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INDUSTRIAL FISHERIES OFF SAURASHTRA COAST BASED ON EXPLORATORY SURVEY DURING 1985-'88*

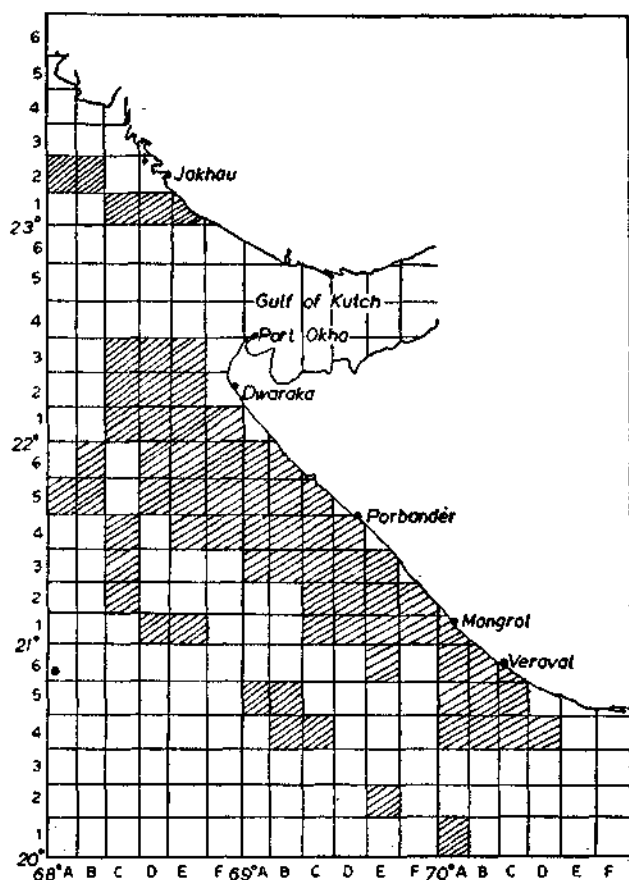
In Saurashtra waters, where fishery resource is currently being well exploited by private sector, exploratory survey programmes are being conducted by Government of India. The log records of these exploratory surveys have been provided to Veraval Research Centre of CMFRI for analysis and interpretation. The results of analysis of the data based on trawling survey conducted by M.V. *Meena Prapi* (overall length: 17.5 m) belonging to Fishery Survey of India (Base: Porbandar), Government of India are reported here. The analysis, based on 4 year survey (1985-'88), is presented here with a view to provide information and to extend our knowledge about the spatial and seasonal distribution

of various industrially important fishes along the Saurashtra coast.

During the 4 year period, the survey was conducted in 72 areas between 20°70' and 23°68' (Fig. 1) at depth range of 12-70 m. Identical fish trawl nets with headrope length of 32 m were operated throughout the survey period. The trawler hauled 1,540 times, returning 1,59,255 kg, i.e. 103.4 kg/haul (Table 1). The following are some of the salient findings.

Table 1. Details of exploratory trawling surveys conducted by the FSI vessel M.V. *Meena Prapi* during 1985-'88 from Porbandar base

Details	1985	1986	1987	1988	Total
No. of days out of port	159	120	142	174	595
No. of days of fishing	153	101	113	138	505
No. of areas/ No. of sub-areas explored	5/29	4/26	4/39	6/71	7/72
Depth range(m)	22-56	21-54	26-70	12-70	12-70
No. of hauls	481	289	331	439	1,540
Catch (kg)	66,578	25,934	28,014	38,729	1,59,255
Catch/haul (kg)	138.4	89.7	84.6	88.2	103.4



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Ribbon fish (49,970 kg) and sciaenids ('ghol': 3,301 + other sciaenids: 45,759 = 49,060 kg) constituted the bulk of the catch (Table 2); these groups together formed more than 60% of the total catch. The catch rate of ribbon fish and sciaenid were 14.7 and 14.5 kg/hr respectively. The other major constituents were cat fish, *Lactarius lactarius*, cephalopod and perch. As the vessel did not operate shrimp trawl, prawn catch was negligible.

