

## **Complexities of Management of Inshore Fishery Resources of India**

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The management of coastal fishery resources of India, accommodating the technological changes, socio-economic objectives, interaction of different users of the resources and other activities which influence the fisheries, has been a matter of great concern for the policy makers, planners, scientists and maritime State Fisheries Departments in the last decade. It appears to dominate the scene in the current decade as well. A review of the present state of the inshore fisheries by Experts has concluded that the catchable potential of different groups of fishes in the 0-50 m depth zone, estimated at 2.21 million tonnes, is very close to the present production level of almost the same quantity. Added to this depressing note, the fishing technological developments, which are perceived as panacea for augmenting production and economic gains, have given rise to the formation of sectoral groups among the fishing communities exploiting the resource, and the consequent social and professional conflicts. The various controversies and complexities of these issues are discussed here in an attempt to help in the development of a balanced management strategy in consideration of the administrative, social, economic resource conservation, technological and political objectives.

### **The Beginnings and Growth Thereafter**

The emphasis on the marine fisheries development of India at the start of the planning process in the fifties and sixties has been on the introduction of mechanised fishing vessels, improved gears and gear material. The location of lucrative shrimp grounds in the inshore waters, establishment of an export trade for shrimps and its accelerated expansion, gave a fillip to the progressive addition of mechanised fishing vessels and popularisation of bottom trawling, which co-existed with the traditional fishing, exploiting the same resources almost in the same area. These activities were supported by modern methods of handling, processing, preservation and utilisation of the catch, and establishment of other onshore infrastructural facilities with considerable financial

aids and subsidies. During 1970-80, the marine fishing activities expanded rapidly harvesting the resources upto about 50 m depth zone in the Continental Shelf.

In the early seventies, purse-seines were introduced on the South-West coast for the exploitation of pelagic fishes. The pattern of fishing also changed from single day fishing to stay-over fishing. Since the last decade, motorisation of country craft got momentum, and employing these craft, gears such as ring seines and "minitravls" were used for fishing in the inshore waters. These inputs have helped the marine fish production of India to increase steadily to the level of two million tonnes by the turn of the last decade.

### **Fishing Pressure and Chasing Crisis**

As the catching capacity of the fishing units increased but confined to a narrow belt of 0-50/60 m depth zone in the Continental Shelf, and the competition among the resource users for maximising their share of opportunities to step up harvests, the exploitation pressure on the stocks in these grounds increased. Several studies made on the production trend and the fishing effort put in to realise the production, and the studies made on the population characteristics of the important individual fish and shellfish stocks constituting the fisheries, have indicated that increased effort in these grounds may not produce enhanced yield or proportionate increase in production as the exploitation has reached the optimum or near optimum level. This is particularly so in respect of the shrimp fishery, which due to its value and importance in the export trade, is playing a pivotal role in stoking the aspirations and also precipitating a crisis in the Indian marine fishing industry.

**Juvenile Exploitation :** Besides the difficulties of resource sustainability, the increase in number of fishing fleet, use of least selective fishing gears

having relatively small mesh size, the changing pattern of fishing methods and the increasing competition to catch as much quantity as possible to realise better economic returns, resulted in the catch of considerable quantities of juveniles. Large quantities of juvenile fishes and prawns, are also caught from the estuaries and backwaters. The increased catch of juveniles of potentially high commercial value fishes has brought intense pressure on the resources.

### Neglect of By - Catch

Similarly, the trawl fishery of our country is, by and large, interested in exploiting only the shrimps and a large quantity (about 75-90% of trawl catch) of fishes and other shellfishes is landed as by-catch. This by-catch is not properly cared for and often, discarded to facilitate proper preservation and landing of shrimps. According to one estimate, about 1,30,000 t of by-catch were discarded in the north-east coast of India alone by the large trawlers in 1988. Such huge discards in the sea pose severe problems for the resource scientists to get a correct and reliable picture of the species composition, seasonal variation, biology of the constituent species in the catch, estimation of natural and fishing mortality rates and other population characteristics of the exploited resources. Besides, in the critical situation of protein fish food supply shortage the country cannot afford wastage of fish biomass in this way. This, coupled with the lack of involvement of the fishing industry in generation of data on exploited stocks places severe constraints on the fisheries managers.

### Modules in Fishery Resource Management

Recognising the adverse effects of the above activities on the resources over the years, and the urgent need to maintain a sustainable resource base and stock conservation, the management strategy advocated for adoption in this zone has been towards the management of resources that are over-exploited or have reached the optimum level of exploitation. The management measures discussed and suggested in this context are : i) regulation of fishing effort and catch limitation, mainly of the shrimps, ii) restriction of fishing gears which exploit the juveniles in the inshore waters, estuaries and backwaters, iii) mesh size regulation of fishing gears such as trawl nets, purse-seines

and ring seines, and iv) closed fishing season and areas.

