

MARINE FISHERY RESOURCES OF INDIA

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WITH the long coast line along the mainland itself besides the rich areas surrounding the Andaman—Nicobar Islands and the Laccadive Archipelago, with the fairly wide continental shelf and slope and with the expansive high seas extending beyond, India has rich marine fishery resources, chiefly constituted by varied species of fishes and crustaceans. There are also ample ancillary resources like the utilizable molluscs, corals, sponges, echinoderms and seaweeds. The marine fish production of India is about 40 per cent of the total of slightly over 2 million metric tons, coming from all the countries bordering the Indian Ocean.

Annual Marine Fish Production

The estimated annual average of marine fish production in India in the five year period from 1964 to 1968 is 869,650 metric tons. Based on 1968 figures, the statewise landings of marine fish were for Kerala 38.23 per cent, Tamil Nadu 13.8 per cent, Maharashtra 13.7 per cent, Mysore 9.7 per cent, Gujarat 9.59 per cent, Andhra Pradesh 9.58 per cent, West Bengal and Orissa 3.3 per cent, Goa 2.0 per cent, and Andaman and Laccadive Islands less than 1 per cent. About 75 per cent of the total marine fish landings come from the west coast because of the rich concentrations of prawns and pelagic fishes like sardines and mackerel occurring there. The coastal waters of the east coast support smaller stocks of diversified fisheries.

In the all-India marine fish landings for the period 1964-68 the clupeoid fishes constituted over 40 per cent and among them the oil sardine contributed to about 30 per cent of the marine fish. Penaeid and non-penaeid prawns, the Bombay duck, silver bellies, elasmobranchs, mackerel, sciaenids, carangids, cat fishes and pomfrets were some of the important groups in the decreasing order of abundance. Seer fishes, tunnies, bill fishes, polynemids in general are important quality fishes even though they form a small proportion only in the landings. Some of the fishes like the sole in Malabar, flying fishes and *Chirocentrus* in Tamil Nadu, *Bregmaceros* off Bombay and the eels and the Bombay duck along the north-western coast support regional fisheries of much importance though their landings on an all-India basis are insignificant.

The annual landings in most groups of fishes are found to vary and often markedly. Wide fluctuations in the annual catches are peculiarly characteristic of the oil sardine (*Sardinella longiceps*) and the mackerel (*Rastrelliger kanagurta*) which are the mainstay of our fisheries. Since 1964, the oil sardine fishery has fortunately been extremely good with unprecedented catches, but in the past 18 years period since 1951 they have varied from 7,412 metric tons (0.1 per cent) to 301,446 m. tons (33.38 per cent). The mackerel fishery which has been rather poor in recent years has in the same 18-year period ranged between 16,431 m. tons (2.28 per cent) and 133,655 m. tons (15.22 per cent). The question of whether there has been over-fishing has been carefully studied at this Institute. It is observed that the fishing effort as exercised at present has very little effect on the stocks. In the case of oil sardine the fishing mortality rate is only 0.12 as against the natural mortality coefficient of 1.47, indicating that the fishing effort could be increased substantially to obtain much larger yields without detriment to existing stocks. Investigations on mackerel also have given similar results and it is believed that oceanographical factors are mainly responsible for the observed fluctuation in abundance in respect of these fisheries.

The crustaceans, comprising prawns, lobsters and crabs, formed 10.98 per cent of the total marine fish landings. The penaeid and non-penaeid prawns formed the bulk of the crustaceans landed. The major prawn fishing grounds, which are among the richest in the world, are confined to the west coast, accounts for more than 90 per cent of the crustacean catches. The large-sized species suitable for export trade are comparatively more abundant in the southern section of the west coast where the substrata conditions with nutrient laden mud banks present ideal environments for prawns to thrive. The landings of prawns along the Maharashtra are also appreciably high, but the catches are contributed by the smaller varieties. On the east coast the prawn catches are low and are obtained mostly from areas close to the river mouths and off the deltaic regions. As in the case of the oil sardine and mackerel, from the available data, it is clear that there is scope for increasing

the fishing effort to reach the optimum level of exploitation of these resources also. Recent studies by the Institute in collaboration with the Government of India fishing vessels have shown that some of the penaeids and carideans frequent deeper water within the continental shelf outside the range of coastal fishing in the south west coast of India. Exploratory operations by some of the vessels have revealed fairly dense concentrations of deep sea prawns and deep sea lobsters which were hitherto not known.

Among the prawn (shrimp) producing countries of the world India ranks very high in catch abundance and in export trade she has assumed major importance of being world's second largest, earning foreign exchange of about 220 million rupees a year.

Lobsters and crabs comprise hardly 0.5 per cent in the landings of the total crustaceans and the former group is mainly confined to the rocky areas, especially in the southern coasts of India. The lobster tails being in great demand in foreign market are frozen and exported to the extent they are available along with the prawns. Catches from the recently discovered deep sea lobster beds have helped to improve substantially the trade in lobster tails.

Molluscs

Apart from fishes and crustaceans, there are other marine resources which could be used as food by man, the most important amongst them being the molluscs, consisting of mussels, oysters, clams, some gastropods and cephalopods. At present these are of local importance supporting only subsistence fisheries of minor scale. The extensive mussel beds along the rocky coasts and the clam and oyster beds in some of the estuaries and backwaters offer great scope for development, assuring food resources of considerable importance. Among the molluscan resources of great commercial value, though not as food, the most important are the pearl and chank fisheries, especially of the Gulf of Mannar which are being exploited very systematically since ancient times. Molluscan shells, whenever they occur, and the massive corals from the reefs along the south-eastern and the extreme north-western coasts are utilised in enormous quantities in making lime. The utilization of the echinoderms is limited to the holothurians which are cured to form the 'beche-de-mer' for export to the Far East.