The effort expended and the catch rate obtained every year in the explored areas were regrouped for the respective latitude zone and presented in Table 3. The catch rate of most of the fish groups and 'all fish' declined from 1985 to 1988. For instance, the catch rate of elasmobranch decreased from 2.6 (1985) to 0.6 (1988)

Table 2. Catch details and months of abundance of various categories of fishes obtained from trawling surveys of M.V. Meena Prapi (Base: Porbandar)

Categories	Catch (kg)					Percentage of all fish					Months of abundance			
	1985	1986	1987	1988	Total	1985	1986	1987	1988	Mean	1985	1986	1987	1988
Elasmobranch	2,664	445	330	625	4,064	4.0	1.7	1.2	1.6	2.6	10	11,10	6	9
Eel	1,258	223	382	107	1,970	1.9	0.9	1.4	0.3	1.2	3,12	11	10	7
Cat fish	4,117	4,838	2,497	6,494	17,946	6.2	18.7	8.9	16.8	11.3	5,4	5,6	7,11	3,8
Carangid	2,070	705	573	635	3,983	3.1	2.7	2.0	1.6	2.5	11,1	11	11	1
'Ghol'	1,137	394	616	1,154	3,301	1.7	1.5	2.2	3.0	2.1	3,10	6,7	6,7	4,1
Other sciaenids	5,554	7,417	10,611	12,179	45,759	23.4	28.6	37.9	31.4	28.7	4,12	11,6	10,6	7,9
Ribbon fish	19,323	8,675	10,125	11,847	49,970	29.0	33.5	36.1	30.6	31.4	10,3	4	5,11	8,4
Pomfret	303	96	352	455	1,206	0.5	0.4	1.3	1.2	0.8	11	1,6	6	1,12
Perch	3,338	339	893	2,195	6,765	5.0	1.3	3.2	5.7	4.2	2,1	11	10	12,11
<i>Lactarius</i>	6,968	1,227	0	170	8,365	10.5	4.7	0.0	0.4	5.3	11,1	3,4	—	11
Cephalopod	3,055	1,126	810	1,966	6,957	4.6	4.3	2.9	5.1	4.4	4,3	3,2	10,5	12,11
Miscellaneous	6,431	159	797	894	8,281	9.7	0.6	2.8	2.3	5.2	3,4	1	6,11	12,11
All fish	66,578	25,934	28,014	38,729	1,59,255						3,10	11	11	9,8,11

kg/hr, the catch rate of ribbon fish from 18.8 to 11.1 kg/hr, cephalopod from 3.0 to 1.9 kg/hr and 'all fish' from 64.9 to 36.4 kg/hr. However, the catch rate of cat fish, 'ghol' and pomfret did not decrease during the 4 year period.

Area-wise analysis of data revealed that maximum effort was expended in 21° 69° and the effort was very low in 21° 70° and 23° 68° (Table 3). The maximum catch rate of elasmobranch and *Lactarius lactarius* was in 21° 69°, that of cat fish and carangid in 21° 68°, that of ribbonfish, pomfret, perch and cephalopod in 22° 68° and that of eel, 'ghol', other sciaenids and 'all fish' in 20° 69°.

Table 3. Latitude-wise effort expended (hr) by M.V. Meena Prapi and the annual catch rate (kg/hr) of major categories of fishes

