

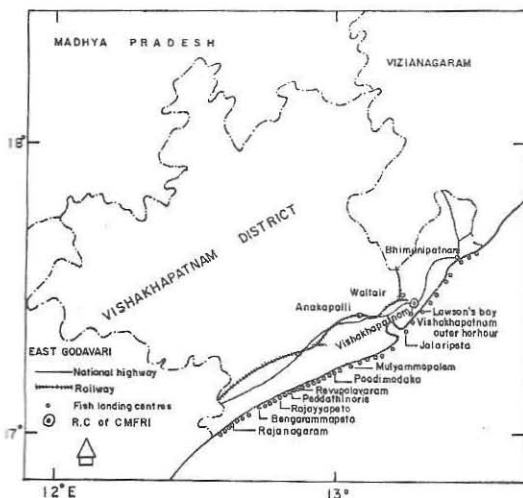
## An Appraisal of the Marine Fishery Resources Of Visakhapatnam Coast

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Located along the east coast of India, between 17 deg 15' N and 17 deg 55' N Latitudes (Fig. 1), the Visakhapatnam coast (bordering the district of Visakhapatnam) has a special place in the marine fisheries map of India being the nucleus of deep sea trawling activities and various other mechanised and non-mechanised gear operations. The range of gear operated varies from the tiny catamarans to the modern shrimp trawlers with all the gadgets of navigation and fishing. With a number of fish landing centres dotted along the 130 km coastline, about 19,735 t of fish are harvested annually from the waters of this coast. Apart from this, about 130 large trawlers, 60 mini-trawlers and 100 'sona' boats fishing along the Orissa and West Bengal coasts land their catches at Visakhapatnam Fishing Harbour.

Fig.1 MAP OF VISHAKHAPATNAM DISTRICT



Traditionally fishing is conducted by a variety of artisanal gears like shore seines, boat seines, hook & lines and gill nets of different mesh sizes. However, with the advent of mechanisation in the sixties and the construction of a modern fishing harbour at Visakhapatnam in 1980 the scenario changed very fast. Realising the importance of monitoring the fishery resources, the Central Marine Fisheries Research Institute at Visakhapatnam has undertaken a number of Research Projects to study the biological and population parameters of various commercially important species of finfish, cephalopods and prawns. The results obtained as a consequence of these studies are reported in various publications by the scientists of the Visakhapatnam Research Centre. Notable among them are Anon (1979), Apparao (1978, 1982), Apparao and Krishnamoorthi

(1983), Appannasastry and Chandrasekhar (1986) Krishnamoorthi (1973, 1976, 1980), Luther (1988), Luther et al (1988), Rao (1987, 1988, 1991), Rao et al (1981), Reuben et al (1989), Sekharan (1973) and Sekharan et al (1973). Most of these publications either deal with a particular resources, limited to one landing centre or the resources along the entire north-east coast. An attempt is made in this paper to give a comprehensive picture of the marine fishery resources of the Visakhapatnam Coast to facilitate the formulation of developmental plans for the region.

### Source of Data

Catch data for the Coast are collected from the records of Field Research and Data Centre of CMFRI for the period 1980-89. Detailed data on the small trawler fishery in respect of catch, effort and species or group composition are retrieved from the records of Visakhapatnam Research Centre of CMFRI. Data for the period 1980-89 are considered for the general trends of small trawler/(mechanised boat) fishery. For the purpose of giving catch composition, data for the period April 1982 to March 1990 are employed. Data collected at Lawson's Bay for the period 1981-85 are analysed to represent artisanal fisheries of the coast of Visakhapatnam in detail.

