	Access to fishing areas limited by custom or law to members of a village, tribe or other groups	Community-based TURFs in Oceania and Japan; Coromandel coast fisheries, Tamil Nadu
Output/catch-based	Collective catch quota	Aggregate catch quotas allotted to specified beneficiary groups	Western Alaska Community Development Quotas (1994)
	Individual catch quota	Species-specific catch quotas (in terms of weight) allocated to individuals. They are generally transferable/tradable	Individual transferable quota (ITQ) programmes in Alaskan halibut/sablefish fishery (1995); ITQs in the Southern Australian shelf for bluefin tuna (1983)
	Vessel catch limits/quotas	Catch quotas specific to vessels	Individual Vessel Quota (IVQ) system for the ground fish trawl fishery, British Columbia (1997)
	Size restrictions	Minimum legal sizes (MLS) specified for individual fish species to prevent juvenile fishing	Kerala fisheries, India (2015); Baltic cod trawl fishery (1994)
Input/effort-based	Gear restrictions	Restrictions on the type, design and mesh size of the gear used	Mesh size regulations in Baltic cod trawl fishery (1994); mesh size limits under the marine fishery regulatory acts of India
	Engine power restrictions	Upper limit on the engine's horsepower	Common Fisheries Policy of the Council of the European Union, 2009
	Vessel size restrictions	Size restrictions on fishing vessels applicable to specific fishery fleets, especially in terms of their length/tonnage.	British Columbia ground fish trawl fishery (1997); Nova Scotia ground fish fishery, Canada (1989)
Temporal restrictions	Seasonal fishing ban	Fishing bans imposed during specified seasons, mainly to prevent fishing during spawning	Eastern and western coasts of India (1980); closure of North sea beam trawl fleet to cod fishery (2001)
	Restrictions on duration	Limiting the duration of fishing by an individual/vessel (limits on hours per day, days per season, time away from the port, etc)	Effort quotas (fishing duration) for regulating demersal fish stocks in the Faroe Islands, Denmark (1996); 'days-at-sea' regulations for New England ground fish fleet (1995)
	Restrictions on time	Fishing during particular time of day (for example, regulation of night fishing)	Prohibition of trawl net operations between 6 pm and 6 am on the Maharashtra coast, India (1981); night fishing ban in Lamu, Kenya (2011)
Spatial restrictions	Marine protected areas (MPA)	Where fishing is prohibited. An MPA is divided by IUCN into six categories, based on the strictness of the protection regime	New South Wales, Australia (2002); Florida Keys National Marine Sanctuary, US (2000); Indian peninsula (1978)
	Temporary area closures	Practised mainly to protect juveniles in specific areas where certain species come for spawning	Area closures to protect octopuses in Velondriake marine area in Madagascar (2004)
	Spatial zoning	Restricting access to different groups of fishers (artisanal fishers versus mechanised fishers) based on distance from shore/depth of water	State marine fisheries regulations, India (1980)

Sources: FAO (1997, 2006, 2007); Huppert (2005); Bavinck (2001); Suuronen et al (2007); Sanchirico et al (2005).

**Figure 1: Maximum Sustainable Yield (MSY) and Maximum Economic Yield (MEY)**

Source: World Bank (2009).

generally based on one of the above two concepts. MSY/MEY can be achieved through varied strategies such as limiting access to the resources, setting caps on quantity harvested, limiting fishing efforts, manoeuvring the area and time of harvesting so as to avoid capturing spawning and juvenile fish, and so on. These basic strategies became the guiding principles behind fishing regulations that form essential components of all major fisheries management programmes in the world. Accordingly, approaches to fisheries' regulation can be broadly classified into five categories: (i) access-control based; (ii) output/catch-based; (iii) input/effort-based; (iv) temporal; and (v) spatial. However, such a classification is subject to change, depending upon context. While the first three approaches are primarily directed at limiting the rate of extraction from the stock, temporal (mainly seasonal bans) and spatial approaches generally seek to minimise destruction of sensitive stocks (endangered species, spawning and juvenile fish).

