CMFRI
bulletin 40

MAY 1987

MARINE CATFISH RESOURCES OF INDIA

EXPLOITATION AND PROSPECTS

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CHAPTER FOUR

ACOUSTIC SURVEYS AND ABUNDANCE ESTIMATION OF CATFISH

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Many fisheries research and development projects include the evaluation of size and potential yield of the fish resources as an essential part of their objectives. While exploratory surveys depending on fishing trials alone are very time-consuming and expensive, and at best can only provide information about the distribution and abundance of the fish which are vulnerable to the type of fishing gear and method of fishing applied, the modern calibrated, highly sensitive acoustic instruments provide the under-water vision required to enumerate correctly and even to size the fish present in practically the entire water column. Exploratory surveys over large areas have proved to be nearly impossible without such under-water vision, especially as it has been shown that the so-called demersal fishes frequently move off the bottom, when they cannot be caught with bottom trawls or similar bottom gear. Consequently, good accoustic equipments are today considered indispensible for almost any sort of fishery exploratory surveys.

Acoustic surveys conducted by the erstwhile UNDP / FAO Pelagic Fisheries Project (P. F. P.) in the area between Ratnagiri and Tuticorin during the period 1972–1977 have considerably enhanced our knowledge of the resource, its abundance, seasonal distribution and methods to be adopted for exploitation. They have estimated, by the acoustic methods the average standing stock of catfishes in the project area to be about 84,000 tonnes forming 8.4% of the total fish biomass (Rao *et al.*, 1977). The peak values obtained in different years covered May/June in 1973 (86,150 tonnes); June/July in 1974 (1,66,402 tonnes) and May/June in 1975 (3,98,904 tonnes). The highest estimated average biomas was observed along the Kerala coast (43,971 tonnes), followed by Karnataka and Goa (26,672 tonnes), Southern Maharashtra (15,629 tonnes). And the lowest was in the Gulf of Mannar (3,604 tonnes). According to the acoustic estimates, greater abundance of catfish occurs during first and second quarters (January-March & April-June) along the coast of southern Maharashtra, whereas the actual landings of catfish in the region are high during the fourth quarter (October-December). Off the coast of Karnataka and Goa, estimates in general were high during second and third quarters (April-June & July-Sept) and higher landings were recorded during the second quarter. Along the Kerala coast, the period of abundance is during second and third quarters of the year, but catfish landings in the region were high during third and fourth quarters. This anomaly is mainly due to the fact that the traditional fishery cannot efficiently exploit the resources during the monsoon months when the stocks are in great abundance in the area. Biomass estimates were fairly high in the Gulf of Mannar in the third quarter and the maximum landings were also during the same period.

As regards the seasonal distribution of catfish, it is discontinuous in February-March in two wide belts between 14° and 16°N and 9° and 12°N, respectively. In April/May, recordings were scattered with concentrations off Ratnagiri, Karwar, Cochin and Quilon. During May/June, recordings were widespread in a continuous belt along the coast with medium to high concentrations in two wide belts; one between Ratnagiri and Karwar and the other between Kasargod and Cochin (Anonymous, 1976). During July/August catfish recordings were noticed in two main belts, between Mangalore and Karwar and between Cannanore and Quilon. Within these belts high concentrations were

observed in patches, mainly in the middle shelf regions off Karwar, Calicut and Cochin, and the bulk of stock was, in general, located in the central sector.

Even though nothing definite could be said about the migratory behaviour of the catfish, it appears that there is a general trend of southward shift in concentrations beginning from April till July/August, when the bulk of the stock was found in the central and southern sector of the west coast. One of the interesting findings of the project is the abundance of catfish mostly in association with the ribbonfish on the western shelf when it is covered with oxygen-deficient water during SW monsoon months. Obviously, they can thrive well in such environment which is avoided by other pelagic species.

Regular fishing trials with pelagic trawl and bottom trawl have shown the pattern of depthwise distribution of catfish. The investigations have shown the possiblity that, as the fish grows bigger and older, it moves to outer shelf. In fact, some of the best catch rates exeeding 1000kg/hr were taken by the project vessels beyond 50m depth, indicating the availability of commercial concentrations of the bigger adult fish in deeper waters.

Recordings of catfish within 10 to 50m depth were generally mixed with those of whitebait. Outside the normal whitebait zone, recordings of catfish in association with ribbonfish have been obtained in depth upto 80 m.

Catfish undertake regular diurnal vertical migrations to some extent (Plate I A-D). Generally during day time they are found close to the bottom and at night they ascend the vertical water column and disperse. Catfish are found in school concentrations at surface during daytime, especially during breeding season, along the southwest and southeast coasts.

The echograms of individual catfish, which are relatively large in size and positioned at some distance from each other while schooling, look like inverted 'V' figures spread more or less evenly. Large ribbon fishes also give similar 'V' type recordings, but on the whole, they are more compact and in straight vertical configurations. Depending on the speeds of recording paper and ship, and of beam-width, these 'V' type recordings change their shape. When the paper moves faster, the legs of 'V' converge, reducing the angle between the two, and vice versa. At high speed the individual recordings appear more or less like straight vertical lines (Natarajan *et al*, 1980).

When the ship operating an echo sounder passes over a fish, the leading edge of the sound beam first hits the fish, making a mark on the recording paper. This, however, does not indicate the true depth of the fish. The correct depth is measured only when the ship passes directly above the fish. After the ship has passed over the fish, the trailing edge of the sound beam hits the fish and the characteristic inverted 'V' recording is produced (Fig. 1).

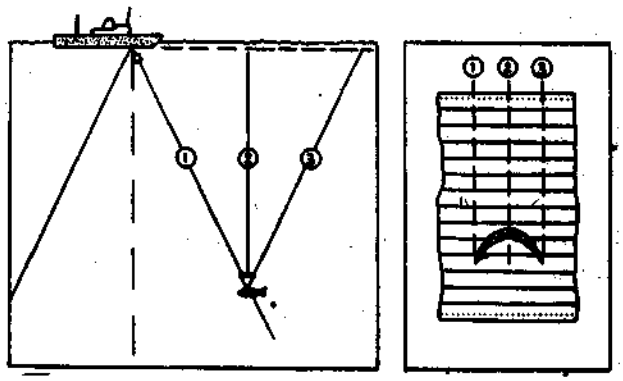

Fig 1. Diagramatic representation of the build up of a fish echo.

The average biomass of catfish in the project area, with the estimate of 84,000 tonnes is about 4.7 times higher than the average landings in the area and 2.3 times higher than the all-India landings. The findings indicate that the average biomas of catfish off the coasts of southern Maharashtra, Karnataka and Goa, Kerala and Southern Tamilnadu are 7.6, 8.8, 3.6 and 2.3 times higher than the average landings in the respective regions. Thus the present level of exploitation could easily be increased to about two and a half times without affecting the stocks. At the same time, it should be emphasized that the shelf area off southern Maharashtra, Goa and Karnataka, offers greater scope for increased exploitation, compared to the southern areas.

CHAPTER NINE

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