

AN ASSESSMENT OF THE DEMERSAL FISHERY RESOURCES OFF THE ANDHRA-ORISSA COAST BASED ON EXPLORATORY TRAWLING

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ABSTRACT

Based on the exploratory trawling surveys for a 10-year period from 1961 to 1970 by the Government of India trawler, *M. T. Ashok*, in the northwestern regions of the Bay of Bengal between the latitude zones $16^{\circ}40'$ and $21^{\circ}10'$, the magnitude of the demersal resources has been estimated by the 'swept area' method. For an area of 41,478 sq. km. a fishery resource of 4,18,682.45 tonnes with 2,51,209.45 tonnes as the estimated potentially sustainable yield at the 60% level, is estimated. The present estimates have been compared with those reported for Goa to demonstrate the richness of the continental shelf along the Andhra-Orissa coast for ground-fish fisheries.

INTRODUCTION

For well over a decade now, a number of Government of India vessels have carried out extensive exploratory trawling surveys to gain knowledge of the magnitude of abundance of the demersal-fishery resources along the shelf regions of the Andhra-Orissa coast between Kakinada ($16^{\circ}40'$) and the False Point ($20^{\circ}40'$). Based on the results of the trawling operations, a series of papers have been published (Shariff 1961; FAO|UN, 1961; FAO|UN, 1962; Nagabhushanam 1966; Krishnamoorthi 1968; Sekharan *et al* 1968; Rao and Krishnamoorthi 1970). Informative as these reports are, they hardly provide an estimate of the magnitude of abundance of the demersal fishery resources. An attempt, therefore, is made here to fill this gap in our knowledge of the magnitude of the demersal fishery resources along the Andhra-Orissa coast.

MATERIALS AND METHODS

The data for this study have been drawn from the log reports of the voyages, made available to the C.M.F.R. Substation, Waltair for processing by a method similar to the one followed in an earlier study (Krishnamoorthi 1968). The trawlers, viz., *M. T. Ashok* and *M. V. Champa*, have consistently conducted exploratory trawling surveys for more than 10 years. Of the two, while *M. V. Champa* with limited capacities has carried out surveys mostly in the $17^{\circ}40'$ latitude-zone, i.e., off Visakhapatnam, the vessel *M. T. Ashok* with capacities to stay-out of port for long periods (10 days), has carried out surveys in the regions between the latitudes $16^{\circ}40'$ and $21^{\circ}10'$. The number of 10'-squares in each latitude zone and the area considered are given below. The survey re-

Latitude Zone	No. of 10' Squares	Area considered in Sq. km.
16°40'	5	1, 633
17°10'	10	3, 266
17°40'	15	4, 899
18°10'	14	4, 572
18°40'	9	2, 939
19°10'	12	3, 919
19°40'	19	6, 205
20°10'	14	4, 573
20°40'	18	5, 879
21°10'	11	3, 593
All Latds.	127	41, 478

ports, therefore, of M. T. *Ashok* alone have been utilised here to assess the demersal-fishery resources by the 'swept area' method (Gulland 1965). A 15-m trawl with a sweep of 0.0765 sq. km. was operated by M. T. *Ashok* throughout the period of this investigation, at an average trawling speed of 2.75 knots per hour.

RESULTS

The latitudewise estimated magnitude of resources in respect of the major six groups of demersal fisheries viz., the sharks & skates, the rays, the cat-fishes, the prawns, the miscellaneous small fish, the miscellaneous big fish, and the 'All Fish', are given in Table 2. Also given in the table are figures (last row of each category) of the estimated potentially sustainable yields at 60% level (*EPSY*).

'All Fish'

The estimated resource ranged from a maximum of 87,180.39 m tonnes recorded in 1964 to a minimum of 12,896.42 m tonnes obtained in 1970. The 10-year average amounted to 41,868.25 m tonnes. The *EPSY* respectively amounted to 52,308.23, 7,737.85 and 25,120.95 m tonnes. Very productive areas yielding 10,000 tonnes and more were located in the 16°40', 19°40' and 20°10' latitude zones.

