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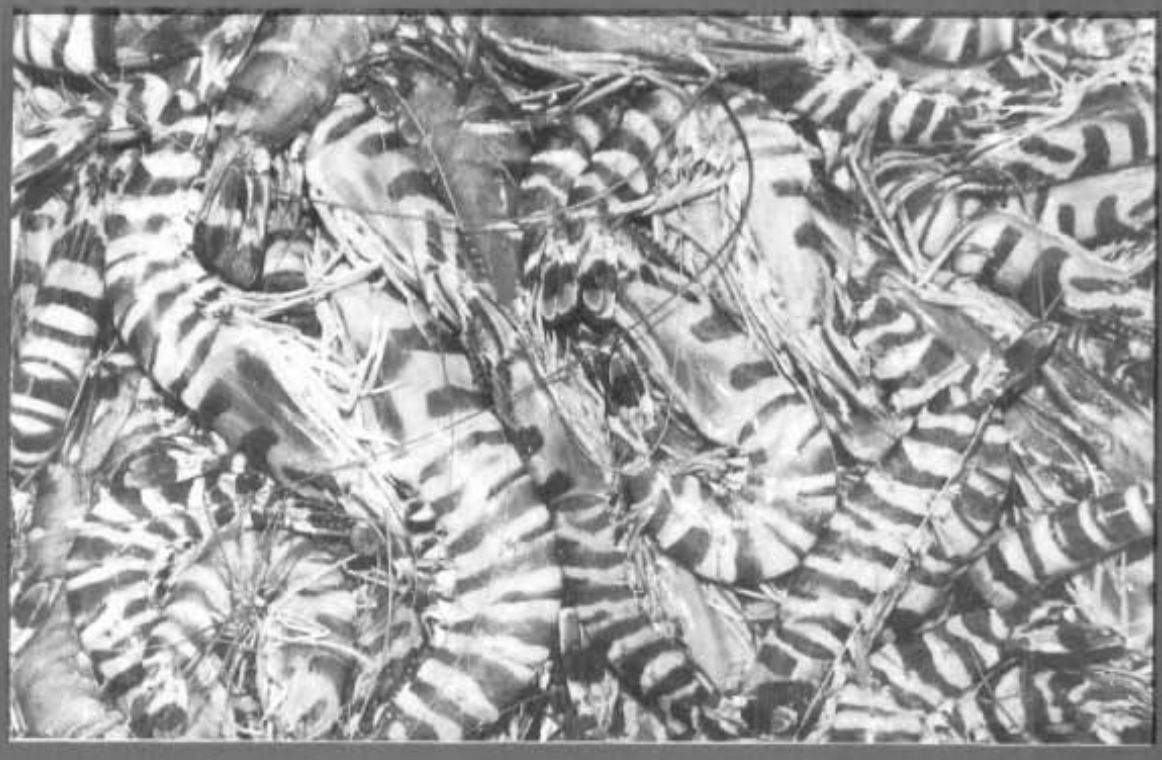

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943 PRAWN FISHERY OF CUDDALORE, NORTHERN TAMILNADU COAST, WITH SPECIAL REFERENCE TO LONG-TERM CHANGES

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Introduction

Prawn fishery along the east coast, in general, occurs in concentrations close to major estuaries and backwaters, for which varying sources of information are available. Little has been known about the prevalent prawn resources along the Cauvery Delta region off Cuddalore despite large scale exploitation since the introduction of trawl fishing in the 1960s.

Increased effort coupled with improved fishing efficiency would result in faster depletion of the resources, if fishing is restricted to a limited area. Thus the trawlers were forced to extend fishing operations gradually towards deeper waters and in horizontal directions. Consequent to such spatial shifting, changes in species composition and abundance were bound to accrue over a time, which necessitated periodical monitoring of the prevailing status of the stocks to assist management programmes. In view of this, prawn fishery off Cuddalore was studied for 1972-'74 and 1986-'88 and the qualitative changes between the two spells, along with the pattern of bathymetric species abundance are highlighted.

The fishing grounds along Cuddalore-Portonovo coast are commonly exploited by trawlers launched from four bases; Cuddalore (D.T.), Portonovo, Devinampatnam and Pazhayar, among which observations were restricted to Cuddalore (D.T.), which was the largest with more infrastructure facilities. Data on catch and effort for trawlers were collected following the common procedure of random sampling for two blocks of years, 1972-'74 and 1986-'88, and processed to obtain the monthly and annual estimates.

During each weekly observation day, the weight of total catch and of prawns were recorded along with the effort in terms of actual trawling hours for a few trawlers selected at random. From the average values for the observed units, the estimates were calculated for the day and in turn for the month and year. The CPUE, expressed in kg/hr, was obtained for the monthly and annual values.

Shrimp-trawl and fish-trawl

Except a few larger out-station trawlers which landed the catches occasionally, the size of the fishing vessels regularly operating from this base is about 10m length and during the later years two types of trawl were used, shrimp-trawl and fish-trawl nets for targeted fishing of prawns at shallow depths and fishes in deeper areas, respectively. These nets are used as an alternative choice for relatively more remunerative catches available in the grounds on a given day of fishing. The basic differences between the two types of nets are related to the length, mesh-size and the position of foot-rope in relation to the ground. The standard size of the shrimp-trawl net is 22.3m length, with the mesh-size of 12-14mm at the cod-end and about 25 and 35mm at the middle and mouth regions and the fish-trawl net is 30.6m length, with the corresponding mesh-size of 16-18 and 40 and 60mm. In shrimp-trawl more closely attached weights along the foot-rope keep pressing the rope of the net scraping along the ground on hauling position whereas, more distantly attached weights, with floats in between in fish-trawls allow the foot-rope lifted about 20 cm above the ground, while the weights hang down to the floor.