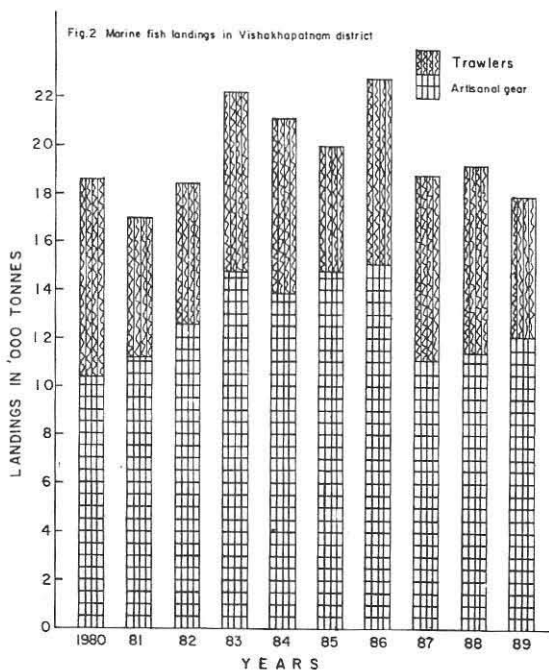
### CRAFT AND GEAR

The fishing boats operating along the Visakhapatnam coast can be broadly classified as small trawlers (mechanised boats) operating trawl nets and non-mechanised boats operating the traditional artisanal gear. The mechanised boats (small trawlers) operating in these waters are of 9.8 m overall length fitted with 45-60 HP diesel engines, dragging 4 seam shrimp trawl of 15 mm codend mesh. These boats either conduct single day trips, leaving for fishing in the early morning hours and returning to harbour in the afternoon or conduct 'voyage' fishing for 3 to 4 days continuously and land the catches after the completion of voyage. They fish upto a depth of 60 m with intensive fishing in the 20-25 m depth zone. Rao (1991) traced the changes in the pattern of fishing by these boats since 1968. The common non-mechanised boats are catamarans and Masula boats. Shore seines, boat seines, drift gillnets, bottom set gillnets and hook & lines are the chief gears operated from non-mechanised boats. These gears operate within 40 m depth with intensive fishing in 5-30 m depth zone. Rao et al (1981) described the construction and pattern of operation of these gears.



## Fishery Resources

Annual marine fish landings of the Visakhapatnam coast for the period 1980-89 are given in Fig. 2. The landings varied from 16,967 t in 1981 to 22,788 t in 1986 with the average estimated as 19,605 t. The mechanised boats operating trawlnets contribute 35% or 6855 t and the artisanal gear contributes 65% or 12,750 t to the annual fish landings of the district. The landings reached a peak in 1986 and then declined till 1989. Applying 'relative response' model (Alagaraja, 1984), Maximum Sustainable Yield (MSY) has been estimated as 19,685 t indicating that harvesting more than this in any one year is not desirable for the future health of the fishing industry.



### Small Trawler (Mechanised Boat) Fishery Resources

Commercial trawling for ground fish started along this coast in 1968 and gradually increased to the present level. When they conduct daily fishing trips, these boats fish between Bheemūnpatnam in the north and Pudimadaka in the south encompassing an area of 1000 sq.km (Fig. 1). During the voyage fishing these boats go as far as Santapalli in the north and Pentakota in the south. Small trawlers operate throughout the year and conduct aimed fishing for shrimps. However, a variety of fin fishes and cephalopods are also caught incidentally as by-catch. The annual landings, effort in trawling hours and the catch per hour of trawling (Cph) for the 10 year period 1980-89 are given in Fig.3. The landings vary from 8182 t in 1981 to 5267 t in 1985 with the average estimated as 6855 t. The effort varied from 390281 hours in 1984 to 229658 in 1982, while the Cph (catch per hour) varied from 18.04 kg in 1989 to 4.39 kg in 1980. It is evident from Fig. 3

that Cph in the first 5-years (25.5 kg) was better than in the later period (23.1 kg).

