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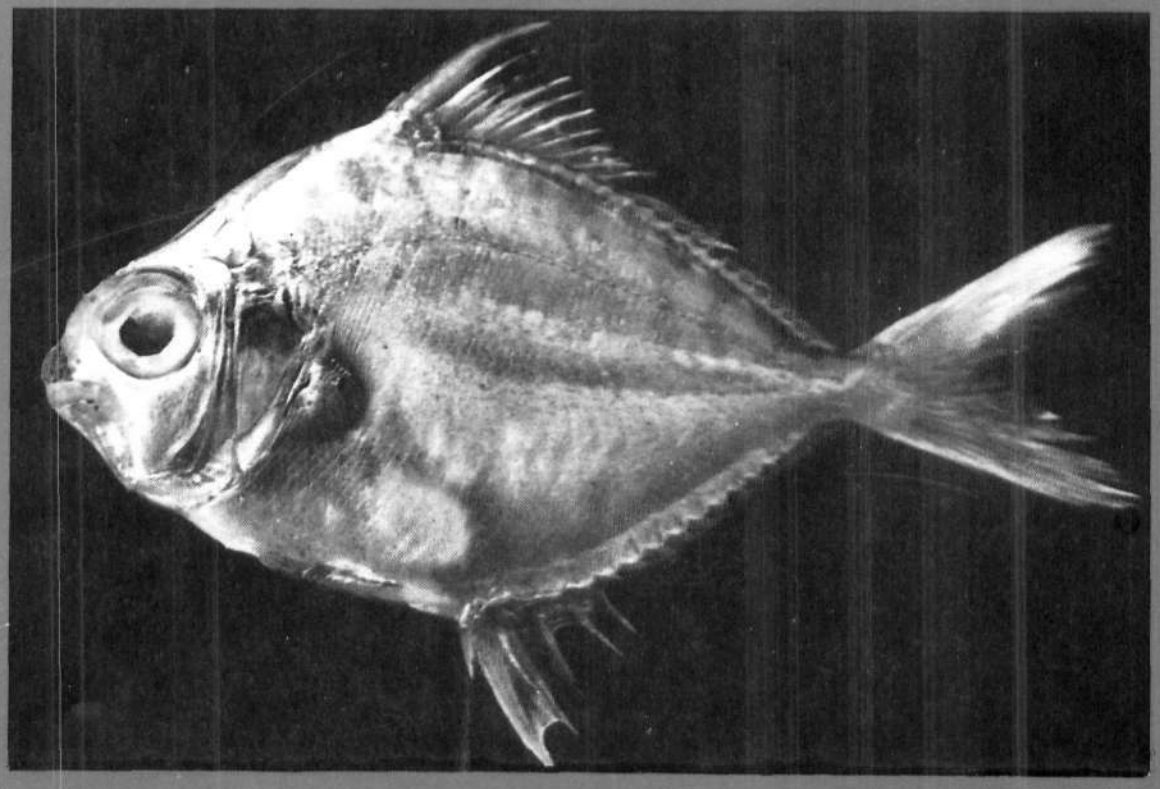

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समुद्री मात्स्यिकी सूचना सेवा : समुद्री मात्स्यिकी पर आधारित अनुसंधान परिणामों को आयोजकों, मत्स्य उद्योगों और मत्स्य पालकों के बीच प्रसार करना और तकनोलजी का प्रयोगशाला से श्रमशाला तक हस्तांतरित करना इस तकनीकी और विस्तार अंकावली का लक्ष्य है ।

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Leiognathus splendens, a silverbelly which has rich resource along the southeast cost of India.

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Back cover photo :

A view of the mechanised boats used for handlining at Beypore (Ref : Article by M. Sivadas).

पृष्ठ आवरण चित्र

बेपूर में हान्डलाइनिंग करनेवाले बोटों का एक दृश्य (सन्दर्भ : एम. शिवदास का लेख)

THE PRESENT STATUS OF SMALL-SCALE TRADITIONAL FISHERY AT TUTICORIN

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Introduction

This is the second study on the small-scale traditional fishery at Tuticorin and covers the period from 1986 to 1990. The first account on the development of small-scale traditional fishery at Tuticorin by Bennet and Arumugham (*Mar. Fish. Infor. Serv., T & E Ser.*, No. **99**: 1989) covered the period from 1979 to 1985. Significant developments in the craft and gear have taken place since 1986. Present study highlights all the recent developments in the small-scale traditional fishery at Tuticorin. The data are presented in the way understandable for the common man and are presented in the manner useful to the business community and entrepreneurs. This account highlights the fishery since the introduction of machine propelled boats (motorised units) and consequent changes in gross fish landings.

Annual production

The trends or production experienced in the fishery are given in the table (Table 1). During the five years from 1986 to 1990, annual average fish catch by traditional fishermen came to 4,798.9 tonnes. Of this, the catch by motorised units came to 2,774.5 tonnes and by non-motorised units 2,024.4 tonnes. Fish landings by motorised units varied from 880.3 tonnes in 1986 to 4,202.1 tonnes in 1989. On the other hand, fish catch by non-motorised units was high during 1986 with 4,623.0 tonnes and gradually came down to 515.2 tonnes during 1990. As in the previous years the sardine gill net was the important gear in the traditional fishery and contributed over 68.3% in the annual catch by the traditional fishery. Next important gear was the long line. Average annual catch-per-unit was uniformly higher for the motorised units than for the non-motorised units. However, catch per unit was fairly high for the shore seine which was operated by non-motorised boats.

Craft and gear

Motorised as well as non-motorised Tuticorin type boats and *Catamarans* brought in from Kanyakumari, operated a heterogenous assembly of gears. Details of craft and gear employed in the fishery are given in the earlier report (Bennet and Arumugham, 1989). Gradually many of the crafts got fitted with motor propellants and their number increased year after year. Consequently a reduction in non-motorised crafts was noticed. 'Disco net', a specialised gear for catching prawns was introduced during 1987 at Tuticorin and was operated mainly by motorised boats. Hilsa net ('Podi valai') was operated by non-motorised 'Catamaran' units mainly to catch *Hilsa toli*. Data collected during the annual census about the fishing crafts employed in the traditional fishery is given below.

Year	Tuticorin type boat		Catamaran		Total
	Motorised	Non-motorised	Motorised	Non-motorised	
1986	90	439	00	13	542
1987	200	340	00	17	557
1988	335	215	00	27	577
1989	444	118	00	26	588
1990	476	91	25	21	613

Gear-wise landings

1. *Sardine gill net* ('Chala valai')

By far, the important gear in the traditional fishery was the sardine gill net. Annual average landings came to 1,585.3 tonnes by non-motorised crafts and 1,691.2 tonnes by motorised crafts. Of the total fish landings, 68.3% was caught by sardine gill nets. Good fishery by sardine gill nets was recorded during the October-December period. *Sardinella gibbosa* ranked foremost in the catch followed by *S. albella* in the non-motorised units and *S. sirm* in the motorised units. Other important fish groups in the gear were *Thrissocles* spp. *Caranx* spp. and *Leiognathus* spp. It is observed that a gradual reduction in the total catch by non-motorised units was observed from 1986 to 1990 due to the

TABLE 1. *Gear-wise effort, catch (tonnes) and catch per unit effort (kg) annual average catch (tonnes) for the period 1986-'90*

Gear	Effort, catch & C/E	Motorised units					Annual average (tonnes)	Non-motorised units					Annual average (tonnes)
		1986	1987	1988	1989	1990		1986	1987	1988	1989	1990	
Chala valai	E	0.0	12703.0	20102.0	24803.0	29922.0	17506.0	51115.0	35419.0	15132.0	5467.0	4066.0	22240.0
	C	0.0	1185.9	1664.8	3017.6	2587.7	1691.2	3816.7	2908.7	685.1	287.0	229.1	1585.3
	C/E	0.0	93.4	82.8	121.7	86.5	76.9	74.7	82.1	45.3	52.5	56.3	62.2
Paru valai	E	859.0	141.0	468.0	286.0	648.0	480.0	510.0	24.0	0.0	0.0	52.0	117.0
	C	67.2	16.6	76.9	29.3	100.9	58.2	37.8	0.9	0.0	0.0	7.9	9.3
	C/E	78.2	118.0	164.2	102.3	155.8	123.7	74.1	40.0	0.0	0.0	151.0	53.0
Podi valai	E	1627.0	1630.0	1800.0	3351.0	3288.0	2339.0	614.0	0.0	0.0	0.0	0.0	123.0
	C	88.3	161.0	155.0	495.4	310.2	242.0	31.1	0.0	0.0	0.0	0.0	6.2
	C/E	54.2	98.8	86.1	147.8	94.4	96.3	50.6	0.0	0.0	0.0	0.0	10.0
Hand line	E	2856.0	650.0	444.0	442.0	970.0	1072.0	3754.0	3836.0	1015.0	1186.0	907.0	2140.0
	C	191.3	64.4	12.9	39.6	71.7	76.0	222.6	181.3	28.9	47.9	59.4	108.0
	C/E	67.0	99.0	29.2	89.5	74.0	71.7	59.3	47.0	28.5	40.4	64.5	47.9
Long line	E	6718.0	5643.0	3738.0	2834.0	3063.0	4399.0	1483.0	790.0	1236.0	509.0	238.0	851.0
	C	509.0	634.2	306.9	197.5	420.1	413.5	74.6	32.6	58.0	37.7	19.9	44.6
	C/E	75.8	112.4	82.1	69.7	137.1	95.4	50.3	41.2	46.9	74.4	83.6	59.2
Troll line	E	517.0	902.0	339.0	1496.0	660.0	783.0	223.0	0.0	0.0	0.0	0.0	45.0
	C	24.5	42.3	20.1	76.7	58.6	44.4	6.5	0.0	0.0	0.0	0.0	1.3
	C/E	47.5	46.9	59.3	51.3	88.8	58.8	29.1	0.0	0.0	0.0	0.0	5.8
Sinki valai	E	0.0	689.0	1528.0	1375.0	620.0	842.0	1775.0	872.0	0.0	0.0	338.0	597.0
	C	0.0	68.3	87.0	83.9	32.4	54.3	96.1	72.5	0.0	0.0	6.3	35.0
	C/E	0.0	99.1	57.0	61.0	52.3	53.9	54.1	83.1	0.0	0.0	18.7	31.2
Thirukkai	E	0.0	1108.0	1928.0	1940.0	1457.0	1287.0	2551.0	998.0	0.0	130.0	0.0	736.0
valai	C	0.0	163.6	215.3	246.5	197.4	164.6	288.2	185.0	0.0	5.6	0.0	95.8
	C/E	0.0	147.6	111.7	127.0	135.5	104.4	113.0	185.4	0.0	4.3	0.0	68.3
Hand line	E	0.0	0.0	.0.0	0.0	1162.0	232.0	0.0	0.0	0.0	0.0	656.0	131.0
(*catamaran*)	C	0.0	0.0	0.0	0.0	25.3	5.1	0.0	0.0	0.0	0.0	7.4	1.5
	C/E	0.0	0.0	0.0	0.0	21.8	4.4	0.0	0.0	0.0	0.0	11.2	2.2
Disco net	E	0.0	2102.0	1314.0	702.0	2203.0	1264.0	—	—	—	—	—	—
(prawn net)	C	0.0	41.7	25.4	15.6	34.6	23.5	—	—	—	—	—	—
	C/E	0.0	19.8	19.3	22.3	15.7	15.4	—	—	—	—	—	—
Other gears	E	0.0	0.0	0.0	0.0	189.0	38.0	—	—	—	—	—	—
(*Mural valai*)	C	0.0	0.0	0.0	0.0	8.7	1.7	—	—	—	—	—	—
	C/E	0.0	0.0	0.0	0.0	46.0	9.2	—	—	—	—	—	—
Shore seine	E	—	—	—	—	—	—	191.0	103.0	154.0	102.0	179.0	146.0
	C	—	—	—	—	—	—	49.4	16.5	29.4	104.5	126.7	65.3
	C/E	—	—	—	—	—	—	258.8	160.2	190.6	1024.3	707.5	468.3
Thallu madi	E	—	—	—	—	—	—	0.0	1045.0	2637.0	3814.0	2466.0	1992.0
	C	—	—	—	—	—	—	0.0	29.4	42.0	97.9	47.5	43.4
	C/E	—	—	—	—	—	—	0.0	28.1	15.9	25.7	19.3	17.8
Podi valai	E	—	—	—	—	—	—	0.0	0.0	1902.0	2171.0	292.0	873.0
(*catamaran*)	C	—	—	—	—	—	—	0.0	0.0	82.7	49.9	11.0	28.7
	C/E	—	—	—	—	—	—	0.0	0.0	43.5	23.0	37.9	20.9
Annual total catch (tonne)		880.3	2378.0	2564.3	4202.1	3847.6	2774.5	4623.0	3426.9	926.1	630.5	515.2	2024.4

Note : E = Effort, C = Total catch in tonnes, C/E = Catch per unit in kg.

reduced number of units engaged in the fishery. Combined total for the sardine gill net units was high during 1987 with 4,094.6 tonnes. Well over 82.3% of the fish caught by sardine gill nets was formed by the lesser sardines.

2. *Drift net* ('Paru valai')

Large quality fish like seer fish, tuna, carangids, perches, *Chorinemus*, barracuda and sharks were caught by 'Paru valai', a drift net with larger mesh size. Catch composition shows differences between motorised and non-motorised units mainly because of the distance and area where these units were operated. Motorised units fished in deeper waters and wider areas landed 21.5% tuna followed by *Lethrinus* and seer fish. On the other hand, 26.4% of the catch by non-motorised units consisted of barracuda. Next in importance were carangids and sharks. Of the total fish caught by traditional fishery, about 1.4% was contributed by 'Paru valai' units.

3. *Drift net* ('Podi valai')

Smaller meshed drift net units were operated mainly for tuna, barracuda, carangids, seer fish and *Chirocentrus*. On an average 242.0 tonnes of fish were landed by *'Podi valai'* units. Mostly these nets were operated by the motorised units because they went to deeper waters for fishing. Fish catch by non-motorised units using the 'Podi valai' were scanty and restricted to the 1986 fishery. Tuna formed 25.7% of the catch followed by barracuda 11.2% and seer fish 11.1%. Good landings were reported during 1989. Many quality fish were landed by 'Podi valai' units. During the period 2,339, 'Podi valai' units were operated every year by the traditioal fishermen. 'Podi valai' units contributed 5.1% of the total fish caught by traditional fishery.

4. *Hand line* ('Thoondil')

Regular fishing by hand line units was carried out and landed an annual average of 184.0 tonnes of fish. On an average, 3,212 hand line units were operated per year. Both motorised and non-motorised boats operated this gear. Good fish catch was reported during 1986. *Nemipterus* spp. ranked first in importance in the hand line catch forming 39.3% in the landings by non-motorised units and 22.5% in the motorised unit landings. Other important fish groups included *Lethrinus*, *Belone* and *Serranus*. Hand line units were operated for pelagic as well as demersal fish groups.

5. *Long line* ('Ayiramkal thoondil')

This is one of the popular and specialized gear at Tuticorin, operated along the extensive areas over and beyond the deep water rocky 'paars'. Large sized pelagic and demersal fishes are caught by this gear. This gear was operated during the period by motorised as well as non-motorised boats. On an average, 458.1 tonnes of fish were caught by this gear forming 9.5% of the total fish caught. Larger perches, sharks and carangids formed the major portion of the catch. Large *Lethrinus* spp. formed 31.1% in the motorised boat catch and in non-motorised boats, *Lethrinus* spp. formed 29.8%. Good landings by motorised long line units were reported during 1987 and during 1986 by non-motorised units. Every year, on an average 5,250 long line units were operated at Tuticorin.

6. *Troll line* ('Odukayiru')

This gear was operated for seer fish, tuna, sharks and some other good quality fish at Tuticorin. Number of this gear operated by motorised units ranged from 339 in 1988 to 1,496 in 1989. On the other hand, 223 units were operated in 1986 by the non-motorised boats. After 1986 this unit was not operated by the non-motorised boats. Total annual fish landings during the period came to 45.7 tonnes forming 0.9% in the total fish caught. Seer fish formed the important species in the catch followed by tuna, sharks and carangids.

7. *Lobster net* ('Sinki valai')

Operated mainly for lobsters that live near the coral reefs, this gear caught crabs and bottom dwelling fishes more than it caught the lobsters. During the period, annual average landings came to 54.3 tonnes by motorised units and 35.0 tonnes by non-motorised units. Motorised units started operating this net from 1987. Lobsters and crabs were caught in small quantities by non-motorised units. Good proportion of the catch composed of lethrinids, catfish, carangids, rays and other perches. Lobster net contributed 1.8% in the total fish catch by traditional units.

8. *Bottom set net* ('Thirukkai valai')

Rays, sharks and skates were caught in large numbers by this net. Every year on an average, 260.4 tonnes of larger fish were caught by this unit and formed 5.4% of the total fish caught during the period. In recent years this gear was increasingly operated by the motorised units.

TABLE 2. *Catch composition of important groups of fish (tonnes) during the years* (1986-1990 in 'Chala valai'

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Sardinella albella	A	0.0	118.8	158.0	262.2	364.1	180.6	10.7	3
	B	381.2	404.2	69.1	30.6	38.0	184.6	11.6	2
Sardinella dayi	A	0.0	79.2	105.8	174.8	210.1	114.0	6.7	4
	B	254.2	269.5	46.2	20.6	22.1	122.5	7.7	5
Sardinella gibbosa	A	0.0	734.6	885.9	1669.3	1231.0	904.2	53.5	1
	B	1896.1	1282.5	337.4	131.6	86.0	746.7	47.1	1
Sardinella sirm	A	0.0	112.8	245.4	506.7	173.2	207.6	12.3	2
	B	429.0	366.1	59.0	44.3	24.7	184.6	11.6	3
Sardinella clupeoides	A	0.0	4.5	8.2	91.4	46.1	30.0	1.8	7
	B	81.3	23.9	4.2	5.3	2.4	23.4	1.5	8
Sardinella longiceps	A	0.0	2.0	0.0	3.6	2.5	1.6	0.1	17
	B	12.5	1.2	0.0	0.0	0.0	2.7	0.2	14
Pellona	A	0.0	4.6	9.2	14.4	31.3	11.9	0.7	11
	B	38.2	8.7	3.6	2.9	2.5	11.1	0.7	11
Kowala kowal	A	0.0	0.6	4.5	5.6	34.3	9.0	0.5	14
	B	0.0	13.3	1.3	0.9	3.6	3.8	0.2	15
Stolephorus	A	0.0	0.0	1.8	12.5	44.6	11.8	0.6	12
	B	3.8	84.4	1.4	0.3	3.2	18.6	1.2	10
Thrissocles	A	0.0	62.4	86.0	102.4	237.1	97.6	5.8	5
	B	458.6	327.0	60.0	22.3	24.4	178.5	11.3	4
Leiognathus	A	0.0	17.5	23.8	27.6	46.9	23.2	1.4	8
	B	47.4	43.0	15.0	4.9	5.2	23.1	1.4	9
Carangids	A	0.0	4.3	29.7	32.3	38.3	20.9	1.2	9
	B	98.1	28.2	13.4	4.6	4.6	29.8	1.9	7
Sphyraena	A	0.0	9.2	13.0	16.5	10.2	9.8	0.6	13
	B	18.2	9.1	13.8	2.9	0.8	9.0	0.6	12
Therapon	A	0.0	1.9	6.8	25.5	42.1	15.3	0.9	10
	B	16.1	3.5	3.3	3.7	3.8	6.1	0.4	13
Seer fish	A	0.0	0.0	0.2	0.0	4.5	0.9	0.1	18
	B	3.9	0.0	0.6	0.5	0.3	1.1	0.1	16
Sillago	A	0.0	6.8	7.6	1.5	10.3	5.2	0.3	15
	B	0.0	3.1	3.8	0.8	0.8	1.7	0.1	18
Chirocentrus	A	0.0	0.0	0.9	13.5	2.9	3.5	0.2	16
	B	0.0	2.7	0.8	1.4	0.4	1.1	0.1	17
Miscellaneous	A	0.0	26.7	78.0	57.8	58.2	44.1	2.6	6
	B	78.1	38.3	52.2	9.4	6.3	36.9	2.3	6
Total	A	Nil	1185.9	1664.8	3017.6	2587.7	1691.2	—	—
	B	3816.7	2908.7	685.1	287.0	229.1	1585.3	—	—

Note : A = Catch by motorised units, B = Catch by non-motorised units.

