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# Management regulation for sustaining marine capture fisheries in Tamil Nadu[1]

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## Introductions

Fisheries have emerged as an important food production sector of the Tamil Nadu State contributing to the livelihood as well as food security of a large section of the people. Fishing activity, starting as a traditional livelihood activity in early fifties has now transformed into commercial enterprise contributing to the State and National economy, livelihood and nutritional security, rural employment generation and foreign exchange earnings significantly. It is one of the foremost States in India showing steady increase in fish production and optimum utilization of resources. Tamil Nadu has a coastline of 1,076 km on the east coast and 60 km on the west coast with a continental shelf area of 41,412 sq. km, and territorial waters of approximately 19,000 sq km. According to the 2010 Marine Fisheries Census for Tamil Nadu, covering its 13 coastal districts, there are 407 landing centres and 573 marine fishing villages in the State, with a total fishermen population of 0.82 million, of whom 0.214 million are active fishermen. The fishers belong mainly to the Paravar, Valaiyar, Kadaiyar and Karaiyar communities. In 2011-12, the total catch from marine capture fisheries in Tamil Nadu was 0.71 MT, of which 24.7 percent came from Ramanathapuram district followed by 19.8 per cent from Nagapattinam district, 13.5 per cent Kanyakumariand 11.6 per cent from Tuticorin district (CMFRI Annual Report, 2012-13). There are around 11,000 mechanized boats, 25,000 motorized boats and 10,500 non-mechanized boats in Tamil Nadu state.

Fishery resources need to be monitored and managed to maintain harvest at sustainable levels as they provide food and livelihood security to millions of population. Management of fisheries is not confined to management of stocks alone but it should consider all the stakeholders associated with the sector directly or indirectly such as fishers, traders, those involved in post-harvest operations and those who provide support services to the sector. (Vivekanandan*et al.*, 2010).Fisheries management tended to assume that the fishery and the target species existed in isolation from the rest of the ecosystem. As pressure

on resources and ecosystems increased, the shortcomings of single-species approach became more obvious. We now know that fishing not only impacts on the target stock, but on other parts of the ecosystem as well. For example, fishing methods are never selective and in addition to the target species, other species are inevitably caught. Some of the so called bycatch may be valuable and retained, while some bycatch may be discarded(Vivekanandan*et al.,* 2011). We have to formulate fishery management policy considering the domestic situations and promote sustainable fishing practices that will not decrease the stock level, but will ensure livelihood security, resource sustainability, economic efficiency and ecosystem integrity (Srinath and Pillai, 2008).

## Current management measures

The **Wildlife (Protection) Act, 1972** provides legal protection to many endangered and threatened organisms viz., Marine mammals, turtles, some of the sharks, fishes like the giant grouper and sea horse, corals, sea cucumbers, gorgonids, some of the molluscs etc. There exists strict enforcement of rules against capture and possession of the protected animals. Joint patrolling is being carried out by the Forest Department, Fisheries Department, Police and Coast Guard to ensure better protection of endangered resources of Gulf of Mannar.

The **Marine Fisheries Regulations Act (MFRA)** was adopted in 1983, amended in 2000 and Rules notified in 1983. The regulatory measures formulated under the above Acts and Regulations by and large cover prohibition of exploitation of resources by destructive gears, explosives and poison,restriction of number of fishing boats, restriction of number of fishing gears which exploit juveniles in the backwaters, estuaries and shallow inshore waters, mesh size regulation, minimum legal length for capture, seasonal ban on fishing. The MFRA insists registration of all fishing vessels, and license required for fishing. Daily tokens are issued to mechanized vessels, to venture into the sea. The use of fishing gears with a mesh size of 10mm (knot to knot) is strictly prohibited. Pair trawling and purse seining are strictly prohibited. Bottom trawling operations within three nautical miles from the shore is restricted. Non-mechanised fishing vessel should operate within three nautical miles shall go for hook and line fishing and boat seine. Fishing within 100 metres below a river mouth is restricted. The owner of a non-mechanised fishing vessel shall not use his gill net in the channel earmarked as the passage for mechanised fishing vessel.