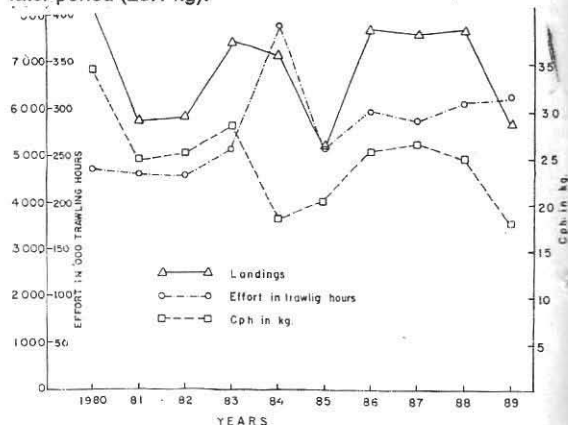


Fig. 3 Annual catch, effort and Cph of small trawler at Visakhapatnam

To assess the present status of the fishery, data on effort and Cph for the period 1980-89 are subjected to 'surplus yield' model. Based on this method Maximum Sustainable Yield (MSY) and the corresponding effort (FMSY) are estimated as 7226 t and 345153 trawling hours. On the assumption that each small trawler operates for 250 days in a year and conduct trawling for 8 hours in a day, i.e., about 172 trawlers would expend an effort of 345, 153 trawling hours and realise a catch of 7226 t. The present strength of the fleet i.e., 200 small trawlers, is therefore in excess of the optimum required number. Hence it is suggested that the fleet size is to be reduced to 172 fro the existing 200. However, Rao (1991) studying the shrimp fishery of the small trawlers or the period 1980-89 estimated the MSY and the corresponding effort for shrimps as 728 t and 270, 785 trawling hours respectively and suggested that the number should be reduced to 135 from the existing 200. He has also shown that exceeding this limit in the two successive years i.e., in 1983-84 and 1984-85 with landings at 1142.5 t and 888.4 t respectively has resulted in the failure of the fishery in the following years. Since small trawlers conducted aimed fishing for shrimps and the fish component is only an incidental bycatch it is better to regulate effort in relation to the prawn fishery and reduce the number of boats accordingly to 135.

Although small trawlers do aimed fishing for prawns, a variety of fishes, cephalopods and crustaceans are landed in huge quantities. In fact prawns form only 10% of the small trawler landings and the rest of 90% is contributed by the other groups. Annual landings of different groups during 1982-83 to 1989-90 are given in Table 1 and the seasonal average of Cph of different groups is given in Table 2. Commercially important groups numbering 19 are separately shown while the other groups landed only sporadically and in lesser quantities are together grouped as miscellaneous.

Annual shrimp landings varied from 1142.5 t in 1983-84 to 430.7 t in 1987-88 and the percentage composition from 13.9% in 1984-85 to 5.5% in 1987-88. Cph also indicated similar trend during this period (Table 2). Further, there was a gradual decline in the percentage composition of prawns in the total landings from 1984-85 to 1987-88 as also the Cph from 3.5 kg in 1983-84 to 1.5 kg in 1988-89 indicating that the prawn stocks of this region are subjected to overfishing. Rao (1991) analysed the population parameters of the two commercially important species, *Metapenaeus monoceros* and *Penaeus indicus*, and showed that these species suffer heavy fishing mortality and hence there is an urgent need to regulate the shrimp fishery of this region. The present analysis of catch, Cph and percentage composition also indicates that the fishery needs immediate regulation.

Data for the period January 1982 to December 1989 are pooled to delineate the seasonal variation in catch, effort, Cph and the group composition and are given month-wise in Table 3. It may be seen from Table 3 that the effort in units gradually increased from January and reached a peak in July and declined gradually till February except for a minor peak in December. Effort in trawling hours also indicated a similar seasonal trend. Total catch varied from 402.3 t in January to 855.1 t in September with a primary peak in September and a secondary peak in April. The peaks for Cph are indicated in March and September. While a number of groups support the fishery during July-December, only a few groups that are associated with upwelling are landed in huge quantities during March-April period. These are nemipterids, carangids, *Pseudocaranx dentex* and mackerel. The seasonal variations in the landings of different groups can be deduced from Table 3. The main groups contributing to the fishery are nemipterids (12.1%), penaeid shrimps (10%), lizardfish (9.3), goatfish (9.1%), sciaenids (6.2%), ribbonfish (6.1%), silverbellies (5.6%), perches (4.7%) clupeids (4.4%), carangids (3.5%) and cephalopods (2.9%).