A brief account of the main fishery regulatory tools that fall under these five approaches along with a few notable examples is presented in Table 1 (p 75). Among the various measures, access control is one of the most basic and easy-to-implement regulations. It 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 restrictions on access, 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 quotas, vessel catch limits and minimum size limits. Catch quotas are generally fixed and depend on total allowable catch estimates, which are based on the concepts of MSY/MEY. These quotas 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, to hasten the rebuilding of excessively exploited stocks. Nevertheless, output control measures are data intensive and require substantial resources for their implementation, and are 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. They include gear restrictions that set limits on the type, design and mesh

size of the equipment used, engine power restrictions, as well as size restrictions on fishing vessels. Though they are relatively easy 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 so as to derive the desired results (FAO 1997). Temporal controls are widely adopted across the world, the idea being to regulate resource extraction during specified seasons of the year or to fix time limits to fishing. Seasonal fishing bans, a common temporal strategy, is adopted both in temperate and tropical waters to minimise the destruction of spawning populations. 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 enforced 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 Regulatory Administration

Globally, fishery regulations are framed and administered at four levels: (i) regulatory frameworks developed at the level of international organisations based on multilateral negotiations and agreements; (ii) regulatory approaches designed/adopted and governed by RFMOs or other, similar regional bodies and administered within their sphere of influence; (iii) national regulations developed and implemented by individual countries within their EEZ; and (iv) regulations implemented by provincial/state governments within their territorial water limits. Such demarcations are 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 customisation at the respective levels. However, certain regulations can be applicable only at a specific level. For instance, an international agreement like an FAO compliance agreement that has its jurisdiction only in the deep seas need not have a corresponding enforcement machinery in a country. Similarly, a specific regulatory measure arrived at 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 get reflected in legislative frameworks at every level, top to bottom.

### Fishery Regulations in India

Marine capture fisheries in India are governed by a number of 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, 1897. This was followed by several local regulations promulgated by various princely states in the subsequent years of the British Raj. In the post-independence era, the enactment of two crucial laws—the Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other

Maritime Zones Act, 1976, and the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981—has significantly altered the way fishery is regulated in the country. These acts, which deal with the demarcation of maritime zones for fishing and ocean administration, were offshoots of the UNCLOS negotiations. Other important legislations and policies passed during the 1970s and afterwards and which are relevant for marine fishing activities include the Indian 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 28 April 2017 (Ministry of Agriculture & Farmer's Welfare 2017).

As per the act of 1976, areas up to 200 nautical miles (nm) from the territorial sea baseline is designated as an EEZ, in which India has sovereign rights for the purpose of exploration, exploitation, conservation and management of natural resources and for producing energy. Areas up to 12 nm from the baseline are designated as territorial waters. As per the Seventh Schedule of the Constitution of India, states have the jurisdiction to govern fishing and fisheries in territorial waters, whereas the union government reserves its jurisdiction beyond territorial waters, that is, between 12 nm and 200 nm.

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 pioneers in passing their own MFRAs in 1980; they were followed by other maritime states in 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 penalise non-compliance and appellate provisions are also inbuilt so as to ensure fair governance of fishing and related activities. The specific details of the legislations and regulatory provisions contained therein with respect to the maritime states of India are presented in Table 2 (p 78).