There is a trawl ban for a period of 45 days every year (closed season).Although seasonal fishing ban is just one of the many tools available for fisheries management, it is the only instrument which is being diligently followed in the country. Earlier there was no uniformity of ban period, but after the intervention of the Ministry of Agriculture, Government of India, the ban has been made uniform all along the west coast (June15 – July 31) and east coast (April 15 – May 31) states and Union Territories. The closed season is followed during different seasons and for varying duration along the east and west coasts. Whereas closed fishing season appears to improve the catch for a few months after the ban is lifted, there is no indication on the sustainability of fish stocks and long-term benefits (Vivekanandan*et al.,* 2010).

## Efficacy of existing management measures

It is well understood that management measure should be directed towards sustainability of natural resources. There is no doubt that a resource which is declining has to be restored by adopting all possible management measures, including total ban on harvesting of the resources, if necessary. However, it is also important that sound database is essential for considering a species or group to be included in the Schedule. It is felt that a realistic long-term database is not yet developed for the major resources. Such a database, if developed, will help in the long-term to evolve appropriate management measures.

Another vital aspect is to review the quality and availability of resources and ecosystem services after implementation of the management measures in order to compare it with the pre-management scenario. This should be given topmost priority and suitable agencies should be identified and the data should be collected to get a real picture. It is understood that in marine resource assessments, many assumptions are made to estimate the stock. However, the methodology adopted and the samplings methodology should be scientifically robust and well accepted.

There is also a lack of coordination and interaction in the implementation by different agencies. This is largely due to the multiple-ownership of the resources. Example - the conservation aspects fall under the jurisdiction of the Department of Forests, while the Department of Fisheries manages the fisheries resources. This dual control of the resource leads to many activities that are detrimental to the health of the ecosystem. Further, the current management measures in the region have not made any serious attempt on alternate livelihood options. Since the management measures are affecting the livelihoods of fishing communities, it would be appropriate to have a participatory conservation approach.

It is evident from the above that certain improvements are essential for the development of effective management measures. Sustainable exploitation of the resources can be practiced, with a participatory approach. It is seen that in some parts of the world, the coral reef ecosystem are permitted for sustainable exploitation, which can substantially contribute to the economy. The policy of total ban should be resorted only when it is absolutely warranted. Otherwise, the rules may be flouted with illegal exploitation of the resources, which is more harmful to the ecosystem.

## Current issues in marine fisheries management:

- The fishing method is use of non-target groups and non-selective fishing gears. Hence species specific ban is irrelevant.
- From 1980-92 an increase in mechanised boats of nearly 50 percent has been reported in Tamil Nadu (Thirumilu*et al.*, 1994). This attracted investments from areas other than the fishermen community. The investment was initially in export trade and processing, but later direct investments in boats and hiring of fishermen as the crew and for maintenance transformed it into a modern, export-oriented industry (Hapke 2001).
- There is no limit on the number of trawlers. Hence,catch per unit effort (CPUE) is declining and per capita area per active fishermen is reduced.
- Trawling operation damages the gear and the crafts of the traditional fishermen.
- The conflict between mechanized and non-mechanized sector was mainly due to declining volume of catches faced by the traditional fishermen, intrusion of

mechanised vessels in the fishing grounds allotted for traditional fishermen, increased fishing pressure can be quoted as some of the reasons for the conflicts.