Area	1985	1986	1987	1988	All years
	<i>Effort</i>				
20° 70°	10.00	19.50	53.25	130.25	213.00
20° 69°	21.00	—	31.50	29.25	81.75
21° 70°	2.75	6.50	—	—	9.25
21° 69°	971.75	595.25	354.50	476.75	2,398.25
21° 68°	21.00	—	233.50	362.25	616.75
22° 68°	—	9.25	—	55.00	64.25
23° 68°	—	—	—	12.50	12.50
All areas	1,026.50	630.50	672.75	1,066.00	3,395.75

i. *Elasmobranch*

20° 70°	0.0	0.2	0.3	0.2	0.2
20° 69°	0.1	—	0.0	0.9	0.4
21° 70°	0.4	0.0	—	—	0.1
21° 69°	2.6	0.7	0.6	1.0	1.6
21° 68°	4.5	—	0.4	0.2	0.4
22° 68°	—	0.2	—	0.2	0.2
23° 68°	—	—	—	0.0	0.0
All areas	2.6	0.7	0.5	0.6	1.2

ii. *Eel*

20° 70°	0.6	0.4	0.0	0.2	0.2
20° 69°	8.8	—	3.7	0.0	3.7
21° 70°	1.8	0.0	—	—	0.5
21° 69°	1.1	0.4	0.4	0.1	0.6
21° 68°	0.2	—	0.6	0.1	0.3
22° 68°	—	0.6	—	0.1	0.2
23° 68°	—	—	—	0.0	0.0
All areas	1.2	0.4	0.6	0.1	0.6

iii. *Cat fish*

20° 70°	11.2	0.3	1.1	2.2	2.2
20° 69°	5.2	—	5.9	4.7	5.3
21° 70°	8.0	0.5	—	—	2.7
21° 69°	3.9	8.1	2.9	6.4	5.3
21° 68°	5.6	—	5.2	8.3	7.1
22° 68°	—	0.0	—	0.0	0.0
23° 68°	—	—	—	0.0	0.0
All areas	4.0	7.7	3.7	6.1	5.3

Table 3. (Contd.)

Area	1985	1986	1987	1988	All years
<i>iv. Carangid</i>					
20°70°	3.3	0.9	0.8	1.1	1.1
20°69°	1.1		2.2	0.0	1.1
21°70°	1.5	1.1			1.2
21°69°	1.9	1.1	0.2	0.2	1.1
21°68°	6.2		1.7	1.2	1.5
22°68°		0.0		0.0	0.0
23°68°				0.0	0.0
All areas	2.0	1.1	0.9	0.6	1.2
<i>v. Ghol</i>					
20°70°	1.4	0.0	0.3	1.6	1.1
20°69°	3.2		0.8	0.8	1.4
21°70°	4.0	0.0			1.2
21°69°	1.1	0.7	1.2	0.9	1.0
21°68°	0.5		0.6	1.3	1.0
22°68°		0.0		0.4	0.3
23°68°				0.0	0.0
All areas	1.1	0.6	0.9	1.1	1.0
<i>vi. Other sciaenids</i>					
20°70°	10.4	10.2	11.3	8.7	9.6
20°69°	4.2		31.6	20.9	20.7
21°70°	15.3	12.6			13.4
21°69°	15.7	11.9	9.4	11.9	13.1
21°68°	4.6		24.3	13.0	17.0
22°68°		4.6		0.5	1.1
23°68°				2.2	2.2
All areas	15.2	11.8	15.9	11.4	13.5
<i>vii. Ribbon fish</i>					
20°70°	0.0	6.6	7.5	7.3	7.0
20°69°	36.7		0.4	0.0	9.6
21°70°	0.0	8.9			6.3
21°69°	18.8	14.0	15.9	12.7	16.0
21°68°	14.0		17.4	10.0	12.9
22°68°		16.2		22.3	21.4
23°68°				0.0	0.0
All areas	18.8	13.7	15.1	11.1	14.7
<i>viii. Pomfret</i>					
20°70°	0.0	0.5	0.5	0.8	0.6
20°69°	0.1		0.0	0.6	0.2
21°70°	0.0	0.3			0.2
21°69°	0.3	0.1	0.5	0.1	0.3
21°68°	0.0		0.6	0.5	0.5
22°68°		0.6		2.1	1.9
23°68°				0.0	0.0
All areas	0.3	0.2	0.5	0.4	0.4

