

BENTHOS AND DEMERSAL FISHERY RESOURCES ASSESSMENT IN THE SHELF REGION OF INDIAN COAST

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A B S T R A C T

The potential of exploitable demersal fishery resources is estimated to be 0.4 million metric tonnes per year (m.m.t.y.) and 0.25 m.m.t.y. respectively based on benthic biomass production and the food pyramid concept, in the shelf region of Indian coast. An overall increase of double in exploitation of demersal fishery resources is envisaged compared to the present exploitation of 0.12 m.m.t.y. However, one should keep in mind the conservation strategies before exploiting these resources.

Introduction

Benthic organisms which inhabit the bottom of the sea largely form the food for the most of the commercially important bottom dwelling fishes like shrimps, flat fishes, rays etc. (Savich, 1972). Hence, their prey-predator relationship, benthic biomass and its production data help in estimation of demersal fishery resources based on the hypothetical food pyramid or bioenergy flow (Odum, 1973). In the present communication, an estimate of the demersal fishery resources is attempted based on the benthic biomass production on the shelf region of Indian coast. Several authors have made a number of fishery resources estimates (Moiseev, 1971; Gulland, 1971; Kurian, 1971; Jones and Banerji, 1973; Qasim, 1977; Parulekar *et.al.*, 1982; Somvanshi, 1998; Devraj & Vivekanandan, 1999) and described biomass distribution (Harkantra *et.al.*, 1980; 1982; Harkantra & Parulekar, 1981; 1987) along the Indian coast. However, such fishery resources estimates, biomass distribution and food pyramid hypotheses have to be tested by fishery exploration work to understand the realistic relationship between these two parameters. In view of this, the paper highlights the importance of benthos in the assessment of demersal fishery resources.

Material and methods

The demersal fishery resources estimates were made in the past, on the basis of food pyramid concept (Slobdokin, 1962; Odum, 1973; Crisp, 1979) and by using the earlier benthic biomass distribution (Harkantra *et.al.*, 1980; Harkantra *et.al.*, 1982). From a total of 270 stations biomass values were used for this purpose comprising 120 from West coast and 170 stations from East coast shelf. The areas fall within the depth range of 10-150m, along the shelf region of Indian coast.

Results and discussion

The mean biomass was relatively higher in the shelf region of West coast ($11.5 + 3.8 \text{ g m}^{-2}$, $n=120$) as compare to the East coast ($10.6 + 3.2 \text{ g m}^{-2}$, $n=150$) of India. The maximum biomass recorded was 190.5 and 150.6 g m^{-2} in the shelf region of West and East coasts respectively. Benthos largely represented by polychaetes, molluscs and crustaceans in order of abundance. Wet biomass was mainly contributed by the polychaetes and bivalves. Polychaete worms were dominant in muddy areas whereas molluscs were dominant in sandy areas. Benthic biomass was usually higher in the vicinity of estuaries, nearshore region and in the areas having a mixture of sand and mud substrata. This is largely due to riverine inflow enrichment of the environment and substratum specificity of the benthic organisms (Harkantra *et.al.*, 1980; Harkantra *et.al.*, 1982; Naqvi *et.al.*, 1992). An analyses of benthic biomass distribution and demersal fish catch showed positive correlation and high biomass areas were found supporting greater density of high bottom fishes (Harkantra *et.al.*, 1980). This suggests that the bottom fishes mainly feed on benthic organisms and reflects on their prey-predator relationships. Relatively nearshore region and West coast shelf region of India showed high demersal fish catch largely due to the upwelling phenomenon (Warren, 1992).

An average standing crop of 10.61 g m^{-2} when converted to annual benthic production (Slobdokin, 1962) gives a value of $21.22 \text{ g m}^{-2} \text{ y}^{-1}$ and organic carbon equivalent of $1.805 \text{ g C m}^{-2} \text{ Y}^{-1}$ (Damodaran, 1973). Available information indicate that particulate organic carbon production in the column water of Bay of Bengal is $20.404 \text{ g m}^{-2} \text{ y}^{-1}$ (Radhakrishna *et.al.*, 1978) showing close trophic relationship (Odum, 1973). The benthic production of $21.22 \text{ g m}^{-2} \text{ y}^{-1}$ or $21,220 \text{ kg km}^{-2} \text{ y}^{-1}$ for the area surveyed can sustain $2,12200 \text{ kg km}^{-2} \text{ y}^{-1}$ of bottom fishes taking into consideration of the hypothetical trophic pyramid ecological efficiency (Odum, 1973). Similarly, for West coast shelf region based on mean standing stock of 11.5 g m^{-2} , the sustainable bottom fish estimate works

out to be 230617kg km² y⁻¹. Accordingly, the potential demersal resources works out to be 0.4 million t per year (m.t.y.). The annual exploitable fishery resources will be 0.25 million t y⁻¹ by taking 60% of the total estimated potential (Silas, 1977). An overall increase of double in exploitation of demersal fishery resources is envisaged compared to present exploitation of 0.12 million t y⁻¹ in the shelf region, keeping in view conservation measures (Somvanshi, 1999). The difference of demersal resources assessment made earlier (Parulekar *et.al.*, 1982) and now was mainly due to the fact that the former one covers larger areas. Thus benthos not only form the food for the bottom living fishes, it is also a reliable parameters to estimate the bottom living resources.

A number of estimates about the potential demersal resources from the Indian Ocean are available. Jones and Banerji (1973) have reported 0.72 million t, Gulland (1971) predicted 4.65x10⁻⁶ and 3.01x10⁻⁶ t for the western and eastern Indian Ocean respectively. Qasim (1977) has given the estimated fish yield for the Indian Ocean to be 15-17 million t. He has estimated 14% or 1.03 million t out of the total 7.36 million t to come from the demersal resources.

The estimates by the above authors differ by 40 to 100% from the figure indicated in the present study. The probable reason for such difference lies in the fact that all the earlier workers have based their estimates either on primary productivity and calculated the tertiary production either as 0.1 of primary production or 10% of secondary productivity. In all, these estimates based on secondary productivity, only the zooplankton biomass has been considered and the contribution by benthos has been overlooked probably due to the non-availability of data. As far as the demersal fishery resources are concerned, the benthic biomass, as rightly pointed out by Moiseev (1971) is more valid parameter for projecting the potential demersal fishery resources and this explains the differences between the present estimate and the earlier ones. In view of this, it is necessary to carry out fishery exploration survey along with oceanographic parameters to establish any reliable relationship among these parameters.

Conclusion

Based on the present study, it is reasonable to conclude that the exploitation of demersal fishery resources can be increased to greater magnitude by exploring the unexploited areas within the shelf region of West coast of India, keeping in view the conservation of marine living resources strategies.

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