Conservation and Management of Marine Fishery Resources of Kerala State, India

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Abstract

The highly productive fisheries of Kerala, India, are suffering from overexploitation. Use of unsuitable fishing gears that result in a high level of wasteful bycatch and destruction of egg bearing and juvenile fish should be controlled. This paper makes some suggestions for monitoring and conservation of the fisheries in Kerala.

Introduction

Marine fish production of Kerala State, India increased from 0.13 million t in 1951-55 to 0.58 million t in 1994. In 1976-80, the fish production of the State was 0.41 million t. It was 0.27 million t in 1981 and increased to 0.39 million t in 1984. The landings dropped to 0.30 million t in 1987 and peaked at a maximum of 0.56 million t in 1994. The production of prawns was 74,000 t during 1973-75. During 1976-78 and 1978-80, it fluctuated between 38,000 t and 43,000 t and reached about 72,000 t in 1994. Thus, marine fish landings in Kerala showed wide fluctuations over the years, especially during the post-mechanization period. Massive changes in the species composition of the catch and the disappearance of previously important species with an increase in unmarketable or small-sized species are signs of overfishing.

Kerala accounts for 12,570 sq. km of coastal sea area, which has an estimated Maximum Sustainable Yield (MSY) of 400,000 t. This highly productive inshore area is being exploited intensively by more than 4,000 mechanized boats and nearly 26,000 traditional crafts, of which about 17,362 are motorized (Anon 1991). The fishing pressure exerted by the increasing number of crafts using innovative gears in the narrow nearshore regions has resulted in heavy competition leading to inter- and intra-sectoral conflicts. Active fishing with synthetic fibres, propulsion with outboard motors and modification of craft and gears, including indigenization of fishing techniques such as mini purse-seining and mini-trawling, have contributed to the overfishing. This has also coincided with an enormous increase in fishing by the mechanized sector, which has led to large scale destruction of egg bearing and juvenile fishes.

Management Measures and Regulations

As a preventive measure, the Kerala Marine Fishing Regulation Act (Anon 1981), the first of its kind in the country, was based on the 'draft bill' of the Majumdar Committee constituted by the government of India in 1976 for examining the question of delimiting the areas of fishing for different types of boats. This act provides for a regulation of fishing in the territorial sea along the coastline of the State through registration and licensing, mesh size regulation, prohibition of certain fishing methods, delimitation of fishing zones and declaration of closed seasons. The question of closed seasons was later studied by various groups of specialists on marine fishery resources appointed by the Government of Kerala, and a partial ban on trawling during the monsoon season was introduced in May 1981 (Kalawar et al.1985; Nair 1989).

The Babu Paul Committee (1982) recommended an area of 2-3 sq. miles as a fish sanctuary at important bar mouths, i.e., Neendakara, Cochin, Chawghat and Beypore. The Committee stressed that no fishing, especially stake net and Chinese dip net fishing, be permitted within this zone, that further licensing of these fishing implements should be stopped, and all unauthorized Chinese dip nets and stake nets should be removed. (Chinese dip net is a type of lift net operated along the backwaters of Kerala during high tide, and is supposed to have originated from China). Stake nets are described elsewhere in this paper. The

Committee recommended 1,145 trawlers, 2,690 motorized canoes, and 20,000 non-motorized craft for fishing and banned purse seines from operating along the Kerala coast. The Balakrishanan Nair Committee (1989) concluded that in the absence of adequate data that should have been systematically collected after imposing the ban on trawling, it is difficult to arrive at definite conclusions regarding conservation along this coast. The Committee recommended a mission oriented study called Save Coastal Resources Project (SCORP). The Silas Committee constituted in 1992 recommended the demarcation of a separate zone as an artisanal exclusive fishing zone and standardization of overpowered artisanal fishing gears like mini trawls and ring seines.

Trawling

As recommended by the various Committees, the ban on trawling during the monsoon season will have to be continued to avoid excessive fishing pressure exerted through intensive trawling affecting recruitment and regeneration of stocks. Another disturbing factor is that a large quantity of young ones and eggs of demersal fishes are hauled up by trawl nets, particularly during the monsoon. The main socioeconomic problem brought about by the ban is the displacement of the labour force working on inshore trawlers. To overcome this, it is necessary that the fishers be compensated. There is also a need to create awareness among the fishers regarding the scientific relevance of the trawl ban during the monsoon. The fishermen's cooperatives set up in each fishing villages, trade unions and social scientists should take the initiative in creating this awareness.

The current practice of trawlers throwing the unwanted fish catch back into the sea creates further pressure on the fish resources. It is necessary to explore ways of reducing the bycatch from prawn trawling to make it more target specific. Introduction of larger square-mesh cod ends in trawls should be encouraged to allow juveniles of finfish to pass through, thereby reducing fish mortality. The use of large mesh size cod ends should be popularized through extension agencies of government and non-government organizations.

Deep-sea trawls catch a quantity of undersized fish. To prevent this, windows made of square mesh panels should be introduced in the upper panel of the cod ends or to increase the area of open meshes, thereby giving the juveniles a greater chance to escape (Robertson 1993). Underwater observations of trawl gears in operation have shown that the design of cod ends has a direct relationship on the mesh opening. A typical cod end used by commercial vessels may have 120 meshes around its circumference and in these cases it was found that the meshes were completely closed at the forward end. A reduction in the number of meshes enables them to open more to match the circumference of the throat.

