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COMMERCIAL TRAWL FISHERIES OFF KAKINADA DURING 1969-1978*

Introduction

Experimental and exploratory trawling off Kakinada by the Central and State Government organisations was initiated in 1960 but the commercial exploitation of the resources by small-sized trawlers started in 1964. Since then, the industry expanded substantially by increasing both the size and number of the trawlers. The staff attached to the Research Centre at Kakinada have been collecting data in a systematic way on various resources, since the beginning of commercial trawling at Kakinada, to understand the resource characteristics and also to provide the data to various organisations and enterpreneurs interested in the same. The data collected during the 10 year period (1969–1978) are incorporated in this report.

Presently the fishing is conducted in the sea off Kakinada between 16° 35′ N–17° 25′ N latitude and 82° 20′ E–83° 10′ E longitude (fig. 1) at depths ranging from 5 to 80 m. During the earlier years however,

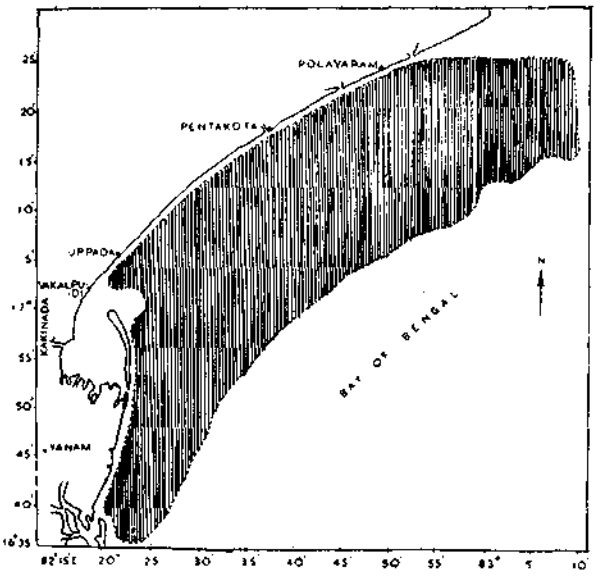

Fig. 1. Map of fishing ground.

the area covered was less (vide:Muthu *et al., Indian J. Fish.*, 22: 1975.) The boats conduct daily fishing during day time and land the catches by evening but during certain months (November–February) some boats conduct night fishing also and land the catches in the early morning.

Craft and Gear

Three types of boats are engaged in fishing in the region. The particulars of the sizes of the boats, engine and the nets used are given in Table 1. The commercial fishery started with small boats *(Pablos)* and subsequently boats of two more sizes were added to the fleet (Table 1) but there was considerable increase in the *Pomfret* and *Royya* boats over the years, whereas similar increase was not noticed for *Pablos* and *Sorrahs* (fig. 2).

Fisheries

Data on the catches collected over a period of ten years from 1969 to 1978 (Table 2) show that on an average 6,691 tonnes of fish including 1,666 tonnes of

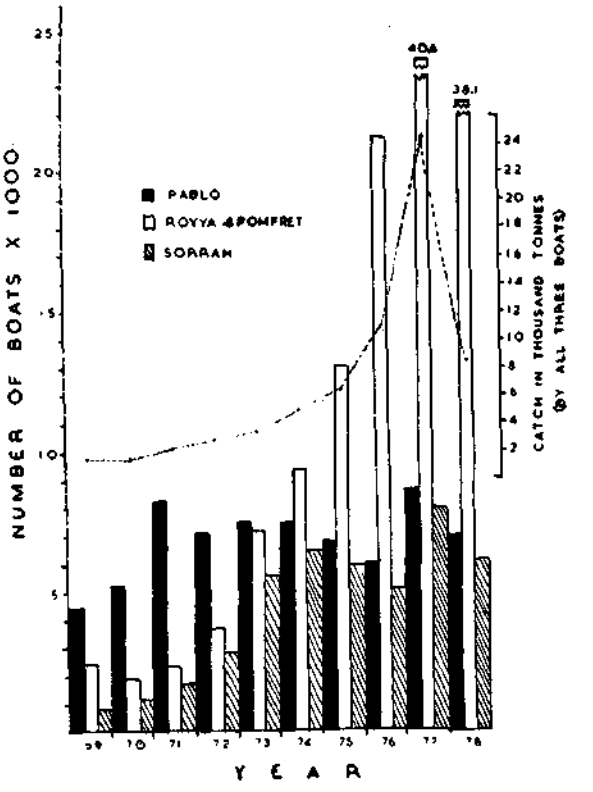

Fig. 2. Details of types of boats operated in different years and estimated total catches.