TABLE 3. *Catch composition of important groups of fish (tonnes) during the years* 1986-1990 *in* 'Paru valai' (*drift net*)

Fish groups		1986	1987	1988	1989.0	1990	Average	%	Rank
Sharks	A	4.4	2.3	6.0	10.6	9.5	6.6	11.3	4
	B	1.1	0.0	0.0	0.0	4.4	1.1	11.8	3
Skates	A	0.0	0.0	0.0	2.7	0.0	0.5	0.9	13
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Tuna	A	5.8	4.7	38.6	0.0	13.3	12.5	21.5	1
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Seer fish	A	10.8	2.8	4.8	1.6	14.9	6.9	12.0	3
	B	2.8	0.0	0.0	0.0	1.4	0.8	9.0	5
Carangids	A	10.0	2.2	3.9	1.6	7.7	4.9	8.4	6
	B	7.9	0.0	0.0	0.0	0.0	1.6	17.0	2
Chorinemus	A	1.4	0.0	0.6	0.0	0.5	0.5	0.9	14
	B	0.4	0.9	0.0	0.0	0.0	0.3	2.8	10
Cat fish	A	2.7	0.0	0.2	0.0	0.0	0.6	0.9	15
	B	1.4	0.0	0.0	0.0	0.0	0.3	3.0	9
Lethrinids	A	11.3	0.8	4.5	4.3	17.1	7.6	13.0	2
	B	4.3	0.0	0.0	0.0	0.0	0.9	9.2	4
Serranus	A	7.2	1.5	5.4	0.5	0.0	2.9	5.0	7
	B	2.3	0.0	0.0	0.0	0.0	0.4	4.9	8
Lutjanus	A	4.4	1.1	0.0	0.0	4.3	2.0	3.4	9
	B	3.4	0.0	0.0	0.0	0.0	0.7	7.3	6
Diagramma	A	0.9	0.0	0.0	0.0	0.0	0.2	0.3	17
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Sphyraena	A	4.6	0.5	1.9	0.9	4.5	2.5	4.3	8
	B	12.3	0.0	0.0	0.0	0.0	2.4	26.4	1
Istiophorus	A	0.3	0.0	9.0	1.9	21.1	6.5	11.1	5
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Rachycentron	A	1.5	0.2	0.6	1.4	3.8	1.5	2.6	10
	B	0.4	0.0	0.0	0.0	0.0	0.1	0.9	12
Lates calcarifer	A	1.9	0.5	1.0	0.0	2.9	1.2	2.2	11
	B	0.9	0.0	0.0	0.0	0.0	0.2	1.9	11
Polynemus	A	0.0	0.0	0.0	3.8	1.4	1.0	1.8	12
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Other perchlike	A	0.0	0.0	0.4	0.0	0.9	0.3	0.4	16
fishes	B	0.6	0.0	0.0	0.0	2.1	0.5	5.8	7
Total	A	67.2	16.6	76.9	29.3	100.9	58.2	—	—
	B	37.8	0.9	Nil	Nil	7.9	9.3	—	—

Note : A = Catch by motorised units, B = Catch by non-motorised units.

9. *Other units*

Several other gear were employed in the Tuticorin fishery during the period. They landed small quantities of fish. When taken together, the aggregate catch contributed fairly good percentage in the total fish caught. Among motorised units, hand lines ('Catamaran' units) contributed annually 5.1 tonnes of fish, 'Disco net' landed 23.5 tonnes of which prawns were important with 7.5 tonnes and 'Mural valai' which was operated during 1990 landed good quantity of belonids. Non-motorised units operated 'Karai valai' (Shore seine) 'Thallu madi' (Prawn net), Hand line (Cephalopod net) and 'Podi valai' (Hilsa net). These units together contributed annually 138.9 tonnes of fish forming 6.8% in the total annual catch by non-motorised units. *Leiognathus* spp. and carangids were important in the shore seines. Good quantities of prawns and *Sillago sihama* were landed by 'Thallu madi 'units. By the Hilsa net good quantities of *Hilsa toli* and sciaenids were landed.

TABLE 4. *Catch composition of important groups of fish (tonnes) during the years 1986-1990 in 'Paru valai' (drift net)*

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Sharks	A	0.5	2.3	3.0	17.0	2.6	5.1	2.1	13
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Tuna	A	9.9	12.2	27.8	247.5	12.9	62.1	25.7	1
	B	8.7	0.0	0.0	0.0	0.0	1.8	27.9	1
Seer fish	A	13.3	34.8	7.0	45.2	34.6	27.0	11.1	3
	B	2.9	0.0	0.0	0.0	0.0	0.6	9.3	5
Carangids	A	10.0	21.6	15.6	38.0	18.9	20.8	8.6	4
	B	7.4	0.0	0.0	0.0	0.0	1.5	23.8	2
Chortnemus	A	0.0	3.1	4.6	4.1	8.7	4.1	1.7	14
	B	0.2	0.0	0.0	0.0	0.0	0.1	0.6	14
Mackerel	A	7.4	3.1	3.3	12.4	10.6	7.4	3.0	8
	B	0.7	0.0	0.0	0.0	0.0	0.1	2.3	8
Cat fish	A	0.0	2.1	4.0	2.7	0.4	1.8	0.8	17
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Lethrinus	A	7.1	16.3	14.0	22.6	32.5	18.5	7.6	6
	B	0.7	0.0	0.0	0.0	0.0	0.1	2.3	9
Serranus	A	4.0	2.6	2.3	7.5	17.6	6.8	2.8	10
	B	0.5	0.0	0.0	0.0	0.0	0.1	1.6	11
Lutjanus	A	2.8	5.5	5.3	0.2	12.9	5.3	2.2	12
	B	0.8	0.0	0.0	0.0	0.0	0.2	2.6	7
Nemipterus	A	0.0	0.0	0.0	0.0	3.4	0.7	0.3	22
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Scolopsis	A	0.0	0.0	0.0	0.0	6.5	1.3	0.6	21
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Diagramma	A	0.3	0.1	4.5	2.7	13.0	4.1	1.7	15
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	00
Sphyraena	A	10.9	25.3	12.1	45.2	42.2	27.1	11.2	2
	B	3.2	0.0	0.0	0.0	0.0	0.6	10.3	3
Istiophorus	A	0.0	0.0	6.5	23.5	5.8	7.2	3.0	9
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Hilsa toli	A	2.6	5.1	12.5	3.0	15.1	7.7	3.2	7
	B	0.6	0.0	0.0	0.0	0.0	0.1	1.9	10
Chirocentrus	A	15.9	20.2	13.1	19.2	35.9	20.9	8.6	5
	B	3.2	0.0	0.0	0.0	0.0	0.6	10.3	4
Sciaenids	A	0.0	1.8	4.3	0.5	3.0	1.9	0.8	18
	B	0.3	0.0	0.0	0.0	0.0	0.1	1.0	13
Lactarius	A	2.8	2.1	1.8	0.0	1.5	1.6	0.7	19
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Sillago sihama	A	0.0	0.0	9.0	0.0	0.0	1.8	0.7	20
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Rachycentron	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	B	0.4	0.0	0.0	0.0	0.0	0.1	1.3	12
Other perchlike	A	0.0	1.9	2.1	3.1	24.6	6.3	2.6	11
fishes	B	1.5	0.0	0.0	0.0	0.0	0.3	4.8	6
Miscellaneous	A	0.8	0.9	2.2	1.0	7.5	2.5	1.0	16
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Total	A	88.3	161.0	155.0	495.4	310.2	242.0	—	—
	B	31.1	Nil	Nil	Nil	Nil	6.2	—	—

Note : A = Catch by motorised units, B = Catch by non-motorised units.

Fig. 1. Tuticorin type boat; principal craft.

Fig. 2. Catch of *Sardinella sirm*; ready for disposal.

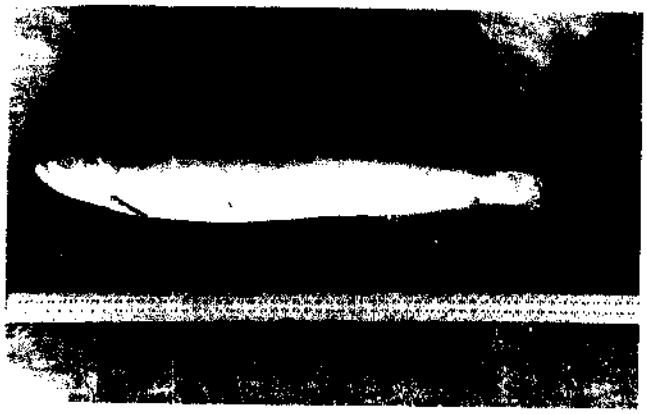

Fig. 3. *Chirocentrus dorab.*

Fig. 4. *Sphyraena jello.*

Fig. 5. *Eleutheronema tetradactylum.*

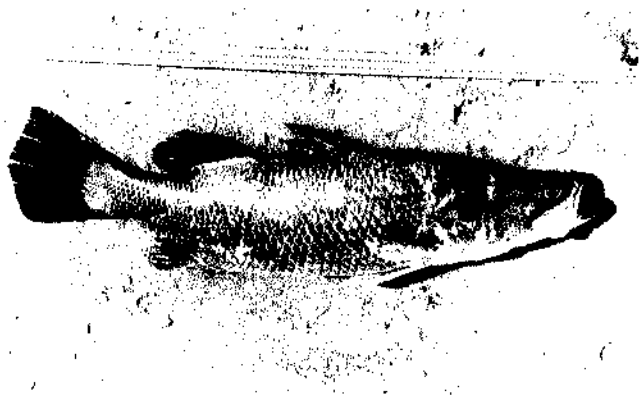

Fig. 6. *Lates calcarifer.*

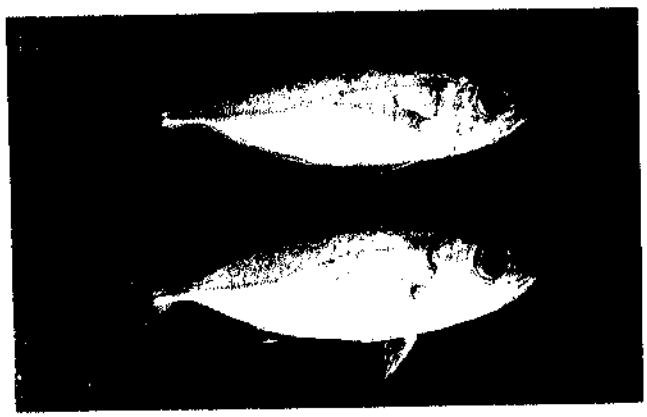

Fig. 7. *Selar crumenophthalmus*.

Fig. 8. *Chorinemus lysan*.

Fig. 9. *Rachycentron canadus*.

Fig. 10. *Psettodes erumei*.

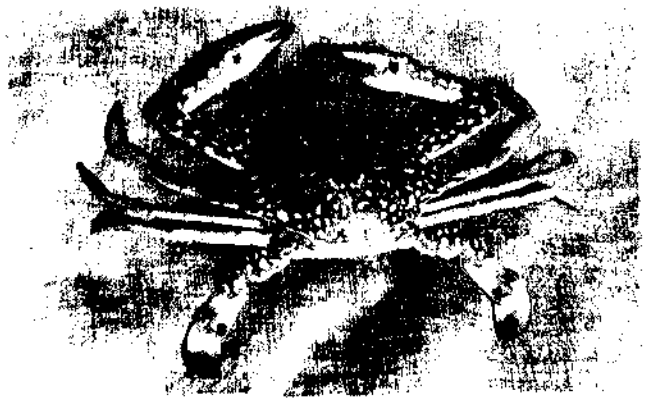

Fig. 11. *Neptunus pelagicus*.

TABLE 5. *Catch composition of important groups of fish (tonnes) during the years 1986-1990 in Hand line* ('Thoondil')

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Sharks	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	B	12.5	0.0	0.0	0.0	0.0	2.5	2.3	9
Lethrinids	A	40.6	23.4	3.6	3.8	10.9	16.5	21.7	2
	B	25.1	36.1	6.7	8.6	12.5	17.8	16.5	2
Serranus	A	16.1	18.9	2.4	5.6	7.9	10.2	13.4	4
	B	15.5	15.1	3.1	8.8	7.7	10.0	9.3	4
Lutjanids	A	2.3	0.0	0.0	0.0	2.5	1.0	1.3	10
	B	6.8	2.1	1.1	0.3	1.7	2.4	2.2	10
Diagramma	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	B	4.3	0.0	0.3	0.0	0.0	0.9	0.9	12
Seer fish	A	19.2	1.7	0.0	3.4	2.2	5.3	7.0	5
	B	8.6	15.6	5.7	2.8	4.5	7.4	6.9	5
Carangids	A	12.7	6.0	0.9	0.0	0.0	3.9	5.2	7
	B	6.3	1.6	0.6	3.3	1.8	2.7	2.5	8
Nemipterus	A	47.1	3.8	1.7	11.9	21.0	17.1	22.5	1
	B	86.6	78.3	5.6	16.2	9.6	39.3	39.3	1
Scolopsis	A	0.0	0.0	2.1	2.6	5.5	2.0	2.7	9
	B	4.1	6.1	1.5	3.4	3.6	3.7	3.5	7
Balistids	A	8.2	0.0	1.3	0.0	13.2	4.5	5.9	6
	B	17.7	3.9	0.3	2.3	5.6	6.0	5.5	6
Belone	A	39.5	10.6	0.3	5.1	3.9	11.9	15.6	3
	B	30.3	19.7	3.1	2.0	11.9	13.4	12.4	3
Other perchlike	A	5.6	0.0	0.6	7.2	0.0	2.7	3.5	8
fishes	B	4.8	2.4	0.5	0.2	0.0	1.6	1.5	11
Cephalopods	A	0.0	0.0	0.0	0.0	4.2	0.8	1.1	11
	B	0.0	0.0	0.0	0.0	0.5	0.1	0.1	13
Miscellaneous	A	0.0	0.0	0.0	0.0	0.4	0.1	0.1	12
	B	0.0	0.4	0.4	0.0	0.0	0.2	0.1	14
Total	A	191.3	64.4	12.9	39.6	71.7	76.0	—	—
	B	222.6	181.3	28.9	47.9	59.4	108.0	—	—

Note : A = Catch by motorised units, B = Catch by non-motorised units.

Species composition

Many species of quality fish, prawns, lobsters and crabs were recorded in the traditional fisheries at Tuticorin. Fish catch by motorised units composed of lesser sardines, perches, rays, *Thrissocles* and sharks in good quantities. On the other hand non-motorised units fished large quantities of lesser sardines, *Thrissocles*, carangids, rays and silverbellies. Much sought after pelagic fishes like seer fish, carangids, barracuda and tuna were caught by different gears by the traditional fishery. Perches as a group contributed greatly to demersal component in the catches.

Lesser sardines, as in previous years, contributed in a major way to the fishery. Average lesser sardine landings for the five years came to 2,699.1 tonnes forming 56.2% in the total fish landings. The months from September to December landed good quantities of lesser sardines by motorised units. The months from January to May saw good lesser sardine catch by non-motorised units. *Sardinella gibbosa* was the dominant lesser sardine species followed by *S. sirm*, *S. albella*, *S. dayi* and *S. clupeoides*. Lesser sardines were caught during all the months.

The group of perches forming important demersal fishes contributed over 511.4 tonnes in the traditional fisheries at Tuticorin. They together formed 10.6% in the total fish catch during the period. *Lethrinus nebulosus* was the important fish in the group. Other perches included *Serranus*, *Lutjanus*, *Diagramma*, *Lates* and *Pristipomoides*. *Lethrinus*, *Lates* and *Serranus* are in much demand for export. Perches in small quantities were available throughout the year and were caught over the rocky *paars* and sandy stretches adjoining the *paars*.

TABLE 6. *Catch composition of important groups of fish (tonnes) during the years 1986-1990 in Long line ('Ayiramkal thoondil')*

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Sharks	A	48.0	61.7	15.5	10.9	62.6	39.7	9.6	4
	B	9.9	2.6	1.0	0.0	8.0	4.3	9.6	5
Rays	A	1.0	1.2	3.7	11.9	20.5	7.7	1.8	9
	B	0.0	0.0	1.5	0.0	0.0	0.3	0.7	11
Seer fish	A	15.0	19.8	6.9	6.4	7.5	11.1	2.7	6
	B	1.0	0.9	0.9	0.1	1.7	0.9	2.0	7
Cat fish	A	0.0	12.8	6.4	3.6	21.8	8.9	2.2	8
	B	0.7	0.0	1.9	1.4	1.5	1.1	2.5	6
Carangids	A	45.6	51.8	25.5	22.5	14.0	31.8	7.7	5
	B	3.3	1.3	5.3	16.6	0.0	5.3	11.9	4
Chorinemus	A	7.0	6.5	4.0	5.3	0.0	4.6	1.1	10
	B	1.2	1.5	1.4	0.2	0.0	0.9	1.9	8
Lethrinids	A	168.4	182.9	99.5	62.2	130.7	128.5	31.1	1
	B	25.3	10.8	19.5	7.2	3.4	13.3	29.8	1
Serranus	A	139.4	172.2	84.6	48.9	88.2	106.7	25.8	2
	B	16.6	9.2	17.1	7.6	4.0	10.9	24.5	2
Lutjanids	A	80.4	98.3	37.3	23.8	33.1	54.6	13.2	3
	B	15.6	6.3	5.2	4.1	1.3	6.5	14.6	3
Diagramma	A	0.0	5.3	3.9	1.0	8.9	3.8	0.9	11
	B	0.6	0.0	2.3	0.0	0.0	0.6	1.3	9
Lates calcarifer	A	0.0	0.0	0.8	0.1	13.1	2.8	0.7	12
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Polynemus	A	0.0	1.5	0.3	0.3	7.8	2.0	0.5	13
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Sphyraena	A	0.0	0.0	2.8	0.0	1.6	0.9	0.2	14
	B	0.0	0.0	0.3	0.3	0.0	0.1	0.3	12
Other perchlike	A	3.8	19.4	15.5	0.6	10.3	9.9	2.4	7
fishes	B	0.4	0.0	1.6	0.1	0.0	0.4	0.9	10
Miscellaneous	A	0.4	0.8	0.2	1.0	0.0	0.5	0.1	15
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Total	A	509.0	634.2	306.9	197.5	420.1	413.5		
	B	74.6	32.6	58.0	37.7	19.9	44.6		

Note : A = Catch by motorised units, B = Catch by non-motorised units.

