

## CHAPTER 49

# RESPONSIBLE FISHERIES- A PRELUDE TO THE CONCEPT, CONTEXT AND PRAXIS

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The concept of Responsible Fisheries is synonymous with the FAO Code of Conduct for Responsible Fisheries (CCRF). CCRF is an international instrument for fisheries management which was developed and released by Food And Agriculture Organisation (FAO) functioning under the United Nations on 31 October 1995 after a series of international deliberations that began in 1992. More than 160 countries, including India are signatories to this international instrument which is considered as a landmark document symbolizing the international consensus achieved on the necessity for providing guidelines to ensure sustainable utilization of fisheries resources of the world. The most salient feature of this global instrument is its voluntary nature. The Code is often referred to as the Bible of Fisheries Management.

### Why the Code?

The term “Responsible Fisheries” may evoke a doubt whether we have been irresponsible in the way we have been developing or managing our fisheries resources. In fact such a doubt is the stepping stone to understand the concept of Responsible Fisheries.

In common parlance the term “responsibility” is immediately read with the notions of rights or ownership. We tend to have a better sense of responsibility to things we own ourselves. Thus, we feel responsible in taking care of our properties or assets like land or house or vehicle. The lesser the sense of our ownership lesser will be our sense of responsibility. Thus we feel less responsible for the affairs of our ecosystem or political system because we deem them as owned by all. A property belonging to everyone tends to be nobody’s property though nobody is excluded from its utilization. This is an important point because in the case of fisheries what we are talking about is a Common Property. Or more correctly an Open access resource. An important question here is “Who actually owns the fish or who actually owns the sea? The *de jure* owner of the fisheries is the State or the government. That is, fish in our waters is owned by the people. But by all practical sense the fish, once caught by the fisher, becomes his or her property. If so, what about his or her sense of responsibility to ensure its conservation? It may sound a bit puzzling. That is why the Code makes it very clear in the very first article which is given under the general principles of the Code.



*" States and users of living aquatic resources should conserve aquatic eco systems. The right to fish carries with it the obligation to do so in a responsible manner so as to ensure effective conservation and management of the living aquatic resources. " (Article 6.1).*

What is in principle a property of every one, becomes the property of none in practice. This is the most fundamental challenge in scientific fisheries management. There is a notion that if a sense of ownership is assured, the likelihood of it being taken care of in a responsible manner is more. There are people who argue that it is a misplaced notion. The above-mentioned article of the Code, in fact, is a preemptive answer to this common misunderstanding.

It is for the same reason that , of the more than 230 clauses in the Code classified under 12 articles, a large number vest the responsibility with the State. This, in a way also helps to clear the doubts regarding the real meaning of implementing the Code.

Another doubt could be on the real meaning of the voluntary nature of the Code. Being a voluntary instrument the question could be, "Is it something like a "barking dog that seldom bites"? The code answers this question in its fundamental philosophy called the Precautionary Approach, which is enshrined in Article 7.5.1.

*"The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures."*

In simple words what it means is " *Better safe than sorry*". It also has a deeper meaning which implies that when a person is given the license or permission or right to fish, what is being transferred is part of the stewardship obligation of the State. One needs to clearly understand this because, when individuals operate in a common property with the sole objective of making profitable livelihoods, the sustainable utilization of such a resource becomes an impossible task in the absence of mutually respected and endorsed regulations. The precautionary principle is further elaborated under the Foundations of the Code below.

Being a global guideline there is much practical sense for keeping it as a voluntary instrument too. Each nation can contextualize the code in sync with its own local realities and requirements at the same time respecting the globally agreed principles and norms. However, there are scholars who argue for making the CCRF a binding instrument given the sorry state of fisheries governance in most parts of the world.

### **Foundations of the Code**

That the sustainability of marine capture fisheries at the current level of harvesting is at stake is no longer a moot point. It is being realized that fisheries anywhere in the world is more a socioeconomic process with biological constraints than anything else. The open access nature of the resource coupled with unregulated penetration of advanced, but not



necessarily eco-friendly, harvesting technologies (a phenomenon called *technological creep*) has enacted a virtual “tragedy of the commons” in our seas. Making the issue still more complex, especially in the context of the Millennium Development Goals, is the rampant poverty/income inequality existing among our fisher folk though the capture fisheries make significant foreign exchange contribution in our country. The plateauing of the resource as revealed by recent trends in landings doesn’t augur well for the ecologic and economic sustainability of the marine fisheries sector.

