

Estimated Resources of Demersal Fisheries off North Tamil Nadu-South Andhra Coasts Based on Exploratory Surveys

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The results of analyses of exploratory trawling survey data for areas north of latitude zone 10°40'N (off Velanganni) up to 15°40' (off Nizampatnam) for a nine year period from 1973 to 1981 are presented. In the entire region explored, a potential yield of 1.09 t km⁻² could be expected. Barring the latitude zone 10°40', the lowest yield (0.7 t km⁻²) was observed off Madras/Ennore zone (13°10'). With this zone as a reference point, the following conclusions could be drawn: a) increasing trends in both southern and northern zones and b) the northern zones were comparatively richer in yields.

Latitude-wise potential yields were estimated for certain major categories of demersal fishes and crustaceans. Silver bellies ranked first (0.4 t km⁻²) followed by perches (0.1 t km⁻²). For prawns, the most productive zones were located off Ramayapatnam (15°10') in the north and off Porto Novo/Cuddalore (11°40') in the south.

The demersal fishery resources of different regions of the Indian coast have been assessed from time to time based on trawling operations and productivity studies (Jayaraman *et al.*, 1959; Rao & Dorairaj, 1968; Kuthalingam *et al.*, 1973; Pai & Pillai, 1973; Rao, 1973; Sekharan *et al.*, 1973; Krishnamoorthi, 1974; Joseph *et al.*, 1976; CMFRI, 1980a and Parulekar *et al.*, 1981). The demersal fishery resources of North Tamil Nadu-South Andhra coast have not been so far estimated. An attempt, therefore, is made here to fill up this gap in our knowledge in the fishery resources along the North Tamil Nadu-South Andhra coast.

Materials and Methods

The trawlers *M.V. Meenagaveshak* (17.5 m) and *M.V. Meenasitara* (17.5 m) belonging to the Exploratory Fisheries Project, Madras, undertook voyages lasting over a week or more during the nine year period from 1973-1981. The data that were made available to the Research Centre of CMFRI, Madras were processed by a method similar to the one followed by Krishnamoorthi (1973, 1974) and CMFRI (1980a). The trawlers have carried out surveys in regions between the latitudes 10°40' (off Velanganni) and 15°40' (off Nizampatnam) (Fig. 1). The number of 3.05 m squares in each latitude zone and the area considered are given in Table 1. Since *M.V. Meenagaveshak* and *M.V. Meenasitara* are of equal tonnage and engine power, the data obtained by both the vessels have been pooled here to assess the demersal fishery resources by the 'swept area' method (Gulland, 1965). A 20 m trawl with a sweep of 0.102 km²h⁻¹ was operated by both the vessels through out the period of investigation, at an average trawling speed of 2.75 knots h⁻¹.

The estimated potential yield, presented in Table 2 was calculated as follows:

$$\frac{\text{Area considered (AC)}}{\text{Area swept (AS)}} \times \text{CPH (Kg/h)}$$