TABLE 1. *Details on catch, effort, CPUE and percentage in total catches of prawns landed by trawlers at Cuddalore during 1972-'74 and 1986-'88*

Month	1972-'74				1986-'88			
	Effort (in 100hr)	Catch (t)	CPUE (kg/hr)	%	Effort (in 100hr)	Catch (t)	CPUE (kg/hr)	%
April	37.6	8.8	2.34	30.1	100.4	18.6	1.85	21.8
May	50.9	15.4	3.03	41.1	108.6	16.1	1.48	20.0
June	41.0	18.4	4.59	32.6	94.6	28.5	3.03	19.2
July	68.0	25.4	3.74	32.5	98.5	19.9	2.02	12.0
August	18.4	5.0	2.72	21.2	103.3	170.1	16.47	37.5
September	22.0	10.0	4.55	22.8	94.4	36.0	3.82	13.1
October	49.8	10.9	2.19	14.7	103.7	17.5	1.68	18.3
November	39.3	6.4	1.63	11.5	102.3	13.4	1.31	10.2
December	62.0	34.1	5.50	34.3	102.6	14.8	1.45	11.0
January	84.0	49.9	5.94	38.6	84.6	7.9	0.93	11.9
February	32.8	13.8	4.21	25.6	88.9	3.9	0.44	1.2
March	21.7	3.5	1.61	13.0	42.0	4.6	1.09	5.7
April	35.5	12.5	3.75	24.8	23.4	22.2	9.48	47.3
May	35.9	12.4	3.46	14.6	61.6	104.3	16.93	82.9
June	29.2	13.0	4.44	26.6	92.2	155.7	16.89	61.6
July	32.9	16.0	4.86	22.1	86.4	102.4	11.85	41.1
August	25.7	15.1	5.88	26.9	77.9	46.9	6.02	23.5
September	28.3	14.4	5.89	25.4	86.8	136.7	15.75	37.1
October	38.6	17.8	4.61	26.2	60.2	9.9	1.65	5.4
November	74.4	30.6	4.11	27.8	59.9	7.6	1.27	7.8
December	73.1	40.4	5.53	48.0	95.1	36.4	3.82	18.6
January	100.3	44.5	4.44	28.8	85.4	24.8	2.90	33.9
February	44.7	14.7	3.29	13.4	54.9	7.5	1.37	4.8
March	39.2	5.2	1.33	6.3	14.9	6.5	4.36	32.2
Ann.Av.for '72-'74&'86-'88	542.7	219.3	4.04	25.4	961.1	506.1	5.26	24.1

Fishing area

The fishing area of trawler operation from this base is flanked by two rivers, Pennar on the northern and Coleroon, a major tributary of Cauvery, on the southern limits. The southern grounds are more muddy, with enormous silt received from the delta and the northern grounds are mixed more with sand. The two rivers present at the northern area are rain-fed, experiencing only monsoon floods and the entire coastal stretch receives a number of

drainage canals with enormous flushes rich in nutrients from the extensive paddy fields. Adjacent to the main fishing ground is the sprawling Killai Backwaters, where the numerous creeks and channels spread all over the thick mangrove forest form the sheltered nursery grounds for the penaeids.

Effort

The number of fishing trawlers operating from Cuddalore (D.T) base increased considerably between the years 1972-'74 and 1986-'88, despite the development of another centre, Pazhayar, to share fishing in these grounds. The annual fishing effort (Table 1) was estimated at 52,750 hrs in 1972-'73 and 55,780 hrs in 1973-'74, with an average of 54,270 hrs and that increased substantially to 1,12,340 hrs in 1986-'87 and 79,870 hrs in 1987-'88, with an average of 96,110 hrs. Wide seasonal variations of fishing activities were evident from the monthly fishing effort ranging between 1,840 and 8,400 hrs in 1972-'73 and between 2,830 and 10,030 hrs in 1973-'74 with more intensive fishing in December-January. The fluctuations were still wider during the latter years, being 4,200-10,860 hrs in 1986-'87 and 1,490-9,510 hrs in 1987-'88, although December-January remained to be a more active fishing season. Protected harbour fecilities often attracted outstation trawlers shifting the operation to this base during the rough monsoon conditions.

As the same trawlers used both shrimp-trawl and fish-trawl nets as an alternative the extent of fishing efforts also varied between them (Table 2). Shrimp-trawls were used for 44,370 hrs in 1986-'87 and 39,030 hrs in 1987-'88, as against 67,970 and 40,840 hrs during the corresponding years for fish-trawls, the average being 41,700 and 54,410 hrs (43.4 : 56.6%) by shrimp-trawls and fish-trawls, respectively. Trawlers used shrimp-trawls most by during the post-monsoon season, December-January, when prawn fishery was in peak and the fish-trawls were more of the choice during the warmer period, May-September.