### Critical Appraisal of the MFRAs

MFRAs have been found effective to a great extent in regulating fishing within India's territorial waters. They 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 used sparsely (except in Kerala, where the minimum legal sizes for fish species were notified in 2015). Compulsory registration and licensing of fishing vessels, which are the basic access control measures used the world over, finds place in the MFRAs of all maritime states and union territories. The temporal restriction of mechanised fishing or seasonal fishing bans is another tool adopted across the maritime regions of India. The basic rationale is to restrict fishing

activities during the time when most marine fish species undergo peak spawning so as to ensure the natural replenishment of fish stock. Gujarat, Goa, Maharashtra, Kerala, and Karnataka have been diligently practising seasonal fishing bans for more than two decades; other states have also adopted this in later years. The criteria in fixing the closure periods and the type of fishing activities restricted during SFBs vary across states. However, to avoid conflicts of fishermen from different states, the union government appointed a committee in May 2013 under the chairmanship of the director, CMFRI, to suggest a uniform seasonal closure period for India's EEZ. The committee, based on scientific facts on spawning periods, other relevant details, and stakeholder consultations across states, recommended a seasonal closure of 61 days (Ministry of Agriculture 2014). Based on this, the government fixed the ban period as 15 April–14 June on the east coast and 1 June–31 July on the west coast. However, within their territorial waters, the states reserve the rights to decide on the fishing ban period and its applicability on the 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 has been shown to improve the intersectoral distribution of the catch in favour of artisanal fishermen, as the closure is more or less in alignment with the spawning and recruitment of species like sardines and mackerel, which form the backbone of the traditional sector (Joe 2008). Though conclusive evidence on the impact of SFBs 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.

Spatial controls are also widely being used to restrict unsustainable and destructive fishing activities in the seas. Spatial zoning is used across states to designate zones in the coastal waters within which the use of certain types of fishing vessels/gear/practices are restricted or prohibited. Zoning, as practised in India, targets two major outcomes: (i) to minimise excessive damage of marine biota through destructive fishing methods (for instance, bottom trawling) in inshore waters; and (ii) to maintain the inter-sectoral distribution of fish catch by reserving inshore areas for traditional/artisanal fishermen. The zones are specified based either on the distance from the shore or in terms of the depth of water. In general, inshore areas up to a distance of 5–10 km are reserved for artisanal fishermen who do not engage in any mechanised fishing activities or use vessels of a certain specified tonnage/engine power (Figure 2, p 79). However, such access restrictions are not revised from time-to-time based on changes in fishing technology and practices, and thereby lose their relevance over time. For instance, the inboard motorised vessels used for ring seine operations in Kerala and elsewhere are often comparable with mechanised boats in terms of catch volumes, thus violating the basic objectives of the policy.

Controlling the type or level of inputs/fishing efforts are also hailed as a practical solution to regulate excessive exploitation of oceanic resources. The main tools presently being used include a blanket ban on certain types of destructive fishing