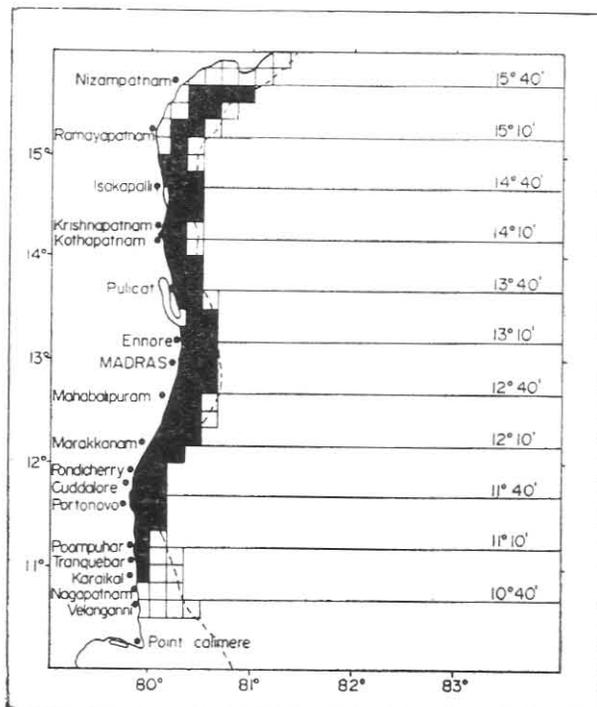


Fig. 1. Regions surveyed

Table 1. *The latitude zones explored by both the trawlers, the number of 3.05 m squares in each latitude zone and the area considered*

Latitude zone	No. of 3.05m squares	Area considered in km ²
10°40'	1	326.6
11°10'	4	1,306.4
11°40'	6	1,959.6
12°10'	9	2,939.4
12°40'	8	2,612.8
13°10'	8	2,612.8
13°40'	6	1,959.6
14°10'	6	1,959.6
14°40'	7	2,286.2
15°10'	5	1,633.0
15°40'	4	1,306.4
All latitudes	64	20,902.4

For 'all years' average, the total category-wise catch in each latitude zone was pooled and the CPH was calculated; subsequently the EPY was calculated by multiplying the CPH with AC/AS for the areas fished in each latitude zone over the 9 year period. Similarly, for 'all latitude' average, the total category-wise catch was pooled for each year and the CPH and subsequently the EPY was calculated.

Results and Discussion

The latitude-wise estimated magnitude of resources in respect of the major twelve groups of demersal fishery, namely, silver-bellies, perches, rays and skates, jew-fishes, carangids, lizard fishes, threadfin breams, sharks, prawns, lobsters, 'others' and 'all fish' are given in Table 2.

Table 2. *Estimated resources (t) in each latitude zone during the years 1973-1981 in respect of ten major categories of demersal fisheries along the North Tamil Nadu-South Andhra Coasts*

Latitude zones (1)	Silver bellies										For all years	
	1973 (2)	1974 (3)	1975 (4)	1976 (5)	1977 (6)	1978 (7)	1979 (8)	1980 (9)	1981 (10)	Average per km ² (11)	(12)	
10°40'					28.82					28.82	0.09	
11°10'		0		342.16	70.44					488.11	0.37	
11°40'	108.74	24.78		1,376.14	16.01					576.74	0.29	
12°10'	578.47	0	439.16	310.85	247.19	0			277.29	605.46	0.21	
12°40'	450.90	335.69	748.89	622.85	153.69	131.41	79.67	175.27	328.14	691.11	0.26	
13°10'	163.94	384.24	547.48	459.16	532.83	177.97	205.05	223.63	212.26	789.22	0.30	
13°40'	546.29	324.10	829.10	825.78	777.11	95.58	80.95	290.29	207.10	675.29	0.34	
14°10'	226.95	64.17	466.26	75.63	1,434.34	139.67		604.99	426.31	1,217.83	0.62	
14°40'	217.67	225.26	647.19	60.23	408.12			127.18	489.32	954.38	0.42	
15°10'	364.26	134.23								580.52	0.36	
15°40'		84.92								84.92	0.07	
All latitude zones per km ²	2,274.96 0.21	2,747.28 0.28	3,694.29 0.38	3,198.40 0.43	6,813.70 1.04	906.31 0.16	405.58 0.18	1,396.05 0.27	1,739.31 0.19	7,332.23 0.35		