- The mean length of commercially important finfish and shrimp species in the landings is reducing, which shows that they are caught before breeding at least one time.Major reason for this is the use of nets, which have a small mesh at the cod end and thus end up catching juveniles.(presently the cod end mesh size used in trawl net is around 10 to 20mm whereas the specified size in the rule is 30 mm)
- Other reasons for this can be attributed to increased fishing pressure, damaging effects of bottom trawling, disposal of industrial wastes and thermal pollution, pollution by heavy metals, discharge of untreated sewage, over fishing and port related activities; coral and sand mining can also be quoted (Elin and Shaap 2003).
- Around 50 per cent of the by catch samples were immature fish that had no chance of spawning even once. (Salagrama, 2002).
- Trawling destroys habitats, shelter and suitable breeding areas for the fish and disturbing the larvae and eggs (Mounsey and Prado 1997, Vijayan, Edward and Ravindran 2000).
- Trawling method is indiscriminative as large amounts of noncommercially; juvenile, low value fish are also caught as by catch. The quantitative estimates regarding depletion levels are listed below: -Sivasubramaniam (1990) stated that 50 percent of the by catch samples he had studies were immature fish that had no chance of spawning even once.Salagrama(2002) and Sujatha (1996) found that by catch in Vishakapatnam by small trawlers amounted from 66-94 per cent of juveniles. The reasons being small mesh size at the cod end and the design of the cod ends (Vijayan, Ravindran and Edwin 2000)
- Horse power used in mechanized boat ranged from 200 & 500 hp. (According to act, the permitted range is 20 to 150 hp).
- Around 20 per centof catch is discarded
- Use banned gears like purse seine, *roller madi* and pair trawling.

Mini trawls (Thalluvalai) causes serious damage to the sea grass beds. Non-target resources removed by the bottom-set gill nets

A view of roller madi nets used in Gulf of Mannar

Damage to bio-resources by trawl

Pair trawling

**Proposed/expected actions for sustaining marine capture fisheries**

- It is noted that many agencies are involved in the collection and collation of research data, evolving conservation measures and implementation of management policies. In addition, there are different stakeholders who are dependent on the resources and ecosystem services in the region. **A proper co-ordination and consultation between the different agencies involved is essential.** Presently, each agency is adopting a stand-alone approach and the data obtained is fragmentary and inadequate. Thus an **integrated approach** may be adopted. In this regard, the Government may constitute a committee incorporating all the agencies involved in the research and management of GoM and also include representatives of all the stakeholders who are dependent on the ecosystem services for their livelihood. The Committee should interact at regular intervals and make necessary recommendations to the Government for implementing the management measures.

- Providing **alternate livelihood** options is a matter of serious concern. Any awareness programme on the need of regulation of exploitation of resource is futile if alternate livelihood options cannot be provided to the fisherfolk who are dependent on the resources for their livelihood. In this context, small-scale mariculture practices can be encouraged as alternate livelihood options. Certain areas of the GoM can be demarcated as mariculture zones where **small-scale sea-cage farming, seaweed farming, lobster and crab fattening, oyster farming, ornamental fish culture and integrated farming of finfish and shellfish with seaweeds can be promoted by Government agencies.**

- Currently there are accepted methodologies for enhancement of stock of depleted resources. In this regard, conservation, mariculture involving seed production of the target species and **large-scale sea ranching** can play a significant role. The process is a non-commercial activity which has to be practiced on a massive scale involving R & D institutions and a host of voluntary agencies. Policies for providing incentives to

authorized voluntary agencies involved in such conservation and stock enhancement programmes will go a long way in the replenishment of many stocks.

- **Conservation of fisheries resources, protection of fish habitats and allocation to fishers are the three most important considerations in fisheries management.**In this process first the carrying capacity of the ecosystems and the biomass at each trophic level by taking into consideration the weather and hydrography of the ecosystem and fish biology has to be estimated. Based on the carrying capacity the number of crafts and gear required for sustainable harvest from the given ecosystem can be quantified. It helps to bring about a greater control over large-scale operations of non-selective fishing gear. If there is a need for reducing the number of crafts, Government can go for buy-back arrangement after negotiating with fishermen.