TABLE 7. *Catch composition of important groups of fish (tonnes) during the years 1986-1990 in Troll line ('Odu kayiru')*

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Sharks	A	4.1	0.0	7.3	11.8	5.8	5.8	13.0	3
	B	1.1	0.0	0.0	0.0	0.0	0.2	16.9	2
Tuna	A	4.4	10.3	2.5	9.4	13.4	8.0	18.0	2
	B	1.1	0.0	0.0	0.0	0.0	0.2	16.9	3
Seer fish	A	7.3	24.9	6.7	37.0	9.6	17.1	38.5	1
	B	2.0	0.0	0.0	0.0	0.0	0.4	30.8	1
Carangids	A	0.8	0.0	0.0	9.5	17.0	5.4	12.3	4
	B	0.5	0.0	0.0	0.0	0.0	0.1	7.7	6
Sphyraena	A	1.3	0.3	2.3	3.1	7.4	2.9	6.5	6
	B	1.0	0.0	0.0	0.0	0.0	0.2	15.4	4
Rachycentron	A	5.6	6.8	1.1	5.4	4.6	4.7	10.6	5
	B	0.8	0.0	0.0	0.0	0.0	0.2	12.3	5
Other fish	A	1.0	0.0	0.2	0.5	0.8	0.5	1.1	7
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Total	A	24.5	42.3	20.1	76.7	58.6	44.4		
	B	6.5	Nil	Nil	Nil	Nil	1.3		

Note : A = Catch by motorised units, B = Catch by non-motorised units.

TABLE 8. *Catch composition of important groups of fish (tonnes) during the years* 1986-1990 *in* 'Sinki valai' (*Bottom set net*)

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Sharks	A	0.0	0.0	0.0	5.7	0.0	1.1	2.1	11
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Rays	A	0.0	5.7	15.7	7.4	2.2	6.2	11.4	4
	B	14.5	5.9	0.0	0.0	0.0	4.1	11.7	4
Seer fish	A	0.0	0.0	0.4	0.0	0.0	0.4	1.1	12
	B	0.5	0.0	0.0	0.0	0.0	0.1	0.3	12
Carangids	A	0.0	7.2	9.5	5.4	2.8	5.0	9.2	5
	B	6.5	24.7	0.0	0.0	1.2	6.5	18.5	1
Cat fish	A	0.0	8.4	11.3	8.1	5.5	6.7	12.3	2
	B	16.3	9.2	0.0	0.0	0.6	5.2	14.9	3
Lethrinids	A	0.0	13.3	11.5	12.7	2.4	8.0	14.7	1
	B	9.6	5.7	0.0	0.0	0.0	3.1	8.8	5
Serranus	A	0.0	2.4	4.0	3.2	0.0	1.9	3.5	10
	B	11.5	0.7	0.0	0.0	0.4	2.5	7.2	7
Lutjanids	A	0.0	6.1	1.7	3.0	1.5	2.5	4.5	9
	B	2.7	1.7	0.0	0.0	0.9	1.1	3.0	9
Diagramma	A	0.0	16.6	15.7	19.7	19.3	61.2	12.2	3
	B	12.4	12.9	0.0	0.0	1.9	5.4	15.6	2
Callyodon	A	0.0	2.2	5.5	6.0	4.1	3.6	6.6	6
	B	4.5	4.8	0.0	0.0	0.9	2.0	5.8	8
Soles	A	0.0	3.5	6.1	4.7	2.3	3.3	6.1	7
	B	10.8	3.5	0.0	0.0	0.4	2.9	8.4	6
Other fish	A	0.0	1.6	3.9	7.1	0.0	2.5	4.6	8
	B	1.9	0.9	0.0	0.0	0.0	0.6	1.6	11
Lobster	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	B	3.6	1.5	0.0	0.0	0.0	1.0	2.9	10
Crabs	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	B	0.6	0.0	0.0	0.0	0.0	0.1	0.3	13
Miscellaneous	A	0.0	0.0	0.0	0.2	0.4	0.1	0.2	13
	B	0.7	1.0	0.0	0.0	0.0	0.3	1.0	12
Total	A	Nil	68.3	87.0	83.9	32.4	54.3		
	B	96.1	72.5	Nil	Nil	6.3	35.0		

Note : A = Catch by motorised units, B = Catch by non-motorised units.

TABLE 9. *Catch composition of important groups of fish (tonnes) during the years* 1986-1990 *in* 'Thirukkai valai' (*Bottom set net*)

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Sharks	A	0.0	44.1	43.7	36.4	68.3	38.5	23.4	2
	B	78.3	55.5	0.0	2.7	0.0	27.3	28.5	2
Rays	A	0.0	108.5	149.1	177.5	107.8	108.6	66.0	1
	B	168.5	93.8	0.0	2.9	0.0	53.0	55.4	1
Skates	A	0.0	11.0	22.5	32.6	21.3	17.5	10.6	3
	B	30.2	35.7	0.0	0.0	0.0	13.2	13.8	3
Pristis	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	B	8.8	0.0	0.0	0.0	0.0	10.8	1.8	4
Miscellaneous	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	B	2.4	0.0	0.0	0.0	0.0	0.5	0.5	5
Total	A	Nil	163.6	215.3	246.5	197.4	164.6		
	B	288.2	185.0	Nil	5.6	Nil	95.8		

Note : A = Catch by motorised units, B = Catch by non-motorised units.

TABLE 10. *Catch composition of important groups of fish (tonnes) during the years* 1986-1990 *in* 'Kara valai' (*Shore seine*), *non-motorised*

Fish groups	1986	1987	1988	1989	1990	Average	%	Rank
Lesser sardines	0.0	0.0	4.2	0.0	0.0	0.8	1.3	13
Pellona	0.0	0.0	0.0	0.0	2.7	0.5	0.8	14
Kowala kowal	2.4	0.0	0.0	13.1	10.7	5.2	8.0	3
Hilsa toli	2.3	1.2	2.9	0.0	11.5	3.6	5.5	4
Thrissocles	0.0	0.0	1.6	0.0	12.9	2.9	4.4	6
Chirocentrus	0.2	0.0	0.8	0.0	0.0	0.2	0.3	20
Sphyraena	2.2	1.4	1.0	0.0	0.0	0.9	1.4	12
Carangids	24.2	2.2	6.8	12.0	16.5	12.3	18.9	2
Leiognathids	4.6	5.5	5.4	62.9	57.4	27.2	41.6	1
Sciaenids	0.7	1.8	0.0	1.3	1.2	1.0	1.5	10
Mackerel	1.8	0.0	0.0	0.0	7.2	1.8	2.8	7
Lethrinids	1.6	0.0	0.8	0.0	0.0	0.5	0.7	15
Mullet	5.3	4.0	3.0	3.1	0.0	3.1	4.8	5
Sillago sihama	0.0	0.0	0.0	4.4	0.5	1.0	1.5	11
Upeneoides	0.0	0.0	0.0	2.1	0.0	0.4	0.6	19
Belonids	2.1	0.0	0.3	0.0	0.0	0.5	0.7	16
Other fishes	0.0	0.0	0.0	2.2	2.9	1.0	1.6	9
Prawns	0.1	0.0	0.2	0.6	1.5	0.5	0.7	17
Crabs	0.3	0.0	0.8	0.2	0.9	0.4	0.7	18
Miscellaneous	1.6	0.4	1.6	2.6	0.8	1.4	2.2	8
Total	49.4	16.5	29.4	104.5	126.7	65.3	-	-

Elasmobranchs comprised of sharks, rays and skates formed 7.2% of the average catch. Annually 345.1 tonnes of elasmobranchs were caught. Most of the fish comprised of large rays and sharks which were cured and sent to interior markets. Small sharks were marketed locally. They were caught in deeper waters.

Seemingly valuable and coveted forms are the medium and large sized seer fish species. These are the monopoly of the traditional fishery at Tuticorin. Every year about 79.7 tonnes of seer fish were caught by small scale fishermen forming 1.6% in the total fish landings. This compares adversely with the seer fish landings during the previous years when seer fish formed 4.2% of the average fish catch. Seer fish species *Scomberomorus commerson* and *S. guttatus* were the major components in the fishery.

Carangids were caught by most of the gear at Tuticorin except 'Thirukkai valai' and some hand lines. Average annual catch of caranx species came to 159.6 tonnes forming 3.3% in the

TABLE 11. *Catch composition of important groups of fish (tonnes) during the years* 1986-1990 *in* 'Thallu madi' (*Prawn net*), *non-motorised unit*

Fish groups	1986	1987	1988	1989	1990	Average	%	Rank
Leiognathids	0.0	8.9	13.1	1.8	2.9	5.3	12.3	4
Sciaenids	0.0	5.8	1.5	1.5	6.8	3.1	7.2	6
Sillago sihama	0.0	0.0	0.0	29.5	7.7	7.9	18.1	3
Carangids	0.0	5.6	6.9	9.8	1.7	4.8	11.1	5
Kowala kowal	0.0	0.0	0.0	0.0	0.7	0.1	0.3	10
Pellona	0.0	0.0	0.0	0.0	3.6	0.7	1.7	7
Therapon	0.0	1.3	0.0	0.0	0.0	0.2	0.6	9
Prawns	0.0	3.1	11.6	28.1	18.8	12.3	28.4	1
Crabs	0.0	0.0	0.8	0.0	1.9	0.6	1.2	8
Miscellaneous	0.0	4.7	8.1	27.2	1.4	8.3	19.1	2
Total	Nil	29.4	42.0	97.9	47.5	43.4	—	—

TABLE 12. *Catch composition of important groups of fish (tonnes) during 1986-1990 in* Podi valai *(Hilsa net)* 'Catamaran' *unit*

Fish groups	1986	1987	1988	1989	1990	Average	%	Rank
Pellona	—	—	0.4	4.3	2.1	1.4	4.7	5
Hilsa toli	—	—	35.0	15.4	8.6	11.8	41.1	1
Chirocentrus	—	—	0.7	0.7	0.0	0.3	1.0	11
Sphyraena	—	—	0.0	0.6	0.0	0.1	0.4	13
Carangids	—	—	3.9	2.0	0.0	1.2	4.1	6
Mackerel	—	—	13.4	5.8	0.0	3.8	13.4	3
Sciaenids	—	—	16.7	10.1	0.0	5.4	18.7	2
Otolithus	—	—	9.5	1.7	0.0	2.2	7.5	4
Sillago sihama	—	—	0.0	0.6	0.0	0.1	0.4	12
Lethrinids	—	—	0.0	1.7	0.0	0.3	1.2	9
Other perch like fishes	—	—	0.0	3.2	0.0	0.6	2.2	8
Crabs	—	—	3.1	2.5	0.0	1.1	3.9	7
Miscellaneous	—	—	0.0	1.3	0.3	0.3	1.1	10
Total	Nil	Nil	82.7	49.9	11.0	28.7	—	—

total fish landings by traditional gear. Large sized carangids were caught by drift nets and hooks & line.

Silverbellies (*Leiognathidae*) formed an important component in the sardine gill net catches. Other units like 'Disco net', shore seines and 'Thallu madi' also landed good quantities. Total quantity of silverbellies per year came to 79.8 tonnes forming 1.6% in the total catch. They were caught along with other smaller fish like lesser sardines and anchovies.

Anchovies were among the important clupeid fishes caught by traditional fishery. They were caught mostly by sardine gill net, *podi valai* and shore seine. The anchovies contribute annually about 354.0 tonnes to the fishery forming 7.3% in the total catch. *Stolephorus* spp., *Thrissocles* spp. and *Ilisha* spp. formed the major portion of the catch. Human consumption of anchovies is restricted but they are in great demand in the fish meal industry.

Fishery for *Nemipterus* was considered to be the monopoly of hand line units. Some quantity was also caught by 'Podi valai' units. During the period 57.1 tonnes of *Nemipterus* was landed per year. On the other hand 110.8 tonnes were landed on an average during the earlier years. *Nemipterus* formed 1.2% in the annual fish landings.

Barracuda fishery was an important one by the traditional units. Smaller sized *Sphyraena* were available in sardine gill nets, shore seine and 'Podi valai' units. Larger forms of barracuda were caught by Paru valai, long line and troll line. On an average 56.6 tonnes of barracuda were landed at Tuticorin every year.

TABLE 13. *Catch composition of important groups of fish (tonnes) during* 1986-1990 *in* 'Disco net' *(Prawn net), motorised unit*

Fish groups	1986	1987	1988	1989	1990	Average	%	Rank
Carangids	—	5.3	0.2	0.0	0.0	1.1	4.7	4
Leiognathids	—	2.0	1.6	0.0	1.2	1.0	4.1	5
Sciaenids	—	19.0	3.1	1.5	5.1	5.7	24.5	2
Therapon	—	0.0	0.0	3.4	0.0	0.7	2.9	9
Sillago sihama	—	3.5	4.7	1.9	13.6	4.7	20.2	3
Kowala kowal	—	0.0	0.0	0.0	3.5	0.7	3.0	8
Saurida tumbil	—	0.0	0.0	0.0	3.8	0.8	3.2	6
Other fish	—	0.0	1.9	1.9	0.0	0.8	3.2	7
Prawns	—	11.9	11.9	6.2	7.4	7.5	31.9	1
Miscellaneous	—	0.0	2.0	0.7	0.0	0.5	2.3	10
Total	Nil	41.7	25.4	15.6	34.6	23.5	—	—

TABLE 14. *Catch composition of important groups of fish (tonnes) during* 1986-1990 *in* 'Mural valai', *motorised unit*

Fish groups	1986	1987	1988	1989	1990	Average	%	Rank
Belonids	—	—	—	—	6.1	1.2	70.1	1
Scolopsis	—	—	—	—	2.6	0.5	29.5	2
Total	—	—	—	—	8.7	1.7	—	—

Cat fishes caught by traditional gears formed an average of 24.6 tonnes per year. They were caught both by motorised as well as non-motorised units. Larger cat fish were caught by 'Paru valai' and long line units. Smaller cat fish species were caught by 'Podi valai' and 'Sinki valai units. Cat fish formed only a small portion in the Tuticorin traditional fishery.

Tuna and bill fishes were a regular feature in the traditional fishery during their season of abundance in the months from July to September. On an average 84.6 tonnes of tuna and 13.7 tonnes of bill fishes were landed every year. Together they formed 2.0% in the total fish catch. Tuna and bill fishes were caught by 'Paru valai', 'Podi valai' and troll line units.

Chirocentrus and *Hilsa toli* form two important species of clupeids in the traditional fishery. They are in demand for the interior markets. These two groups contributed 26.6 tonnes and 23.2 tonnes respectively in the fishery. They were caught by 'Podi valai', sardine gill net and shore seine units. Recently some 'Podi valai' units in catamarams were engaged exclusively for *Hilsa toli* fishery and landed good quantities of the fish. The fishing unit combination of 'Catamaran' and 'Podi valai' were responsible for major portion of the *Hilsa toli* catch.

Prawns, lobsters and cephalopods are the potential money makers and are important in the export trade. Competitive fishery is going on for all the three groups because of their value as foreign exchange earners. On an average, every year 20.3 tonnes of prawns, 2.1 tonnes of lobsters and 5.9 tonnes of cephalopods were caught by traditional fishermen using specialised gear. 'Sinkivalai', 'Disco net', 'Thallu madi' and shore seine units landed prawns and lobsters. Cephalopods were mostly caught by hand lines both in the motorised and non-motorised sectors.

Variety of other fishes were caught by all the units. Fish species like belonids, *Sillago sihama*, *Rachycentron* sp., *Therapon* spp. and soles were important. Edible crabs were also caught by traditional fishermen. During certain months, these species were caught in good quantity. Put together, all these groups contribute valuable income for the small-scale traditional fishery along the Tuticorin coast.

Remarks

The present study has given a wealth of information on the small-scale traditional fishery at Tuticorin. More than twenty five species of fish in twelve broad groups support the fishery with good landings and many other species occur during particular seasons boosting the total fish

TABLE 15. *Catch composition of important groups of fish (tonnes) during* 1986-1990 *in Hand line* ('Thoondil'), 'Catamaran' *Cephalopod unit*

Fish groups		1986	1987	1988	1989	1990	Average	%	Rank
Balistids	A	—	—	—	—	0.5	0.1	2.0	4
	B	—	—	—	—	0.2	0.1	2.7	3
Saurida tumbil	A	—	—	—	—	2.7	0.5	10.7	2
	B	—	—	—	—	2.2	0.4	29.7	2
Other fish	A	—	—	—	—	2.3	0.5	9.0	3
	B	—	—	—	—	4.9	1.0	62.2	1
Cephalopods	A	—	—	—	—	19.8	4.0	78.3	1
	B	—	—	—	—	0.1	0.1	1.4	4
Total	A	Nil	Nil	Nil	Nil	25.3	5.1		
	B	Nil	Nil	Nil	Nil	7.4	1.5		

Note : A = Catch by motorised units, B = Catch by non-motorised units.