Latitude zones (1)	Perches										For all years	
	1973 (2)	1974 (3)	1975 (4)	1976 (5)	1977 (6)	1978 (7)	1979 (8)	1980 (9)	1981 (10)	Average per km ² (11)	(12)	
10°40'					0					0	0	
11°10'		0		32.08	0					42.52	0.03	
11°40'	0	761.75		39.67	51.23					270.89	0.14	
12°10'	0	34.68	759.51	34.07	142.17	32.79			2.88	357.63	0.12	
12°40'	0	1.67	153.81	51.10	0.	9.09	0.02	0.43	2.47	27.92	0.01	
13°10'	0	1.44	77.82	27.86	0.58	0.19	2.18	12.68	5.38	28.18	0.01	
13°40'	0	53.41	874.36	795.52	0.	38.90	10.25	43.32	16.62	545.23	0.28	
14°10'	0	79.54	915.49	108.80	9.61	14.86		182.27	48.22	302.01	0.15	
14°40'	0	108.87	295.73	5.19	7.36			49.86	57.64	197.02	0.09	
15°10'	0	50.14								12.17	0.01	
15°40'		189.04								189.04	0.14	
All latitude zones Per sq.km.	0	473.57 0	3,122.55 0.32	1,213.67 0.16	60.20 0.01	69.13 0.01	4.93 0.002	158.30 0.03	96.83 0.01	1,663.99 0.08		

Table 2 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Rays and skates											
10°40'					16.65					16.65	0.05
11°10'		0.00		37.85	76.85					87.48	0.07
11°40'	117.67	10.95		109.32	0.00					155.81	0.08
12°10'	101.82	21.36	41.04	185.59	257.44	268.84			76.21	233.71	0.08
12°40'	167.72	12.04	40.27	78.77	38.42	36.50		1.99	7.18	27.12	85.04
13°10'	108.39	24.02	52.54	36.12	21.33	14.22	23.05	28.24	18.83	71.98	0.03
13°40'	54.66	70.60	123.90	223.34	83.57	170.18	114.12	136.88	88.09	190.77	0.10
14°10'	134.48	49.18	114.13	30.61	127.37	61.86		285.95	129.87	217.67	0.11
14°40'	118.54	48.67	87.62	13.61	40.47			191.64	143.90	172.59	0.08
15°10'	35.54	0.00								53.47	0.03
15°40'		55.33								55.33	0.04
All latitude zone per sq.km.	851.66 0.08	296.82 0.03	496.72 0.05	559.70 0.07	591.72 0.09	387.02 0.07	56.48 0.02	319.68 0.06	410.62 0.04	1192.67 0.06	0.06

Jew fishes

10°40'					5.44					5.44	0.02
11°10'		0		0	3.84					1.79	0.001
11°40'	30.64	0	0	0	0					30.16	0.02
12°10'	181.55	0	0	0	0	0			0	60.52	0.02
12°40'	148.70	0	0	92.02	0	0	9.61	0.67	0	68.65	0.03
13°10'	298.90	0	0	17.20	0.29	0	42.27	42.07	0	66.60	0.03
13°40'	204.89	0	0	384.55	0	0	132.05	258.30	0	50.62	0.08
14°10'	81.59	0	0	67.82	21.04	0		746.95	0	177.71	0.09
14°40'	167.43	0	0	0	5.25			295.96	0	60.74	0.03
15°10'	216.81	0								326.28	0.20
15°40'		0								0.00	0.00
All latitude zone per km ²	1,218.31 0.11	0 0	0 0	691.53 0.09	87.98 0.01	0 0	97.05 0.04	660.37 0.13	0 0	918.07 0.04	0.04

Carangids

10°40'					7.04					7.04	0.02
11°10'		18.67		32.98	6.40					53.79	0.04
11°40'	0	34.20		23.82	6.40					19.79	0.01
12°10'	0	17.36	103.65	76.14	44.83	57.76			52.35	110.66	0.04
12°40'	0	4.48	112.56	59.36	19.21	13.83	2.91	0.61	29.59	35.35	0.01
13°10'	0	9.70	61.06	39.48	8.65	6.66	153.31	9.03	10.31	86.58	0.03
13°40'	0	44.48	105.88	131.44	22.09	76.05	2.56	40.15	22.38	98.94	0.05
14°10'	0	60.13	119.52	12.94	39.38	35.80		99.95	84.63	102.78	0.05
14°40'	0	95.10	59.19	0	14.86			26.51	83.28	113.64	0.05
15°10'	0	60.71								14.73	0.01
15°40'		88.50								88.50	0.07
All latitude Zones per km ²	0 0	292.02 0.03	540.90 0.06	350.55 0.05	185.71 0.03	159.49 0.03	188.50 0.08	98.88 0.02	233.10 0.03	731.58 0.03	0.03