Fishery

Offshore extension of fishing with the introduction of fish-trawls during the later years resulted in marked changes in species composition and abundance of prawns. The annual prawn landings (Table 1) were 202.2t with a CPUE of 3.83 kg/hr in 1972-'73 and 236.6t at 4.24 kg/hr in 1973-'74, with an annual average of 219.3t at 4.04 kg/hr. After a long interval, the same increased to 351.3t at 3.13 kg/hr in 1986-'87 and 660.9t at 8.27 kg/hr in 1987-'88, giving an average of 506.1t at 5.26 kg/hr. The monthly catches and the CPUE during the periods varied from 3.5 to 49.9t and from 1.33 to 5.94 kg/hr during 1972-'74 and more widely (3.9-170.1t and 1.44-16.93 kg/hr) during 1986-'88 showing peak abundance around pre-monsoon June-September and post-monsoon December-January. The post-monsoon wave was more pronounced in 1972-'74, but reversed in 1986-'88 when the peak in June-September was more dominant, with the additional resources emerging in larger abundance from the deper area. In the annual catches of trawlers prawns constituted about 25% during 1972-'74 but varied later from 15.2% in 1986 to 33% in 1987-'88.

Bathymetric abundance

Different bathymetric areas were exploited by shrimp-trawls and fish-trawls, the former being restricted to 5-30m depth opting for prawns, with more concentration around 8-15m depth, and the latter for fishes at 30-100m depth with higher activities in 40-65m depth. However, fish-trawls accounted for 70% of the prawns landed during 1986-'88 (Table 2-5). The annual prawn landings by shrimp-trawls were estimated as 107.7t at 2.43 kg/hr in 1986-'87 and 193.2t at 4.95 kg/hr in 1987-'88, giving an average of 150.5t at 3.61 kg/hr whereas, fish-trawls landed 244.9t at 3.60 kg/hr in 1986-'87 and 467.6t at 11.45 kg/hr in 1987-'88, averaging 356.3t at 6.55 kg/hr (Table 6). The abundance and the peak season for prawns also bathymetrically varied as shown by the catches of shrimp-trawls and fish-trawls. The monthly landings of shrimp-trawls fluctuated between

TABLE 2a. *Estimated catch in tonnes of important species of prawns in commercial landings at Cuddalore during 1972-'73*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.monoce.*	*M.dob*	*M.aff.*	*Mpsis.spp.*	*Trp.spp.*	*P.sty.*	*P.cora.*	*P.max.*	*S.crs.*	Total
Apr.	1.18	1.04	--	3.13	2.13	--	1.21	0.01	0.10	--	--	0.10	8.8
May	3.02	2.49	--	5.87	2.91	--	0.85	--	0.01	--	--	0.23	15.40
Jun.	3.94	2.56	0.01	6.04	4.18	0.02	1.68	--	0.20	--	0.32	0.18	18.8
Jul.	7.64	2.20	3.97	6.08	2.45	--	1.55	1.21	--	--	0.35	0.20	25.4
Aug.	1.46	0.28	0.41	0.71	1.50	0.03	0.09	0.56	--	--	0.01	0.09	5.0
Sept.	2.52	0.13	0.12	0.01	7.20	--	--	0.03	--	--	--	--	10.0
Oct.	1.41	0.23	5.32	3.22	0.66	0.04	0.01	0.01	--	--	--	--	10.9
Nov.	0.65	0.14	1.16	3.12	0.11	0.27	--	--	0.42	--	--	--	6.4
Dec.	25.39	0.64	0.28	5.67	1.04	0.40	--	--	0.38	0.09	0.17	0.01	34.1
Jan.	34.32	0.52	0.01	2.38	1.45	4.35	--	--	2.26	3.96	--	0.63	49.9
Feb.	4.45	0.89	--	3.75	3.34	--	--	0.02	0.87	0.41	--	0.08	13.8
Mar.	0.83	0.28	0.05	0.53	1.28	0.03	0.50	0.05	0.13	0.01	0.20	0.05	3.5
Total	82.98	11.4.0	11.33	40.51	28.25	5.09	5.41	1.69	4.17	4.47	1.05	1.57	202.0
CPUE	1.57	0.22	0.22	0.77	0.54	0.1	0.1	0.03	0.08	0.09	0.02	3.83	--
%	41.40	5.60	5.60	20.10	14.00	2.50	2.70	0.80	2.10	2.20	0.50	26.50	--

TABLE 2b. *Estimated catch in tonnes of important species of prawns in commercial landings at Cuddalore during 1973-'74*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.monoce.*	*M.dob.*	*M.aff.*	*Mpsis.spp.*	*Trp.spp.*	*P.sty.*	*P.cora.*	*P.max.*	*S.crs.*	Total
April	1.23	0.49	0.08	1.49	5.06	1.76	2.03	0.06	0.12	--	0.03	0.18	12.5
May	2.16	0.48	0.19	4.84	1.83	0.26	2.26	0.29	0.01	--	0.07	0.07	12.4
June	1.70	1.09	0.05	2.88	0.95	0.03	5.66	0.24	0.01	--	--	0.03	13.0
July	4.38	0.84	0.24	0.79	7.96	--	0.43	0.19	0.06	--	0.15	0.02	15.0
Aug.	2.13	0.08	1.65	2.21	7.68	0.15	0.39	0.19	0.06	--	0.29	0.01	15.1
Sept.	3.66	0.13	1.31	0.37	6.95	0.08	0.31	0.4	1.02	--	0.22	0.01	14.4
Oct.	2.91	0.05	6.95	2.49	4.94	0.01	0.30	0.02	0.15	--	0.06	0.01	17.8
Nov.	11.28	0.24	3.48	3.18	10.69	1.17	0.31	--	0.24	--	0.17	0.07	30.6
Dec.	25.77	0.32	--	0.08	0.36	0.31	0.06	--	2.69	10.64	0.14	0.09	40.4
Jan.	17.87	5.40	0.35	2.33	8.87	--	0.07	0.27	5.77	5.34	0.29	0.96	44.5
Feb.	2.34	2.08	0.02	7.86	0.02	--	0.08	0.38	--	--	0.02	0.05	14.7
March	0.29	1.24	0.08	2.15	0.16	--	0.76	0.47	0.01	--	0.02	0.05	5.2
Total	75.72	12.43	14.40	30.67	55.47	3.76	2.56	2.27	10.55	15.98	1.92	2.81	236.50
CPUE	0.57	0.22	0.26	0.55	0.99	0.07	0.05	0.04	0.15	0.29	0.03	4.24	
%	32.00	5.3.0	6.10	13.00	23.50	1.60	1.10	1.00	4.50	6.80	0.80	24.30	