**Table 2: Capture Fisheries Regulatory Framework in India's Maritime States**

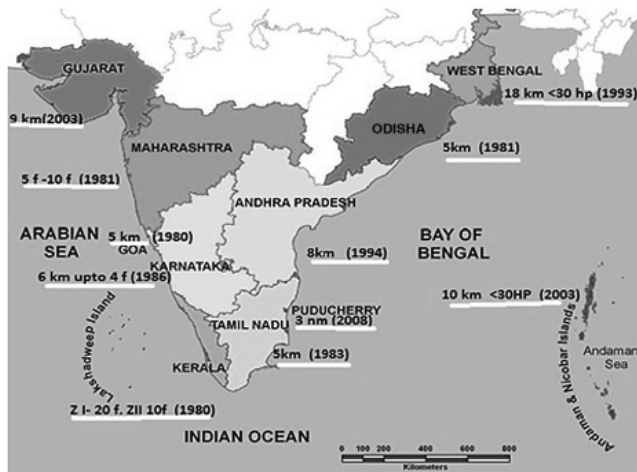
Maritime State	Access Controls	Temporal Controls	Spatial Controls	Input/Effort-based Restrictions	Output/Catch-based Restrictions	Legislations in Force
Gujarat	Registration and licensing of fishing vessels	Seasonal fishing ban (SFB) (1 June–31 July)	Artisanal: up to 9 km; mechanised: beyond 9 km	Square mesh of minimum 40 mm at code end needed for trawl net; gillnet with mesh size less than 150 mm prohibited	—	The Gujarat Fisheries Act, 2003
Maharashtra	Registration and licensing of fishing vessels	SFB (1 June–31 July); mechanised vessels with trawl nets prohibited between 6 pm and 6 am	Mechanised (trawl net): beyond 5–10 fathoms depth in specified areas; mechanised, with more than 6 cylinder engines: beyond 22 km	Use of purse-seine gear by mechanised vessels in specified coastal zones prohibited within territorial waters	—	Maharashtra Marine Fisheries Regulation Act, 1981 (amended in 2015)
Goa, Daman and Diu	Registration and licensing of fishing vessels	SFB (1 June–31 July)	Artisanal: up to 5 km; mechanised: beyond 5 km	Mesh size limits of 20 mm for prawn and 24 mm for fish	—	The Goa, Daman and Diu Marine Fishing Regulation Act, 1982 (amended in 1989)
Karnataka	Registration and licensing of fishing vessels	SFB (1 June–31 July)	Artisanal: up to 6 km or a depth of 4 fathoms (whichever is farther); deep sea vessels (up to 50 feet long): beyond 6 km; deep sea vessels (over 50 feet long): beyond 22 km	Ban of cuttle fish fishery using fish aggregating devices (FADs)	—	The Karnataka Marine Fishing Regulation Act, 1986
Kerala	Registration and licensing of fishing vessels	SFB (15 June–31 July) <sup>1</sup>	Artisanal: 32–40 m depth in the First Zone <sup>2</sup> and 16–20 m depth in the Second Zone; mechanised vessels (< 25 GRT): 40–70 m depth in the First Zone and 20–40 m depth in the Second Zone; mechanised (> 25 GRT): beyond 70 m depth in First and beyond 40 m depth in Second Zone	Mesh size regulations: code end minimum mesh size of bottom trawl net: 35 mm; ring seine and driftnet minimum mesh size: 20 mm	Minimum legal size for 14 fish and shell-fish species notified to control juvenile fishing	The Kerala Marine Fishing Regulation Act, 1980 (amended in 2013)
Tamil Nadu	Registration and licensing of fishing vessels	SFB (15 April–14 June)	Artisanal: up to 5 km; mechanised: beyond 5 km; fishing within 100 m below a river mouth prohibited; number of mechanised fishing vessels permitted in any specified area subject to restrictions	No fishing gear of 100 mm mesh from knot to knot in respect of net other than trawl net to be used; pair trawling and purse seining prohibited	—	Tamil Nadu Marine Fishing Regulation Act, 1983 (amended in 1995, 2000, 2011, and 2016)
Andhra Pradesh	Registration and licensing of fishing vessels	SFB (15 April–14 June)	Artisanal: up to 8 km; mechanised (< 15 m OAL): 8–23 km; mechanised (> 15 m OAL): beyond 23 km	Minimum 15 mm limit for mesh size for any gear; shrimp trawlers not allowed without turtle-exclusion device (TED)	—	The Andhra Pradesh Marine Fishing (Regulation) Act, 1995 (amended in 2005)
Odisha	Registration and licensing of fishing vessels	SFB (15 April–14 June 14)	Artisanal: up to 5 km; mechanised (<15 OAL): 5–10 km; mechanised (>15 OAL): beyond 10 km	—	—	The Orissa Marine Fishing Regulation Act, 1981 (amended in 2006)
West Bengal	Registration and licensing of fishing vessels	SFB (15 April–14 June)	Artisanal and mechanised crafts with < 30 HP engine: up to 18 km; mechanised crafts with >30 HP engine: beyond 18 km	Mesh size regulations for specific gears: minimum 25 mm for gillnet/shore seine /drag net; 37 mm for bag net/dol net; standard trawl net fitted with TED to be used	—	The West Bengal Marine Fisheries Regulation Act, 1993
Andaman and Nicobar islands	Registration and licensing of fishing vessels	SFB (15 April–14 June)	Artisanal and mechanised crafts with < 30 HP engine: up to 6 nm; Mechanised crafts with >30 HP engine: beyond 6 nm	Standard trawl nets fitted with TED; gillnets, shore seines and dragnets with mesh sizes above 25 mm only permitted	—	The Andaman and Nicobar Islands Marine Fisheries Regulation Act, 2003 (amended in 2011)
Lakshadweep	Registration and licensing of fishing vessels	SFB (1 June–31 July)	—	Use of purse seine, ring seine, pelagic, mid-water and bottom trawl of less than 20 mm mesh size, use of drift gill net of less than 50 mm mesh size and shore seine of less than 20 mm mesh size are prohibited in specified areas	—	Lakshadweep Marine Fishing Regulation Act, 2000