prawns are landed at this centre annually. There are differences in the seasonal variations of the ground fish abundance on the trawling grounds in different years

* Prepared by the staff of Kakinada Research Centre of CMFRI

Table 1. *Details of the Craft and Gear used at Kakinada.*

Type of Boat	Particulars of the vessels				Particulars of the gear operated					
	Length	Beam	Draft	Engine	Type of net	Length of Head rope	Mesh size	Otter boards	Rigging	Net operation
	m	m	m	HP			cm			
Pablo	9.14	2.49	0.87–0.97	20–30	2-seam cotton trawl during earlier years 2-seam and 4-seam trawl made of synthetic monofilament of 0.5–1.0 mm diameter.	11.89 & 12.95 m	Wings: 7.6 Body: 3.8–5.1 cod end 0.8–2.5	Shape: oval during early periods Flat Rectangular now. Wt: 35 kg.	Double expanded legs upto a length of 5–10 m	Mechanical winch with G.I. wire rope.
Pomfret & Royya	9.75 & 10.0	2.9	1.07	45–60	–do–	14.94, 16.5 and 18.29 m In some cases the wings are extended even up to 27.44 m to cover wider area.	–do–	Wt: 40–45 kg.	–do– with a length of 15–20 m.	–do–
Sorrah	11.41	3.2	1.22	60–75	–do–	–do–	–do–	Wt: 45–60 kg.	–do– with a length of 10–20 m.	–do–

but a peak in January–March period is more or less common to all years (Table 3). Several species contribute to the fishery and the data are collected by separating the catches into 33 groups as given in Table 2. Of these, prawns, sciaenids, ribbon fish, silver bellys, *Decapterus* sp, *Nemipterus* spp, *Psenes* sp, Lizard fish, Bombay Duck and flat fish are the dominant items (in the order of abundance) in the catches. The seasonal variations in the catches of these ten groups for the period 1969–78 (averages) are presented in Table 4.

Prawns

Prawns form the most dominant component in the trawl catches accounting for about 25% of the total catches (Table 2). 30 species of penaeid prawns and 7 species of non-penaeid prawns contribute to the fishery. Important species of penaeid prawns in the order of abundance are: *Metapenaeus dobsoni, M. monoceros, M. affinis, Penaeus indicus, P. monodon, Parapenaeopsis stylifera, Solenocera crassicornis, P. hardwickii* and *P. merguiensis*. Among non-penaeid species, *Acetes* spp, *Exopalaemon styliferus, Nematopalaemon tenuipes* and *Exhippolysmata ensirostris* are important. The details regarding the prawn fisheries at Kakinada during the study period have been reported by Sudhakara Rao *et al. (Mar. Fish. Infor. Serv. T & E Ser.*, No. 21, 1980).

Sciaenids

These fishes occupy second position in regard to abundance. The catches showed an increasing trend till 1972; in 1973 there was a decline but considerable increase was seen from 1974 to 1977; in 1978 again there was a decline to the tune at 86% with only 18.6% decrease in the effort when compared to 1977. There are two peaks in the seasonal abundance, one in April–May and the other in August–September. About 17 species contribute to the fishery with *Johnius carutta, J. dussumieri, J. vogleri, Pennahia macrophthalmus, Atrobucca nibe* and *Otolithus ruber* dominant.

Ribbon fish

An estimated annual average catch of 536 tonnes were obtained by the trawlers during the ten-year period. Starting from 1969, the catches showed gradual increase in the next two years but in 1972 there was decline. The catches however increased in 1973 and this increasing trend continued till 1977 but in 1978 there was a decline. Though ribbon fish is a pelagic resource, they are caught in considerable quantities by the trawlers when these fishes move into the trawling ground in large shoals. The data show that these fishes are abundant on the fishing ground during April–June. About 6 species occur in the catches but

Table 2. *Estimated catches (kg) of different groups/species by three types of boats combined during different years.*

