Economic Evaluation of Marine Fisheries in India for Sustainable Production and Coastal Zone Development

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Marine fisheries management has become a difficult task in India due to mounting competition among fishers to harvest as much as possible from the sea. Resource management for maintaining sustainable production in marine fisheries requires indepth economic analysis of different production techniques to ensure optimum exploitation, equitable distribution, efficient marketing and evolution of alternative management strategies. Marine fisheries in India are accorded priority in the planned development process due to their significant contribution to the economy. Among the countries bordering the Indian Ocean is India, the largest and contributes about 45% of fish production to the region. Fisheries contribute about 3% of the Gross Domestic Product (GDP) of India.

There are about 2 244 fish landing centers located all along the 8 085 km coastline of India and various types of fishing techniques have been adopted by fishers.

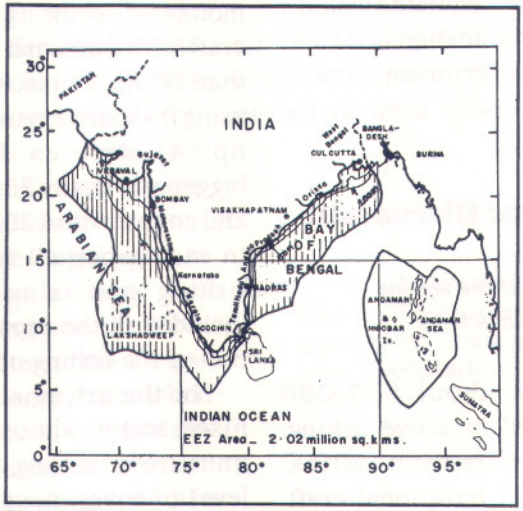

Fig. 1. Map of the Indian Exclusive Economic Zone.

The Socio-Economic Evaluation and Technology Transfer Division (SEETTD) of the Central Marine Fisheries Research Institute (CMFRI) has conducted a number of case studies in different Indian coast regions on the economics of different types of fishing units for the last decade. This article will: (i) highlight briefly the economics of different types of fishing units operating along the Indian coast; (ii) analyze the exploitation trend of major marine fishery resources in relation to its potential yield; and (iii) suggest policy measures for optimum exploitation of resources,

conservation and management. The data collected on profits and costs under various research programs have been pooled for a macro level economic analysis of different craft-gear combinations. Old and new fishing units are in operation and their capital investments vary considerably. Hence, the initial investment of different craft-gear combinations indicate the average resale value of the operating units during the period April 1993-March 1994. The operational costs, catch and revenues not only vary between different types of fishing units in different regions but also in the same type of unit for each trip in the same region. Hence, the operational costs and earnings of sample units of each category were observed continuously for a period of one year covering all seasons. A variety of secondary data available in different publications of Central and State government agencies were also liberally used in the present analysis.

Results and Discussion

(i) An overview of the marine fisheries scenario in India

There are about 800 000 fishers engaged in active fishing. Currently, there are about 180 000 nonmechanized traditional craft, 26 000 motorized craft, 35 000 small mechanized craft (32' to 51' overall length [OAL]), and 200 deep sea vessels (over 70' OAL) engaged in marine fishing activities using different craft-gear combinations of varying levels of investment. The operations of catamarans, canoes, trawlers and gill netters are carried out widely all along the Indian coast whereas the operations of purse seines, dolnetters, pair trawlers and sona boats are confined to certain regions only. As against the estimated potential yield of 3.9 million t of fish, the Indian EEZ currently (1995-96) yields about 2.6 million t of fish. In the small-scale fisheries sector, the average annual catch per unit varies from 0.3 t for a nonmechanized unit in Maharashtra to 300 t for a purse seiner at Goa. The survival and sustenance of different harvesting techniques of capture fisheries depends on their profitability, which is interlinked with the market demand and prices of different varieties of fish.

(ii) Economic evaluation of various fishing methods

The whole marine fishing sector has been classified into four distinct groups: 1) nonmotorized artisanal sector using country craft with traditional gears; 2) motorized sector using traditional craft with outboard engine of less than 50 hp; 3) mechanized sector using in-board engine of 50 to 120 hp; 4) deepsea fishing with bigger size boats (25 m and above) and engine with 120 hp and above. In each group all types of major fishing gear in use have been included in the economic evaluation of the fishing operations.