TABLE 16. *Average month-wise landings of important marine fishes at Tuticorin (in kg) from 1986 to 1990*

Name of fish	January	Feb.	March	April	May	June	July	August	September	Oct.	Nov.	December	Total
Sharks	6167.7	10522.8	11159.2	15595.0	18951.2	9927.4	17821.2	8847.0	12339.4	10596.6	7479.0	2852.8	132259.3
Rays	10432.2	7307.8	15313.4	16722.2	23631.6	19317.2	17300.0	30691.0	17043.6	12488.8	6802.8	2806.6	179857.2
Skates	2569.2	850.8	3009.6	1566.4	8946.4	4348.6	4333.8	1199.4	3318.2	694.0	373.0	0.0	31209.4
Pristis	0.0	0.0	0.0	0.0	0.0	750.0	756.0	0.0	260.0	0.0	0.0	0.0	1766.0
Lesser sardine	189451.8	221592.0	208853.6	209457.4	216292.6	165573.6	220230.0	197944.6	230309.4	277372.0	242198.0	319914.2	2699189.2
Oil sardine	2500.0	0.0	0.0	0.0	0.0	0.0	0.0	68.0	770.0	540.0	488.8	0.0	4366.8
Pellona	556.8	1559.6	800.0	614.5	2187.4	2031.4	3190.8	4148.8	0.0	4833.0	2727.6	3051.4	25701.3
Kowala kowal	0.0	1792.0	845.2	0.0	1222.6	2170.2	4211.0	2957.6	1443.6	2184.0	1477.2	442.0	18745.4
Stolephorus	16848.0	0.0	0.0	0.0	733.2	1190.2	4200.4	1544.8	3013.6	1152.0	1480.2	228.0	30390.4
Hilsa toli	1224.6	193.4	1578.8	3209.8	2419.2	587.2	491.8	152.6	641.2	1209.6	2441.6	8990.4	23140.2
Thrissocles	8242.8	27285.4	45417.6	33580.6	13852.0	14711.0	37068.0	24557.4	25399.0	20943.8	8876.6	18995.4	278929.6
Chirocentrus	1639.0	575.6	1456.8	1113.0	1848.6	1724.8	1501.0	2961.0	5498.6	2941.0	4093.0	1180.0	26532.4
Saurida tumbil	767.0	536.0	330.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.2	86.4	1737.6
Cat fish	2206.2	1147.8	1025.2	1305.2	5558.0	769.8	3119.2	3050.2	2624.0	1572.8	1437.6	739.8	24555.8
Sphyraena	2314.2	1899.8	2764.2	9987.8	5959.0	4937.4	5227.2	6350.6	8251.6	3652.4	4010.8	1248.6	56603.6
Carangids	10010.2	10624.8	6805.4	13727.8	20041.8	14199.6	11165.8	19481.0	17844.2	16895.8	11246.2	7625.4	159668.0
Chorinemus	430.2	250.0	195.2	2301.0	521.6	2309.4	834.6	1072.4	877.0	0.0	1298.4	238.2	10328.0
Lutjanus	4896.8	5705.0	7147.2	12132.0	8886.4	4559.0	8176.4	8619.8	6832.8	3290.2	3643.8	2266.8	76156.2
Nemipterus	5317.4	6491.6	4732.4	1014.0	2732.2	1448.0	8530.0	10112.4	5254.4	2472.8	4217.6	4738.8	57061.6
Leiognathids	9043.2	4533.2	5041.4	1379.6	5813.6	7035.4	1699.8	6648.6	6431.8	16964.8	7440.8	7726.2	79758.4
Scolopsis	375.0	204.8	170.0	0.0	299.4	86.6	521.6	888.8	516.0	460.0	208.0	0.0	3730.2
Sciaenids	1122.4	408.0	591.6	1034.6	930.6	728.0	3178.2	1614.6	1670.2	542.4	1084.2	3911.0	17175.8
Mackerel	1025.0	206.4	324.0	584.4	501.8	400.4	78.0	1196.8	1742.4	757.2	2924.8	3399.4	13140.6
Mullet	503.6	141.6	306.0	156.0	0.0	208.0	0.0	686.4	247.0	0.0	175.0	650.0	3073.6
Otolithus	246.2	87.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	58.4	1977.0	2391.0
Tuna	798.2	888.0	2069.2	2972.0	7603.4	13385.6	4457.6	27823.2	13527.2	8191.0	2080.2	735.6	84531.2
Lethrinids	22952.0	15692.4	14778.8	27260.8	16525.2	22975.8	23438.6	24215.6	15745.8	13198.6	11331.4	6873.0	214988.0
Serranus	13306.2	10571.8	10927.6	17218.4	15453.4	9834.2	13833.8	21838.8	12832.8	10246.0	11536.2	4888.6	152487.2
Diagramma	747.0	1234.8	1568.8	2554.4	4254.6	2804.4	3625.2	3323.2	3089.4	1899.4	1536.8	697.0	27335.0
Lates calcarifer	52.0	90.4	732.0	171.6	2748.0	189.0	75.4	0.0	160.0	108.0	175.6	72.0	4574.0
Seer Fish	6915.2	3321.2	3767.4	8919.0	3263.6	2983.4	10440.2	9860.6	5976.8	6723.2	10065.8	7526.4	79762.8
Istiophorus	0.0	0.0	1341.8	1350.0	602.2	891.8	1332.4	4799.6	2435.0	871.0	0.0	0.0	13623.8
Rachycentron	65.0	624.8	452.4	646.0	529.2	896.0	440.4	857.4	509.6	264.6	624.0	643.0	6552.4
Polynemus	356.4	880.0	205.2	975.0	0.0	0.0	278.2	0.0	52.0	255.0	17.0	0.0	3018.8
Belonids	4713.2	2641.6	900.0	1222.0	2358.0	527.6	1763.2	1840.4	1466.4	1722.2	2067.8	5727.4	26949.8
Therapon	681.2	1174.4	1799.4	5623.6	1444.2	436.8	1138.0	1780.8	3955.6	1551.2	1559.8	1179.6	22324.6
Callyodon	57.2	40.8	243.6	499.2	390.6	243.6	137.6	150.0	78.0	151.2	0.0	52.0	2043.8
Sillago sihama	965.6	921.8	2384.2	2187.8	1456.2	634.4	941.2	5831.8	884.0	884.0	3142.0	2140.8	22373.8
soles	227.2	69.6	340.6	387.4	639.4	332.6	194.4	172.4	182.0	94.8	202.4	96.2	2939.0
Balistids	606.0	424.6	806.0	364.0	745.2	462.2	657.2	491.8	891.8	310.6	187.2	54.0	6000.2
Upeneoides	00	00	416.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	416.0
Lobsters	128.4	68.4	304.4	117.0	311.4	254.2	155.0	97.4	398.0	108.4	122.6	71.4	2116.6
Prawns	1375.8	1411.2	990.8	251.2	1881.0	1472.4	1633.0	3214.8	1363.6	536.8	3504.4	2616.2	20251.2
Crabs	170.0	16.8	185.4	454.4	0.0	234.0	0.0	0.0	108.0	0.0	405.6	669.8	2244.0
Other perch like fishes	5791.0	5113.2	7935.8	7959.4	6211.4	6790.8	10713.2	8199.6	8419.4	9265.0	9691.6	7134.2	93144.6
Cephalopods	873.6	3182.4	1441.0	0.0	0.0	0.0	0.0	0.0	0.0	154.0	49.4	189.6	5890.0
Miscellaneous	1302.4	1932.2	3920.0	4003.8	4165.8	4975.6	2087.8	4423.4	1958.8	5644.0	6662.4	6759.4	47834.6
TOTAL	339973.1	354215.2	375737.2	410618.3	411912.0	329337.6	430977.2	453633.6	426342.2	443764.2	381163.8	441194.6	4798869.0

catch. A comparison of the average annual fish catch with that of the previous years from 1979 to '85 brings to light the decrease in average annual landings to the tune of 1,552 tonnes during the present period. Far from being improved, the decrease in catch happened despite the introduction and active participation of motorised units. Annual total fish catch from all units was much higher than the average annual catch during 1986, '87 and '89. But considerably lower catch was recorded during 1988 and '90. Decrease in total fish landings by non-motorised units was reported from 1986 to 1990. Because more and more boats were fitted with machine propellants every year bringing down the strength of non-motorised units from 439 in 1986 to '91 in 1990 a corresponding increase in total fish catch by motorised units was not achieved. Every year, some additions have been made in the number of crafts employed in the traditional fishery. Total number increased from 542 in 1986 to 613 in 1990.

With advantages in reaching fishing ground earlier, remaining in fishing grounds for longer time and returning with catch in time for the early market, many boats have switched over to motorisation. The enterprising small-scale fishermen were concerned with ends and whatever means they could employ they made full use of them. Those who could foot the bill for fitting machine propellants used their own resources. Others borrowed from bank. From 90 motorised boats in 1986 the number increased to 476 in 1990. Every year some boats are being fitted with machine propellants. Even catamarans are also going in for motorisation.

Catch per unit trends for comparable units show higher rates of catch per unit for motorised units than for the non-motorised units. Especially high are the catch per unit rates for 'Paruvalai', 'Podivalai', long line, troll line and 'Thirukkai valai' units operated by motorised boats than those nets operated by non-motorised boats. Concern is evident whether the inshore fishery by the traditional fishing units could be able to sustain large scale motorised units. Slump in growth may be one of the ill effects of motorisation. But there is no knowning how long the downward trend is going to last. Temporary low catch for one or two years were common in the past. The fishery recovered to new levels afterwards. Whether such buoyancy could be expected this time also is the anxious expectation. Much more scientific body of evidence is requirred to come to any conclusion.

ON THE EMERGING FISHERY OF MACKEREL SCAD, *DECAPTERUS MACARELLUS* FROM VIZHINJAM*

The carangids which constitute a major fishery at Thiruvananthapuram coast is represented by a variety of species. The scad (genus *Decapterus*) is the most abundant group of carangids in the area and is constituted chiefly by two species *viz. Decapterus russelli* and *D. macrosoma*. Eventhough the occurrence of mackerel scad, *Decapterus macarellus* was reported from Vizhinjam area by Sreenivasan (*Indian J. Fish.*, **23**, (1 & 2) : 41-56, 1976), it was landed only in stray numbers prior to the introduction of motorised traditional crafts. These crafts have helped in the expansion of fishing grounds from nearshore areas to slightly distant grounds. Consequently exploitation of certain resources like tunas, perches and carangids has been improved. The emerging fishery of *Decapterus macarellus* (Fig.1) is one among them .

D. macrosoma	*D. macarellus*
Caudal fin hyaline to dusky	Caudal fin yellow-green
Maximum fork length rarely exceeds 25 cm	Fishes upto 33 cm fork length are common
Scales on top of head do extend not extend forward to beyond posterior margin of pupil	Scales on top of head forward to anterior margin of pupil
Posterior end of upper jaw concave above, rounded and produced below	Posterior end of upper jaw straight above, mod erately rounded and slanted anteroventrally

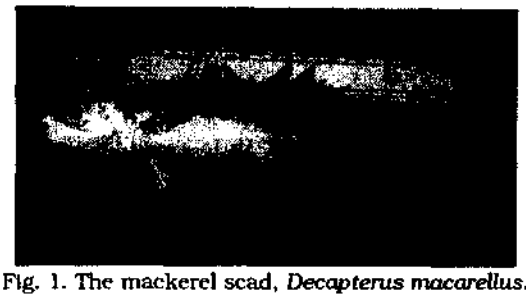

Fig. 1. The mackerel scad, *Decapterus macarellus*.

*Prepared by: G. Gopakumar and K. T. Thomas, Vizhinjam Research Centre of CMFRI, Vizhinjam - 695 521.

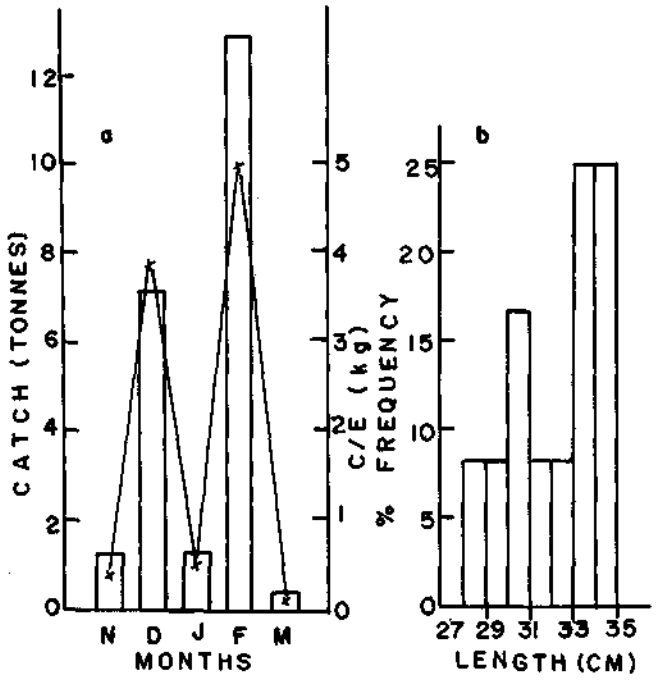

Fig. 2a. Monthwise catch (tonnes) and catch rate (kg) of *Decapterus macarellus* in drift net operated from motorised crafts.

Fig. 2b. Size composition of *Decapterus macarellus* in the drift net fishery.

A total of 26.5 tonnes of *D. macarellus* was landed during 1990-'91. The season of the fishery was November-March, with a peak during February (Fig. 2a). The fish was caught mainly by drift nets and the bulk (88%) was landed by the gear operated from motorised crafts. The area of fishing was between 40 and 60 m depth. The fish ranged in total length from 28 to 35 m (Fig. 2b). The fishes examined were in maturity stages IV and V.

The emerging fishery of *D. macarellus* in recent years due to the exploitation of deeper fishing grounds by the motorised carfts is an indication of the availability of this species in the non-traditional fishing grounds. However, the resource potential, distribution, biological and population characteristics of this commercially important species need to be studied.

Often *D. macarellus* is confused with *D. macrosoma*. The following diagnostic characters could be employed for distinguishing the species in the field.

ON THE COLLECTION OF SPINY LOBSTERS BY SKIN-DIVERS IN THE GULF OF MANNAR OFF TUTICORIN*

Skin-diving is practised every year in the Gulf of Mannar off Tuticorin for a period of four or five months from November/December to March/April mainly for collecting the sacred chank, *Xancus pyrum*. During that time spiny lobsters are also collected by the skin-divers incidentally and are brought to the fish landing centre at Tuticorin for auctioning. The landing of the spiny lobsters thus collected by the skin-divers was monitored twice a week during January and February, 1991. The estimated catch, species composition, size-frequency distributions and sex ratio, of the lobsters collected by the skin-divers were studied and the particulars are presented here.

As the collection of the chank is made by visually searching the floor of the sea, good visibility of the sea water is one of the most important factors that determine the season for the chank fishing. Normally the visibility of the sea water is good along Tuticorin coast from November/December to March/April. So during these months intensive chank fishing is carried out along Tuticorin coast with about 1,200 skin-divers actively engaging in the fishery. The fishing for the chank is carried out at a depth range of 10 to 20 metres. The method of collection of chank by skin-divers has been reported earlier by Nagappan Nayar and Mahadevan (*Proc. Symp. on Living Resources of the seas around India*, 1973).

Two species of the spiny lobsters namely, *Panulirus ornatus* (Fabricius) and *P. homarus* (Linnaeus) were collected by the skin-divers, the former being the dominant one and the latter occurring only sporadically. During the two months period of observation an estimated number of 2,424 lobsters of the species *P. ornatus* weighing 1,599 kg were collected by the skin-divers from the sea off Tuticorin. Out of this 87% of the catches were landed in January itself. The total number of divers involved in chank fishing was 28,440 during January whereas in the subsequent month it was only 9,750.

*Prepard by M. Rajamani and M. Manickaraja, Tuticorin Research Centre of CMFRI, Tuticorin - 628 001.

The size of *P. ornatus* collected by the skin-divers during the two months period ranged between 154 and 450 mm (total length) in male. In females the size ranged from 169 to 423 mm only. However, majority of the lobsters were within the size range of 211 to 280 mm in both the sexes (Fig. 1). The occurrence of *P. homarus* was rare in the collection. Further, the size also was small ranging from 139 to 236 mm in male and from 120 to 245 mm in female. In *P. ornatus*, males were dominant constituting 74.2% of the total number of lobsters collected whereas in *P. homarus* females were dominant forming 67% of the total numbers collected. One specimen of *P. homarus* weighing 480 g and measuring a total length of 237 mm was observed with berry under its abdomen.

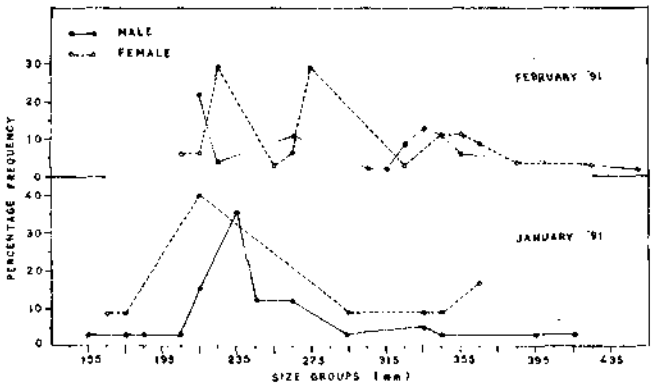

Fig. 1. Size-frequency distribution of *P. ornatus* collected by the skin-divers from the sea off Tuticorin during January and February, 1991.

When compared to the quantity of lobsters landed at Tuticorin by other gears viz. bottom-set gill nets and trawl nets, the quantity of lobsters collected by the skin-divers is insignificant. Nevertheless the importance of this small quantity collected by the skin-divers by visually observing their original habitats cannot be ignored as it throws light on their habitat and certain aspects of their behaviour. Normally the spiny lobsters live in rocky areas and prefer to hide themselves inside the holes and crevices of the submerged rocks (Balasubramanyan *et al.*, 1960, *Indian J. Fish.*, **7** (2). But the ground where chank fishing is carried out is mostly sandy. According to the information gathered from the divers, the bottom is rocky in certain parts of the chank fishing ground. So if they happen to dive in such rocky areas they look out for the lobsters also and when they notice the presence of the lobsters inside the crevices or holes they catch them and bring them up to the boat. It has been reported that lobster catch is much better when fishing is carried out during night hours. Inside the Colombo harbour a total of 202 *P. dasypus* were collected by the skin-divers working with fish light for about two hours during night (Jonklass, 1965, *Proc. Symp. on Crustacea*, Part IV). When compared to this, the number of lobsters collected by the skin-divers from the sea off Tuticorin is negligible. But the collection of lobsters by the skin-divers from the sea off Tuticorin is only incidental as the fishing is carried out during day time primarily for collecting the sacred chank, *Xancus pyrum*.

DISPOSAL OF CATCH FROM 'DOL' NET AT VERSOVA, BOMBAY*

The 'dol' not fishery is a multi-species fishery comprising fishes, penaeid prawns and non-penaeid prawns and gives support to almost 85% of the fisherman families at Versova, Bombay. An account of disposal of catch from 'dol' net boats at Versova is given here. The mesh size of the net from mouth to cod end varies from 280 to 12 mm.

