Proc. Indian natn. Sci. Acad. B 46 No. 1 pp 129-135 (1980)

Demersal Fishery Resources Off the Orissa-West Bengal Coast during 1972-76 — A Survey

K P PHILIP
Exploratory Fisheries Project, Mangalore

The results of the demersal fisheries resources survey conducted by the vessels of the Exploratory Fisheries Project from Paradeep and Calcutta bases during the period from 1972–'73 to 1975–'76 are presented. The total coast line of Orissa and West Bengal is about 1100 km and the total shelf area is about 43,000 sq. km.

Two types of vessels were employed for the survey. *Matsyavigyani* which operated mostly along West Bengal coast expended about 940 hr and obtained an average catch/hr of 242 kg. The 17.5 m trawlers operated along the Oirssa coast spent about 2300 hr of actual fishing effort and recorded an average catch/hr of 260 kg. The areas 19–86, 20–86, and 20–88 yielded relatively high catch rates.

The important group of fishes according to their percentage in the total catch were sciaenids, elasmobranchs, pomfret, cat-fish, perch and eel from the Orissa coast and elasmobranchs, cat-fish, eel and pomfret from the West Bengal coast. Prawns registered about 8% and 1% from Orissa and West Bengal respectively. The best productive seasons were October-December and January-March along the Orissa coast and January-April and November-December along the West Bengal coast.

Introduction

Exploratory fisheries resources survey along the east coast of India is of recent origin as compared to the west coast. The results of survey conducted by the Exploratory Fisheries Project from Visakhapatnam Base during 1964 have been discussed by Naumov (1961) Poliakov (1962) and Borisov (1962). The distribution pattern of major exploited marine fisheries resources along the east coast was discussed by Rao (1969). Sekharan et al. (1973), James (1973), Kuthalingam et al. (1973) have also provided useful information on the demersal fisheries resources of this region. Systematic survey of demersal fisheries resources of the east coast particularly the Orissa-West Bengal coast was started by the Exploratory Fisheries Project, Bombay by establishing its bases at Calcutta in West Bengal and Paradeep in Orissa in 1971 and 1973 respectively. Joseph et al. (1976) gave a detailed account on the demersal fisheries resources along the east coast of India based on the results of operation of vessels from these and other bases viz., Visakhapatnam, Madras and Tuticorin. The present paper deals with the results of the fishing operations conducted along the Orissa-West Bengal coast during 1972 to 1976 from the Project bases at Paradeep and Calcutta. It was undertaken to investigate the relative abundance of resources by area and depth, distribution in time,

composition of catch etc., of the demersal fishes of this region.

Vessels and Gear

The Project operated two types of vessels viz., *Matsyavigyani* (578 BHP) and 17.5 m trawlers (200 BHP) from Calcutta and Paradeep. *Matsyavigyani* is a 32.28 m imported steel trawler from GDR, while 17.5 m trawlers are indigenously constructed steel trawlers. The major specifications of these two types of trawlers are given below:

Particulars	*Matsyavigyani*	*17.5 m trawler*
Length B.P. (m)	31.80	16.3
Beam (m)	7.80	5.20
Depth amidship (m)	7.40	3.00
Hull material	steel	steel
Make of Engine	New Schwema Sohenen	Kirloskar M.A.N.
B.H.P.	578	200
G.R.T.	182.6	56.8
Crew strength	14	10
Place of built	GDR	India

The important types of gear operated were 45 m fish trawl with rectangular otter boards, 24 m fish trawl and 28 m shrimp trawl with oval otter boards. The details of these trawls have been described earlier (Anon. 1976).

Area of Survey

The survey was conducted in areas between latitudes 19°N and 22°N and longitudes 85°E and 89°E which comprises about 43,000 sq. km area of the continental shelf (figure 1) out of which about 80% falls within the 40 fathom depth zone. Orissa and West Bengal have a coast line of about 1100 km and the continental shelf in this part is relatively narrow, the maximum width being about 180 km north of Balasore.

Relative Abundance by Area

Seven areas viz., 19–85, 19–86, 19–88, 20–86, 20–87, 20–88 and 21–88 were surveyed by the vessels during the period under study.