TABLE 3a. *Estimated CPUE (kg/hr) for important species of prawns in commercial landings at Cuddalore during 1972-'73*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.monoce.*	*M.dob.*	*M.aff.*	*Mpsis.spp.*	*Trp.spp.*	*P.sty.*	*P.cora.*	*P.max.*	Total
April	0.31	0.28	--	0.83	0.57	--	10.32	--	0.03	--	--	0.03
May	0.59	0.49	--	1.15	0.58	--	0.17	--	--	--	--	0.04
June	0.96	0.62	--	1.47	1.07	--	0.41	--	0.03	--	0.08	0.03
July	1.14	0.33	0.60	0.92	0.37	--	0.24	0.15	--	--	0.05	0.03
Aug.	0.79	0.15	0.22	0.39	0.81	0.02	0.05	0.24	--	--	--	0.05
Sept.	1.15	0.06	0.05	--	3.24	--	--	0.01	--	--	--	--
Oct.	0.28	0.04	1.09	0.64	0.13	0.01	--	--	--	--	--	--
Nov.	0.16	0.03	0.29	0.79	0.03	0.07	--	--	0.11	--	--	--
Dec.	4.09	0.10	0.04	0.92	0.17	0.06	--	--	0.03	0.02	0.04	--
Jan.	3.96	0.06	--	0.29	0.17	0.05	--	--	0.27	0.47	--	0.08
Feb.	1.36	0.27	--	1.14	1.02	--	--	0.01	0.23	0.11	--	0.02
March	0.39	0.01	0.02	0.25	0.54	0.01	0.03	0.01	0.06	--	0.09	0.03

TABLE 3b. *Estimated CPUE (kg/hr) for important species of prawns in commercial landings at Cuddalore during 1973-'74*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.monoce.*	*M.dob.*	*M.aff.*	*Mpsis.spp.*	*Trp.spp.*	*P.sty.*	*P.cora.*	*P.max.*	Total
April	0.37	0.15	0.02	0.44	1.51	0.53	0.61	0.02	0.04	--	0.01	0.05
May	0.60	0.13	0.05	1.35	0.51	0.07	0.60	0.08	--	--	0.02	0.02
June	0.46	0.34	0.02	0.99	0.33	0.01	1.94	0.08	--	--	--	0.01
July	1.33	0.25	0.07	0.24	2.42	--	0.13	0.05	0.02	--	0.05	0.01
Aug.	0.83	0.03	0.64	0.86	3.00	0.06	0.15	0.05	0.02	--	0.11	--
Sept.	1.30	0.05	0.46	0.13	2.46	0.03	0.11	0.14	0.36	--	0.08	--
Oct.	0.71	0.01	1.81	0.64	1.38	--	0.08	--	0.04	--	0.01	--
Nov.	1.51	0.03	0.47	0.43	1.44	0.16	0.04	--	0.03	--	0.02	0.01
Dec.	3.53	0.04	--	0.01	0.05	0.04	0.01	--	0.37	1.46	0.02	0.01
Jan.	1.75	0.54	0.04	0.23	0.69	--	0.01	0.04	0.58	0.53	0.29	0.10
Feb.	0.52	0.47	--	1.76	--	--	0.02	0.13	--	--	0.01	0.01
March	0.08	0.32	0.02	0.55	0.04	--	0.19	0.12	--	--	0.01	0.01

TABLE 4a. *Estimated catch in tonnes of important species of prawns in commercial landings at Cuddalore during 1986-'87*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.jap.*	*P.monoce.*	*M.dob.*	*M.str.*	*M.mog.*	*T.cur.*	*T.pes.*	*P.max.*	Total
April	1.72	1.89	1.01	0.09	4.63	5.17	1.63	2.4	--	--	0.08	18.55
May	0.41	0.69	2.90	0.42	1.88	0.21	0.59	3.46	0.02	--	3.20	16.05
June	1.39	0.33	2.32	0.20	1.35	15.25	0.69	1.03	0.85	--	0.87	28.47
July	1.42	0.23	1.38	0.04	2.21	1.55	4.85	5.52	2.43	0.02	0.25	19.85
Aug.	5.11	0.05	1.27	0.28	0.21	9.85	30.73	92.18	14.78	1.20	5.20	170.14
Sept.	5.43	0.35	1.37	tr	1.08	14.84	2.35	4.66	2.88	0.62	2.87	36.02
Oct.	2.98	0.12	1.09	--	0.64	11.53	0.19	0.28	0.16	0.03	0.60	17.46
Nov.	2.03	0.75	0.94	--	1.40	6.86	0.95	5.37	0.91	0.01	tr	13.35
Dec.	2.40	0.68	0.89	--	1.79	5.89	0.02	0.01	2.45	0.68	tr	13.35
Jan.'87	2.96	0.02	0.30	--	0.29	4.63	0.01	0.02	--	--	--	7.88
Feb.	2.52	tr	0.04	--	0.44	0.04	0.06	--	--	0.02	0.03	3.90
March	1.04	0.15	0.13	tr	0.21	0.11	1.48	0.61	0.02	1.11	--	4.59
Total	29.21	5.53	13.85	1.00	17.43	81.08	169.16	33.60	25.87	3.69	12.31	351.09
CPUE	0.26	0.05	0.12	0.01	0.15	0.72	1.49	0.30	0.23	0.03	0.11	--
%	8.0	1.50	3.80	0.30	4.80	2.20	46.20	9.20	7.10	1.00	3.30	--