The annual landings of different groups indicate that most of the groups reached peaks in 1983-84 and 1987-88 and then declined in the subsequent years. The general trend over the eight-year period indicates decline of landings from 1983-84 till 1989-90. However, some groups like clupeids, goatfishes, pomfrets and flatfishes have shown increased landings in the later years (Table 3). Cph of different groups also indicated similar trend (Table 2).

## Artisanal Fisheries

The landings of artisanal fisheries operated by non-mechanised boats constituted about 65% to the marine fish landings of the Visakhapatnam district's coastal strip during 1980-98 period with average landings estimated at 12,750 t. The annual landings gradually increased from 10,472 t in 1980 to 15,051 t in 1986 and declined sharply to 11,124 t in 1987 and then increased to 12,149 t in 1989. MSY has been estimated as 13151 t employing relative response model using the data for the years 1980 to 1989. The estimate appears to be realistic since the landings declined in the succeeding years whenever this limit was exceeded.

Gillnets, hooks & lines, shore seines and boat seines are the main gear operated by the non-mechanised boats. Gear-wise landings for the period 1985 to 1989 are given in Fig. 4. It may be seen that with average annual landings estimated at 7301 t, gillnets contributed about 56.6% to the artisanal landings followed by shore seines (17.1%) with 2805 t, hook & lines (14.2%) with 1836 t, and boat seines (12.1%) with 1564 t.

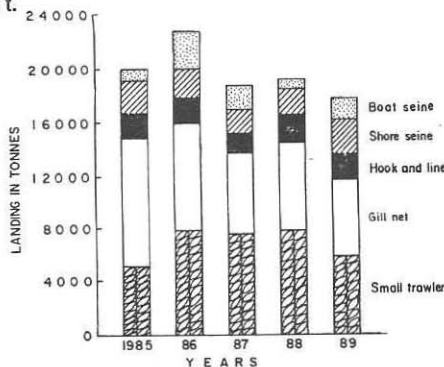


Fig. 4 Gear wise marine fish landings in Vishakhapatnam district

**Gillnets:** Gillnet landings varied from 9655 t in 1985 to 5735 t in 1987 during the five year period. Data collected from the Lawson's Bay landing centre for the period 1981-85 period were analysed to estimate the average annual landing of different groups by both bottom-set gillnets and surface gillnets (Table 4). On an average bottom-set gillnets at Lawson's Bay landing centre landed about 163 t of fishes. With annual landings of 83.6 t, mackerels (51.3%) dominated the catches followed by carangids (13.6%) seerfish (9.4%), catfish (5.2%), bull's eye (3.2%), ribbonfish (1.2%), tunas (0.7%) and silverbellies (0.2%). Miscellaneous groups formed about 15.3% of the landings. Seasonal variations in the landings are shown in Table 5. Bottom-set gillnet landings indicated two peaks in the landings, a primary peak during May and a secondary one during December. About 61% of the annual landings are landed during the 5-month period of May-September.

Gillnets (surface) landed about 71.8 t of fish annually at Lawson's Bay. With annual landings estimated at 66.6t, sardines dominated the surface gillnet landings forming as much as 92.8%. *Dussumeria* spp, mackerels, carangids, silverbellies, tunas, seerfish and anchovies are landed in lesser quantities (Table 3). Gillnet landings reaching a peak in March gradually decline till September and then increase gradually till March. About 60% of the annual landings are recorded during February and March.

**Hook & Lines:** The annual landings by hook & lines in the district varied from 1585 t in 1987 to 203 t in 1988 during the five year period of 1985-98. The annual average is estimated at 1836 t. Lawson's Bay is a major landing centre for hook & lines with average annual landings of 334.9 t during 1981-85 period. Forming almost 33.4% of the landings, seerfish dominate hook & lines landings followed by Tunas (6.7%), Catfish

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(14.9%) and bill fishes (10.2%). Miscellaneous fish represented about 20% of the landings. Hook & line landings reached a peak in June and declined gradually till November. About 50% of the annual landings are recorded during the April-August period.