Sl. No.	Name of fish	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	Average for 1969–'78	Percentage	Rank
1.	Prawns	2,68,847	4,02,762	6,02,524	8,65,835	8,21,883	14,31,896	16,25,225	24,28,381	61,91,004	20,25,855	16,66,421	24.90	1
2.	Crabs	26,323	7,827	23,405	63,474	33,989	69,317	1,40,292	1,14,004	2,01,100	37,534	71,727	1.07	22
3.	Cephalopods	15,705	19,056	29,068	44,265	42,877	50,959	89,279	1,05,634	2,56,783	1,30,916	78,454	1.17	19
4.	Sharks	500	2,188	1,364	3,748	4,493	27,555	39,328	1,15,695	34,060	1,98,908	42,784	0.64	28
5.	Rays	60,398	1,13,482	1,29,171	64,834	76,044	1,15,075	2,52,079	1,97,484	1,45,528	39,079	1,19,317	1,78	14
6.	Skates	20,907	26,832	25,063	46,187	15,805	18,063	44,504	11,890	1,74,921	1,92,647	57,682	0.86	23
7.	Eels	24,945	29,890	22,245	43,005	64,200	1,28,647	1,78,448	2,51,403	2,45,898	1,33,825	1,12,251	1.68	16
8.	Cat fish	32,612	30,185	27,841	74,540	66,186	1,40,611	1,64,764	2,91,417	6,59,070	1,22,623	1,60,985	2.41	11
9.	Lesser sardines	9,036	1,989	1,824	6,438	36,905	5,608	37,236	2,76,558	54,895	22,081	45,257	0.68	27
10.	White bait	15,022	10,044	25,157	61,880	45,787	70,793	45,386	2,38,706	4,66,332	2,30,584	1,20,969	1.81	13
11.	*Ophisthopterus*	23,625	24,880	23,670	8,431	9,930	42,680	58,287	39,214	2,60,417	63,316	55,445	0.83	24
12.	*Thryssa* spp	992	16,978	19,706	53,598	46,946	84,539	1,00,396	1,53,823	1,14,140	1,42,375	73,349	1.10	20
13.	Other clupeids	19,456	5,628	14,979	28,056	51,508	34,256	1,04,279	1,68,424	1,34,793	1,77,678	73,906	1.10	21
14.	Bombay duck	264	7,865	22,277	59,583	88,711	95,862	1,16,578	2,03,910	3,38,996	8,64,872	1,79,892	2.69	9
15.	Lizard fish	16,364	36,710	63,543	83,677	23,889	1,77,253	2,00,791	4,07,162	7,11,457	4,19,814	2,14,066	3.20	8
16.	Perches	16,739	15,362	29,482	26,219	27,300	62,388	1,29,245	89,002	3,66,155	1,07,670	86,956	1.30	18
17.	*Nemipterus* spp	1,63,665	1,28,535	1,01,329	1,12,739	2,07,154	2,91,411	4,92,932	5,27,767	13,36,945	3,93,341	3,75,582	5.61	6
18.	Goat fish	8,937	17,571	88,983	1,49,118	64,014	2,15,457	2,41,444	1,46,257	2,05,021	1,17,179	1,25,398	1.87	12
19.	*Polynemus* spp	25,003	20,326	33,127	22,343	23,948	61,331	81,549	23,311	1,80,900	53,845	52,568	0.78	25
20.	Sciaenids	1,98,833	1,75,444	3,34,372	4,42,077	3,43,202	7,63,278	7,96,500	8,73,076	28,38,254	3,97,309	7,16,235	10.70	2
21.	Ribbonfish	54,458	59,391	2,36,230	1,16,391	2,17,514	3,71,559	3,77,254	6,32,449	22,23,435	10,71,212	5,35,989	8.01	3
22.	*Decapterus* spp	26,726	2,553	1,640	12,441	3,18,326	2,352	95,822	13,71,888	19,83,532	99,361	3,91,464	5.85	5
23.	Other carangids	19,508	35,373	28,426	32,525	13,274	53,989	40,574	30,900	70,177	74,780	39,953	0.60	29
24.	Silver belly	60,555	1,12,426	2,81,807	1,93,775	1,62,862	2,29,329	3,39,729	3,23,475	28,88,942	3,97,141	4,99,004	7.48	4
25.	*Lactarius*	59,838	40,267	45,691	48,259	20,103	1,18,367	1,23,662	80,973	5,42,403	70,520	1,15,008	1.72	15
26.	Pomfrets	2,342	1,973	10,922	6,019	7,271	15,757	16,804	31,521	27,370	20,245	14,022	0.20	31
27.	Mackerel	45,793	322	72	15,657	6,974	3,068	490	—	8,048	4,879	8,530	0.13	33
28.	*Sphyraena* spp	1,620	2,245	—	7,126	15,178	4,309	3,224	24,597	38,078	18,594	11,497	0.17	32
29.	*Psettodes erumei*	—	—	1,172	8,615	7,931	11,058	12,829	21,242	41,375	55,060	15,928	0.24	30
30.	Other flat fish	29,946	39,914	35,772	65,065	78,288	1,75,889	2,80,466	2,88,495	5,22,266	1,73,280	1,68,938	2.52	10
31.	*Kurtus indicus*	7,633	16,400	14,492	35,458	12,027	64,822	50,664	1,68,801	74,634	41,604	48,654	0.73	26
32.	*Psenes* spp	14,317	23,841	28	—	4,98,140	29,254	34,470	13,03,983	9,45,421	3,55,274	3,20,473	4.79	7
33.	Miscellaneous	29,330	28,081	33,295	68,081	44,604	62,138	84,618	1,14,805	2,89,591	1,69,512	92.406	1.38	17
	TOTAL	13,00,239	14,56,340	23,08,677	28,69,459	34,97,263	50,28,870	63,99,148	1,10,56,247	2,45,71,941	84,22,913	66,91,110		
	Effort (hours)	34,236	38,201	55,855	67,507	1,34,119	1,77,347	1,87,065	2,37,339	4,14,697	3,76,972	1,72,333		
	Catch/hour	37.9	38.1	41.3	42.5	26.1	28.4	34.2	46.6	59.3	22.3	38.8		