Table 2 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Lizard fishes											
10°40'					0					0	0
11°10'		0		0	0					0	0
11°40'	17.29	0		0	0					16.91	0
12°10'	36.31	0	31.58	0	0	0			183.63	110.37	0.04
12°40'	163.11	19.34	209.73	21.13	0	58.40	15.63	7.81	195.22	135.76	0.05
13°10'	105.02	35.06	160.13	17.20	0.15	39.90	15.63	29.97	146.81	98.88	0.04
13°40'	1.73	1.63	0	1.12	0	20.49	0	19.31	144.47	37.08	0.02
14°10'	5.38	0	0	0	0	18.12		9.46	55.71	10.95	0.01
14°40'	0	0	0	16.04	0			0	264.74	54.24	0.02
15°10'	0	0								0	0
15°40'		0								0	0
All latitude Zone	500.85	192.12	395.28	69.96	0.38	203.58	46.62	105.02	927.93	647.56	0.03
per sq. km	0.05	0.02	0.04	0.001	0.0001	0.04	0.02	0.02	0.10	0.03	

Threadfin breams

10°40'					0					0	0
11°10'		37.37		5.00	0					20.62	0.02
11°40'	9.99	57.64		4.32	0					30.74	0.02
12°10'	107.39	0	35.31	2.18	0	0			43.39	71.18	0.02
12°40'	92.41	7.56	94.52	57.83	0	80.43	8.10	6.46	14.34	70.96	0.03
13°10'	80.37	14.31	46.78	49.28	0.67	0	91.70	27.70	18.38	79.92	0.03
13°40'	42.75	3.94	15.16	3.36	0	0	60.26	28.34	12.10	22.86	0.01
14°10'	22.29	34.87	26.50	4.23	0.77	0		99.55	171.95	52.26	0.03
14°40'	29.01	9.77	29.30	0	0.51			25.94	214.79	62.76	0.03
15°10'	17.10	1.09								26.10	0.02
15°40'		35.22								35.22	0.03
All latitude zone	412.09	168.10	212.96	185.59	5.12	51.71	137.17	152.16	317.38	538.95	0.03
per sq. km	0.04	0.02	0.02	0.02	0.001	0.01	0.06	0.03	0.03	0.03	

Sharks

10°40'					1.28					1.28	0.004
11°10'		0		2.43	0					3.20	0.002
11°40'	7.02	2.31		2.02	9.61					8.84	0.01
12°10'	17.48	0	39.31	9.48	5.12	5.00			9.61	30.83	0.01
12°40'	13.64	3.07	18.73	77.04	0	5.51	0.48	1.03	4.03	25.10	0.01
13°10'	6.72	3.07	3.97	5.09	7.20	1.60	4.87	3.65	2.24	9.73	0.004
13°40'	0.00	14.79	8.55	4.96	0.00	11.85	2.69	2.11	4.23	9.22	0.01
14°10'	59.94	14.31	2.63	0.13	5.48	0.96		6.64	1.44	17.10	0.01
14°40'	28.43	44.03	3.15	2.88	0			2.59	9.80	37.21	0.02
15°10'	13.83	15.56								24.66	0.02
15°40'		4.23								4.23	0.003
All latitude zones	135.25	87.41	53.79	103.10	36.50	22.86	7.17	16.39	27.79	145.50	0.01
Per km ²	0.01	0.01	0.01	0.01	0.01	0.004	0.003	0.003	0.003	0.01	