Sharks & Skates

The estimated resource ranged from a maximum of 8,375.97 tonnes realised in 1965 to a minimum of 774.87 tonnes recorded in 1969. The 10-year average amounted to 3,787.61 tonnes. The *EPSY* respectively amounted to 5,025.58, 464.92 and 2,272.57 tonnes. Areas sustaining yields 1,000 m tonnes and above were frequented in all the latitude zones from 18°10' to 21°10', with very high productive areas mostly in 19°40' and 20°10' latitude zones.

Rays

The estimated resource ranged from a maximum of 4,586 m tonnes obtained in 1965 to a minimum of 598.96 m tonnes observed in 1970. The 10-year average was 2,202.79 m tonnes. In terms of the *EPSY*, they respectively were 2,751.60, 359.38 and 1,321.67 tonnes. Unlike the sharks & skates, areas yielding 1,000 tonnes and more were mostly located in latitude zones from 18°10' to 19°40'.

Cat-fishes

The estimated resource ranged from a maximum of 23,483.54 tonnes obtained in 1964 to a minimum of 1,987.77 m tonnes realised in 1969. The 10-year average was 9,385.76 tonnes. The *EPSY* respectively were 14,090.12, 1,192.66 and 5,631.46 tonnes. Almost all the latitude zones were uniformly and substantially productive.

Prawns

The estimated resource ranged from a maximum of 1,327.69 tonnes obtained in 1962 to a minimum of 100.76 m tonnes observed in 1961. The 10-year average amounted to 677.67 tonnes. The *EPSY* respectively amounted to 796.61, 60.46 and 406.59 tonnes. Almost all areas between the latitude zones from 17°40' to 21°10' supported rich prawn grounds with heavier concentrations in the northern latitude zones of 19°40' and 21°10'.

Miscellaneous small fish

The estimated resource ranged from a maximum of 45,373.12 tonnes recorded in the year 1961 to a minimum of 5,453.73 tonnes realised in the year 1970. The 10-year average amounted to 20,472.12 tonnes. The *EPSY* respectively amounted to 27,223.87, 3,272.24 and 12,283.27 tonnes. Almost all the latitude zones were highly productive with exceptionally rich grounds in the 19°40' and 20°10' latitude zones.

Miscellaneous big fish

The estimated resource ranged from a maximum of 10,645.12 tonnes observed in 1965 to a minimum of 388.07 tonnes obtained in 1970. The 10-year average was 5,342.30 tonnes. The *EPSY* amounted to 6,387.07, 232.84 and 3,205.38 tonnes respectively. Areas supporting yields 1,000 m. tonnes and above were located in most latitude zones between 18°10' and 21°10' with the latitude zone 19°40' yielding exceptionally high catches.

DISCUSSION

It is now fairly established that the contribution of the east coast to the fisheries wealth of India is only a quarter (Annual Reports of CMFRI). It is true as far as the pelagic fishery resources are concerned, for along the east coast there is hardly a pelagic fishery of importance like that of oil sardine (*Sardinella longiceps*) and mackerel (*Rastrelliger kanagurta*) of the west coast. Against the

TABLE 2. *The estimated resources (in m. tonnes) in each latitude zone during the years 1961 to 1970 in respect of the six categories of demersal fisheries along the Andhra-Orissa coast.*

Categories & Latitude zones	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	All years
<i>Sharks & skates</i>											
16°40'					96.06						96.06
17°10'		281.77	828.24	128.08	286.04	661.74					2185.87
17°40'	531.53	249.75	608.37	608.37	569.95	365.02	512.31	736.45	685.22	518.72	5385.69
18°10'	1942.35	567.76	1027.95	735.11	567.76	537.88	262.96	1021.98	89.65	454.21	7207.61
18°40'	687.69	1202.49	495.60	464.86	491.75						3342.39
19°10'		281.76	1280.72	1270.47	650.61						3483.56
19°40'	1078.78	3244.44		1881.78	1857.44						8062.44
20°10'	615.71	1368.91		1948.76	1159.69						5093.07
20°40'				322.77	1390.98						1713.75
21°10'					1305.69						1305.69
All Lths	4856.06	7196.88	4240.88	7360.20	8375.97	1564.64	775.27	1758.43	774.87	972.93	37876.13
EPSY	2913.64	4318.13	2544.53	4416.12	5025.58	938.78	465.16	1055.06	464.92	583.76	22725.68
<i>Misc.-Small</i>											
16°40'					1799.50	1370.44					3169.94
17°10'	4888.33	3359.92	981.93	1157.00	3330.04	1490.00					15207.22
17°40'	7729.53	5449.74	2439.89	2337.43	1210.34	2202.95	4021.66	4277.82	4834.96	2375.85	36880.17
18°10'	7799.29	3018.12	3257.18	3328.89	2474.26	2636.62	1960.28	6012.33	3968.38	3077.88	37532.23
18°40'	6623.31	1817.19	2259.00	2297.41	3622.85						16619.76
19°10'		3186.43	5005.05	6813.42	2756.11						17761.01
19°40'	10382.22	11339.33		9360.22	6164.44						37246.21
20°10'	7950.44	4525.18		15255.29	2725.87						30456.78