<sup>1</sup> While all other maritime states and union territories agreed to extend the ban to 61 days in conformity with the directive issued by the union government in May 2015, Kerala continues to stick to its earlier ban period of 47 days.

<sup>2</sup> The 78 km<sup>2</sup> area from the shore up to a depth of 32 metres in the sea along the coast from Kollencode in the south to Paravoor (Pozhikkara) is the First Zone. The 512 km<sup>2</sup> area up to a depth of 16 m along the coastline from Paravoor in the south to Manjeswar in the north is the Second Zone.

Sources: MFRAs of maritime states; Biradar and Ayyappan (2006).

Figure 2: Spatial Zoning in India



gear, mesh size regulations, hook size controls, turtle exclusion devices (TED), ban on fish aggregating devices (FADs), and so on. Gear restrictions are mainly aimed at minimising juvenile fishing to allow fishes to mature. However, these restrictions have largely been rendered insufficient due to poor enforcement mechanisms as well as the difficulty in judging the maturity of fishes only on body size. With this realisation, the Kerala government notified the minimum legal sizes of 14 species of fishes and shellfishes in 2015. This is the first of its kind of output-based regulation to be introduced under the MFRA framework of any maritime state. The government is contemplating extending this notification to a total of 57 species, which were originally recommended by CMFRI. However, the effectiveness of this measure depends on the level of enforcement that the state can achieve within economically viable limits.

### Community-based Regulatory Systems

Along with formal and institutional regulatory mechanisms, a number of sui generis regulatory and co-management systems have coexisted in various parts of coastal India. Most of these informal, community-based governance models have evolved over time 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. These widely documented cases include the *padu* system being followed in parts of Kerala and Tamil Nadu (Lobe and Berkes 2004); the *kadakkodi* 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 the Gulf of Mannar and Palk Bay areas. The primary concerns of all these systems are resource conservation and the management of sustainable fishery management with community control over access rights and the regulation 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 *padu* system, access to designated fishing grounds is limited to members of a specific caste group

in the locality based on a lottery system. The *kadakkodi* 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 to and use of fishing resources, besides engaging in conflict resolution among community members. However, none of the above systems are officially recognised and continue to function as parallel systems of governance with little legal sanctity.

### Strengthening the Regulatory Regime

The limitations of MFRAs in addressing the emerging challenges in the contemporary marine fisheries scenario have been highlighted by several recent studies (Pillai et al 2009; Ministry of Agriculture 2014). They have been primarily criticised for persisting with outdated regulatory provisions, inadequate enforcement, dismal community awareness, and poor compliance levels. Except for seasonal closures, none of the MFRA regulations are strictly enforced. In the case of mesh size regulations, it is practically and economically unviable to ensure strict surveillance of the gear used. Similarly, zoning restrictions are violated quite often by mechanised fishing vessels that mostly go unnoticed. Even for the non-mechanised vessels, their catch capacities have increased tremendously, so that conventional zoning restrictions are rendered meaningless. A number of destructive fishing practices such as pair trawling, bull-trawling, purse-seining, and dynamite fishing are still followed at extensive scales without much enforcement. Juvenile fishing, one of the most unsustainable fishing practices, is continued unchecked despite awareness campaigns and legal restrictions due to demand from retail markets and fish meal plants. Many regulations are not adequately implemented due to lack of personnel, limited budgets, poor inter-institutional collaboration, and resistance from fishers (Vivekanandan et al 2003). Conflicts among various factions within the fisher community is another serious constraint that limits the enforcement of important regulations. Therefore, a set of corrective measures and innovative thoughts to address contentious issues are flagged below to strengthen the existing regulatory regime.