If there are no technological magical bullets for the current impasse what is the way out? This is precisely the question the FAO code is trying to answer. As we have seen, “*the right to fish carries along with it an obligation to do it responsibly*” is the cardinal principle of the code. This principle is built on the foundation of what is known as a Precautionary Approach. Precautionary approach, which originally was proposed as Principle 15 of Agenda 21 the Rio Earth Summit meeting in 1992, enunciates that,

*“where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”.*

While in simple terms the precautionary approach means “**better safe than sorry**”, it clearly recognizes that changes in fisheries systems are only slowly reversible, difficult to control, not well understood, and subject to changing environment and human values. As Restrepo *et al.*, define, “the precautionary approach in fisheries is about applying judicious and responsible fisheries management practices, based on sound scientific research and analysis, proactively (to avoid or reverse overexploitation) rather than reactively (once all doubt has been removed and the resource is severely overexploited), to ensure the sustainability of fishery resources and associated ecosystems for the benefit of future as well as current generations”.

It involves the application of prudent foresight. It is about applying judicious and responsible fisheries management practices, based on sound scientific research and analysis proactively rather than reactively to ensure the sustainability of fishery resources and associated ecosystems for the benefit of future as well as current generations.

Taking account of the uncertainties in fisheries systems and the need to take action on incomplete knowledge, it requires, *inter alia*:

- a. consideration of the needs of future generations and avoidance of changes that are not potentially reversible;
- b. prior identification of undesirable outcomes and of measures that will avoid them or correct them promptly;



- c. that any necessary corrective measures are initiated without delay, and that they should achieve their purpose promptly, on a timescale not exceeding two or three decades;
- d. that where the likely impact of resource use is uncertain, priority should be given to conserving the productive capacity of the resource;
- e. that harvesting and processing capacity should be commensurate with estimated sustainable levels of resource, and that increases in capacity should be further contained when resource productivity is highly uncertain;
- f. all fishing activities must have prior management authorization and be subject to periodic review;
- g. an established legal and institutional framework for fishery management, within which management plans that implement the above points are instituted for each fishery, and
- h. appropriate placement of the burden of proof by adhering to the requirements above.

The reversal of burden of proof means that those hoping to exploit our marine resources must demonstrate that no ecologically significant long-term damage will result due to their action. Or in other words human actions are assumed to be harmful unless proven otherwise.

### **Contents of the Code**

The code provides a necessary framework for national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment. It is achieved through 12 articles covering areas like

- a) Nature and scope of the code (article 1)
- b) Objectives of the code (article 2),
- c) Relationship with other international instruments (article 3),
- d) Implementation, monitoring and updating (article 4),
- e) Special requirements of developing countries (article 5),
- f) General principles (article 6),
- g) Fisheries management (article 7),
- h) Fishing operations (article 8),
- i) Aquaculture development (article 9),



- j) Integration of fisheries into coastal area management (article 10),
- k) Post-harvest practices and trade (article 11), and
- l) Fisheries research (article 12).

(The full text of the FAO CCRF ( hereafter referred to as the Code) translated into Malayalam was published by CMFRI in 2002 under an agreement with the FAO ( Ramachandran,2002). Thus, Malayalam became the second language, after Tamil, to have a translated version of this very important international fisheries management instrument. You can access it at [www.cmfri.org.in](http://www.cmfri.org.in). The pdf of the English full text is supplied with the Winter school CD rom).

### Characteristics of the Code

As we have seen, the most salient feature of the code is that it is *voluntary* in nature. Unlike other international agreements like UN Agreement to Promote Compliance with International Conservation and Management Measures by Fishing vessels on the High Seas or the Straddling Stock Agreement, 1995, it is not legally binding and violation of the code cannot be challenged in a court of law.

It would be tempting to castigate it as an Achilles' heel and thus the futility of the code. But it should be remembered, "open access imbroglios" cannot be resolved through attempts that fail to recognize altruistic spirit of the human actors. In a situation where, "you and your enemy belong to the same eco-system", solutions must be found in managing relationships of the actors that make or move the ecosystem. It doesn't mean that the code is impractical or ineffective. What it demands is to construe responsible fisheries management as a *political process* rather than a *technical process*. This insight is a significant contribution of social scientists studying natural resource management (Wilson *et al.*, 2006).