	20°40'				2267.07	2259.38						4526.45
	21°10'					5321.40						5321.40
	All Ltds	45373.12	32695.91	13943.05	42816.73	31664.19	7699.01	5981.94	10290.15	8803.34	5453.73	204721.17
	EPSY	27223.87	19617.55	8365.83	25690.04	18998.51	4619.41	3589.16	6174.09	5282.00	3272.24	122832.70
<i>Misc.-Big</i>												
	16°40'					1156.97	7925.92					9082.89
	17°10'	320.20	388.50	247.62	294.58	550.74	1216.75					3018.39
	17°40'	909.36	320.20	179.31	390.64	467.49	518.72	794.09	749.26	569.95	262.56	5161.58
	18°10'	1183.34	543.86	1141.51	1093.69	1314.82	280.89	478.12	2629.65	286.87	125.31	9078.26
	18°40'	687.69	676.16	733.79	338.08	380.34						2816.06
	19°10'		1214.12	481.55	1690.55	1285.84						4672.06
	19°40'	1906.11	3593.22		3633.78	1241.00						10374.11
	20°10'	765.16	2199.82		1368.91	1829.20						6163.09
	20°40'				637.85	1268.02						1905.87
	21°10'					1150.70						1150.70
	All Ltds	5771.86	8935.88	2783.78	9448.08	10645.12	9942.28	1272.21	3378.91	856.82	388.07	53423.01
	EPSY	3463.12	5361.53	1670.27	5668.85	6387.07	5965.37	763.33	2027.35	514.09	232.84	32053.82
<i>Rays</i>												
	16°40'					320.20	403.45					723.65
	17°10'		247.62	260.43	200.66	358.62	537.93					1605.26
	17°40'	339.41	448.27	294.58	384.24	448.27	416.25	601.97	633.99	813.30	288.18	4668.46
	18°10'	812.80	424.33	502.02	543.86	334.68	418.35	1195.29	1272.99		310.78	5815.10
	18°40'	291.98	142.15	122.94	341.92	330.40						1229.39
	19°10'		696.71	266.39	353.48	1234.61						2551.19
	19°40'	1070.67	1030.11		884.11	413.67						3398.56
	20°10'		717.33		173.36	364.64						1255.33
	20°40'					353.51						353.51
	21°10'					427.40						427.40
	All Ltds	2514.86	3706.52	1446.36	2881.63	4586.00	1775.98	1797.26	1906.98	813.30	598.96	22027.85
	EPSY	1508.92	2223.91	867.82	1728.98	2751.60	1065.59	1078.36	1144.19	487.98	359.38	13216.73

TABLE 2. (Continued)

Categories & Latitude zones	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	All years
<i>Cat-fish</i>											
16°40'					2064.20	898.68					2962.88
17°10'	1152.71	738.59	315.93	926.43	1413.13	943.51					5490.30
17°40'	2497.53	2132.51	1267.98	3727.08	2862.55	1972.41	3278.81	3054.67	1933.98	1831.52	24559.04
18°10'	1727.20	2079.81	2271.06	2641.60	3209.36	2731.25	1840.75	1434.35	53.79	3328.89	21318.06
18°40'	1348.48	3361.60	3184.88	1832.55	3238.66						12966.17
19°10'		189.55	517.41	4856.49	1378.05						6941.50
19°40'	827.33	3114.67		6659.22	413.67						11014.89
20°10'	1123.82	1165.67		1518.36	1619.98						5427.83
20°40'				1321.81	676.28						1998.09
21°10'					1178.88						1178.88
All Ltds	8677.07	12782.40	7557.26	23483.54	18054.76	6545.85	5119.56	4489.02	1987.77	5160.41	93857.64
EPSY	5206.24	7669.44	4534.36	14090.12	10832.86	3927.51	3071.74	2693.41	1192.66	3096.25	56314.59
<i>Prawns</i>											
16°40'						51.23					51.23
17°10'		209.19	76.85								286.04
17°40'	76.85	166.50	38.42	262.56	76.85	275.37	333.00	249.75	416.25	262.56	2158.11
18°10'	23.91	125.51	364.56	161.37	29.88	17.93	191.25	908.42	53.79	59.76	1936.38
18°40'		69.15	138.31	134.46	1.54						343.46
19°10'		256.14		230.53	40.98						527.65
19°40'		405.56		389.33	8.11						803.00
20°10'		95.64		11.96	245.09						352.69
20°40'					69.16						69.16
21°10'					248.93						248.93