- **Fishing quotas** are worth considering as a system to restrict 'too many players' in the mechanised sector. To do so, careful estimation of the total available resource (X) and the Maximum Permissible Catch (MPC) or the Maximum Sustainable Yield (MSY) has to be done. The Department of Fisheries and other independent research bodies should be reviewed every yearand they can facilitate in this mechanism. These fishing quotas would require us to clearly determine what percentage of the resource can be exploited by the traditional and mechanised sectors respectively. Here it becomes essential to create a market for fishing licenses for the operating trawlers. This license, in essence, is a right to over fish, or fish using techniques that might inflict a social cost to the traditional fishermen- a negative externality. So, determining the number of licenses that can be issued becomes a crucial factor.

- If all forms of fishing in certain area are banned altogether, the overall catch can be increased in a sustainable way. Since then, lot of studies have convincingly demonstrated that the creation of **no-fishing reserves** allows the rapid build-up of fish spawning stock biomass (Roberts and Polunin, 1991; Dugan and Davis, 1993; Allison et al., 1998). The idea behind reserves is simple. If the fish are protected from fishing, they live longer, grow larger and produce an exponentially increasing number of eggs. It is observed that adult fishes tend to remain in the protected areas while their larvae help replenish adjacent fisheries. Overall (multispecies) levels of biomass per unit area can double in two years and quadruple in ten years of closure.No-fishing reserves will work well for migratory species also if the reserves are put in the right places. Reserves placed in nursery and spawning areas will protect the migratory species during critical life stages.No-fishing reserves will work well for migratory species also if the reserves are put in the right places. Reserves placed in nursery and spawning areas will protect the migratory species during critical life stages. There are strong evidences to suggest that reserves will work even better in the tropics. However, there is no direct experience of reserves in India barring the marine sanctuaries in the fragile coastal zones to protect coral reefs and mangroves. Considering that the concept of no-fishing zone is a good strategic tool, fisheries managers should start working on the questions about how much of the fishing grounds should be placed in reserves, how many are needed, and where should they be.

- Government of India imposed a ban in 1982 on the export of material which is less than 75 mm in length. Since, all sizes of sea cucumber were indiscriminately collected without giving a chance for the animals to breed at least once during their life. But illegal trade of under-sized sea cucumbers continued. The Ministry of Environment & Forests brought all the species of sea cucumbers under Schedule I of the Wildlife Protection Act, 1972 and strictly banned their collection in 2001. The ban has affected the livelihood of a few thousand fishing populations. Many of them do not have an alternate livelihood avenue. A scientific in-depth study to understand and ascertain the present status of population of different species of sea cucumbers has to be done.Based on thatif required species-specific can be implemented, instead of a blanket ban on all the species. Other regulatory measures which can be considered are implementation of ''minimum legal size for capture'', effort control and monitoring, inclusion of "no take zones" within the Marine Protected Areas, "seasonal and short-term closures" of fishing, implementing "rotational harvest closures", fixing of "catch quotas", market chain licensing and reporting.

## Conclusion

The current management measures in the region have not made any serious concern regarding the livelihood option. When a particular resource on which the livelihood of a group of fisherfolk are dependent, it is inhuman to put a total ban on the resource without regard to livelihood option. It is well known that for any management measure which is affecting the livelihood of a sector, it is better to have a participatory conservation approach. The current management scenario has not made enough scope for this vital aspect.The hard core conservation measures have to be reconsidered. The sustainable exploitation of resources from the area can be practiced whereas destructive practices have to be effectively curbed. On a global basis also, the coral reef ecosystems are permitted for sustainable exploitation. The policy of total ban should be resorted only when it is absolutely warranted based on the database created through careful scientific studies. Otherwise a lot of illegal exploitation of the resources is bound to happen, which is more disastrous and harmful to the ecosystem.The resource which is alarmingly declining has to be restored by adopting all the management measures including total ban. The vital issue is that realistic database should be available to consider a species or group to be included in the Schedule.The current management measures are adopted without a realistic and strong database regarding the status of the resources. Such types of management measures create lot of livelihood issues and hence will become redundant. Providing alternate livelihood options, fishing quotas, no-fishing reserves can be considered and implemented wherever it is feasible. Participatory approach to conservation where the different stakeholders voluntarily accept the regulatory measures is the best policy.

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