Table 2 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Prawns											
10°40'					0					0.00	0
11°10'		1.60		2.75	0					4.23	0.003
11°40'	8.84	1.92		3.27	0					10.37	0.01
12°10'	10.76	0	0.79	1.15	0	0			0	4.32	0.001
12°40'	3.65	0.26	0.13	1.15	0	0	0	0	0	1.28	0.001
13°10'	1.12	0.19	1.22	0.29	0	0	0.06	0.29	0	0.77	0.0003
13°30'	0.00	0.00	2.13	2.24	0	0	8.45	0.00	0	2.50	0.001
14°10'	5.89	1.73	2.40	0.99	2.50	0		0.40	0	3.84	0.002
14°40'	4.23	1.60	1.10	0	0.64			0.00	0	2.69	0.001
15°10'	3.27	5.57								6.24	0.004
15°40'		2.05								2.05	0.002
All latitude zones	33.81	7.69	9.13	8.84	9.64	0	2.02	1.02	0	20.49	0.001
Per km ²	0.003	0.001	0.001	0.003	0.001	0	0.001	0.0002	0	0.001	

Lobsters

10°40'					0					0	0
11°10'		0		0.90	0					1.15	0.001
11°40'	0	1.92		0	0					0.58	0.0003
12°10'	0	0	0.71	6.60	1.28	0				2.02	0.001
12°40'	0	0.02	0.21	0.77	0	0	0	0	0	0.26	0.0001
13°10'	0	0.38	2.16	0.67	0.05	0	0.06	0	0	0.77	0.0003
13°40'	0	0	0.08	0.80	0.96	0	0	0	0	0.19	0.0001
14°10'	0	0.19	0.33	0.03	0.58	0		0	0	0.58	0.0003
14°40'	0	0	1.23	0	0.19			0	0	0.67	0.0003
15°10'	0	0								0	0
15°40'		0								0	0
All latitude zones	0	2.88	5.28	5.89	2.56	0	0.09	0	0	6.15	0.0003
per km ²	0	0.0001	0.001	0.001	0.0004	0	0.0001	0.00	0	0.0003	

Others

10°40'					45.47					45.47	0.14
11°10'				396.15	26.90					652.69	0.50
11°40'	1,118.03	460.70		595.57	6.40					1,451.83	0.74
12°10'	2,288.89	970.19	843.00	129.81	94.78	609.65			497.90	1,773.73	0.60
12°40'	1,381.52	242.26	751.59	613.43	46.11	558.03	41.15	17.60	293.40	814.58	0.31
13°10'	459.32	191.06	518.87	391.25	32.47	158.88	202.49	60.61	246.55	497.19	0.19
13°40'	1,179.99	2,358.05	1,186.68	1,119.56	154.65	1,525.57	131.28	219.98	189.14	1,299.10	0.66
14°10'	2,288.11	1,309.76	1,516.60	273.96	229.67	678.18		641.42	359.84	1,531.56	0.78
14°40'	1,114.67	2,334.86	459.89	66.47	59.11			176.56	229.87	1,980.93	0.87
15°10'	1,441.36	1,750.19								2,594.39	1.59
15°40'		1,926.67								1,926.67	1.47
All latitude zones	9,915.56	7,346.58	5,450.52	3,696.98	979.15	3,196.31	344.50	656.79	1,710.62	9,684.78	0.46
Per km ²	0.92	0.75	0.56	0.49	0.15	0.58	0.15	0.13	0.19	0.46	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
					All fish						
10°40'					104.70					104.70	0.32
11°10'		361.28		852.30	184.43					1,355.58	1.04
11°40'	1,418.31	1,356.16		2,154.12	89.66					2,572.65	1.51
12°10'	3,322.67	1,043.58	2,294.51	755.86	792.80	974.03			1,143.26	3,360.71	1.14
12°40'	2,421.64	626.39	2,130.54	1,675.46	257.43	893.21	159.54	217.05	894.53	1,957.55	0.75
13°10'	1,223.78	663.48	1,472.04	1,043.58	604.21	399.41	740.67	437.36	660.98	1,729.83	0.66
13°40'	2,030.30	2,871.00	3,145.82	3,492.68	1,038.39	1,938.62	542.61	1,038.68	684.23	3,032.00	1.55
14°10'	2,824.62	1,613.80	3,164.26	575.14	1,870.73	949.45		2,677.59	1,278.06	3,633.90	1.85
14°40'	1,679.97	2,868.14	1,583.40	164.42	536.51			896.23	1,493.23	3,636.63	1.59
15°10'	2,092.16	2,017.49								3,638.55	2.23
15°40'		2,385.96								2,385.96	1.83
All latitude zones	15,342.49	11,614.47	13,981.41	10,084.21	876.56	4994.78	1,290.34	3,564.68	5,462.67	22,884.02	1.09
per km ²	1.42	1.19	1.43	1.34	1.34	0.90	0.56	0.68	0.60	1.09	