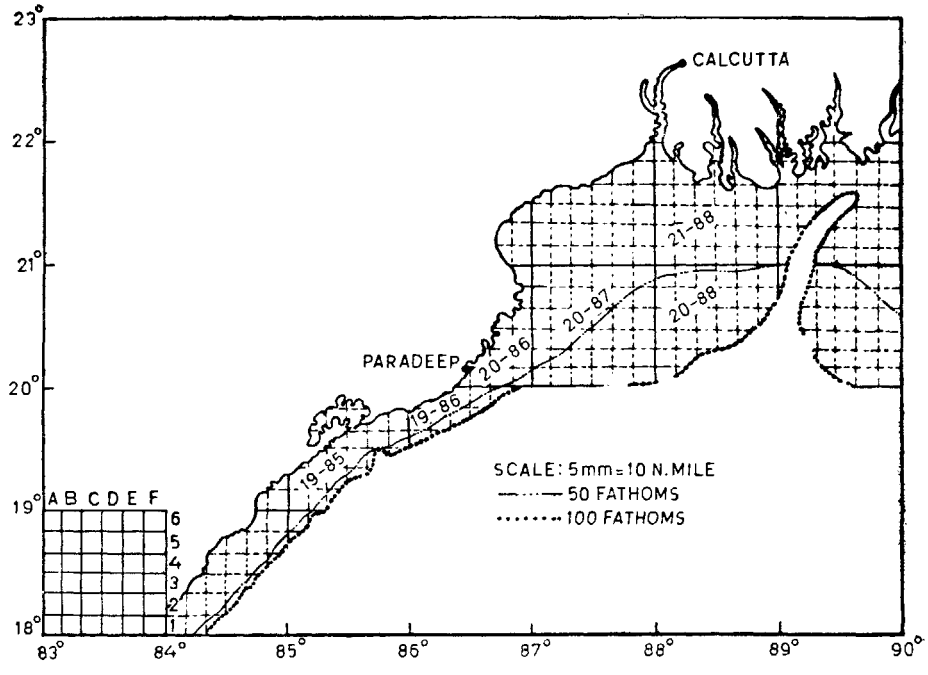

Figure 1 Area of survey showing different depth contours along the Orissa-West Bengal coast.

Table 1 *Summary of operation of* Matsyavigyani *and 17.5 m trawlers*

Area	Fishing effort in hrs expended by *Matsyavigyani*	Catch/hour (in kg)	Fishing effort in hrs expended by 17.5 m trawlers	Catch/hour (in kg)
19–85	4.15	77	—	—
19–86	69.87	284	22.0	345
19–88	2.00	612	—	—
20–86	116.28	280	2136.40	169
20–87	26.88	235	3.00	120
20–88	623.30	269	130.86	107
21–88	2.30	113	—	—

Out of these, the area 20–88 off West Bengal was fairly surveyed by the vessel *Matsyavigyani* while the area 20–86 off Orissa was intensively surveyed by the 17.5 m trawlers (table 1). The vessel *Matsyavigyani* recorded the highest catch rate viz., 612 kg/hr from area 19–88. It may require further surveys to confirm the findings since only two hours of fishing effort was expended in this area. The area 19–86 recorded the next highest catch rate (284 kg/hr) which is in conformity with the earlier observations (Anon. 1976). Out of the four areas covered by the 17.5 m trawlers along the Orissa region the highest catch rate was observed from area 19–86 (345 kg/hr) followed by area 20–86 (169 kg/hr).

Relative Abundance by Depth

The 17.5 m trawlers surveyed the depth zones 0–19 m and 20–39 m of areas 19–86, 20–86, 20–87 and 20–88 whereas *Matsyavigyani* surveyed up to 60 m depth (table 2). Among the depth zones covered by the 17.5 m trawlers, 20–39 m of area 19–86 recorded the highest catch rate (344 kg/hr) while in the case of area 20–86 the depth zone 0–19m recorded the highest catch (291 kg/hr). In the case of *Matsyavigyani* the depth zones 0–19 m and 20–39 m yielded relatively high catch rates. In general, the depth zone 20–39 m can be regarded as the most productive depth range of this region.

The table also shows the vessel-wise catch rates of prawns and different species of fish from various depth zones of different areas. It may be seen that prawns recorded relatively high catch rates from 20–39 m depth zone of most of the areas of this region. A high rate/hour of 24.3 kg was obtained from the depth strata 20–39 m of area 20–86 by the 17.5 m trawlers. The low catch rates of prawn by *Matsyavigyani* can be attributed to the exclusive use of fish trawls during the period under study. In the case of elasmobranchs no significant variation was noticed in the depth-wise distribution. However, it can be said that the depth zone 40–59 m is more productive with reference to elasmobranchs. Cat-fish recorded comparatively high catch/hour from 0–19 m and 20–39 m depth zones of most of the areas while the abundance of pomfret and eel was relatively high in the 20–39 m depth zone. The depth zones 20–39 m, and 0–39 m appeared to be the most productive in the case of perch and sciaenids respectively.