Table 3. *Quarterly estimated total catches (kg) and catch rates (CPH) in parentheses by three different types of boats during* 1969–1978.

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1969–1978
PABLO											
Ist quarter	1,44,891 (42.21)	1,19,382 (26.60)	2,71,754 (33.35)	4,61,070 (50.46)	4,94,510 (50.36)	3,17,373 (16.09)	2,04,460 (26.21)	6,40,769 (51.33)	8,42,083 (52.41)	1,92,146 (13.78)	36,88,456 (35.14)
IInd quarter	1,65,015 (28.81)	2,58,044 (31.50)	3,39,518 (45.26)	4,00,047 (38.43)	2,01,005 (15.10)	3,21,940 (23.74)	3,73,340 (28.67)	2,31,246 (26.54)	7,81,614 (46.0)	1,62,422 (13.31)	32,34,191 (29.50)
IIIrd quarter	1,85,348 (27.84)	1,80,372 (26.0)	3,79,977 (36.63)	2,61,268 (32.14)	1,51,149 (8.99)	2,84,951 (25.19)	3,11,230 (25.94)	2,78,702 (24.32)	4,93,152 (42.37)	5,20,833 (47.36)	30,46,981 (28.66)
IVth quarter	89,920 (21.76)	1,66,014 (37.0)	3,45,452 (29.94)	1,83,855 (25.01)	1,04,094 (12.07)	1,92,792 (25.05)	1,75,560 (19.84)	1,50,922 (25.33)	2,73,748 (28.46)	1,41,139 (21.02)	18,23,496 (24.33)
POMFRET & ROYYA											
Ist quarter	2,38,043 (67.32)	1,60,448 (53.0)	61,906 (35.09)	1,94,922 (61.76)	5,84,704 (59'09)	6,81,534 (24.42)	7,68,598 (43.61)	38,23,713 (78.96)	73,18,750 (91.75)	24,13,210 (21.28)	1,62,45,828 (52.87)
IInd quarter	1,84,280 (44.35)	1,26,651 (56.5)	1,27,160 (52.82)	2,21,253 (52.31)	2,65,279 (22.64)	4,40,680 (29.13)	7,21,690 (34.19)	14,40,300 (35.49)	55,37,692 (60.12)	10,31,122 (11.25)	1,00,96,107 (35.38)
IIIrd quarter	81,757 (39.04)	57,188 (31.2)	1,67,007 (53.4)	2,36,132 (40.06)	1,95,431 (15.50)	4,63,811 (31.31)	11,10,380 (38.04)	15,31,484 (33.73)	26,25,037 (44.62)	20,61,974 (43.72)	85,30,201 (31.61)
IVth quarter	48,334 (45.9)	72,489 (42.8)	2,01,792 (60.93)	1,78,030 (34.74)	2,27,252 (17.09)	5,56,016 (34.46)	7,32,151 (26.50)	7,46,255 (33.88)	23,95,173 (37.30)	7,01,325 (23.69)	58,58,817 (31.83)
SORRAH											
Ist quarter	39,459 (56.61)	1,21,063 (79.1)	42,936 (44.17)	1,94,535 (64.68)	5,67,706 (84.73)	5,07,934 (29.14)	5,98,162 (51.28)	12,94,008 (90.1)	17,59,634 (91.39)	4,25,997 (23.23)	55,51,434 (59.09)
IInd quarter	19,273 (40.07)	88,638 (61.60)	1,06,451 (56.59)	2,27,802 (60.74)	2,61,471 (26.83)	4,55,020 (37.09)	4,45,744 (37.10)	3,50,162 (34.44)	15,16,234 (73.35)	1,93,271 (12.06)	36,64,066 (41.42)
IIIrd quarter	63,671 (49.05)	58,665 (45.0)	1,06,276 (47.52)	1,79,195 (43.02)	2,08,496 (19.10)	4,81,373 (37.97)	6,61,960 (43.78)	3,87,650 (32,35)	6,22,496 (48.66)	4,30,396 (40.57)	32,00,178 (38.51)
IVth quarter	40,248 (38.22)	47,386 (45.80)	1,58,448 (61.13)	1,31,350 (41.70)	2,36,166 (22.13)	3,25,446 (32.81)	2,95,873 (26.74)	1,81,036 (31.43)	4,06,328 (31.86)	1,49,060 (23.66)	19,71,341 (30.66)