In the artisanal, nonmechanized sector, almost all types of units are sustaining due to the low level of investment requirement and also due to the family-enterprise nature of operation. Among motorized units, ring seines are profitable, although it requires a greater number of laborers for its operation as compared to other types of units. There is a large-scale shift from the traditional gears to ring seines (*rani vala, me-tubala, kudukku vala*) along the west coast. In the small-scale mechanized sector for trawlers, there has been a spurt not only in the number of units but also in the size of craft, horsepower of engines, and duration and distance covered for fishing which resulted in more intensive fishing and higher net income. The rate of return for the deepsea vessels is less compared to those of other fishing units (both mechanized and artisanal) operating in inshore waters. One reason for this low rate of return is the huge investment required for deepsea vessels. The tuna longliner fetches a better rate of return compared to the other deepsea vessels that concentrates mainly on prawns. There should be priority for sustained deepsea fishing development in formulation and implementation of resource management policies that should ensure reduction of fishing pressure on the penaeid shrimp and diversifying fishing effort to other resources.

(iii) Exploitation and conservation of resources

The potential yield from the Indian EEZ is estimated to be around 3.9 million t as against the current production of about 2.6 million t (1995-96). The multispecies and multigear nature of marine fisheries has led to the underexploitation of many cheaper fish species stocks and the overexploitation of certain high-value vulnerable stocks. The fishing operations in the inshore waters were intensified by the motorization of small craft and the introduction of medium-size mechanized vessels and gears that has resulted in further exploitation of the resources.

Studies indicate that the overall exploitation of the resources in the fishing grounds in the 0-50 meter depth zone has reached the near-optimum level.

The pelagic fish stocks contribute about 50% to the total marine fish production in the country.

The drastic reduction in the stock of deepsea lobsters and also

the reduction in their mean size along the Kerala coast calls for management interventions such as fishing moratoriums after every fishing season. The nearshore trawl operations by sail boats (Thallumadi) along the Tamil Nadu coast and mini trawls, introduced since 1985 along the Kerala and Karnataka coasts, were found to catch large quantities of juvenile prawns leading to recruitment overfishing.

(iv) Policy implications

Economics of different types of fishing units indicate that almost all types of fishing units, on average, earn a profit as their production surpasses the break-even point. The manifold increase in the price of most of the marine fish in recent years is mainly responsible for their better rates of return. However, due to the pure competitive nature of open access marine fisheries, many of the less efficient units belonging to each category have left the sector due to losses. The fleet size of the non-mechanized fishing units at present appears to be higher than its requirement. However, they are surviving since they are operating as labor-intensive family enterprises.

There is no area to increase the fishing fleet of small trawlers (32'-36') as the inshore waters are already overcrowded with various types of fishing units. Marginalization of the indigenous nonmotorized sector by the motorized and mechanized sectors is another problem, which frequently creates conflicts among fishers warranting immediate attention. Necessary steps should be taken to enforce the existing fishing regulations on the areas of operations of different types of fishing units. Deepsea fishing should be intensified by encouraging fishers to adopt dory type of fishing. The benefits expected from these types of deepsea fishing are: 1) increased production of marine fish; 2) contribution to foreign exchange earnings to the country; 3) enhanced availability of fish for domestic consumption; 4) employment; and 5) reduction of poaching by unauthorized foreign vessels.

Voluntary adoption of mesh size regulation for trawl and purse seine nets will be helpful for conservation of resources. The code and mesh size of trawls should not be less than 35 mm stretched knot to knot to avoid harvesting juveniles. Similarly, purse seine nets of smaller mesh size of 5 mm should be operated only at "white bait" grounds and not at juvenile, oil sardine and mackerel grounds. The advisable mesh size for catching oil sardines should be at least 20 mm and 30-35 mm for mackerel. Awareness campaigns should be conducted at fishing villages by extension agencies and voluntary organizations on the importance of mesh size regulations and avoiding harvesting juvenile fish.

The preservation of the ecosystem gains greater importance when considering the social cost and environmental economics. The destruction of natural habitats like mangrove swamps, coral reefs, estuarine systems, breeding grounds lying between the mainland and chain of islands, and other natural ecosystems should be stopped through the intervention of the state to maintain sustainable development.

Open sea mariculture offers improved production and remunerative employment to coastal fishers. The traditional fishers operating in the inshore regions are caught in a low income trap due to diminishing returns from capture fisheries. Hence, integration of small-scale mariculture with small-scale capture fisheries is a viable alternative to supplement their income.

Each fishing center/village requires a comprehensive program for its development and improvement of the socioeconomic condition of fishers. Allotment and development of housing sites, landing centers, auction sheds, processing plants, aquaculture farms, agriculture and social forestry, and provision of other infrastructure facilities in each fishing village would help achieve sustainable development of the region.

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Further Reading

Sathiadhas, R., R.Narayanakumar and R. Reghu. 1995. Marine fisheries management for sustainable development. CMFRI Technol. Trans. Ser. 2, 1 - 32.

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