All Lids	100.76	1327.69	618.14	1190.21	720.54	344.53	524.25	1158.17	470.04	322.32	6776.65
EPSY	60.46	796.61	370.88	714.13	432.32	206.72	314.55	694.90	282.02	193.39	4065.98

All Fish

16°40'					5436.93	10649.72					16086.65
17°10'	6361.24	5225.59	2711.00	2706.75	5938.57	4849.93					27793.08
17°40'	12084.21	8766.97	4828.55	7710.32	5635.45	5750.72	9541.84	9701.94	9253.66	5539.39	78813.05
18°10'	13488.89	6759.39	8564.28	8504.52	7930.76	6621.92	5928.65	13279.72	4452.48	7357.03	82887.64
18°40'	9639.15	7268.74	6934.52	5409.28	8065.54						37317.23
19°10'		5824.71	7551.12	15214.94	7346.20						35936.97
19°40'	15265.11	22727.33		22808.44	10098.33						70899.21
20°10'	10455.13	10072.55		20276.64	7944.47						48748.79
20°40'				4549.50	6017.33						10566.83
21°10'					9633.00						9633.00
All Lids	67293.73	66645.28	30589.47	87180.39	74046.58	27872.29	15470.49	22981.66	13706.14	12896.42	418682.45
EPSY	40376.24	39987.17	18353.68	52308.23	44427.95	16723.37	9282.29	13788.99	8223.68	7737.85	251209.45

background of such a knowledge, the exploratory trawling operations for ground-fish fisheries along the east coast (Andhra-Orissa) between the latitude zones 16°40' and 21°10' are of immense value for they have helped to bring to light hitherto unknown, potentially rich areas for ground-fish fisheries in the north-western regions of the Bay of Bengal.

In the absence of estimates similar to those obtained in the present account, it is difficult to compare the current findings with those on the demersal fishery resources both on the west coast (Jayaraman *et al* 1959; Rao 1968) and the east coast (Kuthalingam *et al* 1968; Pai and Pillai 1968; Sekharan *et al* 1968). Rao and Dorairaj (1968) provide, however, estimates similarly arrived at for the Goa region based on the exploratory trawling by the Government of India vessels and make a comparison possible. For an area of 15,798 sq. km., they have estimated a fishery resource of 47,558.813 tonnes and the estimated potentially sustainable yield at 60% level as 28,535 tonnes which is considered as highly productive. In the present investigation, for an area of 41,478 sq.km., an estimated fishery resource of 4,18,682.45 tonnes with 2,51,209.45 tonnes as the estimated potentially sustainable yield at 60% level, were obtained for the 10-year period. Even with respect to the cat-fishes, the elasmobranchs and the prawns, estimated resources comparable to those reported by them have been obtained. There is, thus, reason to believe that the northwestern regions of the Bay of Bengal are about a third as productive as those off Goa.

The trawl landings (CMFRI 1969) during the years 1960 to 1968, along West Bengal, Orissa and Andhra coasts, have ranged from 124 tonnes (1965) to 2,606 tonnes (1968), with an annual average of 659 tonnes. According to the present findings the estimated 10-year average resource amounted to 41,868.25 tonnes which is about 63 times the catches presently being harvested. The actual level of exploitation being low, there is room for a substantial increase in the expansion of the fishing activities for ground-fish fisheries along the Andhra-Orissa coasts.

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