**Catch limitation :** catch limitation and control of fishing effort are among the most common methods used in the management of fisheries, particularly in their developed state. This technique is based on estimations of Maximum Sustainable Yield (MSY) and determination of Total allowable Catch (TAC) indicating the quantum of catch that could be taken annually without disturbing the replenishment ability of the stock and, the optimum effort needed to exploit this quantum of catch. However, as the estimations of MSY and maximum effort are dependent on a number of variables and the quality of the commercial catch and effort data used for the estimation, the management strategy based on this technique is often criticised for being too narrow in its objectives.

Similarly, the changing seasonal pattern of the fishery as well as the fishing methods, rapid generation of improved gears and ineffective system of surveillance are the other problems of its practical application. Besides, the regulation of fishing effort is difficult in the context of multigear and multispecies nature of the fishery and the competitive attitude of the resource users, enjoying common property rights of fishing. It is observed that for species which have short life span and exhibit intense recruitment variability, it is difficult to base the management strategy on catch quotas. This strategy would also attract opposition from economic and political angles. In view of these complexities, although this management technique should receive further consideration for dealing with excess fishing effort, its practical success cannot be achieved in the present situation, and perhaps, continuous education of the resource users on the deleterious effects of excess fishing effort on resources needs to be undertaken before its application.

**Young Fish Conservation :** Restrictions on the exploitation of juveniles of commercially important fishes and shellfishes in the inshore waters, estuaries and backwaters to conserve the stocks are in application in the coastal fishery of the country. Licensing of fishing gears such as stake nets and Chinese dip nets in the estuarine/backwater fisheries of Kerala is in force. Similarly, the operation of gears during high tides is also prohibited.

These measures are meant to protect certain life stages of the exploited stocks, mainly the shrimps, that spend a part of the life cycle in these ecosystems. Their implementation, however, has not been successful mainly due to the socio-economic constraints. The estuarine fisheries contribute significantly not only to the sustenance of the fisher population living on the banks of these water bodies, but also offers gainful employment opportunities. The increasing demand for even tiny shrimps and the absence of regulations on the minimum size of species for capture as well as for export, have prompted the use of several hundreds of unlicensed gears along with the licensed gears. Further, the exploitation of smaller individuals of certain culturable species such as *Penaeus monodon* and *P. indicus* for purpose of seed in certain parts of the Indian Coast is causing concern to the already existing problem of over-exploitation of shrimps in the nursery ground. In respect of shrimps, there is one school, however, which believes that exploitation of juvenile prawns in the estuaries and backwaters is the best way of utilisation of the resource because all the juveniles which enter the estuaries as larvae may not return to the sea even in the absence of fishing due to heavy natural mortality during post-larval and juvenile phases. In any case this unrestricted exploitation has led to the necessity of controlling the fishing to ensure safeguarding of the resource without sacrificing the social and economic benefits. The regulation of this practice, therefore, cannot be achieved immediately, unless an alternate workable policy for rehabilitation of the affected fishermen in gainful fishery related avocations is incorporated in the management strategy recommended for the purpose.

**Mesh regulation and gear selectivity** : Mesh size regulation for the capture of marine fishes has been one of the traditional methods of conservation and management of fisheries resources used in several parts of the world. The use of nets with large mesh size would permit the escapement of juvenile fishes enabling them to grow to larger size, mature and contribute to the maintenance of spawning biomass. It is also observed that by allowing the fish to grow to larger size, the market value of the catch would be improved and growth overfishing averted. As the fishing effort in the marine fishery of the country increased, the catch distribution among the fishing units dwindled, and consequently, the resource users started reducing the mesh size

of the net to catch even small fish in more numbers which gradually resulted in the reduction of size of the fish or in catching greater proportion of small-sized fish and shrimps. Over the years, the cod-end mesh size of the shrimp trawl nets was reduced from 25 mm to 8-20 mm and that of purse-seine from 10/18 mm to 7/15 mm. Studies carried out on mesh selectivity in relation to populations of shrimps exploited from the inshore waters of the country have shown that there is an urgent necessity for increasing the cod-end mesh size of shrimp trawl nets to atleast 30 mm to save the stocks from the danger of over-exploitation. However, in recommending an appropriate mesh size of the net, there should be a realistic relationship between the size of the fish and the performance of the fishing gear used to catch the fish. Further, in the operation of demersal trawling and purse-seining, often large quantities of fish are caught which virtually seal off the net meshes resulting in the retention of undersized fish. For a multispecies fishery of the type prevailing in our waters, selection of gear by mesh size would be difficult. From the investment point of view, a regulation based on mesh size will not be appreciated by the fishermen as they may have to sacrifice the present nets incurring loss and requiring additional investment for the new nets. Nevertheless, studies carried out have indicated that it is worthwhile to encourage adoption of more selective gears for stabilised harvest of the resource, although the benefits are slow to be realised. Recently, the UK Government has insisted that square meshed panels with a cod-end mesh size of 75 mm shall be used for trawl nets, as it permits greater escapement of juvenile fish than the normal mesh nets.