Silver-bellies

Among the 10 major categories of demersal fishery for which EPY was calculated, silver-bellies recorded the maximum in all years. The estimated resources ranged from a maximum of 1.04 t km⁻² in 1977 to a minimum of 0.16 t km⁻² in 1978. The 9 year average amounted to 0.35 t km⁻². Zone 14°10' sustained the maximum yield of 0.62 t km⁻² followed by 14°40' (0.42 t km⁻²).

Perches

Maximum estimated resource of 0.32 t km⁻² obtained in 1975; there was no catch of perches in 1973. The 9 year average amounted to 0.08 t km⁻² which is next only to the silver-bellies. Maximum yield of 0.28 t km⁻² was obtained in the zone 13°40'.

Rays and skates

The estimated resources ranged from a maximum of 0.09 t km⁻² in 1977 to a minimum of 0.02 t km⁻² in 1979. The 9 year average was 0.06 t km⁻². Zone 14°10' yielded the maximum (0.11 t km⁻²) followed by 13°40' (0.10 t km⁻²).

Jew-fishes

The maximum estimated resource (0.13 t km⁻²) was recorded in 1980, during which year the jew-fishes formed the second largest catch next only to the silver-bellies. There was no sciaenid catch during the years 1974, 1975, 1978 and 1981, which only reveals the inconsistent jew-fish resource off North Tamil Nadu-South Andhra coast. The 9 year average was 0.04 t km⁻². Zone 15°10' accounted for 38.4% of total jew-fish resource in this region.

Carangids

The maximum estimated resource was 0.08 t km⁻² in 1979; there was no carangid catch in 1973. The 9

year average amounted to 0.03 t km⁻². The yield in the zone 15°40' recorded the maximum (0.07 t).

Lizard-fishes

The estimated resource ranged from a maximum of 0.10 t km⁻² in 1981 to 0.0001 t in 1977. In the year 1981, the lizard-fishes formed the second largest catch. The 9 year average amounted to 0.03 t km⁻². The maximum yield of 0.05 t km⁻² was obtained from the zone 12°40'.

Threadfin breams

The estimated resource ranged from a maximum of 0.06 t km⁻² in 1979 to a minimum of 0.001/km² in 1977. Similar to the carangids and lizard-fishes, the 9 year average amounted to 0.03 t km⁻². Barring the latitude zones 10° 40' and 13° 40' which exhibited low yield of threadfin breams, the other zones yielded almost equal quantity of threadfin breams (0.02-0.03 t km⁻²).

Sharks

During the years from 1973 to 1977, the yield was static at 0.01 t km⁻² and there was a decline thereafter. The 9 year average was 0.01 t km⁻². Zones 14°40' and 15°10' exhibited maximum yield of 0.02 t km⁻².

Prawns

The maximum prawn catch (0.003 t km⁻²) was in 1973 and thereafter there was a general decline. In the years 1978 and 1981, there was no record of prawn catch. The 9 year average was 0.001 t km⁻² which is 0.09% of 'all fish' catch. The maximum yield of 0.01 t km⁻² was obtained in the zone 11°40', followed by 15°10' (0.004 t km⁻²).