TABLE 4b. *Estimated catch in tonnes of important species of prawns in commercial landings at Cuddalore during 1987-'88*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.jap.*	*P.monoce.*	*M.dob.*	*M.str.*	*M.mog.*	*T.cur.*	*T.pes.*	*P.max.*	Total
April	0.25	0.01	0.45	0.06	0.19	0.63	8.13	12.39	0.08	--	0.01	22.17
May	1.67	tr	1.08	0.33	0.42	0.87	31.07	69.92	0.04	--	0.05	104.29
June	1.61	0.01	1.90	0.43	1.11	13.25	41.19	94.01	1.12	--	0.72	155.69
July	4.79	0.02	1.82	0.29	0.28	4.33	5.44	70.74	7.32	0.02	7.21	102.40
Aug.	1.48	0.09	0.29	0.49	0.90	28.72	0.69	12.54	1.05	0.19	0.42	46.89
Sept.	2.93	tr	4.53	0.23	0.40	75.03	5.46	44.21	1.42	0.33	0.34	136.70
Oct.	1.72	0.15	0.15	0.08	0.05	3.03	0.66	1.86	0.19	0.42	0.78	9.94
Nov.	2.49	0.21	0.50	0.04	0.16	1.46	0.19	0.41	1.83	0.02	0.27	7.55
Dec.	14.09	1.20	0.58	--	0.41	3.59	0.45	5.71	7.70	1.67	0.85	36.36
Jan.	17.09	0.09	0.07	--	1.00	5.28	--	0.24	0.14	--	0.81	24.44
Feb.	2.94	0.05	0.14	--	0.69	2.84	--	0.30	0.18	--	0.36	7.51
March	0.02	--	0.03	--	0.78	0.07	--	5.18	0.41	--	tr	6.48
Total	51.08	1.83	11.54	1.84	6.39	139.10	93.28	314.53	21.48	2.85	11.82	660.90
CPUE	0.59	0.02	0.13	0.02	0.07	1.61	1.08	3.55	0.25	0.03	0.14	--
%	7.70	0.35	1.80	0.30	1.00	21.10	14.10	47.60	3.30	0.40	1.80	--

TABLE 5a. *Estimated CPUE (kg/hr) for important species of prawns in commercial landings at Cuddalore during 1986-1987*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.jap.*	*P.monoce.*	*M.dob.*	*M.str.*	*M.mog.*	*T.cur.*	*T.pes.*	*P.max.*
April	0.17	0.19	0.10	0.01	0.46	0.52	0.16	0.24	--	--	0.01
May	0.04	0.06	0.27	0.04	0.17	0.02	0.05	0.32	--	--	0.29
June	0.15	0.04	0.25	0.02	0.14	1.62	0.07	0.11	0.90	--	0.09
July	0.15	0.23	0.14	0.01	0.24	0.16	0.49	0.56	0.25	--	0.03
Aug.	0.49	0.01	0.12	0.03	0.02	0.95	2.98	8.92	1.43	0.12	0.50
Sept.	0.58	0.04	0.15	tr	0.12	1.57	0.25	0.49	0.31	0.07	0.03
Oct.	0.29	0.02	0.11	--	0.06	1.11	0.20	0.03	0.02	0.01	0.01
Nov.	0.20	0.06	0.09	--	0.14	0.67	0.09	10.53	0.09	0.02	--
Dec.	0.24	0.07	0.09	--	0.18	0.58	0.002	0.001	0.24	0.07	--
Jan.	0.35	tr	0.04	--	0.03	0.55	0.001	0.002	0.01	--	0.01
Feb.	0.32	tr	0.01	--	0.06	0.05	0.004	0.007	--	0.02	0.03
March	0.24	0.04	0.03	--	0.05	0.03	0.16	0.07	0.01	0.26	0.01

TABLE 5b. *Estimated CPUE (kg/hr) for important species of prawns in commercial landings at Cuddalore during 1987-'88*