The disposal of catch depends upon the species and quality of the fishes or prawns. While about 85-90% of the 'dol' not catch, which is constuted by low priced fishes, is sun dried, the rest forming quality fishes and prawn is sold fresh. Dried fishes are disposed mainly at three points. The largest portion i.e. 70% is sold to petty merchants locally, while 25% is taken to the Marol wholesale market and the remaining 5% at rotail markets.

For sun drying of these fishes a long stretch of sea shore is utilized by erecting scaffoldings of about 1-4 m. At Versova there exist nearly 325 scaffoldings of various sizes, which belong to boat onwers as well as others.

*Prepared by: S. G. Raje, Bombay Research Centre of CMFRI, Bombay - 400 023.

TABLE 1. *Average wholesale prices of fishes at Versova landing centre during 1983 - '84 to 1985 - '87*

Year	1983 - '84	1984 - '85	1985 - '86	1986 - '87
Groups/Species	Rs./kg	Rs./kg	Rs./kg	Rs./kg
Acetes spp.	0.88	0.73	0.88	2.25
Bombay duck	1.40	1.06	2.25	3.50
P. tenuipes	1.50	1.38	1.88	3.25
C. dussumieri	1.80	1.92	2.10	2.60
Ribbon fish	1.25	1.26	1.27	1.50
Myctophid spp.	0.58	0.87	0.53	0.85
Prawns	6.15	7.30	7.82	8.25
Sciaenids	0.70	0.72	0.69	1.00
B. mechlallandi	1.54	1.19	1.92	3.30
Promfrets	11.38	10.75	11.92	15.00
Ghol	11.90	11.30	13.50	14.75
Catfish	3.25	3.30	5.25	6.25
Eels	6.25	6.25	6.75	8.60
Perches	3.25	4.13	4.50	5.30
Carangids	3.75	4.00	4.27	5.45
Sharks	10.00	10.50	11.00	12.70
Cephalopods	1.13	1.25	1.30	7.35
Trichirus spp.	0.50	1.13	1.15	2.20
Misc. quality fishes	6.40	6.53	6.30	7.50

The species-wise details of disposal of fishes and prawns are given below. Prices may vary according to place, quality and demand for particular fish. The average wholesale price of fishes and prawns at landing centre during 1983-'84 to 1986-'87 is presented in Table 1.

Acetes spp. is locally called 'Kolim' or 'Jawala'. The major portion of this group is used as feed for poultry, cattle and in fish farm. It is a cheap and good manure in the agriculture sector. 70% goes towards manure and feed.

About 90% of *Palaemon tenuipes* locally called 'Ambar' or 'Kardi' goes for human consumption in fresh and dried condition.

Bombay duck is comparatively more valuable and fetch better price in dried form. About 10% is sold in fresh condition in the local retail markets in Bombay and 90% in dried condition. The dried Bombay duck are packed and sold in baskets or bags. The fish are sold as bundle of 110 fishes.

Coilia dussumieri, popularly called as 'Mandeli' is smaller in size having more spines but tasty and therefore they have good market in fresh and dry form. About 20% are sold in fresh condition and 80% in dry condition. The maximum portion of this fish goes waste while consumed in fresh condition. But dry 'Mandeli' is consumed wholely in roasted or 'Chatni' form.

Sciaenids which include *Otolithus cuvieri, O. ruber, Johnieops sina, J. vogleri, Johnius glaucas, J. belengiri* and *J. microrhynus* are mainly sun dried after removing the scales, operculam and gut. Though this process is laborious, the final product gets good price, say, three time more than that of ordinary dry sciaenids. It has good demand in interior part of Maharashtra and northeastern region of India.

Ribbon fishes are classified into three groups according to the species they being *Lepturacanthus savala*, locally known as 'Wakati', *Eupleurogrammus muticus* as 'Pithi-wakati' and *Trichiurus* spp. as 'Bagaa'. About 8 to 15 pieces of *L. savala* and *E. muticus* are tide together by making use of their long tail and sold in dry condition only, whereas *Trichiurus* spp. are sold in fresh (15%) as well as dried (85%) condition.

The price varies according to quality and size of all species.

Myctophum spp. (Lantern fish) locally called as 'Gim' are not preferred for human consumption due to small size, big head and photophores. After drying it is used as cattle and poultry feed, but major part goes as manure. This is caught in bulk exclusively or along with *Acetes* spp. Even when caught in bulk quantities, some times, the fishermen are unable to recover their operational expenses ever.

Prawns caught in 'dol' include *Metapenaeus affinis, M. brevicornis, Parapenaeopsis stylifera, P. hardwikii, P. sculptilis, Solenocera crassicornis* and *Atypopenaeus stenodactylus*. The prawns are sold at landing centre, carwford market and at Sassoon Dock. The prawns are sold according to species and size. The low priced prawns like *Solenocera* spp. and *Exhippolysmata enstrostris* are peeled, dried and sold in retail market or in wholesale market where they could get good price.

The bigger specimens of *Sepia* spp. are locally known as 'Makol' while smaller ones are known as 'Makali'. The bigger ones of *Sepia* and *Loligo* spp. ('Nale') are sold in fresh condition but smaller ones are sold in wholesale market at Marol after drying.

Miscellaneous quality fishes are called as 'Tipan'. They include a variety of fishes like small sized pomfret, prawns, big size Bombay duck, *Hilsa* spp. *Sciaenids, Coilia dussumieri, Bregmaceros mechlallandi, Cynoglossus* spp., *Trichiurus* spp. *Ploynemus* spp. and small eels. These are sorted out from catch, filled in baskets and taken to retail or wholesale markets.

AN ACCOUNT OF HAND LINING FISHERY FOR SNAPPERS AND GROUPERS AT BEYPORE, CALICUT WITH A NOTE ON THE BIOLOGY OF *PRISTIPOMOIDES TYPUS**

Introduction

The hooks and line fishery at Calicut is mainly for sharks and seerfishes and is used either in long lining or trolling. It is operated both by local and migrant fishermen. However, there is a seasonal hand lining fishery for groupers and snappers by Colachel and nearby fishermen. The snappers of which *Pristipomoides typus* forms the main species are totally untapped by any other gear in this area. Hence a brief note on its biology is also given along with the general description of the fishery based on the data collected during December, 1990 to April, 1991 from Beypore and Calicut.

Craft and gear

The craft is the mechanised boat similar to trawlers of 30-32' OAL fitted with Ruston or Leyland engines (see back cover photo). The gear consists of a monofilament main line with branch line of 13 cm length containing barbed hooks of Nos. 8 & 12. The number of hooks varies from 8-15 and they are attached at a distance of 18 cm from one another (Figs. 1 and 2). The main line is weighted at the bottom. In a boat, there will be 7-8 persons. One will steer the boat while the others operate the gear. About 25 units are operated from Beypore.

Operation

The fishery starts by November/December and lasts till March as the weather becomes unfavourable afterwards. But in 1991, it continued upto the end of April. The gear is operated in rocky areas of depth upto 150 metres. Usually they go for fishing by midnight between 12 and 1 O'clock and reach the ground around 7 or 8 in the morning. The tunas caught en route by operating smaller hooks and line are used as bait. Instead of bait, coloured silk twines are attahced as lures on these hooks.

After reaching the probable ground, the nature of the ground is ascertained by operating the gear. Once the desired fishes are hooked, the operation continues till sun set. After sunset, irrespective of the quantity of the catch, they return and reach the landing centre by midnight. But some will stay overnight due to poor catch and resume fishing the following day and come back.

Species caught and average catch

The main species caught are the snappers, *Pristipomoides typus*, *Lipocheilus carnolabrum*, the groupers, *Epinephelus* sp. and *Sepia* sp. of which *P. typus* form the dominant catch followed by *Epinephelus* sp.

*Prepared by: M. Sivadas, Calicut Research Centre of CMFRI, Calicut - 673 005.

Fig. 1. A unit of hand line with the baits attached to each hook.

Fig. 2. An individual hook with the bait.

Though the exact catch details are not available, it was found that on an average about 300 kg of *P. typus* and 100 kg of *Epinephelus* sp. were landed per trip by a boat. The *Sepia* sp. and others were negligible in quantity.

Biology of *Pristipomoides typus*

Size distribution (Fig. 3): The size varied from 300-600 mm. In January and March, 420 mm followed by 440 mm formed the dominant group whereas in February, 460 mm followed by 440 and 500 mm were dominant. But, in general it could be seen that size groups between 380 and 460 mm were more common and the representation of bigger ones above 520 mm were scarce.

Length-weight relationship: The relationship based on 100 fishes was found out to be: Log W = -3.51+2.42 Log L.

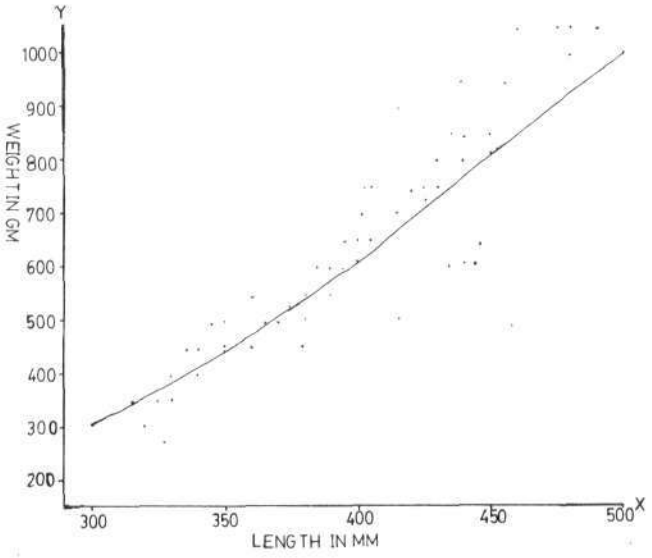

Fig. 3. Length-frequency distribution of *P. typus* in mm.

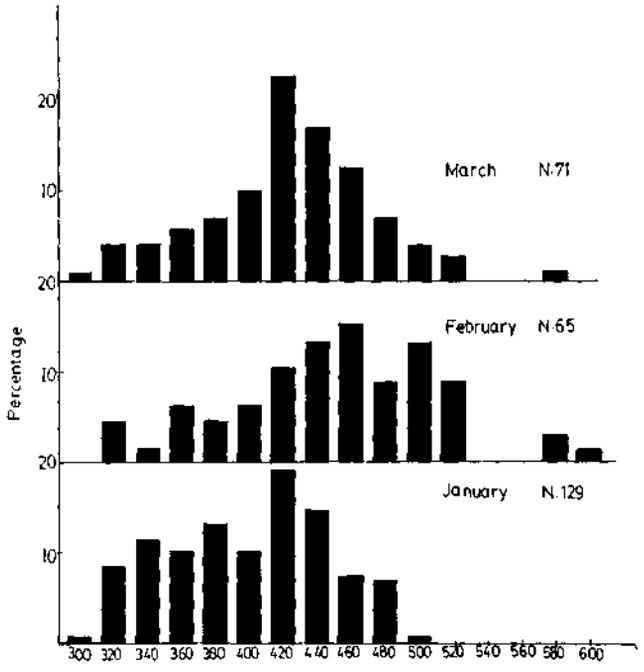

Fig. 4. Observed length and weight plotted against calculated relationship of *P. typus*.

The correltion coefficient (r) was found to be 0.91 (Fig. 4).

Stomach conditions

Most of the examined stomachs were found to be everted and others contained little or no food.

Gonadial condition

Both immature and mature fishes were observed. The mature ones were mainly in partially spent condition.

Disposal of the catch

The snappers were taken to the main market of Calicut and sold by auction and its retail price varied from Rs. 15-20.0 per kg. The groupers on the otherhand were taken by the processing companies from the landing centre itself and its price varied from Rs. 10-15/- per kg. Groupers below 500 g were generally not taken by them.

General remarks

Though the fishing is profitable, the local fishermen show little interest because of the inherent difficulties and inconveniences associated with this fishery. The fishing is quite tedious mainly with the hauling of the line as is evidenced from the horizontal cuts on the forefingers of the fishermen. Moreover, since the departure and arrival are at odd times, the fishermen get little time for proper sleep, bath, food etc. Above all, as the fishing is carried out farther off from the usual fishing ground of other gear, the persons have to be more hardy and seafaring and these qualities are less in the local people when compared to the migrants.

However, considering the untapped nature of the resources and dwindling of catches in other gears, it is likely that atleast a few local fishermen will resort to this fishing in future. This belief is strengthend by the fact that in Malabar, especially Calicut, a new type of gear, craft or fishing method will be accepted only after its popularity in the nearby areas as is evidenced in the case of mechanisation of craft, introduction of ring-seine etc.

ON THE FIRST RECORD OF THE DEEP SEA SHARK *CENTROPHORUS GRANULOSUS* (BLOCH AND SCHNEIDER) FROM INDIAN SEAS*

Two numbers of the deep sea gulper shark *Centrophorus granulosus* (Bloch and Schneider, 1801) belonging to the family Squalidae were landed at the Cochin Fisheries Harbour on 23-2-1991. The specimens were 95 cm and 91 cm (Fig.1) in total length and weighed 6 and 4.5 kg respectively. It is for the first time that this species is recorded from the Indian coasts; though common in the Atlantic and upto Southern Mozambique. Both specimens were females. A single fully developed embryo with characters of the adult was present in the specimen of total length 91 cm. The embryo measured 323 mm in total length and weighed 190 g. They were caught northwest off Cochin (off Ponnani-Chavakkad) at depth ranging 300-320 m in shark long lines. Again on 19-6-'91, two female specimens of the same species, measuring 90 and 98 cm were landed at the Fisheries Harbour, caught by the same gear.

Fig. 1. *Centrophorus granulosus*, the deep sea gulper shark.

*Prepared by Grace Mathew, K. Thulasidas and K. M. Venugopal, CMFRI, Cochin - 682 031.

Colour dark brown, fins dark, body elongate and slightly compressed. Snout pointed and longer than width of mouth, but shorter than distance from mouth to pectoral fin origin. Teeth in upper jaw small, broad and blade like, lower jaw teeth large, compressed and blade like. A strong spine with lateral grooves present on anterior edges of both dorsal fins. First dorsal relatively high, second lower than first, its base about $^{3}/_{4}$ the length of first dorsal base. Inner corners of pectoral fins produced as narrow, pointed lobes that extend to behind first dorsal spine; caudal fin with a deep subterminal notch, caudal peduncle without dorsal keels of precaudal pits.

Teeth $\frac{16\text{-}19/1/16\text{-}19}{14\text{-}17/1/14\text{-}17}$

Morphometric measurements in cm are given below:

Total length	:	91
Length of first dorsal base	:	18
Length of second dorsal base	:	10.6
Height of first dorsal	:	6.2
Height of second dorsal	:	5
Snout length	:	8.4
Width of mouth	:	9
Horizontal diameter of orbit	:	4.5
Tip of snout to origin of caudal	:	71
Tip of snout to origin of first dorsal	:	29
Tip of snout to origin of second dorsal	:	62
Tip of snout to origin of ant. of orbit	:	5.5
Length of interdorsal space	:	24
Length of pectoral base	:	10.2

UNUSUAL CATCH OF CATFISH *TACHYSURUS DUSSUMIERI* IN BOTTOM SET GILL NET AT VERSOVA*

An unprecedented catch of about 3,250 kg of catfish *Tachysurus dussumieri* was landed by a bottom set gill netter at Versova on 23-12-'90. Usually the bottom set gill nets, locally called 'Budi' are operated for pomfret fishery along the north-west coast of India. Normally the duration of fishing trip is about 4-5 days depending upon the catch, ice and diesel. A 62 footer mechanised bottom set gill netter departed Versova village on 21-12-'90 afternoon for fishing and operated on 22-12-'90 at a depth of 45 m off Versova. On the evening when the net was hauled a heavy catch of catfish was realised which was landed on 23-12-'90 (Fig. 1).

The catfish caught in bottom-set gill net is considered as subsidiary catch. However, the present catch of *T. dussumieri* from a single operation is an unusual phenomenon at Versova. Along with catfish, pomfret, *Megalaspis cordyla*, *Chirocentrus* spp. *Hilsa* spp. and elasmobranchs were also landed. The entire catch was transported to the Shivaji wholesale market at Bombay. Table 1 shows the details of catch, rate and value of different components sold.

A total of 113 specimens of *T. dussumieri* were examined for biological aspects. The size ranged from 480 to 670 mm with a dominant mode at 600 mm. The weight of fish ranged from 2 to 4.5 kg. Of the 113 specimens, 81.6% were males and 18.4% females. All the fish were immature. Majority of stomachs examined were empty. The food items present in the guts, in order of preference, were crabs (78.3%), teleosts

Fig. 1. Part of the catfish catch in entangled form in gill net on deck of the boat.

*Reported by: S. G. Raje, Bombay Research Centre of CMFRI, Bombay - 400 023.

Fig. 2. "Budi" type of gill net with wooden floats.

(13.1%) and bivales (4.1%) indicating them to be bottom feeders.

TABLE 1. *Details of catch, rate and value of different component*

Species/Group	Estmated catch (kg)	Price (Rs./kg)	Value (Rs.)
Tachysurus dussumieri	3,250	7 - 9	27.400
Megalaspis cordyla	450	2.25 - 2.50	1,215
Pomfret	160	30 - 40	5,200
Others	60	1.5 - 2	105
Total	3,920		33,920

The bottom set gill net was made of monofilament and nylon webbing (Fig. 2). The mesh size range of monofilament webbing was 130-135 mm and nylon 140-145 mm. The length and depth of a single piece of gill net was 45-50 X 6 m. Total of 80 pieces of gill net were operated, of which 20 pieces were of monofilament webbing and 60 of nylon. Enquiry with the fishermen revealed that the bulk of the catfish was caught in Nylon gill net and Pomfret and *M. cordyla* were in monofilament gill net. The monofilament part of the net was in a torn state, hence it is inferred that some catfishes would have managed to escape from it by breaking the mesh.

It can thus be concluded that it would be better to use different types of twine with various mesh sizes to catch different resources for profitable returns.

A NOTE ON THE COMMERCIAL FISHERY OF THE KING PRAWN OFF TUTICORIN*

The king prawn *Penaeus latisulcatus* Kishinouye is distributed in the Indo-West Pacific region from Africa through India to Japan. The occurrence of this species in Indian waters was reported as early as 1969 from the southwest coast of India (George, CMFRI *Bulletin*, No. **14**, 1969). However, there is no information on its contribution to the commercial prawn fishery of India. Therefore, the data collected on the catch, percentage composition, size-frequency distributions etc. of this species landed by the mechanized trawlers at Tuticorin Fisheries Harbour during the years 1987-'90 are presented in this short note.