Seaweeds which yield phycocolloids like agar-agar and algin and those utilised as food, fodder and fertiliser abound in quantities for commercial exploitations along our coasts more particularly in the south-eastern and north-western parts of the country. Based on the work done at the Institute a seaweed industry and an export trade in seaweeds in substantial quantities have been developed in this country. The agarophytes and alagin yielding seaweeds are being harvested to some extent,

but very little headway has been made regarding the utilization of edible seaweeds mainly due to the conservative dietary habits of our people.

Besides direct observations on the concerned fisheries detailed in the above account a complimentary picture of the marine fisheries potential has emerged out of the environmental studies conducted by the Institute. Extensive work carried out from R.V. VARUNA on hydrology, upwelling and plankton production of the offshore waters has indicated that the south-west coast has rich productive areas where the fishery could be expanded. The ratio of the phytoplankton production to the magnitude of fish landed on the west coast works out to about 0.03 per cent which is about half that of the corresponding figure of the North Sea, which is one of the most intensively fished areas of the world. It is, therefore, clear that fishing effort can be increased to exploit the resources at least two times even in the traditionally fished areas. The high values of organic production obtained by C^{14} experiments have also shown that the catch can be increased several times without detriment to the existing stocks in the very zone which is currently exploited.

The continental shelf up to 100 fathom line has extensively fishable grounds of nearly 300,000 sq km but hardly a quarter of it is being exploited at present. The very intensively fished zone is the narrow coastal belt within 20 fathoms where the fishermen operate a large number of indigenous non-powered craft. Mechanisation of the craft commenced by about 1947 and by 1968 about 7000 such boats were operating in the coastal areas. These have enabled extending the zone of exploitations only very little beyond the traditional grounds, even though they had other advantages over the non-mechanised crafts, especially in helping the fishermen to reach the ground more quickly and in bringing catches fresh to the consumer. Seaworthy vessels capable of fishing in distant grounds and provided with cold storage facilities for preventing the spoilage of the fish catches are only very few, but they have helped in exploration and charting of the fishing grounds in a fairly satisfactory manner up to the 50 fathom line. Good trawling grounds off Kutch and Dwarka for *ghol*, *harkara*, *dara*, and *koth* have been discouraged and good grounds have been located off the south-west coast. Co-operative experimental fishing operations from the Research Vessels 'Kalava' and 'Varuna' by the Central Marine Fisheries Research Institute and the Indo-Norwegian Project fruitfully indicated possibilities of exploiting the recently observed resources of deep-sea prawns, deep-sea lobsters and certain bathypelagic fishes at 150-180 fathoms on the continental slope off the south west coast. A great deal more, however, remains to be done by way of exploratory fishing on the shelf and the slope. It may be mentioned here that the potentialities of the east coast grounds are not

fully known and there is need for further explorations in the region.

Further, no attempt has yet been made to tap the rich oceanic resources of the Indian Ocean, mainly consisting of tunas and bill fishes. The country's central geographical location offers decided advantages over other nations to harvest these resources. The Andaman-Nicobar group of Islands in the Bay of Bengal and the islands of the Laccadive Archipelago, both being Indian territories are ideally suited to be developed as bases for offshore fishing operations. The only place in the Indian Union where there is an established tuna fishery is around the Islands of Minicoy in the Laccadives where a few species like *Katsuwonus pelamis*, *Kishinoella tonggol* and *Thunnus albacares* are caught in some quantities. The Japanese are engaged in large-scale exploitation of the tuna resources of the Indian Ocean outside our territorial waters. Taiwan, Russia, Korea, Australia and the Union of the South Africa are also interested in a big way in exploiting the fishery resources of the Indian Ocean. At present about 200,000 tonnes of these valuable fishes are caught from the Indian Ocean by foreign fishing vessels and it is estimated that the catch could be three times the present output on a sustainable basis.

In conclusion, it may be said that to take full advantage of the available resources, the demersal fisheries of the continental shelf and the continental slope to a depth of about 200 fathoms have to be exploited to a far greater extent than is done at present and to achieve this objective we require larger multi-purpose fishing vessels and trawlers equipped with more efficient gear and trained personnel. Exploratory surveys and oceanographic and hydro-biological studies should be continued side by side with the development programmes and extended to regions as yet not covered, for we are dealing with ever-changing resources, both quantitatively and qualitatively, depending upon a multitude of factors in the environment and also inherent in the concerned species. The development of oceanic fishery being an extremely specialised job where our men need long term and intensive training demands very high level of expertise if not foreign collaboration at least in the initial stages.

The Symposium on the Living Resources of the Seas around Indian Ocean held at Cochin in December, 1968 by the Central Marine Fisheries Research Institute has helped to bring together the existing information on our marine fisheries resources and make a general assessment of the same. The proceedings of the symposium under publication now, give in detail particulars of our fisheries resources. With further extension of our fishing activities and sustained exploratory surveys we could expect to get a better picture of our fishery potential. The materialisation of the fishery research and development programmes during the Fourth Five-Year Plan period is bound to help us in understanding and exploiting our marine fishery resources to the optimum extent.



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