Lobsters

The maximum yield was 0.001 t km⁻² during the years 1975 and 1976. There was no record of lobsters

during 1973, 1978, 1980 and 1981. The 9 year average was 0.0003 t km⁻². The zones 11°10' and 12°10' exhibited a better yield (0.001 t km⁻²) compared to the other zones.

Others

All the other categories of fishes, crabs, cephalopods, etc. were grouped together. The yield ranged from the maximum of 0.92 t km⁻² in 1973 to 0.13 t in 1980. The 9 year average amounted to 0.45 t⁻² which is 43.2% of 'all fish' catch. In general, northern zones (15°10' and 15°40') supported yields more than 1 t km⁻².

'All fish'

During the years from 1973 to 1977, the 'all fish' resource ranged from 1.19 t km⁻² to 1.43 km⁻² t, thereafter a steep decline and the resource was 0.60 t km⁻² in 1981. The 9 year average was 1.09 t km⁻². Of the 11 zones explored, 15°10' recorded the maximum yield (2.23 t km⁻²). Barring the latitude 10°40' the lowest yield (0.66 t km⁻²) was observed off Madras/Ennore zone (13°10'). With this zone as a reference point, the following conclusions could be drawn: a. increasing trends in both southern and northern zones and b. the northern zones were comparatively richer in yields.

Discussion

The estimates of potential yields presently obtained in respect of the major groups of demersal fishery resources of the North Tamil Nadu-South Andhra coasts for the years 1973-1981 have helped to reveal the individual importance of various categories that contribute to the fisheries of the region. Barring 'Others', the silverbellies contribute substantially to the fisheries, forming 32.1% of total demersal fish yield. This resource appears potentially the largest component of the demersal resources of the shelf area not only in this part but in the upper part as well of the coast of India (West, 1973).

Intensive fishing operation by commercial shrimp trawlers have increased considerably the prawn landings in Tamil Nadu and Andhra coasts during the years 1979 and 1980 (CMFRI 1980b, 1981), forming about 10% of total demersal fish catch. In the present study, the prawn yield has been estimated as 0.1% of 'all fish' catch; the reason for a low percentage composition may be attributed to the fact that both the EFP trawlers M.V. *Meenagaveshak* and M.V. *Meenasitara* operated fish trawl nets during their exploratory cruises.

The 'all fish' yield is estimated as 22,884 tonnes for an area of 20,902 km². In other words, the estimated 'all fish' yield was 1.09 t km⁻². An analysis of data on surveys carried out by 17.5 m trawlers in areas between Nizampatnam and Gopalpur during 1972-1978 revealed that a potential yield of 0.8 t km⁻² could be expected (CMFRI, 1980a). Krishnamoorthi (1974) estimated

an average potential yield of 41,868 t off Visakhapatnam coast for an area of 41,478 km² based on a 10 year trawling surveys data gathered during 1961-1970. The estimated potential yield was 1.01 t km⁻², which is very close to the value obtained in the present study. Recalculating the data of Krishnamoorthi (1974), Antony Raja (1980) indicated a potential yield of 5.0 t km⁻² for Vishakhapatnam coast after assuming mortality as 1.0. In the light of the fact that the standing stock of 418,682 t estimated by Krishnamoorthi (1974) is the total for a 10 year period, the potential yield given by Antony Raja (1980) appears to be an over estimate.

Joseph *et al.* (1976) too utilised the exploratory survey data for the period 1958-1974 to estimate the potential yield of east coast of India by employing the swept area method. They estimated a potential yield of about 206,000 t. On recalculation of their data, Antony Raja (1980) has reported a potential yield of 3.8 t km⁻². Thus, there is a wide difference among the estimates provided by different authors, the lowest being 0.8 t km⁻² and the highest 3.8 t km⁻². One possible reason for the observed difference may be due to the fact that the regions considered in these studies are different.