Table 4. *Seasonal variations in the catches of important groups (Average for the period* 1969–78) *(Values in parentheses are percentages)*

Name of fish	Jan–Mar Ist Quarter	April–June II Quarter	July–Sep III Quarter	Oct–Dec IV Quarter	Average totals for 10 years.
Prawns	4,33,121	4,58,593	4,73,104	3,01,603	16,66,421
	(26.0)	(27.5)	(28.4)	(18.1)	
Sciaenids	1,36,895	3,36,524	1,42,707	1,00,108	7,16,234
	(19.1)	(47.0)	(19.9)	(14.0)	
Ribbonfish	1,27,276	1,70,011	1,54,839	83,863	5,35,989
	(23.7)	(31.7)	(28.9)	(15.7)	
Silverbelly	2,36,190	1,23,566	80,298	58,950	4,99,004
	(47.3)	(24.8)	(16.1)	(11.8)	
Decapterus sp	3,87,078	2,969	799	817	3,91,464
	(98.8)	(0.8)	(0.2)	(0.2)	
Nemipterus spp	2,13,530	60,316	35,274	66,462	3,75,582
	(56.8)	(16.1)	(9.4)	(17.7)	
Psenes sp	2,89,981	27,902	1,087	1,503	3,20,473
	(90.5)	(8.7)	(0.3)	(0.5)	
Lizard fish	92,583	45,173	31,956	44,354	2,14,066
	(43.2)	(21.1)	(14.9)	(20.7)	
Bombay duck	9,690	15,382	1,46,658	8,161	1,79,891
	(5.4)	(8.6)	(81.5)	(4.5)	
Flat fish	65,104	38,032	34,852	30,950	1,68,938
	(38.5)	(22.5)	(20.6)	(18.4)	

Trichiurus leptures is the most dominant, contributing about 70% of ribbon fish catches.

Silverbellys

An average of about 500 tonnes are landed annually forming about 7.5% of total landings. The catches of these fishes also showed decline during 1977 and 1978. Although contributing to the fishery throughout the year, they are most abundant during January–March period. Out of 10 species, *Leiognathus bindus* and *Secutor insidiator* are most abundant.

Decapterus sp.

These fishes form a seasonal fishery, most abundant during January–March. Like ribbon fish, this species also is pelagic and caught by trawls when large shoals move into the fishing ground. There are wide fluctuations, like many other pelagic resources, in the catches during different years (Table 5). An average of 391 tonnes are landed annually forming about 6% of trawl catches.