A fundamental objective of the Code is "to serve as an instrument of reference to help states to establish or to improve the legal and institutional framework required for the exercise of responsible fisheries and in the formulation and implementation of appropriate measures." The policies of the state for managing the fisheries resources should be based on the provisions of the code.

If world fisheries are to be sustainable in the long term, structural adjustment within the fisheries sector is required. Although policy decisions in this regard must be made by national governments, effective implementation of the code requires the participation and cooperation of a wide range of stakeholders, including fishers, processors, NGOs and consumers. Implementation of the code is primarily the responsibility of states. The code will require regional and sectoral implementation in order to address the particular needs of fisheries in different regions or sub-sectors.



## Relevance of the Code in our context

Before analyzing the relevance of the code in our context it is necessary to have an inkling of the historical context in which the code was developed.

The code was unanimously adopted on 31 October 1995 after lengthy deliberations and negotiations spanning about four years. One of the major triggers for the idea behind the code has been the international concern over the serious decline noted in the global catch of marine fish. The iconic cod fish of the Canadian waters collapsed in 1992. The famous *Science* magazine at that time wrote in its editorial that “Fisheries is five per cent protein and 95% politics”. It was realized that the command and control regime of fisheries management, banking mainly on scientific advice, has come of age. It was realized that Fisheries management needed to be perceived more as fisher management or managing the behavior of human beings rather than that of the fish. No effective management was possible without the active participation of stakeholders. It was this realization that led to the concept of responsible fisheries. It is worth noting that the global production of marine fish after reaching a peak of 86.4 million tons in 1996 from a mere 20 million tons of the 1950s started stagnating or even plummeting down to 79.7 million ton in 2012.

## The Lessons of the Code

In order to better understand the lessons we can garner from the code which is an international instrument a comparative key word analysis of the Code with the instrument we currently have namely the Marine Fisheries Regulation Acts of the maritime states in India. (Kerala MFRA is considered for the analysis here). Also given is the famous Magnuson –Stevenson Fisheries Conservation and Management Act 1976, 2007 of USA for a comparative understanding.

Table 1. A comparative Key word analysis of three instruments

Key word	FAO CCRF 1995	KMFRA 1980	MS Act 2007
Sustainability	5	0	8
Over fishing	0	0	45
Conservation	70	1	>200
Management	10	0	>200
Food security	4	0	0
Gender	0	0	0
Regulation	19	37	152
Research	46	0	64
Penalties	0	0	22
Mesh size	1	2	0
Over capacity	0	0	0



MSY	1	0	5
Fisherman	15	0	43
Justice	0	0	6
Discard	9	0	18
By catch	1	0	68
Participation	4	0	32
Fisheries development	0	0	1
Poverty	1	0	2
Conflicts	3	0	3
Rights	33	0	0
Safety	11	0	26
Ecosystem	27	0	13
Code of conduct	NA	0	0

The table reveals certain interesting things. The greater importance given to Resource Conservation both by the CCRF and the MS Act compared to KMFRA is indicative of the nature of exploitation in our waters. Remember that the KMFRA was developed in 1980. Today the situation has definitely changed given the declining trends we have witnessed in recent times. Another key word to take note of is MSY, the Maximum Sustainable Yield, which is the most fundamental creed of fisheries stock assessment science. MS act of USA has given much more importance to MSY indicating the extent to which scientific stock assessment has influenced the fisheries management regime in that country. FAO CCRF has mentioned MSY only once ( Article 7.2). It indicates the lesser global applicability of MSY as a management reference point. All the three instruments give importance to fisheries regulations. CCRF obviously does not deal with penalties. But what is relevant here for us is the fact that out of the 24 keywords used in this analysis only three keywords appear in KMFRA. They are conservation, regulation and mesh size . (What are your impressions over this finding?). The absence of these key words in our Act indicates that there is a need for reforming it taking into cognizance the new ecologic and economic realities emerging in our fisheries sector.