The prawn fishing off Tuticorin is carried out by mechanized trawlers of medium size (12 to 13 m) using shrimp trawl net with a mesh size of 20 mm at the cod end. The depth in the area of operation ranges between 20 and 60 metres. During the four year period of observation, a total catch of 8.7 tonnes of *P. latisulcatus* were landed at Tuticorin Fisheries Harbour with the monthly catch showing wide fluctuation ranging between 6 and 1,725 kg. Among *Penaeus* spp. *P. latisulcatus* occupies third place in terms of abundance, the first two species being *P. semisulcatus* and *P. indicus*. The landing of *P. latisulcatus* was recorded only during two months in 1987 and 1988. But in the subsequent two years its occurrence in the catches was observed during five months. It was totally absent in the catches in November, December and January during all the four years of observation (Table 1).

*Prepared by: M. Rajamani and M. Manickarja, Tuticorin Research Centre of CMFRI, Tuticorin - 628 001.

TABLE 1. *Estimated catch and percentage composition of* P. latisulcatus *landed by mechantzed trawlers at Tuticorin Fisheries Harbour during the years 1987 - '90*

Years	Months	Estimated catches of *Penaeus* spp. (kg)	Estimated catches of *P. latisulcatus* (kg)	Composition of *P. latisulcatus* in the total catches of *Penaeus* spp. (%)
1987	February	1,884	6	0.3
	July	38,200	290	0.8
1988	April	7,525	550	7.3
	May	10,251	432	4.2
1989	April	34,524	180	0.5
	June	60,375	1,725	2.9
	August	16,375	1,500	9.2
	September	10,500	1,500	14.3
	October	6,996	864	12.3
1990	February	8,436	36	0.4
	March	7,750	1,390	17.9
	June	32,144	240	0.7
	July	19,435	13	0.1
	August	10,491	13	0.1
Total		264,886	8,739	3.3

The percentage composition of *P. latisulcatus* among *Penaeus* spp. landed during the four year period was worked out and it was observed that its contribution to the commercial prawn fishery was almost negligible with its composition ranging between 0.1 and 17.9%, the average composition being 3.3%. It constituted above 10% of the catches of *Penaeus* spp. only during three months viz. September and October in 1989 and March in 1990.

The size-frequency distribution in males and females of *P. latisulcatus* landed during 1990 was studied and it was observed that in males, the size ranged between 143 and 178 mm with the dominant mode at 156-160 mm whereas in females the size ranged between 158 and 218 mm with the dominant mode at 201-205 mm (Fig. 1). Males were predominant in the catches forming 60.4%. Among females, prawns in spent-recovering stages dominated the catches forming 57.9%. Females in mature and late maturing stages constituted 31.6 and 10.5% respectively. Immature females were not recorded in the catches.

At Tuticorin, this species is considered inferior to other *Penaeus* spp. in terms of quality of the meat and hence it is not preferred for export by the prawn merchants. Consequent to this, the

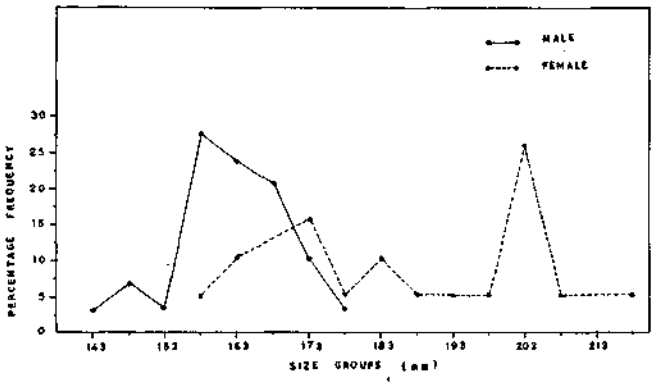

Figure 1. Size-frequency distribution of *P. latisulcatus* landed at Tuticorin Fisheries Harbour during the year 1990.

market price of this species is very low ranging between Rs. 40 and Rs. 60 only per kilogram for the first quality prawn whereas the price of other *Penaeus* spp. namely, *P. semisulcatus* and *P. indicus* is high ranging between Rs. 125 and Rs. 200 per kg. However, it is worth mentioning here that according to Motoh (*Southeast Asian Fish. Res. Center*, 1980) there is a great demand for this species in countries like Philippiness where it is sold at par with *P. japonicus* and *P. indicus*.

FISH MORTALITY DUE TO POLLUTION BY INDUSTRIAL EFFLUENTS IN INSHORE WATERS OF KAYALPATNAM*

Mortality of fishes and aquatic organisms due to pollution was observed in inshore waters of Kayalpatnam and adjacent area. The pollution was mainly caused by the industrial wastes released by Dharangadhara Chemical Works and Plastic Resins and Chemicals Ltd, situated at Shahupuram near Kayalpatnam landing centre. Dead fishes were found floating and some washed ashore for about 3 to 4 km along the coast of Kayalpatnam and Tiruchendur on 2-11-8'9 (Figs. 1-5). A brief account of this incident with results of analysis of relevant parameters is given.

Pollution problems and related fish mortality were noted in and'around Kayalpatnam coast on prior occasions also during 1982-'87. Such mortality occurred usually in November and occasionally in December as it happened in 1983 and 1986 and in February, 1985. It happens only when the creek opens, immediately after the rain discharging the concentrated effluents accumulated in the creek. The cause of the mortality was assumed to be high concentration of acid found in the industrial waste released from the chemical factory. Dharangadhara Chemical Works Ltd., is the major complex which produces a variety of chemicals such as caustic soda, liquid chlorine, hydrochloric acid, trichloroethylene, polychloroethylene, beneficiated ilmenite and vinyl chloride monomer. Traces of mercury and acid were major pollutants discharged into the effluent channel leading to the lagoon and then into the sea.

Plastic Resins and Chemicals Ltd. is a private factory situated adjacent to DCW Ltd. The kinds of products manufactured are polyvinyl chlorine resin, benzene, tar and waste aromatics. The type of pollutants are total suspended solids (carbon) oil in traces and organic compounds (chlorinated hydrocarbons). The pollutants from the DRC mix with the effluents coming from M/s. DCW which are ultimately discharged into the sea.

The lagoon extends over a distance of 2 km before joining the sea. The lagoon mouth remains closed for most of the period except during the peak of northeast monsoon when it opens discharging the polluted water into the sea. The polluted water is yellowish-brown in colour when it mixes with the open sea water and flows mostly towards the southern side due to the prevailing current in the sea. The sudden release of polluted water into the sea might have resulted in the mass mortality of fish and aquatic organisms in the inshore waters. This kind of mortality occurs only for a day of two. Subsequently the concentration of pollutant is reduced considerably due to further influx of fresh water by incessant rain.

Fig. 1. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Mullets and other fishes).

Fig. 2. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Cat fishes).

Reported by: H. Mohamad Kasim, T. S. Balasubramanian, S. Rajapackiyam and V. S. Rengasamy, TRC of CMFRI, Tuticorin - 628 001.

Fig. 3. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Group of eels).

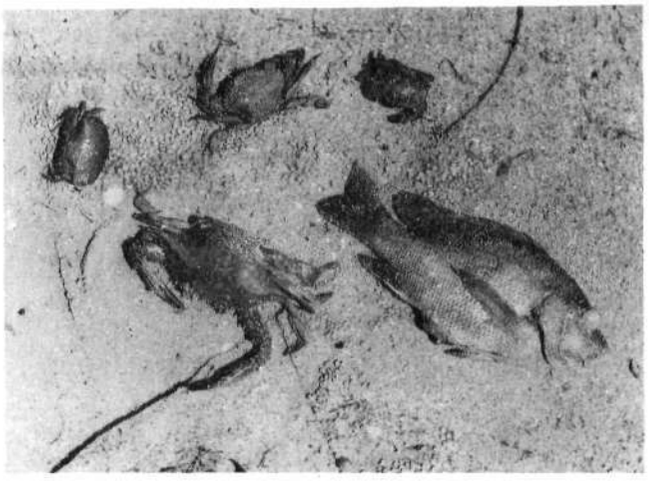

Fig. 4. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Crabs and fish).

During our regular visit to Kayalpatnam landing centre on 20-11-'89 in connection with fishery biology work, we encountered such a fish mortality in Kayalpatnam coast. Dead fishes and aquatic organisms were seen right from lagoon mouth to Tiruchendur. The concentration of dead organisms was more near the DCW lagoon and was lesser towards Tiruchendur. Dead fishes were collected and measured. The list of fishes and their percentage composition and size ranges are given in Table 1. As many as 23 groups of marine organisms comprising fish, crabs, star fish, molluscs etc. were found to be affected by the polluted water. Mullets, cat fish and eels were affected severely.

TABLE 1. *Percentage composition and size range of different marine organisms which suffered mortality on 2-11-'89 along the Kayalpatnam coast*

Species	Percentage	Size range (mm)
Mugil spp.	25	75 - 240
Hemirhamphus marginatus	5	80 - 105
Tachysurus maculatus	13	60 - 90
Jhonius spp.	2	180 - 210
Thryssa mystax	2	90 - 140
Chorinemus sp.	4	200 - 270
Pampus argenteus	3	150 - 210
Thyrsoidea macrura	15	2110 - 3230
Gymnothorax sp.	2	650 - 790
Other eels	3	400 - 900
Epinephelus spp.	2	230 - 350
Platycephalus spp.	2	100 - 220
Diagramma sp.	2	200 - 290
Lutianus spp.	1	190 - 220
Lethrinus nebulosus	5	170 - 215
Callyodon spp.	2	200 - 235
Scatophagus argus	4	130 - 165
Therapon spp.	1	75 - 115
Crabs	2	90 - 105
Cow fish	2	70 - 120
Star fish	2	65 - 70
Clams	1	30 - 50
Sea weed		

In order to understand the causses for the mortality, water samples were collected at four different stations and analysed for parameters such as temperature, dissolved oxygen, salinity, pH and mercury content (Table 2). The Physico-chemical parameters indicate that temperature, salinity and dissolved oxygen were well within the normal tolerable ranges in all the stations, whereas pH appeared to be on the critical side. During low tide, the pH remained on the acidic side in all the four stations and the acidity increased towards the D.C.W. lagoon. During high tide the pH was little higher in all the stations and it was 7.62 and 7.9 in Mada Koil and Kayalpatnam landing centres respectively. The mortality might have been caused by high taoxic nature of acidity.

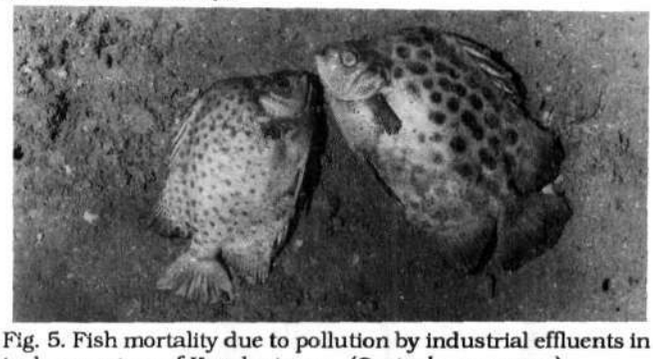

Fig. 5. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (*Scatophagus argus*).

TABLE 2. *Distribution of dissolved oxygen, salinity, temperature, pH and mercury at different places situated at various distances from the lagoon mouth at low tide and high tide on 2-11-89*

Station	Distance from lagoon mouth	Time (hrs)	Tide	Temperature (°C)		Dissolved oxygen (ml/l)	Salinity (‰)	pH	Mercury (mg/l)
				Atmosphere	Surface				
DCW lagoon	100 m (towards inland)	09.30	Low	29.5	27.2	*	30.10	3.26	3200
DCW lagoon mouth	0.0 m	09.40	Low	29.5	27.6	4.00	31.14	4.25	1100
Mada Koil landing centre	1.6 km	10.00	Low	29.8	27.6	4.35	31.75	5.82	560
Kayalpatnam landing centre area	3.0 km	10.20	Low	30.0	27.8	4.29	32.01	6.68	320
DCW lagoon	100 m (towards inland)	14.30	High	33.2	28.5	*	30.97	3.85	3000
DCW lagoon mouth	0.0 m	14.40	High	33.2	28.5	5.26	32.52	6.88	260
Mada Koil landing centre	1.5 km	15.00	High	33.0	28.8	6.18	33.22	7.62	180
Kayalpatnam landing centre area	3.0 km	15.30	High	33.0	28.8	6.06	33.22	7.90	120

* could not be analysed.

ON THE LANDING OF A RARE SALTWATER CROCODILE *CROCODYLUS POROSUS* AT DIBBAPALEM, SOUTH OF VISAKHAPATNAM*

A rare sub-adult male saltwater crocodile of the species *Crocodilus porosus* measuring 2.14 m in length was caught alive from the sea in a nylon shore seine at Dibbapalem, 15 km south of Visakhapatnam on the afternoon of 6th March, 1991. The fishermen transported the animal to a nearby tidal pool where it was kept alive for one night. On receiving information of the incident at the Research Centre, the reporter made arrangements to bring the crocodile to the Visakhapatnam Fisheries Harbour where it was exhibited for public viewing. On the same day the animal was taken to the Indira Gandhi Zoological Park, Visakhapatnam where it is kept in captivity.

Though the crocodile was alive and ferocious some morophometric measurements could be taken on 7th March, 1991 as detailed below.

Total length (from tip of snout to end of tail)	214 cm
Length of head	42 cm
Maximum width of head	16 cm
Maximum width at dorsal side	28 cm
Distance between eyes	3 cm
Length between commencement of eye to tip of snout	19 cm
Length of upper jaw (length between commencement of upper jaw to tip of snout	26 cm
Length of lower jaw (length between commencement of lower jaw to tip of snout	24 cm
Length between anus to tip of tail	108 cm
No. of double scutes (on dorsal side) over caudal region	20
No. of single scutes (on dorsal side) over caudal region	19
No. of longitudinal body scutes on dorsal side (3 longitudinal body scutes on either side of middle one)	7
Approximate weight	55 kg

Hind limbs paddle like, each with 4 fingers; nails of fingers large and vary in length. Fore limbs each with 5 dettached fingers each with large nails of different sizes. According to the Curator of the Indira Gandhi Zoological Park, the specimen is a 5-6 year old sub-adult, male. Pale-yellowish thick square type of plates of different sizes present on ventral side. The specimen was deep yellow with black patches over the dorsal surface of the body.

Crocodylus porosus

Remarks

Out of the twenty one species of crocodiles recognised in the world, only three species are found in India, namely the riverine crocodile, Gharial, *Gavialis gangeticus* Schneider inhabiting the rivers and large streams, the fresh water crocodile, Mugger, *Crocodylus palustris* Schneider inhabiting in confined waters like ponds, lakes and reservoirs and the Saltwater crocodile *Crocodylus porosus* Schneider inhabiting generally the low saline waters like tidal creeks, estuaries, mangrove environment, backwaters and lagoons. Among the various species of crocodiles *Crocodylus porosus* is known to grow to the largest size of over 8 m, very aggressive and ferocious. Saltwater crocodile is known to be notorius and voracious carnivorus feeder, feeding mainly on fishes, crustaceans, molluscs, insects and other animals.

In India the saltwater crocodile is found along the coasts of Tamil Nadu, Andhra Pradesh, West Bengal and Andaman and Nicobar Islands. In the mainland of India, the species is now restricted to an area of 176 sq. km in Bhitarkanika Sanctuary in Orissa and in Sunderbans. According to Shri K. Tulasi Rao, Assistant Curator (Crocodiles), Zoological Park, Visakhapatnam a very large sized *Crocodylus porosus* measuring a little over 6.30 m in total length was present at Bhitarkanika Wild Life Sanctuary in Orissa in 1980. The Government of India declared these animals as endangered species under Wild Life Protection Act of 1972, imposing a ban on killing, trading, exporting or possessing them.

*Reported by: C. V. Seshagiri Rao, Visakhapatnam Research Centre of CMFRI, Visakhapatnam - 530 003.

टूटिकोरिन के परंपरागत लघु मात्स्यिकी उद्योग की वर्तमान स्थिति

पी. साम बेन्नट और जी. अरुमुगम

केंद्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान, कोचीन

यह टूटिकोरिन के परंपरागत लघु मात्स्यिकी उद्योग संबंधी दूसरा अध्ययन है जिस में वर्ष 1986 से लेकर 1990 की अवधि का विवरण प्रस्तुत किया है। इस संबंधी प्रथम अध्ययन बेन्नट और अरुमुगम ने पहले किया था और एम एफ आइ एस में 1989 में प्रकाशित किया था जिस में 1979 से लेकर 1985 तक के वर्ष की डाटा शामिल है। वर्तमान अध्ययन में विषय संबंधी अद्यतन विकास पर प्रकाश डाला गया है।

वार्षिक उत्पादन

अध्ययनाधीन पाँच वर्ष के दौरान परंपरागत मछुओं द्वारा पकडी गयी औसत मछली 4798.9 टन थी। इस में 2774.5 टन यंत्रीकृत एककों का और 2024.4 टन अयंत्रीकृत एककों का योगदान था। इन वर्षों में यंत्रीकृत एककों के ज़रिए पकड में क्रमिक वृद्धि दिखाई पडी तो अयंत्रीकृत एककों के ज़रिए क्रमिक घटती। डाटाओं के अनुसार वर्ष 1986 में यंत्रीकृत यानों के ज़रिए मिली कुल पकड 880.3 टन थी तो वर्ष 1989 में यह 4202.1 टन हो गई और अयंत्रीकृत यानों के ज़रिए वर्ष 1986 में मिली पकड 4623.0 टन थी तो वर्ष 1990 में यह 515.2 टन हो गई। पिछले वर्षों के समान उपयोग किया गया मुख्य गिअर सारडीन गिल नेट था जिसका अंशदान वार्षिक पकड का 68.3% था। अयंत्रीकृत एककों की तुलना में यंत्रीकृत एककों का वार्षिक प्रति एकक पकड अधिक था। पर अयंत्रीकृत एककों द्वारा परिचालित शोर शीनों का प्रति एकक पकड ऊँचा था।

क्राफ्ट व गिअर

यंत्रीकृत व अयंत्रीकृत बोटों और कटामरीनों के ज़रिए बहुजातीय गिअरों का परिचालन हुआ। पर अयंत्रीकृत यानों के परिचालन में घटती देखी थी। वर्ष 1987 में झींगों की पकड के लिए विशेष रूप से तैयार किया डिस्को नेट का परिचालन मूलतः यंत्रीकृत यानों के ज़रिए होता था। *हिल्सा टोलि* को पकडने को उपयोग करनेवाला पोडि वलै का उपयोग अयंत्रीकृत कटामरैनों के ज़रिए होता था।

गिअर-वार स्थलन

सारडैन गिल नेट (चाला वलै) : सब से महत्वपूर्ण परंपरागत जालों में एक है चाला वलै। कुल मछली पकड का 68% चाला वलै के ज़रिए प्राप्त होता था। चाला वलै का परिचालन दोनों यंत्रीकृत और अयंत्रीकृत यानों से किया करता था; यंत्रीकृत यानों से प्राप्त औसत वार्षिक पकड 1585 टन और अयंत्रीकृत यानों से प्राप्त वार्षिक औसत पकड 1691.2 टन थी। इस जाल के ज़रिए सब से उच्चतम पकड अक्तूबर-दिसंबर के महीनों में प्राप्त होती थी। पकड की मूल जाति *सारडिनल्ला गिब्बोसा* थी। अन्य मुख्य जातियाँ *त्रिस्सोकिलस, कारंक्स* और *लियोग्नाथस* थीं।