The minimum cod end mesh size suggested by the various expert committees appointed by the Government of Kerala should be strictly adhered to for achieving desired results. The recent use of 'uni mesh' trawls should be discouraged and the fore part of shrimp trawls should have a mesh size of at least 50-60 mm. The government should monitor the implementation of these regulations very strictly. The long terms benefits of these measures should be explained well to the fishers. The level of acceptance of mesh regulations is very low because of the poor educational background of the fishers. Serious attempts should be made to limit the level of exploitation to the MSY. It may be useful to consider the practice of quotas. Incentives in the form of subsidies can also be used to encourage fishers to voluntarily accept the proposed regulations.

Gill Nets

Non-selective gear destroys the resources. The use of gill nets is a very selective and low energy fishing method and the use of this gear should be encouraged. The framing lines of gill nets should be made of natural fibres, to help restrict 'ghost-fishing'. Fishermen and fisheries cooperatives should make it a point to interact closely with R&D organizations to get the necessary scientific information on target species to make the gear optimally effective. Considering the low disturbance that gill nets and trammel nets cause to the bottom fauna and the ecosystem as a whole, these gears should be encouraged as a conservation measure. The use of gill nets is a practical method for the development of coastal fisheries as it is simple, has a relatively small outlay but with a high performance (Anon 1984). Gill nets utilize only 0.15-0.18 kg of fuel per hour as compared to trawling, which uses 0.8 kg of fuel (Gulbrandsen 1986.)

Long Lines

Long line gear is highly targeted specific, non-destructive and can be operated with low power engines. Sails can be used for propulsion to reduce fuel consumption and environmental pollution. With some modification to their traditional fishing, skilled fishers can use this method. The operation can be semi-

automated by shooting the gear manually and hauling it back with a mechanical device (George et al. 1993). It can also be operated in combination with a gill net, making it more cost effective. This combined operation has not yet been widely adopted despite the efforts of the Bay of Bengal Programme (BOBP) of the FAO.

Traps, Pots and Pounds

These gears are also selective devices that do not cause any damage to the environment and are also low energy fishing methods.

Mini-purse Seines (Ring Seines)

The mini-purse seine or the ring seine contributed 21.4% of the marine fish landing of Kerala in 1994 (Balan and Andrews 1995). Although the recommended number of ring seines is 300, there are about 2,224 ring seines in operations in the State (Anon 1991). The size and the CPUE of the ring seine had changed over the years (Edwin and Hridayanathan 1998). The use of excess horsepower for propulsion, beyond the actual requirement, and the use of up to four outboard engines of 90 hp must be discouraged as this results in high fuel consumption without a commensurate increase in pro-duction. An engine power of less than 50 hp is sufficient for effective operations. Selectivity measures can be introduced in ring seines by using large meshed sections and escape windows in the bunt for excluding non-targeted species. The economic viability of smaller units should be highlighted.

Stake Nets

Stake nets are traditional fish bag nets operated widely in the backwaters of Kerala mainly for catching penaeid prawns. There are 17,724 stake nets in the State. Since these nets are used mainly to catch prawns, which have a high value, every effort is made to increase the catch by reducing the mesh size, thus resulting in the depletion of stocks. The catch is influenced by the lunar phases and seasonal variations in tidal currents and floods can also induce variations in the catch. It is reported that 90% of the stake nets have a cod-end mesh size of less than 13 mm, of which 47% are below 8 mm (George et al. 1998). A study conducted at the Central Institute of Fisheries Technology showed that the three species caught in the stake nets, i.e., *Metapenaeus dobsoni*, *Metapenaeus monoceros* and *Penaeus indicus*, have a modal length less than the size at first maturity. The percentage of immature prawns landed by stake nets is 88.3%, 94.7% and 82.7%, respectively, for these three species. These figures indicate that huge quantities of juveniles are removed by stake nets thereby reducing the stock. As stake nets are a non-selective gear, it is essential to regulate the cod end mesh size for conservation of stocks. Operation of this gear in and around the bar mouths should be banned, especially in the zone demarcated as a fish sanctuary. Registration and licensing of stake nets should be limited to facilitate the free migration of penaeid prawns from and towards the sea. Any gear that obstructs the free migration of prawns should be banned.

Mini-trawling

An ordinary country craft is sawn in the middle to convert it to a trawl. Ropes ranging from 8-12 mm are used in place of warps and the gear is hauled up manually. Mesh size in the cod end is in the range of 10-12 mm, though the suggested mesh size is 20 mm (Vijayan et al. 1990). This gear system contributes to the depletion of finfish resources in the inshore belt. Licensing and re-gulations on the operation of this gear should also be initiated as a conservation measure.

Some Suggestions

As literacy in the coastal areas is low, the results of research reach the fishers very slowly. The government should organize awareness programs at important fishing centers to educate the fishers about the importance of resource conservation and the methods suitable for this purpose. For the organized fishing sector, the government should enact and enforce suitable legislation. Implementation can be monitored with the help of organizations like the coast guard. Government organizations like the Central Institute of Fisheries Technology should be entrusted with the task of licensing the design of fishing gear used by commercial vessels to curtail the use of totally destructive gears.

Conservation and management measures for the sustainable exploitation of marine resources are attracting worldwide attention due to the poor conditions prevailing in many commercially important fisheries. The Chilean Government's acceptance that an error in the government's application of the fishing law had contributed to the depletion of the mackerel stocks in 1998 is a case in point. In Chile, mackerel was over fished during 1994-1996, adversely affecting the population of adult fish for at

least eight years. The fishing ban proposed in 1998 reduced total landings by 45%. It was estimated that for the imposition of the ban, Chile would have lost 80% of all mackerel broodstock and would have severely damaged the fishery for many more years (Anon 1998). Appropriate governmental regulations have brought about positive changes in many parts of the world and they should be introduced and enforced wherever possible in the best interests of conservation and management of marine fishery resources.

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