Another interesting thing is the fact that the MS Act of USA is silent about the FAO CCRF. But, in an international study published in Nature 2009, which assessed the extent to which the FAO CCRF is being complied by different nations USA got second rank. Out of the 53 countries where the assessment was made India got 27 th position. The lesson we have to draw from this study is the importance accorded by Nation States in adopting problem-based management measures in ensuring sustainable utilization of their marine fisheries resources and the kind of policy significance these countries bestow to the importance of sustainable fisheries in the economy of those nations. It is worth noting that all of the 10





highly ranked countries belong to temperate regions of the world. The issues like overfishing are more visible in these countries and hence there is no wonder that these countries are ahead of other nations in adopting conservation oriented- fisheries management and regulations in their waters. In this context a question may creep in our minds. Should we also follow these nations where overfishing has become a reality? Can we continue our business as usual attitude in the absence of fisheries collapses or severe decline in our resources? It indeed is a challenging poser.

It is here that the science of fisheries management and the knowledge base we have accumulated so far regarding the status of our marine resources become relevant.

There are only two fundamental questions in fisheries management anywhere in the world.

- i) "How much fish we can safely catch?"
- ii) "How much is the fish available ?"

These questions are very simple. But answers are not so simple to come. That is precisely the reason why Precautionary approach has become the driving philosophy of the global thinking over sustainable or responsible fisheries. We should not fail to see the intellectual humility enshrined in this approach. It is the deep ecological insight that in the face of the excruciating uncertainty and ignorance attached to our fisheries management knowledge base, we need to respect the self rejuvenating capacity of the ecosystem. This realization is the basic idea behind new approaches like Ecosystem based Fisheries Management and of course this demands new and complex approaches in fisheries research and governance.

### **What is the Problem?**

The most important problem a fishery faces is what is known as Over Fishing. It takes place over time as the fishing is intensified. It is the stage where a stock of fish loses its capacity to keep on providing the Maximum Sustainable Yield. It is at this stage that the fishery is at the verge of an almost irredeemable loss, economically and biologically. MSY as a logic is easy to understand . But as a quantitative reference point, MSY is a methodological challenge especially in our multi-species tropical water scenario. This is still considered as the Holy Grail in fisheries stock assessment science. Remember, this should not be construed as a weakness of the scientist. It is the epistemological challenge the fisheries scientists all over the world share , lament and endeavour to overcome.

MSY is like a *Laxman Rekha*. The most frightening aspect about this *Laxman Rekha* is that we need to cross it to realize that we have trespassed it. Hence we can build our defense against the specter of overfishing only on the basis of a stronger understanding and contextual analysis of its symptoms.





Will our waters also witness collapses like that of the Canadian Cod? That such a tragedy has not happened so far is not a guarantee that it will not happen here. But we have a better sense of optimism thanks to the resilience of our marine ecosystem which is mainly due to the rich bio diversity. However, we need to be concerned if recent events like the pelagic fatigue in Kerala are of any indication. The decline experienced by our fishers vouch for a serious rethinking on our laid-back attitude. Our fishers also share the veracity of different ways in which symptoms of overfishing are being manifested. They are :

- a) severe decline or total absence in those fish which used to be abundant,
- b) decline in the size range of major species ,
- c) excessive catch of juveniles,
- d) increase in fishing time and distance,
- e) frequent fluctuations in the total catch, and
- f) changes in species composition.

### **Our Tool Box**

There are five types of remedies for the disease called "over fishing".

- 1. Based on the total catch of the fish ( yield or Output)
- 2. Based on fishing effort or input
- 3. Based on time or season ( temporal)
- 4. Based on space or depth ( spatial)
- 5. Based on technical things

A typical example of the first type of remedies is the Quota system of fisheries management which is common in countries like EU and USA. This demands the assistance from a very precise stock assessment science. These measures which are similar to rationing of the catch, can be considered as the last ditch effort feasible in areas of lower species diversity that makes determination of MSY much less cumbersome. The second type of measures aims rationalizing the fleet size. Licensing based on an optimum fleet size is an example here. The next type of measures based on time and space is well known to us through the Monsoon Trawl Ban. Other examples are Marine sanctuaries and no-fishing zones. Technical measures include Mesh size regulations, and Minimum legal size.

For an overview of the status of the tool box (interpreted in a slightly different mode) in our context, see the table annexed. The table is taken from (Shinoj and Ramachandran 2017).