Table 2 *Species-wise catch per hour of trawling by 17.5 m trawlers and* Matsyavigyani

Area	Depth range (m)	Catch/hour of trawling of different species							Other quality fish	Miscellaneous	Total
		Prawn	Elasmobranchs	Cat-fish	Pomfret	Eel	Perch	Sciaenids			
17.5 M TRAWLERS											
19–86	20–39	6.95	52.59	35.73	10.14	19.64	23.91	80.59	—	114.68	344.23
20–86	0–19	21.47	16.87	2.33	7.52	0.56	0.46	50.55	0.58	191.11	291.45
	20–39	21.31	22.06	7.00	7.14	6.06	3.08	47.91	1.14	126.58	245.28
20–87	0–19	—	46.00	—	—	2.00	—	21.33	—	50.67	120.00
20–88	0–19	1.28	63.13	13.65	6.42	0.57	—	—	2.64	36.67	124.36
	20–39	4.04	58.90	6.36	2.22	0.17	—	—	—	32.17	103.86
MATSYAVIGYANI											
19–85	20–39	—	22.89	—	—	—	—	—	9.64	44.58	77.11
19–86	20–39	1.2	47.49	10.79	33.18	23.55	11.61	—	39.70	86.37	253.89
	40–59	—	66.00	20.00	6.00	—	32.00	—	—	880.00	1004.00
19–88	20–39	17.50	52.50	52.50	61.00	—	53.00	—	270.00	105.00	611.50
20–86	0–19	—	34.93	14.03	142.01	—	—	—	4.86	151.39	347.22
	20–39	1.92	47.90	14.79	48.76	11.80	10.66	—	27.29	104.53	267.65
20–87	20–39	1.09	53.95	4.30	1.25	—	—	—	23.63	165.20	249.42
	40–59	—	69.09	—	—	—	—	—	—	38.18	107.27
20–88	0–19	—	36.00	34.86	6.57	4.57	16.00	—	—	55.43	153.43
	20–39	0.67	56.42	3.45	1.14	2.83	1.00	—	10.37	155.12	231.00
	40–59	1.28	35.03	6.83	2.76	7.15	1.40	—	3.75	147.32	205.52
21–88	0–19	—	20.00	—	—	—	—	—	—	84.00	104.00

Table 3 *Percentage composition of important groups in the North and South Zones*

Zone	Depth range (m)	Prawns	Elasmo-branchs	Cat-fish	Pom-fret	Eel	Perch	Sciae-nids	Other quality fish	Miscel-laneous
NORTH ZONE										
20–87	0–19	2.1	45.0	11.8	4.8	0.8	1.3	0.5	1.5	32.2
20–88	20–39	0.5	25.8	1.7	0.6	1.1	0.4	—	4.5	65.4
21–88										
19–88	40–59	—	64.4	—	—	—	—	—	—	35.6
Total	0–59	0.6	27.3	2.4	0.8	1.1	0.6	—	4.4	62.8
SOUTH ZONE										
19–86	0–19	7.2	5.8	0.8	3.1	0.1	0.1	17.0	0.1	65.8
20–86	20–39	8.3	10.5	3.3	4.9	3.1	1.8	16.7	2.0	49.4
19–85	40–59	—	6.5	1.9	0.5	—	3.1	—	—	88.0
Total	0–59	7.7	8.1	2.0	3.9	1.5	1.8	16.8	0.8	57.4

Catch Composition by Region and Depth

Table 3 gives the percentage composition of important varieties of fish by depth and region. The data gathered from areas 20–87, 20–88, 21–88 and 19–88 off West Bengal, areas 19–85, 19–86 and 20–86 off Orissa have been grouped for obtaining a clear picture of the species composition of these two regions. Along the north zone, elasmobranchs and cat-fish constituted about 27% and 2% of the total catch respectively. Prawns constituted about 1%. Again, this may be due to the exclusive use of fish trawls by *Matsyavigyani*. Along the south zone the main constituent of the catch was sciaenids which formed about 17% of the total catch followed by elasmobranchs (8%) and pomfret (4%). Compared to the north zone, prawns recorded a relatively high percentage (8%) from the south zone.

Table 3 also shows the percentage composition of prawn and important groups of fish in depth intervals of 20 m. Elasmobranchs registered the highest percentage from the 40–59 m depth belt of the north zone and 20–39 m depth belt of the south zone. Cat-fish and pomfret recorded the highest percentage from 0–19 m depth belt of the north zone while the percentage of these two groups were more in the 20–39 m depth belt of the south zone. Eel recorded relatively high percentage from 20–39 m depth range of both zones. Sciaenids were abundant along the

Table 4 *Monthwise catch (in kg/hr) of trawling from Orissa and West Bengal*

Months	Orissa	West Bengal
January	332	304
February	231	222
March	251	254
April	184	298
May	178	170
June	133	391
July	101	—
August	81	132
September	206	167
October	271	184
November	394	293
December	374	236

south zone, distributed in a more or less similar pattern in 0–19 m and 20–39 m depth ranges. Prawns registered about 8% of the total catch from 20–39 m depth belt of the south zone.

