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31 An introduction to demersal finfish resources

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ABSTRACT

An estimated 250 species of demersals form regular fisheries of varying magnitude in Indian coastal bottom, with greater diversity in the east coast compared to the west coast and occupy all types of habitats. They are exploited by a variety of traditional and mechanised craft and gear. Their production has reached 7 lakh tonnes in 1994, comprising of sciaenids (24 %), pink perch (12%), silverbellies (9%), elasmobranchs (9%), large perches (8%), flat fishes (7%), catfishes and pomfrets (6% each), and lizard fishes (5%). The paper overviews the demersal fisheries research in India since the inception of CMFRI.

Of the two major marine realms which sustain production of finfishes, *viz.*, *pelagic* and *demersal*, the latter of the continental shelf and slope waters support a wide spectrum, with particular dominance in the coastal region upto about 50/70 m depth. About 700 species of finfishes are said to be recorded from the Indian sea bottom of which about 250 form regular components in demersal fisheries, some even forming shoals. Their diversity is much more off the east coast than off the west coast. The important demersal finfish groups are : Jew fishes (Sciaenids), perches, sharks, rays, silverbellies, catfishes, pomfrets, flatfishes, lizard fishes, flatheads and goat fishes. These inhabit all kinds of habitats from sandy, muddy to rocky and coral grounds as well as from shallow coastal waters to deep continental slope, from all geographical regions and through all the seasons in the subcontinent, at varying temporal and spatial diversities. Their distributions and abundance are usually governed by the macro and micro-climatic changes, the abiotic environmental conditions and the biological as well as behavioural pattern of the individual species. Many of them undertake horizontal and/or vertical migrations, in response to environmental factors such as diurnal rhythm, upwelling, water currents, availability of food, and spawning behavior.

The demersal finfish resources are susceptible for exploitation by a wide variety of gears, both artisanal and mechanised, such as: shoreseines, traps, fixed stake nets, cast nets, gill nets, hooks and lines, handlines, purseseines and bottom trawls. Since the sea off the east coast is usually rough during most part of the year, the traditional crafts evolved there are nonrigid; but since the sea off the west coast is comparatively calmer, rigid traditional crafts have evolved there. The estimated total annual demersal finfish production upto the late forties (until Indian Independence) has ranged from about 50,000 to 80,000 t from a depth of upto 20 m, composed mostly of sciaenids, perches, elasmobranchs and flatfishes. Although certain experimental fishing surveys using bottom trawls were undertaken during 1908 -1930 along the south west and south east coasts have revealed good demersal grounds, the propositions for their exploitation have remained unrealised due to lack of the then governmental support and poor economic considerations.

It was only during the first two Five Year Plan periods (1951-1961) and with the initiation of efforts for mechanisation of indigenous crafts and introduction of mechanised vessels for bottom trawling from late fifties that demersal fishing has gained momentum. This has opened up the possibility of not only adequate exploitation of demersal finfishes but also extending the areas of fishing to more than 20 m depth. An impetus was given to the above efforts during the IIIrd Five Year Plan (1961-66) when about 5,000 small and medium sized vessels (7.5-14 m OAL) were in position, mostly using bottom trawls and harvesting a total annual of about 2,50,000 t. Subsequently, there was a gradual increase in the number of mechanised boats including the ones for gill netting, purse seining and long lining, amounting to about 35,000 as at present. There was also motorization of traditional crafts which at present number about 26,000. With the increased efficiency of the crafts, the range of fishing operations has also extended to deeper waters, thus most of the medium sized vessels venturing upto 120 m depth at present.

As a result of these advances, the demersal finfish production has crossed the 5,00,000 t mark in 1988 and 7,00,000 t mark in 1994. As at present, about 24% of this is contributed by sciaenids, 12% by the pink perches, 9% each by silverbellies and elasmobranchs, 8% by large perches, 7% by flatfishes, 6% each by catfishes and pomfrets, 5% by lizard fishes etc. The State of Gujarat and Maharashtra have together contributed to about 52% of the total sciaenid catches along the west coast; while along the east coast Tamil Nadu and Andhra Pradesh are the important States. The variations in production of sciaenids as well as the relative species contribution are not only from West coast to the east coast; but also from one State to another and from season to season. With the extension of exploitation to deeper grounds beyond