As long as a fishery remains a common property resource, a regulated fishery is more profitable than an unregulated fishery in the long run. Our fishers have started accepting this truism. But they are helpless to avoid competitive fishing due to two main reasons. One is the increase in fuel cost. And the other is the high demand for fish which has led to a situation where you are economically rewarded whatever be the catch. So fishers tend to do indiscriminate fishing. This has resulted in an illusion of super abundance which again drives more fishing effort. This is leading to a very dangerous situation. There are fishers (like Mr Jossy Palliparambil, Munambam Kerala) who characterize this ugly scenario as a phase of "Foolish Fishing" (*"mandan fishing"* in Malayalam). It is high time each fisher take more care in analyzing the fluctuations observed in the economics of their operations. As Charles Glover, the author of the book *End of the Line*, notes "*what makes a fisherman great now is what he leaves in the sea*".

### Challenges in the praxis

Sustainable Management of resources is no different from fisheries development. They are no longer considered as dichotomous. There will be no fisheries development if there is not enough fish in the sea. There won't be enough fish in the sea, if human beings, both as harvesters and consumers, do not act in a precautionary manner which is nothing but to nurture a feeling of "better safe today than sorry tomorrow". What it means is to understand clearly the limits to which nature can be tapped. The requirements of both the present generation and future generation are to be given equal importance. It is also about respecting the co-evolutionary culture of a fisheries-resource dependent community. Thus Responsible Fisheries management takes place at the dynamic interface between the behavior of man and that of fish. So the knowledge base for responsible fisheries ought to be a convergence of different disciplines like fisheries biology, socio-politics, ecology, economics, engineering, law and communication. The aim of fisheries management is to ensure optimum utilization of a common pool resource without jeopardising the inherent regenerative ability of the resource leading to livelihood security of the dependent community.

Much has been said about rights-based fisheries, fisheries co-management and ecosystem-based fisheries management with fisheries managers, policy-makers, scientist and researchers racking their brains about the meaning of each of these fisheries management approaches. In trying to find definitions and formulating "how-to" guidelines and handbooks on such fisheries management approaches, their essential ingredient often is overlooked, namely dialogue. Whether talking of co-management and partnerships between fisheries stakeholders or of the adaptive nature of ecosystem-based fisheries management the fundamental nature of any fisheries management effort is the communication process among its various protagonists. Neither a partnership between



fishing communities, fisheries managers, researchers and other stakeholders, nor the merging of the development goals of human well-being with that of ecological well-being through an ecosystem-based fisheries management approach would be possible without free-flowing information among the various partners in the management process. It thus becomes a political or governance process.

These communication processes can take many different forms and can be designed according to a diversity of purposes: (1) to meet specific fisheries management objectives, needs and aspirations for the fisheries sector; and 2) to generate new information about local fisheries systems through participatory (eg. catch-reporting) mechanisms. The experiences from these activities should encourage fisheries managers, scientists, and fishing communities to actively seek such dialogue and information exchange as a basis for improving fisheries management on an ecosystem approach.

The efforts to engender a scientifically-informed fisheries management or governance regime are always challenged by the inherent uncertainty that characterizes the epistemology of fisheries science. The complexity of an otherwise resilient tropical marine ecosystem adds fuel to the fire and on the Human dimension we have a plethora of challenges despite promising perspectives from Hardin to Ostrom.

It is here that we need to fully appreciate the multitude of challenges we face in a precautionary and participatory framework. We have the instruments/tool box. But the credo of responsible fisheries is yet to become part of the community ethos (including that of researchers and managers). What could be the reasons and how we can overcome the barriers? As a concerned stakeholder each one of us has a responsibility to be part of a collective process to not only decipher the answers but also translate them into pragmatic ameliorative strategies.

### **The Code and CMFRI Initiatives**

Our fisheries have undergone tremendous changes during the past six decades. Before the advent of modernization, (motorization, mechanization, refrigeration, export orientation and transportation) the access to sea was limited to a few skillful and adventurous people who were by birth fishers. The community could afford to have self regulations oriented towards resource conservation which were arrived through the ecological experience of the community over generations. These concerns or tacit knowledge were institutionalized too. An example of such an institution still, surprisingly, surviving in Kerala is the *Kadakkody* of the Malabar coast (Ramachandran, 2006). The self regulations and community regulations which were rooted in the traditional wisdom have given way to technological skills. These skills, unleashed by what we generally refer to as an era modernization, most often take a



dehumanized manifestation thus weakening the hold of the community. This is where the crucial role of the State comes into play in the management as well as development of the fishery. This is better known as fisheries governance.