Seasonal Variation

The monthwise catch per hour of trawling obtained during the period under observation (table 4) show that along the Orissa coast the best productive season was the October-December period where the catch/hr varied from 270 to 375 kg. The second best productive season appeared to be January-March. The period July-August yielded relatively low catch rates.

Along the West Bengal coast, the periods January-April and November-December were the most productive seasons. The highest catch rate viz., 391 kg/hr obtained from West Bengal during the month of June is not taken into account owing to the less effort expended during the month.

Scope of Demersal Trawling along the Orissa-West Bengal Coast

A comparative study of the trawl fisheries of the different regions along the west and east coast based on the catch rates of 17.5 m trawlers obtained during 1975-76 revealed that the area off Orissa is most productive (Anon. 1976). One of the vessels operated from Paradeep landed an average catch of more than a ton/day with an average catch/hr of 282 kg. The average fishing effort/day was about 4 hr as the vessel was doing daily fishing due to non-availability of ice etc. It was pointed out that the vessel can fish between 6–8 hr a day if the vessel is sent on long voyages, whereby operation can be extended to the rich unexploited areas and land about 3 tons a day. The percentage of prawn was more here as compared to other regions.

The potential demersal fisheries yield from the east coast and particularly of the upper east coast has been worked out by several authors. Jones and Banerji (1973) and Prasad and Nair (1971) have worked out the potential yield from the east coast at about 1,43,000 tonnes. West (1973) has estimated a potential yield of about 1,17,000 tonnes for the upper east coast, comprising Orissa and West Bengal. Silas et al. (1976) estimated the potential yield from the east coast at about 1,19,000 tonnes while Joseph et al. (1976) have estimated the potential yield of the upper east coast below 40 fathom depth belt at about 1,31,000 tonnes. Based on all these studies it can be said that there is considerable scope for increasing the fishing effort along the upper east coast. The average annual demersal fish landing from the Orissa-West Bengal coast appears to be around 40,000 m.t. which indicates ample scope for expansion of the industry resulting in increasing the production.

Acknowledgements

The author would like to thank Shri M Swaminath, Director, Exploratory Fisheries Project, Bombay for the encouragements given for the preparation of this Paper. Thanks are also due to Shri Antony Joseph, Exploratory Fisheries Project, Bombay for his assistance in processing of the data.

References

Anon. 1976 Results of exploratory fishing conducted during 1975-76; *Bull. Expl. Fish. Proj.* 4 1–53

Borisov N I 1962 Report to the Govt. of India on experimental and exploratory fishing in the Bay of Bengal; *Report No. 1446, F.A.O. Rome*

James P S B R 1973 Sharks, rays and skates as potential fishery resources off the east coast of India; *Proc. Symp. on Living resources of the Seas around India*, C.M.F.R.I. 481–494

Jones S and Banerji S K 1973 A review of the living resources of the Central Indian Ocean; *Ibid* 1–17

Joseph K M, Radhakrishnan N, Joseph Antony and Philip K P 1976 Results of demersal fisheries resources survey along the east coast of India 1959–74; *Bull. expl. Fish. Proj.* **5** 1–53

Kuthalingam M D K, Mazumdar P and Chatterjee A K 1973 Offshore fishery resources of the Bay of Bengal from Sand heads to Gopalpur; *Proc. Symp. on Living resources of the Seas around India*, C.M.F.R.I. 338–364

Naumov M V 1961 A survey of the fishery resources of the Bay of Bengal; *Report No. 1393, F.A.O. Rome*

Poliakov M P 1961 Interim report to the Government of India on experimental and exploratory trawling in the Bay of Bengal; *Report No. 1573 F.A.O. Rome*

Rao K Virabhadra 1969 Distribution pattern of the major exploited marine fishery resources of India; *Bull. cent. mar. Fish. Res. Inst.* 6 1–69

Reghu Prasad R and Ramachandran Nair P V 1973 India and Indian Ocean fisheries; *J. mar. biol. Ass. India* **15** 1–19

Sekharan K V, Mathu M S, Venkatasubba Rao K, Rammohana Rao V, Mojumder R and Reuben S 1973 Exploratory trawling on the continental shelf along the North-Western part of the Bay of Bengal; *Proc. Symp. on Living rescources of the Seas around India*, C.M.F.R.I. 280–337

Silas E G, Dharmaraja S K and Rengarajan K 1976 Exploited marine fisheries resources of India; *Bull. cent. mar. Fish. Res. Inst.* **27** 1–24

West W Q B 1973 Fishery resources of the Upper Bay of Bengal; *IOFC/DEV/73/28, F.A.O. of U.N. Rome*, 1–39