**Shore Seine:** The annual shore seine landings in the district varied between 1875 t in 1987 to 2468 t in 1989 and the average is estimated as 2205 t. At Lawson's Bay the average annual landings are estimated as 85.1 t during 1981-85 period with almost 94% of the landings recorded during February-April. This gear is not operated during June-September and the landings during October-January are negligible (Table 5). Anchovies and ribbonfish account for over 59% of the landings with *Dussumaria* spp (10.5%), carangids (10.3%), silver bellies (5.8%) and sardines (3.4%). (Table 3.).

**Boat seines :** Of all the gears boat seine landings fluctuated widely during the 5-years period. Annual landings varied from 597 t in 1988 to 2832 t in 1986 with the average estimated as 1564 t. The average annual landings are estimated as 30.1 t at Lawson's Bay with almost 81% of the landings recorded during the two months of February and May. The landings and the effort expended are negligible during the other months.

## General Remarks

The present analysis indicates that the fisheries of different gears are fully exploited and there is no scope for any further increase in the presently exploited fishing grounds. In fact the fishery of small trawlers has to be regulated since over-fishing has already set in for some groups. The measures to be taken are 1) to reduce the number of small trawlers to 135 from the

existing 200, 2) to increase the mesh size to 25 mm from the present 15 mm and 3) to stop the entry of new 'sona' boats (14m OAL). Although the sona boats presently fish along the Orissa and West Bengal coasts, they can be prevailed upon to restrict their operations to the Visakhapatnam coast in view of the provisions of the Orissa Marine Fisheries Regulation Act and the threatening postures of fishermen of Orissa and West Bengal warning the operators to desist from fishing along the coastline of their respective states.

Even in the case of artisanal fisheries the picture is not rosy, as the landings show a declining trend. Since the boat seines and shore seines are already phased out at most of the landing centres in view of their inefficiency as compared to trawlers they may not pose any threat to the stocks. As regards gillnets, it is interesting to note that the important group, namely sardines is only represented by the juveniles and spent recovering fish. Major portion of the sardine population is not exploited by the present gear since the present gillnets could harvest only the fringe of the sardine population, and the spawning population is not vulnerable to the present gear. Hence any amount of gillnet effort directed to fishing sardines will not effect the sardine stocks in the currently fished grounds. Same is the case with the mackerel, *Rastrelliger kanaqurta*. Effective gear may be designed to harvest these two groups to step up the fish production off the Visakhapatnam coast (District)

Another species which is likely to contribute to increase in the pelagic fish landings of this coast is the oil sardine, *Sardinella longiceps*. It is now being caught at a number of localities along the east coast where the salinity is relatively low such as the vicinities of harbours and river mouths (Luther 1988). Hence the distribution and abundance of oil sardine along the east coast needs to be monitored with interest.

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**TABLE 1 :**
**Annual Catch and Effort for different groups landed by small trawlers at Visakhapatnam**