Fisheries governance is dependent on the particular stage of economic development and local ecological status of the fishery resources. This varies with each country. It is because of this contextual nature that the Code has been made as a voluntary tool. Each government is free to make its own rules, regulations and strategies based on the guidelines and principles elaborated in the Code. Thus article 4.3 says "FAO through its competent bodies, may revise the code, taking into account developments in fisheries as well as reports to COFI on the implementation of the Code. (But in recent times an argument against this position has also emerged).

It is in this context that the actions and initiatives being taken by CMFRI, mainly through an NATP funded research project titled "Designing and validation of communication strategies for responsible fisheries –a co-learning approach" become relevant. A Responsible Fisheries Extension Module (RFEM), which consists of 13 tools including a Malayalam translation of the code, animation films in all maritime languages *etc.* developed have been widely used to create awareness among the fisherfolk. A state-wide campaign on Responsible Fisheries was launched and the RFEM was released for further scaling up by the respective State Fisheries Departments. These mass communication tools have the potential to reach almost 85 % of the fisher folk and other stakeholders in the country. It is reasonable to conclude that CMFRI has made a pioneering initiative in the cause of popularization of the concept of Responsible Fisheries in India (Ramachandran, 2004).

Though the voluntary nature of the code has been necessary in garnering the all-nation agreement when it was drafted in the early 1990s, our attitudes to the oceans have changed since then (Pitcher *et al.*, 2009). There is now widespread scientific consensus on the ecological impacts of continued over-fishing and the threats to seafood security and broad agreement on policy issues such as curtailing illegal catches and minimizing the impacts of fishing on marine ecosystems. The basic requirement for adoption of Ecosystem Approach is a dynamic knowledge base on stock assessment. The stock assessment knowledge base generated and continuously maintained by CMFRI is a unique achievement among the developing tropical context countries. But the utility of this Knowledge base in translating into management praxis is less appreciated. There still exists a communication divide between the research system and the fisheries management system in the country.

Though the communication tools and strategies already developed by the institute have been useful in creating awareness on the need for sustainable/responsible fisheries



there is a need to develop and scale up specific communication interventions to sensitize the stakeholders in making a transition towards ecosystem based approaches that ensure responsible management of our waters. Fisheries management is fisher management and participatory approaches informed/initiated by a proactive research system taking place in a democratic and decentralized civil society space is globally accepted as the key to Ecosystem Based Fisheries Management. The future is decided by the capacity we build today amongst the different stakeholders responsible for sustainably utilizing the marine fisheries resources of our country. It is with this objective that we are continuing the efforts in this line through innovative research projects in Capacity Development for compliance to Ecosystem Based Responsible Fisheries Management in India through Co-Learning and Multi-disciplinary action research under the leadership of Extension scientists in CMFRI.

### **Pathways before us**

Taking into consideration the inherent epistemological limitations of the Fisheries science, it is essential to make a transition towards more participatory efforts fisheries governance and research. There cannot be any management without measurement. What our fishers lack is the big picture on the status of our fisheries resources. The science has the tools to draw this picture. But its precision depends on the accuracy of the data on landings. We badly need a National Marine Fisheries Data Acquisition Plan. The active and informed participation of fishers in providing the catch data needs to be encouraged through proper incentive mechanisms.

Engendering a scientifically informed fisheries management governance system is the need of the hour. As recent events like the Kochi Initiative (Ramachandran and Mohamed 2015) is of any indication, formation of multi stakeholder platforms of responsible fisheries co-governance is not an impossible task in our context. The response of the State in facilitating this transition is essential. With the landmark promulgation of insisting Minimum Legal Size for 55 species of fish by the Government of Kerala (GoK, 2017) done based on the recommendation of CMFRI (Mohamed *et al.*, 2014), the State of Kerala has shown an instance of proactive engagement with responsible fisheries governance which is worthy of emulation by other maritime states. It is, however, worth remembering that regulatory measures like MLS would become impotent in the absence of strong-arm measures to eliminate (or at least rationalize) external drivers like demand for the juveniles either for reduction or consumption. As scholars of regulatory politics argue, legislative coercion though necessary can not be open to tendencies for inefficient rent seeking in a public good.