50 m the group of pink perches (Threadfin breams) came under proper exploitation from the late seventies/early eighties. Kerala contributes to so high as 52% of the production followed by Maharashtra 14% and Tamil Nadu-Pondicherry 11%. Silver bellies yield is maximum from Tamil Nadu (71%), followed by Andhra Pradesh (9%), Kerala (8%) and Karnataka. The elasmobranch production is mostly from Tamil Nadu, Gujarat and Maharashtra. The large perches (Serranidae, Lutjanidae and Lethrinidae) are abundant in the rocky grounds off Kerala and Tamil Nadu while flatfishes inhabiting the muddy and/or sandy bottom are exploited mostly in Kerala, Karnataka, Maharashtra and Tamil Nadu. Lizard fishes and goat fishes are available mostly from Kerala, Tamil Nadu, Karnataka, Maharashtra, etc. Studies conducted on these resources have shown that all of them with the exception of large perches are exploited to their optimum level in the fishing grounds of 0-50 m depth. In the case of large perches, an additional production of upto about 50,000-60,000 t appears possible.

Although catfishes are abundant in Gujarat, Maharashtra, Karnataka, Kerala and northeast coast, the large-scale exploitation by purse seines along Karnataka has resulted in mass destruction of their brooders and recruitment overfishing in Karnataka and Kerala in the recent past. Since the resource is migratory and most species have a long life span, the above impact is reflected in other parts of the country also and over a long duration. Thus, the average annual catfish production in the country has declined from about 8,060 t during 1979-86 to 4,070 t during 1984-87 and to an all time low of 34,110 t in 1991, although marginally recovering subsequently. The Whitefish (*Lactarius lactarius*) has suffered a similar fate, thus declining from the peak annual production of 25,334 t in 1985 to 4,189 t in 1993, although slightly recovering later. The Whale shark *Rhincodon typus* inhabiting Gujarat waters has been overexploited and has reached an endangered status. The other finfishes that had once supported good fisheries but suffered overexploitation are: the polynemids *(Polydactylus, Polynemus)*, *Karkara (Pomadasys)*, Koth *(Otolithoides)*, *Ghol (Protonibea)*, Wam *(Congresox, Muraenesox)* and the flathead *(Platycephalus maculipinna)*.

In the present context of optimum exploitation of most of the resources, as well as overexploitation of many others in the coastal sector, the sole alternative for further increasing demersal finfish production is from the region beyond the presently exploited zone, from where about 3,20,000 t of elasmobranchs, pink perches, large perches etc. as well as considerable quantities of bull's eye, black ruff, drift fish etc. can be harvested. Catch rates so high as 2.67 t of pink perches off southwest coast during June-July, 3.5 t during July-August, 8.1 t during September-December; as

much as 4.9 t of bull's eye during August, 1.5 t during September; 8 t of drift fish during February; and 0.75 t of lizard fish during June have been recorded. For their judicious exploitation and utilization it is essential to identify and improve upon the designs of crafts and gears to be used in space and time and to adhere management strategies.

With the large-scale introduction of mechanised trawling, many environmental problems and stock recruitment hazards to inshore fisheries have come up. The scrapping of the shallow bottom has trampled and damaged the juvenile population of demersal finfishes such as pomfrets, flatfishes, perches, sciaenids, lizard fishes, etc. as well as of the bottom in inedible biota (stomatopods, echiurids, sipunculids, sponges, molluscs, echinoderms, etc.) which are the major basis for the food of many edible groups. Since the trawling operations are continuous throughout the year, day in and day out, these have resulted in little opportunity for the biota to re-establish and replenish at the bottom. Thus, the damage to the demersal habitat of finfishes is much more severe than what is estimated. Since the shallow coastal waters upto about 50 m depth are the spawning and nursery grounds of most demersal finfishes, primary causes for the depletion of the once thriving fisheries are the large-scale destruction of their juveniles and degradation of nursery grounds.

In view of these, it is high time that we identify the resources/species which are under threat of destruction, wherever necessary; monitor the specieswise stock-recruitment pattern, sustainable yield, spawner and juvenile components; delimit the areas and seasons of trawling and purseseining; regulate the cod end mesh size of trawl nets; encourage the use of vertical, high opening type of trawl nets for avoiding benthic sweeping and juvenile destruction; close purse seining in certain areas and breeding seasons of the resources; wilfully avoid the capture of breeding shoals; educate the fishermen to be ecofriendly and resourcefriendly; audit the environment at periodic intervals for conservation and rational management; and involve all the people concerned in these aspects.