ix. Perch

20°70°	16.1	0.6	0.9	2.0	2.3
20°69°	6.3		0.6	1.3	2.3
21°70°	0.0	0.0			0.0
21°69°	2.6	0.6	0.3	1.1	1.5
21°68°	23.7		3.1	2.5	3.4
22°68°		0.0		8.8	7.6
23°68°				0.0	0.0
All areas	3.3	0.5	1.3	2.1	2.0
<i>x. Lactarius lactarius</i>					
20°70°	0.0	1.8	0.0	0.0	0.2
20°69°	10.0		0.0	0.0	2.6
21°70°	0.0	3.8			2.7
21°69°	6.5	2.0	0.0	0.0	3.1
21°68°	2.3		0.0	0.5	1.1
22°68°		0.0		0.0	0.0
23°68°				0.0	0.0
All areas	6.8	1.9	0.0	0.2	2.5
<i>xi. Cephalopod</i>					
20°70°	3.0	2.5	0.9	1.2	1.3
20°69°	7.0		1.0	0.8	2.4
21°70°	3.3	3.8			3.7
21°69°	2.8	1.7	0.6	1.0	1.9
21°68°	7.1		2.2	2.7	2.7
22°68°		1.6		5.9	5.2
23°68°				0.0	0.0
All areas	3.0	1.8	1.3	1.9	2.0
<i>xii. Miscellaneous</i>					
20°70°	31.5	0.2	0.1	1.2	2.3
20°69°	10.8		0.0	0.5	3.0
21°70°	21.8	0.3			6.7
21°69°	5.9	0.2	1.0	0.2	2.6
21°68°	6.0		1.9	1.3	1.7
22°68°		1.0		2.2	2.0
23°68°				0.0	0.0
All areas	6.3	0.5	1.1	0.8	2.4
<i>xiii. All fish</i>					
20°70°	77.5	24.1	23.6	26.4	27.9
20°69°	96.1		46.4	30.5	53.5
21°70°	56.0	31.4			38.7
21°69°	63.4	42.0	33.0	35.7	48.1
21°68°	95.5		58.2	41.5	49.6
22°68°		25.0		42.4	39.9
23°68°				2.2	2.2
All areas	64.9	41.2	41.6	36.4	46.9

Depth-wise analysis was made by pooling the catch-data obtained for different latitude zones during the survey period. The maximum catch rate of ribbon fish and other sciaenids was obtained at 21-30 m depth (Table 4), and as these 2 groups formed 60% of 'all fish' catch, the 'all fish' catch rate was also maximum at 21-30 m. However, the catch rate of all other groups was maximum in areas deeper than 40 m. The catch rate of elasmobranch, carangid and *Lactarius lactarius* was maximum at 41-50 m, cat fish, pomfret and perch at 51-60 m and carangid and cephalopod at 61-70 m depth.

Table 4. Depth-wise effort (hr) expended by M.V. Meena Prapi and the annual catch rate (kg/hr) of major categories of fishes

Depth (m)	1985	1986	1987	1988	All years
<i>Effort</i>					
11-20				12.50	12.50
21-30	201.75	115.75	49.50	21.00	388.00
31-40	506.25	362.50	232.00	386.25	1,487.00
41-50	262.25	143.75	109.00	321.50	836.50
51-60	56.25	8.50	176.00	203.00	443.75
61-70			106.25	121.75	228.00
<i>i. Elasmobranch</i>					
11-20				0.0	0.0
21-30	1.6	0.4	0.5	0.7	1.1
31-40	1.6	0.7	0.5	0.8	1.0
41-50	5.6	1.2	0.5	0.4	2.2
51-60	4.1	0.0	0.9	0.2	1.0
61-70			0.2	1.3	0.8
<i>ii. Eel</i>					
11-20				0.0	0.0
21-30	0.8	0.4	0.5	0.0	0.6
31-40	1.8	0.4	0.3	0.2	0.8
41-50	0.6	0.4	0.1	0.0	0.3
51-60	0.2	0.0	0.5	0.1	0.2
61-70			1.7	0.1	0.8
<i>iii. Cat fish</i>					
11-20				0.0	0.0
21-30	5.7	7.5	2.9	5.4	5.9
31-40	4.3	7.8	3.1	5.3	5.2
41-50	4.0	8.0	2.7	5.8	5.2
51-60	1.6	4.5	5.5	8.7	6.4
61-70			3.5	5.9	4.8