Years	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90
No. of Units	25714	33630	32096	27282	22797	23719	22435	17254
Effort in Hours	210225	323602	349400	295500	315237	267829	314389	238389
Total Catch (t)	4799.0	8427.6	6375.0	6480.1	7186.3	7876.8	7420.8	5157.7
Composition (t)								
Penaeid prawns	585.7	1142.5	880.4	599.8	668.1	430.7	470.7	564.3
Cephalopods	212.4	239.7	138.6	214.7	239.7	224.3	180.3	149.8
Elasmobranchs	122.1	107.7	137.8	87.8	87.1	82.1	114.4	59.4
Nemipterids	488.8	1451.0	535.6	846.3	562.1	1152.4	458.2	610.6
Lizard fish	884.1	581.4	535.6	490.8	813.8	649.0	577.6	356.2
Sciaenids	315.1	638.8	557.0	470.2	560.0	310.5	284.8	184.5
Ribbonfish	273.6	672.3	564.9	411.9	574.4	396.5	271.9	183.1
Silverbellies	338.2	544.6	333.0	367.5	449.2	414.1	411.5	216.7
Perches	114.4	444.9	247.0	343.6	313.6	486.2	334.7	202.6
Clupeids	231.4	312.3	200.8	212.0	262.2	367.1	371.0	324.5
Carangids	159.8	356.8	99.1	212.0	115.1	337.7	202.6	135.0
Goatfish	195.7	250.0	303.8	667.3	788.3	756.5	1544.5	591.6
Pseneue indicus	57.1	262.6	153.7	107.5	32.9	67.8	67.2	56.1
Catfish	165.8	140.8	114.0	69.8	131.2	148.0	130.1	51.0
Lactarius lactarius	12.4	144.3	51.8	37.2	126.8	155.3	95.6	52.3
Flatfish	53.7	64.3	111.8	77.3	88.4	128.3	165.0	103.1
Mackerel	12.5	76.6	-	-	40.8	249.4	25.7	21.2
Polynemids	24.8	44.8	-	-	69.6	42.1	51.0	37.7
Pomfrets	12.0	6.3	38.9	45.5	94.0	55.7	69.0	32.1
Miscellaneous fish	540.4	945.7	1363.8	1219.1	1176.0	1423.1	1595.0	1225.0

**TABLE 2 :**
**Catch, Effort and Cph of different groups landed by small trawlers at Visakhapatnam.**

Years	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90
Effort (Hours)	210225	323602	349400	295500	315237	267829	314389	238389
Catch (t)	4799.0	8427.6	6375.0	6480.1	7186.3	7876.8	7420.8	5157.7
Cph (kg)	22.8	26.04	18.2	21.9	22.8	29.4	23.6	21.6
Catch composition (Cph in kg)								
Penaeid prawns	2.79	3.53	2.54	2.03	2.12	1.61	1.49	2.36
Cephalopods	1.01	0.74	0.40	0.72	0.74	0.84	0.57	0.62
Elasmobranchs	0.58	0.33	0.39	0.30	0.28	0.31	0.36	0.25
Nemipterids	2.33	4.48	1.53	2.86	1.78	4.30	1.46	2.56
Lizard fish	4.21	1.80	1.53	1.66	2.58	2.42	1.84	1.49
Sciaenids	1.49	1.97	1.59	1.59	1.78	1.16	0.91	0.77
Ribbonfish	1.30	2.08	1.62	1.39	1.82	1.48	0.86	0.77
Silverbellies	1.61	1.68	0.95	1.24	1.42	1.54	1.31	0.91
Perches	0.54	1.37	0.71	1.16	0.99	1.82	1.06	0.85
Clupeids	1.10	0.97	0.57	0.72	0.83	1.37	1.18	1.36
Carangids	0.76	1.10	0.28	0.71	0.37	1.26	0.64	0.57
Goatfish	0.93	0.77	0.87	2.26	2.50	2.82	4.91	2.48
Pseneue indicus	0.27	0.81	0.44	0.36	0.11	0.25	0.21	0.24
Catfish	0.79	0.44	0.33	0.24	0.42	0.55	0.41	0.22
Lactarius lactarius	0.06	0.45	0.15	0.13	0.40	0.58	0.30	0.22
Flatfish	0.26	0.20	0.32	0.26	0.28	0.48	0.52	0.43
Mackerel	0.06	0.24	-	-	0.13	0.93	0.08	0.09
Polynemids	0.12	0.14	-	-	0.22	0.16	0.16	0.16
Pomfrets	0.06	0.02	0.11	0.15	0.30	0.21	0.22	0.13
Miscellaneous fish	2.57	2.92	3.90	4.13	3.73	5.31	5.07	5.14

TABLE 3  
 Monthwise Catch and Effort and Composition of small trawlers landings at Visakhapatnam  
 (Data Pooled for the Years 1982-1989)