Month	*P.indi.*	*P.monod.*	*P.semi.*	*P.jap.*	*P.monoce*	*M.dob.*	*M.str.*	*M.mog.*	*T.cur.*	*T.pes.*	*P.max.*
April	0.11	--	0.19	0.02	0.08	0.27	3.47	5.30	0.03	--	--
May	0.27	--	0.17	0.05	0.07	0.14	5.04	10.86	tr	--	tr
June	0.18	tr	0.21	0.04	0.12	1.44	4.47	10.20	0.18	--	0.08
July	0.56	--	0.22	0.03	0.02	0.50	0.63	8.18	0.85	0.11	0.85
Aug.	0.19	0.01	0.04	0.06	0.12	3.69	0.09	1.61	0.13	0.03	0.05
Sept.	0.34	0.01	0.52	tr	0.02	3.88	0.63	5.09	0.16	0.04	0.04
Oct.	0.29	0.03	0.03	0.02	0.01	0.50	0.11	0.31	0.03	0.07	0.13
Nov.	0.42	0.04	0.08	0.01	0.03	0.24	0.03	0.07	0.31	--	0.05
Dec.	1.48	0.13	0.06	--	0.04	0.38	0.05	0.60	0.81	0.18	0.09
Jan.	2.00	0.01	0.03	--	0.12	0.64	--	0.03	0.02	--	0.10
Feb.	0.54	0.01	0.03	--	0.13	0.52	--	0.06	0.03	--	0.07
March	0.02	--	0.02	--	0.52	0.05	--	3.49	0.27	--	--

TABLE 6. *Details on catch, effort, CPUE and percentage in total catches for prawns landed by shrimp trawls and fish - trawls at Cuddalore during 1986-'88*

Month	Shrimp-trawl				Fish-trawl			
	Effort (in 100hr)	Catch (t)	CPUE (kg/hr)	%	Effort (in 100hr)	Catch (t)	CPUE (kg/hr)	%
1986-'87								
April	34.2	6.35	1.86	28.1	66.2	12.20	1.84	18.7
May	28.8	3.51	1.22	17.6	79.8	12.54	1.57	19.8
June	46.9	22.21	4.74	25.4	47.2	6.26	1.33	7.4
July	29.7	3.63	1.22	18.2	68.8	16.25	2.36	17.9
August	46.0	17.68	3.84	19.8	57.3	152.46	26.61	37.1
September	33.2	20.55	6.20	29.7	61.2	15.47	2.52	6.2
October	35.9	10.30	2.87	27.4	67.8	7.16	1.06	8.4
November	47.2	8.30	1.76	23.2	55.1	6.53	1.19	4.2
December	34.6	5.80	1.68	36.3	68.0	9.03	0.75	5.9
January	57.0	6.14	1.08	22.6	27.6	1.74	0.63	2.3
February	41.9	2.60	0.62	1.2	47.0	1.30	0.28	1.1
March	8.3	0.64	0.77	5.3	33.7	3.95	1.17	6.7
1987-'88								
April	5.1	0.66	1.30	12.3	18.3	21.51	11.75	53.5
May	19.6	5.90	3.01	13.8	42.0	98.39	23.43	39.2
June	32.3	17.53	5.43	35.7	59.9	138.16	23.07	65.7
July	32.0	8.93	2.79	19.2	54.4	93.47	17.18	45.2
August	45.4	35.72	7.87	57.3	32.5	11.17	2.13	16.9
September	38.8	64.08	16.52	46.7	48.0	72.62	15.13	28.8
October	42.9	6.76	1.58	4.6	17.3	3.18	1.84	7.1
November	28.4	5.13	1.81	12.1	31.5	2.42	0.77	4.5
December	55.6	24.32	4.37	22.2	39.5	12.04	3.05	14.0
January	58.3	17.33	2.97	39.7	27.1	7.51	2.77	25.4
February	27.7	6.18	2.23	6.9	27.2	1.33	0.49	1.9
March	4.2	0.42	1.52	13.3	10.7	5.84	5.46	38.2
Av. for 1986-'88	417.0	150.45	3.61	22.5	544.1	356.27	6.55	19.85

0.6-64.1t, the CPUE being 0.62-16.52 kg/hr, with two annual peak seasons in June-September and December-January. Fish-trawls recorded wider variations of 1.3-152t at 0.28-26.61 kg/hr, with a single protracted season during April-September. The percentage of prawns in the monthly catches of shrimp-trawls varied from 1.2 to 57.3, with an average of 22.5, as against, 1.1-65.7, with an average of 19.9 for fish-trawls (Table 6).

Species composition and trend

Penaeus indicus, P.merguiensis, P.semisulcatus, P.monodon, P.japonicus, P.canaliculatus, P.latisulcatus, Metapenaeus dobsoni, M.monoceros, M.affinis, M.moyebi, M.brevicornis, M.lysinassa, Metapenaeopsis mogiensis, M.stridulans, M.barbata, M.hilarula, Parapenaeopsis maxillipedo, P.stylifera, P.cornuta, P.coramandalica, P.uncta, P.acclivirostris, P.sculptilis, Trachypenaeus curvirostris, T.pescadoreensis, T.sedili and *T.asper* were found in the landings. *Solenocera crassicornicus, S.chopra, Parapenaeus longipes, Atyopenaeus stenodactylus, Hippolysmata ensirostris and Scyonia lancifer* were also available in small quantities.

The fishery of *P.indicus, M.dobsoni, M.monoceros* and *P.semisulcatus* maintained to be in larger commercial proportions, although both *P.indicus* and *M.monoceros* experienced considerable decline. The species of *Metapenaeopsis* and *Trachypenaeus* appeared in abundance later in 1986-'88 and species in minor catches like *M.affinis* and *P.stylifera*, suffered sharp decline, while *P.maxillipedo* gained substantial increase between the years.