Nemipterus spp.

The ten year average estimated catches show that about 375 tonnes of these fishes are landed annually forming 5.6% of trawl catches. The data on seasonal abundance show that January–March and October–December are the peak periods for these fishes, the first quarter, however, being more productive. Five species occur in the catches, *N. japonicus* being the most dominant.

Penses sp.

This species occurs seasonally and about 90% of the annual catch comes during January–March period. There are wide fluctuations in the catches in different years (Table 5). An average of 320 tonnes are landed annually forming 4.8% of the catches.

Lizard fish

The annual estimated catches range from a minimum of 16 tonnes in 1969 to a maximum of 711 tonnes in

1977. From 1969 the catches showed increase till 1972 but in 1973 there was a deep decline. There was improvement from 1974 till 1977, again declining in 1978. These fishes occur in large quantities during January–March period. About 3 species occur, of which *Saurida tumbil* is the most dominant.

Bombay Duck

Harpodon nehereus occurs seasonally in large quantities. The ten-year data show that this species is abundant during July–September period. The catches showed increasing trend in successive years. Starting with less than 1 tonne in 1969, an estimated 865 tonnes were landed in 1978, the ten year average being 180 tonnes forming 2.7% of the trawl catches.

Flat fish

The estimated annual average catch of these fishes is 185 tonnes forming about 3% of total catches. *Psettodes erumei* and *Cynoglossus* spp are the important species. These fishes occur almost round the year but they are most abundant during January–March period.

Remarks

In general there was deep decline in the catch per unit effort during 1973 and 1978 for the total trawl catches (Table 2). It is however, observed that the catches showed steady increase from 1969 to 1977 without decline in 1973 and declined only in 1978. So the decline in catch rate in 1973 appears to be brought about by the heavy input of effort, almost double that of the previous year. But in 1978 there is decline in total catch, effort and catch rate.

As already pointed out by Silas *et al., (Bull. Cent. mar. Fish. Res. Inst.*, 27, 1976) and Sudhakara Rao *et al (Mar. Fish. Infor. Serv. T & E Ser.*, 21, 1980), trawling is almost exclusively carried out for prawns because of the export market. This has resulted in extensive coverage of certain parts of the fishing grounds and little or no coverage of other parts, thus affecting the production of other demersal resources. In this connection it may be pointed out that Sriramachandra Murty (Ms: A study of the Sciaenid fisheries off Kakinada along the east coast of India) observed that increase in effort in different years did not bring increased sciaenid catches. Further it has also been shown that in some years, periods of peak effort coincided with periods of poor catches of sciaenid fishes. This increased effort was apparently used to catch prawns in certain parts of the fishing ground. In fact the demand for prawns has also lead to the reduction of the cod end mesh size of the trawl nets (Sudhakara Rao *et al., Mar. Fish. Infor. Serv. T & E Ser.*, 21, 1980) in recent years. Though this has resulted in the increase of the small-sized non-penaeid prawn catch, there is no recognisable change in the length composition of the important groups of finfish caught. This again, is probably, due to the uneven distribution of effort on the fishing ground with the sole aim of catching more prawns. It may be pointed out here that majority of the boats conduct trawling in the inshore waters of 5–20 m depth zone where it is known that the prawns are abundant. If the effort is uniformly distributed on the fishing grounds one would expect large quantities of early juveniles of fish also to be caught at least during certain seasons, on account of reduction in the cod end mesh size.

The boats carry ice in boxes to bring prawns but no such arrangement exists for bringing fin fishes though they constitute about 70% of the catches. This is because the deck-space is not sufficient to keep more boxes with ice and also there is lesser demand for them as compared to prawns. A consequence of this is that in majority of the cases, most of the fishes are spoiled by the time they are landed and hence are not fit for consumption in fresh condition. These fishes are sold at very cheap prices for purposes of salt-curing and sun-drying.

Since the boats are small (Table 1) and have to return to the base every day, the scope for further expansion of the fishing ground is limited. In the light of these observations it is felt that uniform distribution of effort on the existing fishing ground would help increase production of important fin fishes. This, however has to be done keeping the prawn production in view. Another approach would be to introduce larger vessels that can venture into deeper areas which are not covered so far. In any case constant monitoring of the resources would be essential in order to enable appraisal of the fisheries with proper management approach.