Months	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	%
No. of Units	1444	1442	1629	2163	2117	2803	3222	3096	2690	1475	1475	1654	25807	10.0
Effort in hrs.	26944	23294	20824	15808	20335	20335	26947	32529	29250	25709	25709	31954	294522	2.9
Catch in t	402.3	480.6	508.3	584.6	443.8	475.1	719.4	745.9	855.1	517.9	517.9	514.9	6825.9	0.9
Cph in kg	14.9	20.6	84.4	37.9	32.9	23.4	26.7	22.9	29.2	20.1	20.1	16.1	23.2	12.1
Catch composition														
in t Penaeid prawns	55.5	47.8	31.1	23.4	18.2	41.9	60.9	101.3	85.5	82.2	72.3	65.2	665.3	9.3
Cephalopods	12.4	10.1	10.7	22.4	18.9	11.2	18.9	17.7	28.1	17.6	15.0	17.0	200.0	6.2
Elasmobranchs	4.6	4.2	3.9	3.1	3.3	6.4	6.3	7.9	7.4	5.5	5.3	4.5	62.4	6.1
Nemipterids	61.2	1060	77.3	252.8	91.2	9.6	27.5	23.9	63.3	30.9	28.0	52.1	824.3	5.6
Lizard fish	59.2	21.3	21.3	27.1	31.0	44.9	95.1	88.3	104.0	57.9	47.5	38.9	636.5	4.7
Sciasnids	24.2	18.5	19.9	5.3	15.8	34.7	41.5	52.4	47.7	51.5	55.9	53.9	421.3	4.4
Ribbon fish	15.7	8.7	4.8	2.9	5.3	13.4	39.0	66.1	127.1	60.7	50.0	25.0	418.7	3.5
Silverbellies	24.3	19.0	16.1	13.7	19.3	35.9	46.9	45.8	57.6	37.6	32.6	34.1	382.9	9.1
Perches	21.2	20.7	20.7	29.4	30.7	16.7	43.1	38.2	44.7	20.4	16.0	10.1	321.4	1.7
Clupeids	22.9	25.3	43.1	7.5	9.9	17.7	25.1	25.6	34.4	25.9	28.0	32.6	298.0	1.8
Carangids	12.7	40.6	51.9	23.9	34.2	5.6	9.4	21.9	23.1	5.2	5.3	5.1	238.9	1.2
Goat Fish	32.4	32.7	31.5	30.7	45.5	68.4	97.4	72.3	59.2	56.1	49.3	47.7	623.2	1.4
Psenus indicus	6.5	22.5	33.7	22.0	9.9	1.0	14.1	1.4	3.1	0.8	-	0.7	115.7	0.9
Catfish	11.2	10.2	8.7	4.1	4.3	4.5	16.2	15.0	18.1	9.0	11.6	11.2	124.1	0.7
Lactarius	4.5	3.1	0.4	0.3	1.1	2.6	5.9	14.1	18.7	15.3	13.1	5.9	85.0	0.6
lactarius														
Flatfish	6.4	5.1	5.6	5.0	7.8	17.3	12.7	11.1	8.1	7.3	6.2	6.3	98.9	1.4
Mackerel	1.6	3.9	12.0	27.0	1.6	0.4	2.3	1.8	6.0	1.9	0.3	1.1	59.9	0.9
Polynemids	3.6	2.8	1.8	0.2	0.4	2.2	4.8	4.8	6.7	6.0	5.4	6.2	49.1	0.7
Pomfrets	2.0	0.8	0.8	0.5	0.7	2.1	3.5	9.0	7.8	6.9	6.6	5.8	44.1	0.6
Miscellaneous	20.2	77.3	113.5	83.3	94.2	138.6	148.8	125.4	104.5	79.3	69.6	81.5	1136.2	16.6

TABLE-4

Composition of artisanal gear landings Lawsons Bay (Pooled for the years 1981-85)