Whereas the estimated potential yield of the area between Velanganni and Nizampatnam for demersal fishery resources is 1.09 t km⁻² the average estimated demersal fish landing for 1979 and 1980 in the maritime states of Tamil Nadu and Andhra Pradesh are 1,19,744 t and 47,341 t respectively (Anon, 1980b, 1981). The total area of Tamil Nadu up to 50 m depth (up to which commercial boats normally operate) is about 22,000 km² and for Andhra Pradesh, it is about 16,600 km² (Jones & Banerji, 1973). The average estimated demersal fish landings for the years 1979 and 1980 works out to 5.4 t km⁻² in Tamil Nadu and 2.9 t km⁻² in Andhra Pradesh. These figures point to over-exploitation of resources especially off Tamil Nadu coast. But it should be noted that the demersal fish landing per km² mentioned here is for the entire maritime states Tamil Nadu and Andhra Pradesh, whereas the estimated potential yield of 1.09 t km⁻² is the calculated value for only the upper half of Tamil Nadu and lower half of Andhra Pradesh. Furthermore, the estimated landings for the states of Tamil Nadu and Andhra Pradesh are based on data collected from both mechanised and non-mechanised craft and gear.

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References

- Antony Raja, B. T. (1980) *Current Knowledge of Fisheries Resources in the Shelf Area of the Bay of Bengal. Bay of Bengal Programme Working Paper 8, 22*

- CMFRI (1980a) *Mar. Fish. Infor. Serv. T & E Ser.* **15**, 1
- CMFRI (1980b) *Mar. Fish. Infor. Serv. T & E Ser.* **22**, 1
- CMFRI (1981) *Mar. Fish. Infor. Serv. T & E Ser.* **32**, 1
- Gulland, J. A. (1965) *Manual of Methods for Fish Stock Assessment. Part I, Fish Population Analyses.* *FAO Fish. Tech. Pap.* (40) Rev. **1**, 1
- Jayaraman, R., Seshappa, G., Mohamed, K. H. & Bapat, S. V. (1959) *Indian J. Fish.* **6**, 58
- Jones, S. & Banerji, S. K. (1973) *Proc. Symp. Living Resources of the Seas Around India.* Spl. Publ. Central Marine Fisheries Research Institute, Cochin 17
- Joseph, K.M., Radhakrishnan, N., Joseph, A. & Philip, K. P. (1976) *Bull. Expl. Fish. Proj.* **5**, 53 (Mimeo)
- Krishnamoorthi, B. (1973) *Spl. Publ. Central Marine Fisheries Research Institute, Cochin* 495-516
- Krishnamoorthi, B. (1974) *Indian J. Fish.* **21**, 557
- Kuthalingam, M. D. K., Mojumdar, P. & Chatterjee, A. K. (1973) *Proc. Symp. Living Resources of the Seas Around India, Spl. Publ.* Central Marine Fisheries Research Institute, Cochin, 338-364
- Pai, M. V. & Pillai, P. K. M. (1973) *Proc. Symp. Living Resources of the Seas Around India, Spl. Publ.* Central Marine Fisheries Research Institute, Cochin, 261-279
- Parulekar, A. H., Harkantra, S. N. & Ansari, Z. A. (1982) *Indian J. mar. Sci.* **11**, 187
- Rao, K. V. (1973) *Proc. Symp. Living Resources of the Seas Around India, Spl. Publ.* Central Marine Fisheries Research Institute, Cochin, 18-101
- Rao, K. V. & Dorairaj, K. (1968) *J. Fish.* **15**, 1
- Sekharan, K. V., Rao, K.V.S., Rao, V. R., Mojumdar, P. & Reuben, S. (1973) *Proc. Symp. Living Resources of the Seas Around India. Spl. Publ.* Central Marine Fisheries Research Institute, Cochin, 280-337
- West, W.Q.S. (1973) *Fishery Resources of the Upper Bay of Bengal IOFC/DEV/73/28, FAO, Rome p.* 44