The species composition and abundance (Table 7) showed striking difference between the catches of shrimp-trawls and fish-trawls, which were fishing execlusively in different zones of depth. The catches of shallow waters landed by shrimp-trawls were dominated by *P.indicus, M.dobsoni,* and *P. maxillipedo* with two annual peaks of abundance around the pre-monsoon, September, and post-monsoon, December-January. Altogether a different set of species supported the fish-trawl catches, dominant among them being *M.mogiensis, M.stridulans, M.monoceros, T.curvirostris,* and *T.pescadoreensis.* Larger portion of *P.semisulcatus* and *P.monodon* also came from the deeper areas.

Table 7. *Average annual landings of important prawn species by shrimp-trawls and fish-trawls and the species contribution to the total prawns of each net at Cuddalore during 1986-'88*

Species	Annual landings				Percentage contribution to total prawns	
	Shrimp-trawl		Fish-trawl			
	Catch(t)	%	Catch(t)	%	Shrimp-trawl	Fish-trawl
P. indicus	35.9	89	4.2	11	23.8	1.2
P. semisulcatus	1.8	15	10.4	85	1.1	2.9
P. monodon	1.3	33	2.4	67	0.9	0.7
M. dobsoni	102.3	93	7.8	7	68.0	2.2
M. monoceros	0.9	8	11.0	92	0.6	3.1
M. mogiensis	2.2	1	212.9	99	1.5	60.2
M. stridulans	0.7	1	67.7	99	0.5	19.0
Trachypenaeus spp.	0.7	3	24.3	97	0.5	6.8
P. maxillipedo	8.5	70	3.6	30	5.6	1.0

P. indicus

It was the commercially most remunerative species of the area and topped in abundance during 1972-'74, with the annual landings of 79.4t at 1.47 kg/hr forming 36.6% of prawns, which slided sharply later to 40.2t at 0.45 kg/hr to contribute 7.6% in 1986-'88. Bulk (89%) of the species was caught from shallow waters by shrimp-trawls and it formed 23.8% and 1.2% of prawns landed by shrimp-trawls and fish-trawls respectively (Table 7). The monthly landings varied between 0.29-34.0t in 1972-'74 and 0.2-17.1t in 1986-'88, having the peak abundance in December-January along with another moderate peak during July-September.

P. semisulcatus

The species had a moderate fishery without experiencing much changes over the years. The average annual catch was 15.2t at 0.28 kg/hr supporting 6.9% of prawns in 1972-'74, and 12.2t at 0.13 kg/hr forming 2.6% in 1986-'88. About 85% of the species was landed by fish-trawls and formed 2.9 and 1.1% of prawns caught by fish-trawls and shrimp-trawls, respectively. The monthly catches fluctuated between 0.01-6.95t in 1972-'74 and 0.03-4.53t in 1986-'88, with higher abundance around June-July and October and poor catches during December-April.

P. monodon

The annual landings of *P.monodon* was estimated as 9.86t at 0.18 kg/hr forming 4.5% of prawns in 1972-'74 which declined to 3.68t at 0.04 kg/hr supporting 0.7% in 1986-'88. About 67% of it was caught by fish-trawls and formed 0.9 and 0.7% of the prawn catches of shrimp-trawls and fish-trawls respectively. It was either totally absent or in negligible quantities during some months and the maximum monthly catch was 5.4t with the CPUE of 0.62 kg/hr in 1972-'74 and 1.89t and 0.23 kg/hr in 1986-'88. Higher abundance was observed for a couple of months within April-June and November-January.

M. dobsoni

The species was consistantly in good abundance over the years. The average annual catch was 41.9t at 0.77 kg/hr forming 19.1% of prawns in 1972-'74, which had more than doubled later to 110.1t at 1.15 kg/hr forming 21.8% in 1986-'88. It was the most abundant shallow water species with more than 90% of its catches landed by shrimp-trawls and formed 68% of the prawns caught by shrimp-trawls, as against 2.2 in fish-trawls. The fishery showed wide seasonal variations, with monthly catches ranging between 0.02-10.7t at 0.03-3.24 kg/hr in 1972-'74 and 0.07-75.3t at 0.03-3.88 kg/hr in 1986-'88, with peak abundance during June-September and another smaller peak in December-January.

M. monoceros

It continued to be a major commercial component, in spite of a severe decline between 1972-'74 and 1986-'88. The average annual catch was 35.6t at 0.66 kg/hr constituting 16.2% of prawns in 1972-'74 but decreased to 11.9t at 0.12 kg/hr sharing 2.4% in 1986-88. Fish-trawls accounted for more than 90% of its catches and formed 3.1 and 0.9% of prawns landed by fish-trawls and shrimp-trawls, respectively. The fishery showed two peaks in April-June and November-February with slight annual variations. The maximum monthly landings and average CPUE were 7.86t and 1.76 kg/hr in 1972-'74 and 4.63t and 0.52 kg/hr in 1986-'88.

M. mogiensis

The species was noted to have emerged in large abundance during the later years, 1986-'88, when its average annual landings were 215.1t at 2.24 kg/hr contributing 42.5% among prawns, as against a meagre 1.4t at 0.03 kg/hr in 1972-'74. The fishery was highly seasonal, the monthly catches varying from nil in the catches for several months to the maximum of 2.0t at 0.69 kg/hr in 1972-'74 and increasingly 94.0t at 10.86 kg/hr in 1986-'88. The distribution of the species was very much restricted to deeper grounds as about 99% was landed by the fish trawls and formed a dominant proportion of 60.2% of prawns as against 1.5% from shrimp-trawls. The fishery season was was limited to warmer period extending from April to September with a very sharp peak of abundance around August in 1986-'87 but presented a protracted spell (May-July) in 1987-'88. The catches were distinctly poor during the wet season, October-February.