**Revisiting the MFRAs:** Concerted efforts are needed to undertake a comprehensive assessment of various provisions of the MFRAs against the changed technological and socio-economic scenarios of marine fishing. This needs to be done in consultation with the wider stakeholder constituency. Impractical provisions may be revisited and better solutions presented in the light of scientific studies. During this process, it is imperative to ensure consistency with the larger regulatory protocols advocated by global agreements such as UNCLOS, CCRF, MEAS of relevance, and so on. Though output/catch-based regulatory provisions are touted to be impractical in tropical waters, the scope of various tools such as catch quotas, effort quotas, territorial use rights, etc. can be examined through pilot studies making use of the present scientific capabilities of the country's maritime research establishment.

The MPA network in India has been used as a tool to manage natural marine resources for biodiversity conservation and for the well-being of the people depending on it (Sivakumar et al 2014). There are 25 marine protected areas in peninsular India and more than a hundred MPAs in the country's islands. However, there are no fisheries MPAs or fish refugia in Indian waters with the sole aim of rebuilding fish stocks in fragile or highly exploited marine areas (Mohamed 2015). Though the idea of fishery refugia is highly contested among the stakeholders in India, such strict measures may be needed to ensure sustainable resource management in the days to come.

**Expanding the contours of regulations:** Though the territorial waters in India's EEZ are well under the regulatory framework of the MFRAs, the areas beyond 12 nautical miles, which are under the administrative control of the union government, are literally left without any rules for fishing. This renders a substantial proportion of the catch from this area (nearly 70% of trawl catches) as illegal, unreported, and unregulated (Mohamed 2015). The need for regulatory control in these areas was minimal till recently, due to limited fishing operations. However, with the advent of extensive multi-day fishing operations after the 1990s, it has become increasingly necessary but also difficult to impose discipline in the area for ensuring sustainable fishing. Urgent steps are needed to plug this gap by devising pre-emptive legislative mechanisms. India is yet to embark on a comprehensive institutional framework for marine fisheries governance on a national scale given the emerging challenges. Corresponding legislative reforms, including a national act for responsible fisheries governance, are a prerequisite in this context.

**Harnessing science and technology for strengthening enforcement:** Recent advancements, particularly in the field of space science and information technology, can be effectively utilised for strengthening fishery governance and enforcement. One such promising intervention would be to devise institutional mechanisms for tracking fishing vessels on their course of movement during fishing operations. The Government of India is already working out the modalities for introducing a vessel monitoring system (VMS) in India's EEZ. Such a system would be instrumental in strengthening monitoring, control and surveillance (MCS) in the EEZ, particularly with respect to zoning and protected areas. Similarly, spatial planning of marine and coastal habitats covering major fishing grounds using advanced GIS mapping tools would be a step forward in ensuring efficient fishing operations, foolproof MCS as well as enhanced security across the Indian coastline (Dineshbabu et al 2016). Taking cognisance of the ecological complexities of tropical waters, it is equally important to strengthen research capabilities to undertake regular stock assessment exercises. This can minimise the disconnect between science and policy, engendering a fishery management regime that is better informed scientifically.