**Closed seasons and areas** : Closed season, as a fishery management technique, is well known in many parts of the world. For example, in UK, closed season is practised to protect Salmon and Coarse fish breeding stocks. Similarly, in some of the world penaeid shrimp fisheries such as in Gulf of California, it is used for the protection of spawning stock. Besides helping in the protection of breeding stocks or juveniles in the nursery grounds, it also limits the fishery at certain level of the total catch. Closed fishing season for shrimps is observed at present in India during April-June by the larger trawlers operating from Visakhapatnam on the east-coast. As this is a voluntary action, no problem is encountered at present. Otherwise, the main constraints of this system would be, when

## FISHING CHIMES

the fishing season changes it would adversely affect the industry as the vessels and the crew may have to be laid off for longer period. Consequently, the supply of raw material would fluctuate.

**Conflicts :** The system of fisheries management through fishing zone demarcation (Territorial use of Rights in Fisheries) is a recent thinking in India. As the fishing activities by the traditional and the mechanised fishing vessel operators in the inshore fishing grounds increased, competition to maximise the rent from the resource ensued. This has gradually led to conflicts between the two sectors for the control of the fishing grounds. Similarly, as the mechanised fishing vessel operators could harvest the resource more effectively than the traditional fishermen, the social and economic status between them widened and this imbalance caused dissatisfaction among the traditional fishermen. This conflict between the two sectors, often becoming violent, necessitated safeguarding the interest of the Small-scale and Medium-scale fishermen.

**Fishing Zone :** The management policy which has been adopted to tackle this problem has been the demarcation of fishing zone for the operation of different types of fishing vessels in the inshore fishing ground. Accordingly, certain regions of the inshore area based either on distance from the shore or on bathymetric disposition, are set apart exclusively for the operation of traditional fishing units; the mechanised fishing vessels are prohibited from operation in this zone. However, the demarcation of fishing zone is found to vary from state to state and often, within the same state, as in Kerala. This arbitrary nature of fishing zone demarcation and the pressure of increased fishing effort, technical modernisation and exploitation based on common property principle, form formidable obstacles for the success of this system of management. Besides, its strict enforcement is beset with practical difficulties mainly due to inadequate facilities and resource with the implementing/enforcing agencies. Nevertheless, the management of fisheries through the Territorial Use Rights has elsewhere shown that it is possible to achieve a balance among the administrative, social, economic, resource conservation systems and technological & political objectives, whenever it is organised by the resource users entirely by their own inputs without much of external regulations.

**Monsoon Trawling conflicts :** In the complexity of issues causing the conflicts between the traditional and mechanised fishing sectors, the monsoon fishing practised in certain states, particularly in Kerala since the last decade, has become a critical issue of controversy. Opposition to monsoon fishing comes from (i) the mechanized fishing vessels sharing the resources in the inshore waters normally held for the traditional fishing, (ii) fears of possible adverse affects of monsoon fishing on the resource against the already deepening crisis of resource availability and consequently, the urgent need for conservation of the resource, (iii) acute competition for the harvest of shrimps available in the inshore waters and (iv) the widening economic imbalance between the sectors. At the same time, one school believes that the monsoon fishing would help better utilisation of the resources such as shrimps which otherwise may not be available for exploitation if not harvested when available during the monsoon period. The dilemma whether this problem can be successfully accommodated within a management policy which seeks to place the stock conservation at the top without unduly restricting the utilisation of the resource or risking serious dislocation of the fishing industry, has been a matter of great concern for several Committees and Commissions appointed by the Government of Kerala to go into the issue of trawling during the monsoon period. After considerable deliberations on the subject, it was decided to ban bottom trawling in the territorial waters of the State during June-August. Although this is implemented since 1988, with relaxation in certain areas and duration, the controversy still persists and a workable solution to the conflicts does not seem to have been worked out.

### Remarks and Conclusions

It will be clear from the preceding paragraphs that none of the management measures adopted in the country can be considered as successful. Is it due to the failure of planning system or setting up of rational, non-conflicting developmental objectives? One is tempted to believe that the policy of introduction of mechanised fishing vessels and their addition year after year in the context of common use right system for exploitation has resulted in an imbalance between the emphasis of fisheries development for maximising production and economic components and the need to maintain