**Table 2. Capture fisheries regulatory framework in maritime states of India**

Maritime State	Access controls	Temporal controls	Spatial controls	Input/ effort-based	Output/ catch-based	Legislation/s in force
Gujarat	Registration and licensing of fishing vessels	Seasonal fishing ban (Jun 1 – July 31, 61 days)	Artisanal: up to 9 km; Mechanized: beyond 9 km.	Square mesh of minimum 40 mm size at cod end need to be used for trawl net; Gillnet with mesh size less than 150 mm cannot be operated	-	The Gujarat Fisheries Act, 2003 Maharashtra Marine Fisheries Regulation Act, 1981 (Amended in 2015).
Maharashtra	Registration and licensing of fishing vessels	Seasonal fishing (Jun 1 – July 31, 61 days); Mechanized vessels with trawl net prohibited between 6 pm and 6 am	Mechanized (trawl net) : beyond 5-10 fathom depth in specified areas; Mechanized (any type with more than 6 cylinder engines): beyond 22 km	Use of purse-seine gears by mechanized vessels at specified coastal zones prohibited within territorial waters.	-	
Goa, Daman & Diu	Registration and licensing of fishing vessels	Seasonal fishing ban (Jun 1 – July 31, 61 days)	Artisanal: up to 5 km; Mechanized: 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	Seasonal fishing ban (Jun 1 to July 31-61 days)	Artisanal: up to 6 km or up to 4 fathoms (whichever is farther); Deep sea vessels (up to 50 feet length): beyond 6 km Deep sea vessels (>50 feet length): beyond 22 km.	Ban of cuttle fish fishery using FADs -		The Karnataka Marine Fishing Regulation Act, 1986.
Kerala	Registration and licensing	Seasonal fishing ban	Artisanal: 32-40 m	Mesh-size regulations:	Minimum legal size for 14 fish and	The Kerala Marine Fishing Regulation



	of fishing vessels	(Jun 15- July 31, 47 days) <sup>1</sup>	depth in the first zone <sup>2</sup> and 16-20 m depth in the second zone; Mechanized vessels (< 25 GRT): 40- 70 m depth in the first zone and 20-40 m depth in the second zone; Mechanized (> 25 GRT): beyond 70 m depth in first and beyond 40 m depth in second zone	code end minimum mesh size of bottom trawl net-35 mm; ring seine and driftnet minimum mesh size – 20mm.	shell-fish species notified to control juvenile fishing. Act, 1980 (Amended in 2013).
Tamil Nadu	Registration and licensing of fishing vessels	Seasonal fishing ban April 15 to June 14, 61 days)	Artisanal: up to 5 km. Mechanized: beyond 5 km; Fishing within 100 m below a river mouth is prohibited; The number of mechanized 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 are prohibited.	Tamil Nadu Marine Fishing Regulation Act, 1983 (Amended in 1995; 2000; 2011; 2016).
Andhra Pradesh	Registration and licensing of fishing vessels.	Seasonal fishing ban (April 15 to June 14, 61 days)	Artisanal: up to 10 km; Mechanized (< 15 m OAL): 10-23 km; Mechanized (< 15 m OAL): beyond 23 km.	A 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.	Seasonal fishing ban (April 15 to June 14, 61 days)	Artisanal: up to 5 km; Mechanized (<15 OAL): 5-10;Mechanized (>15 OAL): beyond 10 km.	The Orissa Marine Fishing Regulation Act, 1981 (Amended in 2006).	-
West Bengal	Registration and licensing of fishing vessels.	Seasonal fishing ban (April 15 to June 14, 61 days)	Artisanal & mechanized crafts with < 30 HP engine: up to 18 km; Mechanized 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;Trawl net of standard mesh-size fitted with TED to be used.	The West Bengal Marine Fisheries Regulation Act, 1993. -
Andaman & Nicobar islands	Registration and licensing of fishing vessels.	Seasonal fishing ban (April 15 -June 14, 61 days)	Artisanal & mechanized crafts with < 30 HP engine: up to 6 nm; Mechanized crafts with >30 HP engine:	Trawl nets of standard mesh size fitted with TED alone are permitted; Gillnets, shore seines and dragnets with mesh	The Andaman and Nicobar Islands Marine Fisheries Regulation Act, 2003 (Amended in 2011).





			beyond 6 nm.	sizes above 25 mm only are permitted.
Lakshadweep	Registration and licensing of fishing vessels.	Seasonal fishing ban Seasonal fishing ban (Jun 1- July 31, 61 days)	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.



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## (Footnotes)

<sup>1</sup>While all other maritime states and UTs agreed to extending the ban to 61 days in conformity with the directive of the Union Government issued in May, 2015, Kerala continues to stick on to its earlier ban period for 47 days.

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