iv. Carangid

11-20				0.0	0.0
21-30	1.6	1.2	0.1	0.9	1.3
31-40	2.0	1.1	0.4	0.3	1.1
41-50	2.8	0.8	0.6	0.4	1.3
51-60	3.0	0.0	1.3	0.7	1.2
61-70			1.8	1.7	1.8

v. Ghol

11-20				0.0	0.0
21-30	0.6	0.4	1.5	0.0	0.6
31-40	1.3	0.5	1.1	0.9	0.9
41-50	1.3	1.1	0.4	1.5	1.2
51-60	0.2	1.2	1.2	1.3	1.1
61-70			0.6	1.0	0.8

vi. Other sciaenids

11-20				2.2	2.2
21-30	22.9	15.9	10.0	10.3	18.4
31-40	14.9	10.3	11.2	12.0	12.4
41-50	11.3	11.5	11.9	10.3	11.2
51-60	8.1	6.1	21.5	12.1	15.6
61-70			22.8	12.7	17.4

vii. Ribbon fish

11-20				0.0	0.0
21-30	26.7	13.3	10.9	14.9	20.1
31-40	21.0	14.4	13.2	12.1	15.9
41-50	10.0	11.7	21.1	9.5	12.0
51-60	23.7	0.1	14.3	12.0	14.2
61-70			13.5	11.1	12.2

viii. Pomfret

11-20				0.0	0.0
21-30	0.3	0.1	0.1	0.7	0.2
31-40	0.3	0.2	0.2	0.3	0.3
41-50	0.3	0.3	0.4	0.4	0.4
51-60	0.2	0.1	1.2	0.4	0.7
61-70			0.3	0.6	0.5

ix. Perch

11-20				0.0	0.0
21-30	2.7	0.1	0.1	1.5	1.5
31-40	2.2	0.5	0.5	1.6	0.6
41-50	4.3	0.8	1.3	2.4	2.6
51-60	9.3	0.0	1.8	3.6	2.9
61-70		3.1	2.5		2.8

Table 4. (Contd.)

x. <i>Lactarius lactarius</i>					
11-20				0.0	0.0
21-30	4.4	3.0	0.0	0.0	3.2
31-40	6.1	1.9	0.0	0.0	2.6
41-50	9.6	1.3	0.0	0.1	3.3
51-60	7.9	0.0	0.0	0.6	1.3
61-70			0.0	0.0	0.0

xi. <i>Cephalopod</i>					
11-20			0.0		0.0
21-30	1.6	2.4	0.1	0.1	1.6
31-40	2.9	1.9	0.8	1.1	1.9
41-50	4.3	1.5	1.3	2.0	2.6
51-60	3.0	0.0	1.7	2.5	2.2
61-70			2.0	3.2	2.7

xii. *Miscellaneous*

11-20				0.0	0.0
21-30	6.5	0.5	2.5	0.0	3.8
31-40	3.0	1.9	3.5	0.2	2.8
41-50	9.1	0.8	1.0	1.5	3.8
51-60	4.2	4.8	0.8	0.2	2.0
61-70			7.4	0.8	3.7

xiii. <i>All fish</i>					
11-20				2.2	2.2
21-30	75.4	45.2	29.2	34.5	58.3
31-40	61.4	41.6	34.8	34.8	45.5
41-50	63.2	39.4	41.3	34.3	45.1
51-60	65.5	16.8	50.7	42.4	45.9
61-70			56.9	40.9	48.3