Gear	Bottom-set gill nets	Gillnets	Shore Seine	Boat seine	Hook & line	Total
Mackerels	83.6	0.3	0.8	0.8	1.0	86.5
Carangids	22.1	0.3	8.8	1.0	14.5	46.7
Seerfish	15.3	0.1	0.1	0.1	112.0	127.6
Catfish	8.4	-	0.1	0.1	50.0	58.6
Sciaenids	0.1	-	1.1	0.3	0.1	1.6
Bull's eye	5.2	-	-	-	-	5.2
Tunas	1.2	0.1	0.1	-	56.0	57.4
Ribbonfish	1.9	-	18.9	2.3	-	23.1
Silverbellies	0.3	0.8	4.9	5.4	-	11.4
Anchovies	-	0.1	31.1	1.9	-	33.1
Sardines	-	66.6	2.9	3.6	-	73.1
Dussumaria	-	3.3	8.9	0.1	-	12.3
Bill fish	-	-	-	-	34.2	34.2
Miscellaneous	24.9	0.2	8.4	-	67.1	100.6
<b>Total</b>	<b>163.0</b>	<b>71.8</b>	<b>85.1</b>	<b>30.1</b>	<b>334.9</b>	<b>694.9</b>

TABLE 5 :

Seasonal distribution of fish landings (in t) at Lawsons Bay (pooled average for the years 1981-1985)

Months	Shore seine	Boat seine	Hooks & line	Gillnet	Bottomset gillnet	All gears		
						Catch in t	Standard effort	C/E In kg
Jan.	0.6	-	19.8	6.5	11.2	38.1	1057	36.0
Feb.	24.4	11.1	18.2	17.6	7.5	78.8	7729	10.2
Mar.	11.8	-	25.4	25.5	13.2	75.9	5379	14.1
Apr.	43.8	0.1	34.4	3.1	5.4	86.8	8987	9.7
May	3.8	13.2	32.3	2.2	33.5	85.0	2309	36.8
June	-	0.5	48.4	3.6	15.5	68.0	4171	16.3
Jul.	-	1.0	36.2	5.0	17.5	59.7	3903	15.3
Aug.	-	1.2	42.4	0.4	19.1	63.1	3492	18.1
Sept.	-	3.0	23.1	-	14.5	40.6	2932	13.8
Oct.	0.1	-	21.4	0.7	8.2	30.3	2574	11.8
Nov.	0.5	-	15.4	3.8	5.0	24.2	1165	20.8
Dec.	0.1	-	17.9	3.4	12.4	33.8	2187	15.5
<b>Total</b>	<b>85.1</b>	<b>30.1</b>	<b>334.9</b>	<b>71.8</b>	<b>163.0</b>	<b>684.9</b>	<b>45885</b>	<b>14.9</b>

### MINOTA AQUA FOODS TO SET UP A PROCESSING PLANT NEAR VISAKHAPATNAM

M/s. Minota Aqua Foods Ltd., a subsidiary/associate of ITC Ltd. is poised to set up an integrated shrimp/fish processing plant on the outskirts of Visakhapatnam at an investment of Rs. 6-crores. This will be a 100 per cent export-oriented unit, which is expected to commence production within one year. Minota Aqua Foods gets technical support and marketing assistance from Minota Aquatech Limited, an associate of ITC. The plant will mainly produce cooked, processed and aseptically packed shrimp delicacies with a very high level of value addition. It is learnt that Minota Aquatech would arrange for required technology from M/s. AQL of The Neth-



erlands, the exclusive licencees of Ms/. Aquastar of Thailand. According to Mr. G.K.P.Reddy, Director ITC and Chairman of Minota Aqua Foods Ltd., the processing unit would be unique in the country, with imported technology and sophisticated machinery. It is hoped that the new company would be able to export value added products, hitherto exported in negligible quantities from India. The plant would have an ultimate capacity of 5,000 tonnes per annum, to be achieved in three years after the plant becomes functional. Foreign exchange earnings from the unit are estimated at Rs. 75 to 100 crores per annum by the third year of operation. It was also mentioned that the unit would largely depend on cultured shrimp. The company would provide the needed help to the farmers around to take up scientific shrimp culture and also shrimp seed production.