M. stridulans

It was another species landed in larger quantities during 1986-'88. From an average annual landings of 2.62t at 0.05 kg/hr supporting 1.25% of prawns in 1972-'74, it increased to 68.4t at 0.71 kg/hr to share 13.5% in 1986-'88. Fish-trawls landed about 99% of the species and of the total prawns landed by fish-trawls and shrimp-trawls the species formed 19.0 and 0.5%, respectively. The fishery occurred during the warmer period, March-August with the peak abundance around August in 1972-'74, but advanced to May-June in 1986-'88, the maximum monthly catches being 41.2t recorded in June, 1987.

***Trachypenaeus* spp.**

These included mainly *T.curvirostris* and to a small extent, *T.pescadoreensis* and *T.sedili*, which appeared in good quantities during 1986-'88. The average annual landings of these species were 2.0t at 0.03 kg/hr forming 1.0% in 1972-'74 which increased to 25.0t at 0.28 kg/hr to 5.0% in 1986-'88. Fish-trawls accounted for 97.0% of their catch and these species contributed 6.8 and 0.5% of prawns landed by fish-trawls and shrimp-trawls, respectively. The fishery was very poor or not present for several months particularly during the peak monsoon and the maximum monthly landings of them were 1.21t at a CPUE of 0.24 kg/hr in 1972-'74 and 14.98t at a CPUE of 1.67 kg/hr in 1986-'88. The fishery showed two annual peaks of abundance around August-September and February-March in 1972-'74 and shifted to July-August and December in 1986-'88.

P. maxillipedo

It was another species which improved in catches during 1986-'88. The average annual landings of it were 1.5t at 0.03 kg/hr forming about 0.5% of prawns in 1972-'74 and recorded considerable increase to 12.1t at 0.13 kg/hr supporting 2.4% of prawns in 1986-'88. The species showed relatively wider range of bathymetric distribution, as about 70 and 30% of its catches were brought by shrimp-trawls and fish-trawls respectively. It represented 5.6% of the prawns landed by shrimp-trawls, as against 1.0% by fish trawls and showed more abundance during wet season. The maximum monthly landings were 0.35t in 1972-'74 and 7.2t in 1986-'88.

Other species

Important among those species forming minor fishery were *P.stylifera*, which had the

average annual catch of 7.5t at 0.12 kg/hr forming 3.5% of prawns in 1972-'74 and declined to 1.1t at 0.01 kg/hr in 1986-'88. It was landed mostly by shrimp-trawls and the fishery was seasonal being more restricted to the wet periods, September-February. *P.coramandalica* was another shallow water form, which appeared in sporadic spells mostly around the post-monsoon, January-February. The annual catch of it was 10.2t at 0.19 kg/hr forming 4.7% of prawns in 1972-'74 and decreased to negligible quantities in 1986-'88. The kuruma prawn, *P.japonicus* was caught in small concentrations around 2.0t annually mostly by fish-trawls from deeper margins. The fishery season of this species, which coincided with other two grooved prawns, *P.canaliculatus* and *P.latisulcatus*, extended from April to October and virtually disappeared from the scene during November-March. *M.afinis*, *M.moyebi*, *M.lysinassa*, *S.crassicornis* and *P.acclivirostris* occurred occasionally and other species were mostly seen only in traces.

Remarks

Data for two intermittent spells, 1972-'74 and 1986-'88, indicated the existence of productive prawn fishing grounds off Cuddalore with drastic changes in the abundance and composition of the fishery over the years. As a result of extension of fishing towards deeper areas, the abundance of the leading shallow water species, *P.indicus* and *M.dobsoni*, of 1972-'74 had been surpassed later in 1986-'88 by deeper forms such as *M.mogiensis*, *M.stridulans* and *Trachypenaeus* spp., although the former species, along with *P.semisulcatus* and *P.monodon*, still maintained the remunerative importance.

The salient feature of fishery of the region has been the multiplicity of species many of which being more remunerative. The combination of *P.indicus* and *M.dobsoni* in dominant state and the moderate catches of *M.monoceros* and *P.semisulcatus*, form the cream of commercial fishery. Towards north, similar pattern of species distribution and abundance appeared to extend into the southern margins of Andhra Pradesh coast, beyond which *M.monoceros* takes the prime position. While *M.dobsoni* contributes far less towards south, the different coastal conditions around Mandapam host a dissimilar set of species, among which, *P.semisulcatus* stands outstanding in abundance. The declining resources due to increasingly higher concentration of fishing in the shallow grounds, coupled with the technological improvements to the conventional shrimp-trawls resulted in the exploration of additional resources. The outcome was the introduction of fish-trawls capable of operations at more deeper waters optionally for fishes. Incidentally huge quantities of the species of *Metapenaeopsis* and *Trachypenaeus*, were caught as a compensation to the decline of the commercially important *P.indicus* in the shallow grounds. As an added advantage, the same trawler alternatively using both shrimp-trawl and fish-trawl-nets at different depth zones has resulted in the reduction of the increasing fishing pressure since they shared between the resources at either grounds. Further, the shallow water species were more abundant during the wet seasons, and the deeper forms over the warmer periods alternatively attracted concentration of fishing during the respective season in these bathymetric areas, leaving substantial time for the revival of populations which were subjected to heavy exploitation. It appears to support the general opinion that the regulation of mesh-size of fishing nets is generally not effective for penaeids because of their complex structure and appendages.