**Facilitating co-management/co-governance:** The idea of a rights-based fisheries management is being promoted through

the institutionalisation of co-management approaches (Pomeroy et al 2001; Allison et al 2011). However, barring some traditional models detailed above, ideal, manifested examples of co-management have been rather rare in India. The primary reason behind this is the lack of interest on the part of successive governments—which found it politically convenient to not upset the export-driven development agenda—to accept and endorse such initiatives with full institutional support. It is therefore high time to work out modalities to establish co-management groups with local partners and other relevant stakeholders within major fishery hubs in the country which can function with full legitimacy and administrative support of the respective local governments. In this context, it is essential to harness the strengths of civil society organisations, NGOs, fishermen organisations and other non-state actors who have considerable influence in fostering ecosystem-based, tenure rights-based and human rights-based fishery management approaches. The Kochi Initiative, wherein traditional fish operators and trawl operators in Kerala agreed to adopt a package of responsible fishing practices in the wake of a serious decline in pelagic resources, is one such example of stakeholder-induced efforts towards co-governance (Ramachandran and Mohammed 2015).

**Operationalising the CCRF and other voluntary instruments:** As detailed above, the FAO Code of Conduct for Responsible Fisheries, 1995 provides for an elaborate set of principles and standards for ensuring the conservation, sustainable management and development of fisheries. However, so far, its implementation in India has hardly gained any momentum. For effective implementation, various fisheries should be assessed for their existing levels of compliance with the Code, followed by concerted efforts to draw up detailed grass-roots-level strategies to plug the gaps. Though CMFRI has embarked on a major exercise to develop a National Marine Fisheries Management Code (NMFMC) for customised guidance on CCRF implementation in India, the initiative should be taken forward with the proactive participation of all stakeholders. On similar lines, the principles and procedures mooted under Tenure Guidelines and SSF Guidelines may also be adopted with suitable customisation at local levels. Though the above instruments are voluntary in spirit at the global level, their effective implementation could be ensured through some legislative coercion at local levels, integrating them with the national and state policy instruments.

**Ensuring global cooperation:** Frequent trespass of international maritime boundaries by fishermen, often unintentionally, and the consequent diplomatic impasse that ensues between India and neighbouring maritime countries<sup>1</sup> have highlighted the need for instituting bilateral and multilateral negotiation and conflict resolution platforms for the Indian Ocean. In most of the oceanic regions across the globe, concerned RFMOs serve as effective platforms for conflict resolution in respect of fishery management and other related issues. India is a signatory to the Indian Ocean Tuna Commission (IOTC),



which is a designated RFMO in the Indian Ocean, and should take appropriate measures to further strengthen regional co-operation to resolve outstanding issues related to interstate conflicts. Such platforms can also be utilised to develop guidelines for governing fishing in areas beyond national jurisdiction.

## Conclusions

India's capture fishery sector is at the crossroads. With ever-increasing pressure on our marine resource base, there is a growing realisation among the various stakeholders, including fishing communities, that a sustainable management of the resources is extremely important for future sustenance of the sector. Against this backdrop, this paper emphasises the need for relooking at the marine fisheries regulatory and

enforcement regimes in the country with a view to align it better to address outstanding issues and emerging challenges. A set of interventions that include revisiting the MFRAs; expanding the contours of regulation to areas beyond territorial waters; harnessing technological advancements for tightening enforcement and improving compliance; facilitating co-governance through the institutional empowerment of local fishery management groups; operationalising CCRF; and, ensuring multilateral diplomacy for fishery governance in the Indian Ocean are put forth in this paper. Though sectarian interests and the lack of institutional will have held back regulatory consolidation of the sector so far, the rapid depletion of the natural resource base in the region warrants joint action propelled by far-sighted vision, common interests and shared responsibilities.

## NOTE

- 1 This mainly includes bilateral issues between India and Sri Lanka and conflicts arising out of Indian fishermen venturing into British territories in the Indian Ocean (Scholtens et al 2012; Mathew 2011).

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