ड्रिफ्ट नेट (पारू वलै) : ड्रिफ्ट नेट की जालाक्षी बडी होती है जिसके जरिए बडी मछलियाँ जैसे सुरमई, ट्यूना, करंजिडस, पर्चस, *कोरिनिमस,* बारकुडा और सुराओं को पकडती है। इस गिअर का परिचालन दोनों यंत्रीकृत और अयंत्रीकृत यानों के ज़रिए होता है। दोनों का परिचालन क्षेत्र, माने यंत्रीकृत यान जब गहरे समुद्र में परिचालित होता है तब अयंत्रीकृत यान उथले समुद्र में, के अनुसार पकडी गई मछली की जाति व प्रतिशत में अंतर देखा था। यंत्रीकृत यान की मुख्य पकड ट्यूना था और अयंत्रीकृत यान का बारकुडा। परंपरागत मात्स्यिकी के 1.4% पारू वलै के ज़रिए प्राप्त हुआ था।

ड्रिफ्ट - नेट (पोडि - वलै) : इस ड्रिफ्ट की जालाक्षी छोटी होती है जिसके ज़रिए ट्यूना, बारकुडा, करंजिड, सीर फिश और चीरोसेन्ट्रस पकडी जाती है। पोडि वलै एककों के ज़रिए औसत 242.0 टन मछली प्राप्त होती है। इसका परिचालन मूलतः यंत्रीकृत यानों के ज़रिए होता है। पकड का 25.7% ट्यूना, 11.2 % बारकुडा, 11.1% सीर फिश थे। परंपरागत मात्स्यिकी में पोडि वलै का योगदान 5.1% था।

हान्ड लाइन (तूंडिल) : इस गिअर का वार्षिक औसत योगदान 184.0 टन मछली था। प्रति वर्ष 3212 हांड लाइन एककों का परिचालन होता है। दोनों यंत्रीकृत और अयंत्रीकृत यानों का परिचालन हुआ था। पकडी गई मुख्य मछली नेमिप्टीरस जातियाँ थी। अन्य वर्ग थे *लेथ्रिनस बेलोन* और सेरानस। इसका परिचालन वेलापवर्ती, और तलमज्जी वर्ग की मछलिमों को पकडने के लिए किया था।

लोंग लाइन (आयिरमकाल तूंडिल) : इसका उपयोग टूटिकोरिन के गहरे समुद्र के पथरीली पार में किया जाता है। इस गिअर के ज़रिए बडे आकारवाले वेलापवर्ती और तलमज्जी वर्ग प्राप्त होते हैं। दोनों यंत्रीकृत और अयंत्रीकृत यानों से इसका परिचालन करता है। पकडी गई मुख्य मछली लेथ्रिनस जातियाँ थी। प्रतिवर्ष औसत 5250 तूंडिल का परिचालन होता है।

ट्रॉल लाइन (ओडुकायुरू) : इसका प्रचालन सीर फिश, ट्यूना, सूरा और कुछ अच्छी मछलियों को पकडने के लिए किया जाता है। पहले यंत्रीकृत और अयंत्रीकृत एककों से इसका परिचालन होता था अब तो यह यंत्रीकृत एककों में सीमित रहता है। वर्षिक कुल पकड के 0.9% इसका योगदान था।

लॉबस्टर नेट (सिंकी वलै) : प्रवाल भित्तियों के पास रहनेवाले महाचिंगटों को पकडने के लिए इसका उपयोग किया जाता है। पर महाचिंगटों की तुलना में कर्कट और निम्न तल में जीनेवाली मछलियाँ इसके ज़रिए ज़्यादा पकडी गई। दोनों यंत्रीकृत और अयंत्रीकृत यानों से इसका परिचालन होता है पर यंत्रीकृत यान जिसका परिचालन यहाँ वर्ष 1987 को हुआ था, द्वारा अधिक मछली पकडी गई। पकडी गई मुख्य जातियाँ लेथ्रिनिडस, शिंगटी, करंजिड्स, रेयस और अन्य पर्चे थी। परंपरागत मात्स्यिकी में लॉबस्टर नेट का योगदान 1.8% था।

बॉट्टम सेट नेट (तिरूक्काय वलै) : इस जाल के ज़रिए रेयस, सूरा और स्केट्स बडे तादाद में पकडे गये। इस नेट का औसत वार्षिक योगदान 260.4 टन था। कुल मछली पकड का 5.4% इस यूनिट का योगदान था। यंत्रीकृत यूनिटों के ज़रिए इसका परिचालन ज़्यादा हो रहा है।

अन्य एकक : यंत्रीकृत यानों से परिचालित हान्ड लाइन का वार्षिक योगदान 5.1 टन मछली था। डिस्को नेट का योगदान

23.5 टन था। मुरल वलै के ज़रिए बेलनोइड की अच्छी पकड वर्ष 1990 के दौरान मिली। अयंत्रीकृत यानों से कारा वलै, तल्लु माडी, हान्ड लैन और पोडि वलै का परिचाल किया गया जिनका वार्षिक योगदान 138.9 टन मछली था।

जाति मिश्रण : टूटिकोरिन से वर्षों से पकडी जानेवाली गुणतापूर्ण मछलियों में झींगा, महाचिंगट और कर्कट हैं। यंत्रीकृत यानों से लेसर सारडीन, पर्चस, रेयस *त्रिस्सोकिलस* और सुरा भारी मात्रा में पकडी जाती है। अयंत्रीकृत यानों से भी बडी मात्रा में लेसर सारडीनस, *त्रिस्सोकिलस*, करंजिड्स, रेयस और सिलवर बेल्लीस पकडी जाती है। विविध प्रकार के गिअरों से सीरफिश, करंजिड्स, बारकुडा और ट्यूना, वेलापवर्ती मछलियाँ और पर्चस वर्ग के तलमज्जी मछली पकडी जाती हैं।

पकडी गई मछलियों में सब से बडा योगदान लेस्सर सारडीन का था जिसका प्रतिशत 56.2 था। अनुकूल महीने सितंबर से दिसंबर तक थे पकड की मुख्य जाति *सारडिनेल्ला गिब्बोसा* थी। पर्चों का योगदान 10.6% था। इस वर्ग की मुख्य मछली लेथ्रिनस नेबुलोसस थी। उपास्थिमीन का योगदान 7.2% था और मुख्य मछलियाँ सुरा, रेयस और स्केट्स थी। मूल्यवान मछलियों में सीर फिश थी जिसका योगदान 1.6% था, करंजिडों और सिलवर बेल्लियों का योगदान यथाक्रम 3.3 और 1.6% था। क्लूपेइड में ऐंचोवी मुख्य था जिसका योगदान 7.3% था। हान्ड लाइन यूनिटों से पकडा गया नेमिप्टीरस का योगदान 1.2% था। बारकुडा, शिंगटी, ट्यूना आदि भी यहाँ की परंपरागत मात्स्यिकी के अंग हैं।

टूटिकोरिन के परंपरागत लघु मात्स्यिकी उद्योग पर चलाये गये इस अध्ययन ने बहुत ही महत्वपूर्ण सूचनायें संग्रहित की है। यहाँ 25 से अधिक मछली जातियों की पकड होती है। पर अध्ययनाधीन वर्ष के दौरान देखी गई मुख्य बात मछलियों की पकड में हुई क्रमिक घटती है। यंत्रीकृत यानों के दबाव में अयंत्रीकृत यानों की पकड में हुई कमी को स्वाभाविक कहा जा सकता है पर यंत्रीकृत यान और उस से परिचालित किये जानेवाले वैविद्यपूर्ण गिअर के होते हुये भी पकड में हुई कमी चिंताजनक बात है जिसका उत्तर शायद भविष्य ही दे सकता है।

विषिंजम में माकेरल स्काड *डेकाप्टीरस माकरेल्लस* का उद्गमन*

तिरुवनंतपुरम से पकडी जानेवाली समुद्री मछली संपदाओं में "करंजिड" का प्रमुख स्थान है। करेंजिड मछली की विविध जातियाँ यहाँ से पकडी जाती है जिस में *डेकाप्टीरस रसेल्लि* और *डी. माक्रोसोमा* प्रमुख हैं। यहाँ से माकेरल स्काड, *डेकाप्टीरस माक्रेल्लस* की छूट-फूट उपलब्धि के बारे में श्रीनिवासन ने इंडियन जर्नल आफ फिशरीस के अंक 23 (1व2): 41-56, 1976 में पहले रिपोर्ट की है। पर मोटोरैसड परंपरागत यानों से मत्स्यन शुरू करने के बाद इसकी पकड में बडी वृद्धि हुई है। इन यानों ने तटीय क्षेत्रों से दूर, समुद्रों में मत्स्यन करने के लिए सहायता प्रदान की है जिसके फलस्वरूप ट्यूना, पर्च, करंजिड आदि संपदाओं का विदोहन बढ गया है। *डेकाप्टीरस माक्रेल्लस* इस प्रकार बढ गयी मात्स्यिकी में एक जाति है। वर्ष 1990-91 के दौरान कुल 26.5 टन *डी. माक्रेल्लस* का अवतरण हुआ था। मत्स्यन केलिए अनुकूल समय नवंबर से दिसंबर तक के महीने थे। मोटोरैसड यान से परिचालित गिअर, ड्रिफ्ट जाल के ज़रिए पकड का मुख्य भाग मिला था। मत्स्यन का क्षेत्र 40 से 60 मी की गहराई थी। मछली की लंबाई 28 से 35 से मी के बीच थी।

डी. माक्रेल्लस और *डी. माक्रोसोमा* के आकार में सदृशता है फिर भी इनके तैदानिक लक्षण समझने पर इस संभ्रांति दूर किया जा सकता है।

डी. माक्रोल्लिस की उच्चतम पकड जो हाल ही में मिल रही है अपरंपरागत मत्स्यन क्षेत्रों में वह इस जाति की उपलब्धता की ओर इशारा करती है। जो भी हो इस जाति की संपदा, शक्यता, वितरण, जीववैज्ञानिक और जीवसंख्या सम्बंधी अध्ययन अत्यन्त आवश्यक है।

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*सी. एम. एफ. आर. आई. विषिंजम अनुसंधान केंद्र के जी. गोपकुमार और के. टी. तोमस द्वारा तैयार किया लेख।

टूटिकोरिन के मान्नार खाडी से अनावृत निमज्जकों द्वारा शूली महाचिंगट का संग्रहण*

टूटिकोरिन के मान्नार खाडी में वर्ष में चार-पाँच महीनों में पवित्र प्रशंख *ज़ैंकस पाइरम* के संग्रहण के लिए स्किन डाइविंग (skin diving) किया जाता है। इस समय आकस्मिक रूप में शूली महाचिंगटों को भी मिल जाता है और इन्हें नीलाम करने केलिए टूटिकोरिन के अवतरण केन्द्र में लाते हैं। निमज्जकों द्वारा संग्रहित महाचिंगटों का मॉनिटरन हफ्ते में दो बार किया। पकड, जाति मिश्रण, आकार की आवृत्ति वितरण और लिंग अनुपात पर चलाया गया अध्ययन ब्योरा इस लेख में दिया गया है।

प्रशंखों का संग्रहण समुद्र तल में अच्छी तरह खोज करने पर किया जा सकता है। प्रशंख के मत्स्यन केलिए समुद्र जल की दृश्यमानता एक प्रमुख घटक है। नवंबर/दिसंबर से मार्च/अप्रैल तक टूटिकोरिन तट का समुद्र जल दृश्यमान हो जाता है और इस समय लगभग 1,200 निमज्जकों सक्रिय रूप से प्रशंख मत्स्यन में लग जाते हैं। 10 से 20 मी के गहराई रेंच से इनका मत्स्यन किया जाता है।

निमज्जकों द्वारा शूली महाचिंगट की दो जातियों जैसे *पैन्युलिरस आर्नेटस* और *पी. होमारस* का संग्रहण किया जिनमें पहली जाति प्रमुख और दूसरी विरल दिखाई पडती है। संग्रहण के दो महीनों की अवधि के दौरान *पी. आर्नेटस* जाति के 2,425 महाचिंगटों का संग्रहण किया, पकड का 87% का अवतरण जनवरी में ही हुआ।

दो महीनों के दौरान संग्रहित महाचिंगटों का आकार रेंच पुरुष जाति में 154 और 450 मि मी के बीच है। स्त्री जातियों में आकार रेंच 169 से 423 मि मी के बीच है। पकड में *पी. होमारस* की उपस्थिति बहुत कम थी। *पी. आर्नेटस* में पुरुष जाति 74.2% और *पी. होमारस* में स्त्री जाति 67% थी।

टूटिकोरिन में अन्य गिअरों जैसे बोटम-सेट गिल नेट और ट्राल नेट द्वारा पकडे गए महाचिंगटों की मात्रा की तुलना में निमज्जकों द्वारा संग्रहित महाचिंगटों की मात्रा बहुत कम थी। फिर भी निमज्जन द्वारा पकडने पर उनके आवास और उनके स्वभाव के विशेष पहलुओं पर पता चलता है। साधारणतया शूली महाचिंगट चट्टानों के छेदों में छिपकर रहते हैं। लेकिन प्रशंखों का मत्स्यन अधिक रूप से रेती धरातल में किया जाता है। प्रशंखों के संग्रहण के लिए निमज्जन करते वक्त चट्टानों के छेदों में महाचिंगटों को भी दिखाई पडते है और निमज्जक उन्हें भी पकडते हैं। यह रिपोर्ट की जाती है कि महाचिंगटों का संग्रहण करने केलिए उचित समय रात्रि है। कोलम्बो पोताश्रय में निमज्जकों द्वारा रात के वक्त फ्लाश लाइट की सहायता से 202 *पी. डासिपस* का संग्रहण किया। इसकी तुलना में टूटिकोरिन तट से निमज्जकों द्वारा संग्रहित महाचिंगटों की संख्या नगण्य है। लेकिन टूटिकोरिन में पवित्र प्रशंख *जैंकस पाइरम* के मत्स्यन के वक्त आकस्मिक रूप में शूली महाचिंगटों को देखने पर उनका मत्स्यन भी किया जाता है।

*एम. राजामणी और एम. माणिक्य राजा. सी. एम. एफ. आर. आइ का टूटिकोरिन अनुसंधान केन्द्र, टूटिकोरिन।

बंबई के वेरसोवा से "डोल" जाल द्वारा प्राप्त पकड का निपटान*

डोल जाल मात्स्यिकी एक बहु जातीय मात्स्यिकी है जिस में झींगे और अन्य मछली होती है। पकड का निपटान पकडे गये झींगे या मछलियों के गुण पर निर्भर है। साधारणतः पकड से प्राप्त निम्न दाम की मछलियों को सुखाती हैं बाकी गुणता पूर्ण मछलियाँ और झींगों को ताज़े स्थिति में बेचते है।

यहाँ से पकडी सुखाई गई मछली के 70% छोटे-मोटे व्यापारियों को, 25% मारोल के थोक बाज़ार में और बाकी 5% खुदरा बाज़ार में बिकते हैं। सूर्यतपन केलिए समुद्र तट का उपयोग करता है।

"कोलिम" या "जवाला" नाम से जानने वाले एसेटस

जातियों की एक बडी हिस्सा कुकुट, पशु और मछली के आहार के रूप में उपयोग करती है। कृषि केलिए यह कम दाम के एक अच्छा उर्वर भी है। 'अम्बार' या "कारडी" नाम से पुकार जाने वाला *पालिमोन टेनिपेस* का 90% ताजे या सूखे रूप में लोग उपभोग करते है। बम्बिल महंगी मछली है और इसके सूखे रूप को ज्यादा दाम मिलता है। उसका 10% ताजा रूप में बाकी 90% सूखे रूप में बिकते है।

कोयलिया डसुमेरी का स्थानीय नाम है "मन्डोली"। यह छोटा एवं अधिक कौंटे वाले होते हुए भी स्वादिष्ट है। इसलिए इसकी ताज़ा और सूखा रूप को बडी मौंग है। इसका 20% ताजा स्थिति में और बाकी 80% सूखे रूप में बिकते हैं।

सीनेइडस को शल्क, प्रच्छद और आहार नली निकालकर सुखाते हैं। यह एक श्रमशील काम है। फिर भी इस प्रकार तैयारित उत्पाद को साधारण रीति से सुखाये सीनेइड्स से तीन गुणा दाम मिलता है। फीता मछलियों को जाति के अनुसार तीन श्रेणियों में वर्गीकृत किया है। *लेप्ट्यूरा कान्तस सवाला, यूप्लेयूरोग्रामस म्यूटिकस* और *ट्राइक्यूस जातियाँ* जिनका स्थानीय नाम यथाक्रम "वाकाटी","पित्ति-वाकाटी" और "बागा" हैं। *एल. सवाला* और इ.म्यूटिकस को तपित रूप में ही बिकते है जबकि *ट्राइक्यूरस* जाति को ताज़ा एवं सूखी स्थिति में। गुणता के अनुसार दाम में भी उतार-चढाव होता है।

माइक्टोफम जातियाँ (लैन्टर्न फिश) जिसका स्थानीय नाम है "जिम" बहुत छोटी हैं। इसलिए सुखाकर पशु एवं कुकुटों के आहार के रूप में उपयोग करता है। लेकिन अधिकतः इसको उर्वर के रूप में उपयोग करता है।

"डोल" जाल में पकडे जानेवाले झींगों को अवतरण केन्द्र में ही इसकी जाति और आकार के आधार पर बिकते है। निम्न दाम के जातियों को सुखाकर बिकते है जिससे इसका अच्छा दाम मिलता है।

सीपियों के बडे एवं छोटे नमूनों के स्थानीय नाम यथाक्रम "माकोल" और "माकाली" है। बडे नमूनों को ताज़े स्थिति में और छोटे नमूनों को सूखी स्थिति में थोक बाज़ार में बिकते है।

विविध प्रकार की मछलियों के संग्रह को "मिपान" कहते है। इनके छँटाई करके ताजे रूप में बिकते हैं।

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*एस. जी. राजे, सी. एम. एफ. आर. आइ. का बंबई अनुसंधान केन्द्र द्वारा तैयार किया लेख।

कालिकट के बेपूर में स्नैपेरमीन और ग्रूपर मछली को काँटा डोर से पकडने के संबन्ध में स्नैपर मीन *प्रस्टिपोमोइड्स टैपस* के जीव-विज्ञान के साथ एक ब्योरा*

प्रस्तावना

कालिकट में काँटा डोर का प्रयोग मुख्यतःसुराओं और सुरमइयों केलिए होता है और यह भी लंबी डोर या ट्रॉलिंग के ज़रिए। लेकिन यहाँ ग्रूपर और स्नैपर मछली केलिए मौसमिक काँटा-डोर (हान्डलाइनिंग) मत्स्यन भी होता है। ऐसा मत्स्यन कोलचल और आसपास के धीवरों द्वारा किया जाता है। स्नैपर मीन में प्रिस्टिपोमाइड्स टैपस एक मुख्य जाति है जिसकी पकड यहाँ काँटा डोर से होता है और इस क्षेत्र में कोई अन्य संभार से इसकी पकड भी नहीं होती है। इसलिए इसके जीव विज्ञान पर एक छोटी टिप्पणी भी, कालिकट के बेपूर से दिसंबर 90 से अप्रैल 91 तक प्राप्त डाटा के अनुसार प्रस्तुत किया जाता है।

क्राफ्ट और गिअर

क्राफ्ट, ट्रॉलरों के समान यन्त्रीकृत पोत है। गिअर एकतंतु के एक मुख्य लाइन है जिसको 13 से मी लंबाई के शाखा लाइन होते है। इस में 8 से लेकर 15 तक काँटे होते हैं जो 18 से मी दूरी पर डोर पर बाँधे गये हैं।

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*एम. शिवदास, सी. एम. एफ. आर. आइ का कालिकट अनुसंधान केन्द्र, कालिकट

एक पोत में 7-8 व्यक्ति होंगे और उनमें एक पोत चलायेगा और बाकी गिअर का परिचालन करेंगे बेपूर से ऐसे 25 एकक का परिचालन होता है।

साधरणतया इसके मत्स्यन केलिए अनुकूल अवधि नवंबर/ दिसंबर से मार्च तक है। लेकिन इस साल में यह अप्रैल तक जारी रखा। 75 फैतम तक की गहराई के चट्टानी क्षेत्र में संभार चलाता है। साधारणतया दल मत्स्यन केलिए आधि रात में जाकर सबेरे सात या आठ बजे को वापस आते हैं। मत्स्यन के लिए चारा (बेट) के रूप में ट्यूना मछली के मांस का उपयोग करता है।

अनुयोज्य तल में पहूँचने पर गिअर का परिचालन करके यह सुनिश्चित करता है कि मत्स्यन क्षेत्र परिचालन केलिए उचित है या नहीं। इस प्रकार के अनुयोज्य क्षेत्र में मत्स्यन सूर्यास्त तक जारी करता है।

यहाँ से पकडी गई मुख्य जाति- स्नैपर जाति के *प्रिस्टिपोमोइड्स टैपस, लिपोचेयुलस कारनोलाब्रम* और ग्रूपेर जाति के *एपिनेफेलस* एस पी. और *सीपिया* जाति थीं। पकड में *पी. टैपस* प्रमुख था। सीपियाँ और अन्य की मात्रा बहुत कम थी।

प्रिस्टिपोमाइड्स टैपस की जैविकी :

आकार 300-600 मि मी के बीच दिखाया पडा। जनवरी और मार्च में 420 मि मी और 440 मि मी के आकार वाले प्रमुख थे तो फरवरी में 460 मि. मी, 440 मि मी और 500 मि मी के आकारवाले। लेकिन सामान्य आकार 380 और 460 मि मी के बीच था। 520 मि मी ऊपर के आकार की मछली बहुत कम थी।

लंबाई-भार संबंध : 100 मछलियों के आधार पर लंबाई - भार संबंध ऐसा था।

लॉग डब्लियु = - 3.51 + 2.42 लॉग एल सहसंबन्ध गुणांक (आर) = 0.91 दीख पडा।

आमाशय की स्थिति : जाँच में अधिकांश आमाशय भरा हुआ और बाकी थोडा सा आहार के साथ या शून्य दिखाये पडे।

जनन-ग्रंथि की स्थिति : प्रौढ एवं अप्रौढ-दोनों अवस्थाओं की मछलियों का निरीक्षण किया। प्रौढ अवस्था की अधिकांश मछलियाँ अंडरिक्त स्थिति में थी।

बिक्री : स्नैपेर मीन को कालिकट के प्रधान बाज़ार में नीलाम कर दिया और इसका फुटकर कीमत प्रति कि.ग्रा. 15-20 रुपये थे। ग्रूपर मछली को संसाधन कंपनियों ने अवतरण केन्द्र से ही खरीद लिया। इसका कीमत प्रति कि. ग्रा 10 और 15 रुपये के बीच था।

अभ्युक्तियाँ

लाभदायक होते हुए भी स्थानीय मछुए इसके मत्स्यन में होनेवाले कठिनाइयों और असुविधाओं के कारण अधिक रुचि नहीं दिखाते हैं। फिर भी इसकी अवशोषित संपदा और अन्य संभारों में इसकी कम पकड आदि से स्थानीय मछुए इसकी ओर आकृष्ट हो जाने की संभावनाएं हैं।

भारत में गभीर सागर सुरा *सेन्ट्रोफोरस ग्रानुलोसस* पर पहलावृत्त *

कोचीन मात्स्यिकी बन्दरगाह में 23-2-91 को स्क्वालिडे वंश के दो गभीर सागर गल्पर सुरा सेन्ट्रोफोरस ग्रानुलोसस का अवतरण हुआ। इनकी लंबाई और भार यथाक्रम 95 और 91 से.मी. और 6 और 4.5 कि.ग्रा था। भारत के तट में इस जाति का यह पहला अवतरण है। यहाँ अवतरित सुरा दोनों स्त्री जाति की थी। 91 से. मी लंबाई की सुरा में एक विकसित भ्रूण दीख पडा इसकी कुल लंबाई 323 मि मी और भार 190 ग्राम था। इन्हें कोचीन के उत्तर पश्चिमी भाग से 300-320 मी गहराई रेंच से पकडी जाती थी। इसी जाति की दो स्त्री सुराओं का अवतरण कोचीन मात्स्यिकी बन्दरगाह में 19-6-91 को भी हुई। इनकी लंबाई 90 और 98 से मी थी। ये गहरे भूरे रंग, काले पंख, लंबे और थोडा सा संकुचित शरीरवाली थी। प्रॉथ नोकदार था। उर्ध्व हनु के दाँतें छोटे, चौडे और ब्लेड के समान दीख पडे तो अधोहनु के दाँतें संकुचित और ब्लेड के समान थे। दोनों पृष्ठ पंखो के अग्र भाग में पार्श्व खांचा के साथ एक मज़बूत अर था। पहला पृष्ठ पंख दूसरे पृष्ठ पंख की तुलना में कुछ ऊँचा था।

इन में एक का शारीरिक मापन नीचे प्रस्तुत है।

कुल लंबाई	: 91	प्रोथाग्र से पहले पृष्ठ के आरंभ स्थान तक	: 29
पहला पृष्ठ तट की लंबाई	: 18	प्रोथाग्र से दूसरे पृष्ठ के आरंभ स्थान तक	: 62
दूसरी ,, ,,	: 10.6	प्रोथाग्र से पूर्वी नेत्रख के आरंभ स्थान तक	: 5.5
पहला पृष्ठ की ऊँचाई	: 6.2	अंतरापृष्ठीय जगह की लंबाई	: 24
दूसरा पृष्ठ की ऊँचाई	: 5	अंसीय तट की लंबाई	: 10.2
प्रोथ की लंबाई	: 8.4		
मुँह की चौडाई	: 9		
नेत्रख का क्षैत्रिज व्यास	: 4.5		
प्रोथाग्र से पुच्छ स्थान तक	: 71		

*ग्रोस मात्यू, के. तुलसीदास और के. एम. वेणुगोपाल द्वारा तैयार किया लेख।

वेरसोवा में बोटम सेट गिल जाल के ज़रिए शिंगटी *टाकीसुरस डसुमेरी* की असाधारण पकड*

वेरावल से 23-12-90 को एक यंत्रीकृत बोटम सेट गिल जाल द्वारा लगभग 3,250 कि.ग्रा *टाकीसुरस डसुमेरी* का अवतरण हुआ। स्थानीय रूप से "बुडी" से पुकारे जाने वाला उपर्युक्त जाल का प्रचालन साधारणतया पॉम्फेट मात्स्यिकी केलिए किया करता है। साधारणतः पकड का स्वरूप, बर्फ और डीसल की उपलब्धि के अनुसार लगभग 4-5 दिन तक मत्स्यन होता है।

बोटम सेट गिल जाल में शिंगटी एक उप पकड होता है। पर वेरसोवा से केवल एक प्रचालन में प्राप्त *टी. डसुमेरी* के 3,250 कि. ग्रा. की पकड एक असाधारण घटना है। शिंगटी के साथ पॉम्फेट, *मेगालाटिसस कोरडियाला, कैरोसेन्टरस* जातियाँ, *हिलसा* जातियाँ और उपास्थिमीन आदि के भी अवतरण हुए। संपूर्ण पकड बंबई के शिवजी थोक बाज़ार में ले गया। *टी. डसुमेरी* के जैविक पहलुयें समझने केलिए इनके 113 नमूनों का निरीक्षण किया। इनका आकार रेंच 480 से 670 मि मी के बीच दिखाया पडा और 600 मि मी के आकारवाले अधिक थे। भार 2 से 4.5 कि. ग्रा के बीच था। 113 नमुनों में 81.6% नर और 18.4% मादा मछली थी। सभी अप्रौढावस्था के थे। अधिकांश मछलियों के पेट खाली थे। आहार नली में कर्कट (78.3%) टेलिओट (13.1%) द्विकपाट (4.1%) आदि का अंश दिखाया पडा जिससे मालूम पडता है कि ये सब अधस्तल भोजी है।

बोटम सेट गिल जाल मोनोफिलमेन्ट और नाइलॉन पट्टी से बनाया गया था। मोनोफिलमेन्ट पट्टी के जालाक्षियों का आकार रेंच 130-135 मि मि और नाइलॉन का 140-145 मि मी था। गिल नेट के इकहरा खण्ड की लंबाई और गहराई 45-50 X 6 मी थी। इस प्रकार के 80 खण्ड गिल जालों का परिचालन किया जिसमें 20 खण्ड मोनोफिलमेन्ट और 60 नाइलॉन पटी के थे। धीवरों ने कहा कि नाइलॉन गिल जाल से शिंगटियों को भारी मात्रा में पकडा गया तथा पाम्फेट और *एम. कोरडियाला* को मोनोफिलमेन्ट जाल के ज़रिए। जाल का मोनोफिलमेन्ट भाग फाट जाने के कारण कुछ शिंगटियाँ जालाक्षी टूट करके बच गये।

इस से व्यक्त होता है कि विविध प्रकार की संपदाओं को पकडने केलिए विविध आकार के जालाक्षियोंवाला विविध घागों का प्रयोग करना ही अच्छा है।

*एस. जी. राजे और वी. डी. दशमुख, सी. एम. एफ. आर. आई. का बंबई अनुसंधान केंद्र, बंबई।

टूटिकोरिन में किंग प्रोण की उपस्थिति - एक टिप्पणी*

आफ्रिका से लेकर जापान तक के इन्डो-पश्चिम पसफिक क्षेत्र में किंग प्रोण *पेनिअस लाटिसुल्काटस* को दिखाई पडता है। इस जाति की उपस्थिति के बारे में भारत के दक्षिण-पश्चिम तट से वर्ष 1969 से पहले ही रिपोर्ट की थी। भारत की वाणिज्यिक मात्स्यिकी में इस जाति के योगदान की कोई सूचना न होने के कारण टूटिकोरिन मत्स्यन पोताश्रय से वर्ष 1987-90 के दौरान यंत्रीकृत ट्रालरों द्वारा अवतरण की गई इस जाति की पकड, प्रतिशत मिश्रण, आकार की आवृत्ति, वितरण आदि का ब्योरा यहाँ दिया जाता है।

टूटिकोरिन में साधारण आकार वाले यंत्रीकृत ट्रालरों द्वारा ट्राल जाल से झींगों का मत्स्यन किया जाता है। परिचालन क्षेत्र की गहराई रेंच 20 और 60 मी है। आकलन के चार वर्ष की अवधि के दौरान टूटिकोरिन पोताश्रय में कुल पकड के 8.7 टन *पी. लाटिसुलकाटस* था। *पेनिअस* जाति की पकड में *पी. सेमिसुलकाटस* का, प्रथम *पी. इंडिकस* का द्वितीय और *पी. लाटिसुलकाटस* का तृतीय स्थान है। वर्ष 1987 और 1988 के दौरान सिर्फ दो महीनों में *पी. लाटिसुलकाटस* का अवतरण आकलित किया है। लेकिन आगामी दो वर्षों में पाँच महीनों में इसका अवतरण हुआ था।

आकलन के चार वर्षों के दौरान *पेनिअस* जाति में *पी. लाटिसुलकाटस* के प्रतिशत मिश्रण का आकलन करने पर वाणिज्यिक झींगा मात्स्यिकी में इसका योगदान नगण्य देखा गया, औसत मिश्रण 3.3% था।

वर्ष 1990 के दौरान अवतरण किए गए *पी. लाटिसुलकाटस* की पुरुष और स्त्री जाति के आकार की आवृत्ति का अध्ययन करने पर व्यक्त हो गया कि पुरुष जाति का आकार रेंच 143 और 178 मि मी है और स्त्री जाति का 158 और 218 मि मी के बीच। अवतरण का अधिक भाग 60.4% पुरुष जाति था। स्त्री जाति में अवतरण का 57.9% अंडरिक्त अवस्था की थी। प्रौढ़ और प्रौढोत्तर अवस्था स्त्री जातियों का प्रतिशत क्रमशः 31.6 और 10.5 था। अवतरण में अप्रौढ़ स्त्री जाति नहीं थी।

टूटिकोरिन में गुणवत्ता की दृष्टि से इस जाति को हीन माना जाता है और इसका निर्यात मूल्य भी कम है। बाज़ार में इसलिए इस जाति का मूल्य बहुत कम है। जब अन्य पेनिअस जातियों जैसे *पी. सेमिसुलकाटल* और *पी. इंडिकस* का प्रति कि ग्राम मूल्य 125 और 200 रु है तब इसका 40 रु और 60 रु है। लेकिन फिलिप्पिन्स जैसे देशों में इस जाति की मांग अधिक हैं। वहाँ *पी. जापोनिकस* और *पी. इंडिकस* के साथ इन्हें भी बेचते हैं।

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औद्योगिक प्रदूषण से मछलियों की मृत्यु*

तारीख 2-11-89 को कायलपट्टणम के तटीय जलों और समीपस्थ क्षेत्रों में मछलियों और जलजीवियों की मृत्यु देखी गई थी। निकटस्थ रासायनिक व प्लास्टिक रेसिन कारखाने से निस्रावित औद्योगिक अपाशिष्ट इसका मूल कारण देखा गया है। इस प्रकार की घटना पहले 1982 से 87 तक की अवधि में भी हुई है विशेषकर नवंबर या दिसंबर के महीनों में। इस समय वर्षा ऋतु के बाद साधारणतः संकर खाडी खुल जाने का समय है। खाडी के खुल जाने पर उस में संग्रहित सांद्रतापूर्ण पानी जो रासायनिक उपसर्गों से मिला हुआ है, बहिस्रावित होता है। रासायिनिक कारखाने से निःस्रावित उपसर्ग में मूलतः मेरकुरी और अम्ल का अंश होता है जो जलजीवों के नाश का कारण बनता है। प्रदूषित पानी पीले भुरे रंग का होता है और अब यह समुद्र जल में एकदम मिल जाता है तब वहाँ के मछलियों और जलजीवियों का नाश होता है। इस प्रकार की मृत्यु सिर्फ एक या दो दिन तक होता है क्योंकि धीरे धीरे जब यह पानी समुद्र और बारिश

के पानी से मिल जाता है तब रासायनिक पदार्थों की सांद्रता कम हो जाती है।

20-11-89 को इस घटना के निरीक्षण करने केलिए वैज्ञानिकों ने वहाँ 23 वर्गों के समुद्री जीवों को जिस में मछलियाँ, कर्कट, तारा मीन, मोलस्क आदि थे, को इस प्रदूषण से पीडित देखा था। मृत्यु संबंधी कारण समझने केलिए पानी का तापमान, विलीन ऑक्सिजन का अंश, लवणीयता, मेरकुरी का मूल्य आदि सम्बन्धी प्राचलित अध्ययनों ने व्यक्त किया कि मछलियों की मृत्यु का कारण अम्लीयता का उच्च विषैला अंश है।

*रिपोर्ट किया है : एच. मोहम्मद कासिं, वी. एस. बालसुब्रमण्यम, और वी. एस. रंगसामी, सी. एम. एफ. आर आइ. का टूटिकोरिन अनुसंधान केन्द्र।

दक्षिण विशाखपट्टणम के डिब्बापालम में विरल लवणीय जल मगर मच्छो *क्रोकोडिलस पोरोसस* का अवतरण

1991 मार्च आठवीं के अपराह्न को विशाखपट्टणम के डिब्बापालम से क्रोकोडिलस पोरोसस जाति के विरल एवं जीवंत एक मगर को पकडा था। पुरुष वर्ग के उपवयस्क इस मगर की लंबाई 2.14 मी थी। इसे नइलोन तट-संपाश के ज़रिए पकडा था। मछुओं ने इसे एक निकटस्थ तालाब में एक रात डाला। सी एस एफ आर आइ के विशाखपट्टणम अनुसंधान केन्द्र में इसके संबंध में खबर पाते ही लेखक ने उसे वहाँ से ले जाकर विशाखपट्टणम के मात्स्यिकी बंदरगाह में एक दिन के प्रदर्शन केलिए रखा। इसको अब इंदिरागांधी जूवोलोजिकल पार्क में बंधनावस्था में पालन कर रहा है।

*सी. एम. एफ. आर. आइ. के विशाखपट्टणम अनुसंधान केन्द्र के सी. वी. शेषगिरि राव द्वारा तैयार किया लेख।

GUIDE TO CONTRIBUTORS

The articles intended for publication in the MFIS should be based on actual research findings on long-term or short-term projects of the CMFRI and should be in a language comprehensible to the layman. Elaborate perspectives, material and methods, taxonomy, keys to species and genera, statistical methods and models, elaborate tables, references and such, being only useful to specialists, are to be avoided. Field keys that may be of help to fishermen or industry are acceptable. Self-speaking photographs may be profusely included, but histograms should be carefully selected for easy understanding to the non-technical eye. The write-up should not be in the format of a scientific paper. Unlike in journals, suggestions and advices based on tested research results intended for fishing industry, fishery managers and planners can be given in definitive terms. Whereas only cost benefit ratios and indices worked out based on observed costs and values are acceptable in a journal, the observed costs and values, inspite of their transitionality, are more appropriate for MFIS. Any article intended for MFIS should not exceed 15 pages typed in double space on foolscap paper.

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