

Trawl Fishing of Penaeid Prawn in the Northern Mandapam Coast of Palk Bay

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Abstract: Total landings of penaeid prawns due to trawling at northern Mandapam coast during January to December 2008 was 2347.61 tonnes. Prawns were landed through out the year with a peak season during August to September. The catches were composed of *Penaeus indicus*, *P. japonicus*, *Metapenaeopsis stridulans*, *P. semisulcatus* and *P. monodon*. The prawn fishery was dominated by *P.indicus* (1355.51 t) followed by *P. japonicus* (629.318 t), *M. stridulans* (217.457 t), *P. semisulcatus* (78.885 t) and *P. monodon* (66.44 t). Along with the prawns 14,549.573 tonnes of fishes were landed as by catches. Among this 13,927.9 tonnes were commercial fishes and 620.673 tonnes were non commercial trash fishes. commercial fishes includes *Leiognathus* sp., *Upeneus* sp., *Lutjanus* sp., *Mugil cephalus*, *Plotosus lineatus*, *Scarus* sp., *Siganus* sp., *Epinephalus* sp., *Carangoids* sp., *Sepia* sp. and *Pelagicus* sp. etc. and non commercial fishes includes *Congresox* sp., *Channa punctata*, *Tetrodon* sp., *Canthigaster* sp., *Eetroplus* sp., *Lactoria* sp., *Narcine timlei*, *Chaetodon* sp. and *Saurida tumbil*. Demolishing of prawn population is going on due to over fishing by trawl nets and also the commercial and non commercial fishes also being destroyed by this trawl fishing.

Key words: Prawn fishery % Commercial fishery % Non commercial fishery % Trawler

INTRODUCTION

The effort of trawl fishing was developed in the beginning of twentieth century in Palk Bay along the southeast coast of India [1, 2]. The prawn resources usually found in the depth of less than 30 to 40 meters are intensively fished and may be nearing to maximum exploitation. The small demersal fishes mainly silver bellies are fished as by-catches in prawn trawlers and also heavily exploited in some areas, while the stocks of larger demersal species and small and large semi - pelagic and pelagic species within the same depth range are generally under - exploited. About 60% of the catch is taken by traditional craft and about 40% of the catch by 2,000 motorized boats of 9 to 10.5 m length. The traditional crafts are using fishing gears of various types and sizes such as gill nets, shore and boat seines, hand lines, long lines, etc. and fished large quantity of highly prized commercial fishes. Almost all motorized boats concentrate on prawn fishing and during the off- season of prawn fishery they deliberately exploit commercial fishes [3].

Exploitation of prawn resources by mechanized boats by trawling has been intensified in the beginning of seventies due to the increasing demand in the export market. Even among prawns, there has been greater

demand for larger varieties since they are having high price. This is prompting more and more entrepreneurs to go for different types of fishing for catching large sized prawns. Trawl fishing during night time was adapted by trawler owners for fishing large sized prawns [4]. The landings were fluctuated between 2,557 t and 7,218 t in 1980 and 1984. The fishing effort by trawling showed a steady increase during the five years period from 1980 to 1984 except in 1982. The Catch Per Unit Effort (CPUE) showed a steady increase from 100.74 kg to 137.93 kg in 1980 to 1982 and then declined to 133.23 kg in 1983 and further declined to 115.64 kg in 1984 [5]. In the present study landing data's of Penaeid prawns and commercial and non commercial fish catches by trawlers in Palk Bay were collected from northern Mandapam coast during January to December 2008.

Trawl fishing operations and fishing ground of Mandapam coast of Palk bay were reported earlier [6]. Small mechanized trawlers of 9.15 - 9.76 m fitted with 41- 88 HP engines are employed in the exploitation of penaeid prawns through out the year at the northern side of Mandapam coast. Shrimp trawl net is having cod end mesh size of 26 mm is generally operated by these vessels. Prawn fishing is carried out by over night fishing. Trawl boats cover the fishing grounds of Thondi on the

northwestern side of Mandapam and up to the EEZ border between India and Sri Lanka on the eastern side. Following local regulation the trawlers go for fishing to the north western and northern region on alternate days. The depth in the fishing ground varies between 7 to 13 m. Bottom of the fishing ground is flat and muddy favoring bottom trawling. Besides being shallow, the near shore zone of this region is characterized by luxuriant growth of sea grasses up to about 4 m depth and serves as nursery ground for juveniles of *Penaeus semisulcatus* [7]. The present work is aimed to quantify the different species of prawns, commercial fishes and non commercial fishes fished by trawl fishing.

MATERIALS AND METHODS

Data on catch and effort of Shrimp trawlers of northern Mandapam coast was collected regularly once in a week from January to December 2008. Data on effort and catch was collected during each observation day were

raised to total number of units landed on that day to obtain the total effort and catch of each observation day. The pooled totals of all observation day in a month were raised to total number of actual fishing days in that month to calculate monthly catch. Prawn samples were analyzed in the laboratory for species composition. From the day obtained on the observation days, the monthly estimates were computed based on the fish landing days of a month by enquiry from the crew and traders as well as from the records maintained at the fishing harbour. Finally data were statistically analysed by two way analysis.

RESULTS

The details of monthly catch, effort and species composition are given in Table 1. On an average 2347.61t of prawns were landed in northern Mandapam coast from January 2008 to December 2008. Among all months prawn landing was highest (378.5 t) in September followed by August (363.55 t).

Table 1: Penaeid prawn landings by trawlers at Mandapam

Months	Different species of prawns					Total
	<i>P. indicus</i>	<i>P. japonicus</i>	<i>M. stridulans</i>	<i>P. semisulcatus</i>	<i>P. monodon</i>	
January	187.95	92.23	33.52	10.85	9.95	334.5
February	127.535	55.65	17.46	6.66	5.895	213.2
March	109.95	47.54	12.95	2.335	0.975	173.75
April	10.95	6.465	3.35	1.23	0.655	22.65
May	0	0	0	0	0	0
June	45.655	27.455	6.875	3.495	2.995	86.475
July	194.575	88.56	39.78	12.64	10.965	346.52
August	207.89	95.77	35.95	11.98	11.96	363.55
September	219.86	107.60	24.535	15.655	10.85	378.5
October	178.40	85.67	32.50	9.65	8.345	314.565
November	35.985	11.42	5.615	2.43	1.975	57.425
December	36.76	10.958	4.922	1.96	1.875	56.475

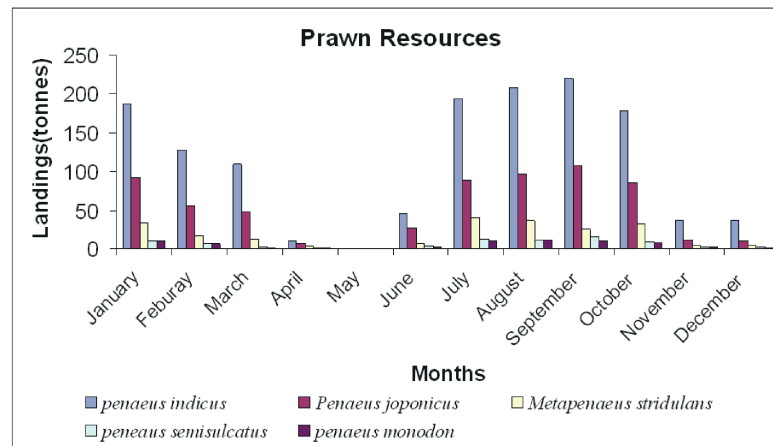


Fig. 1: Landings of prawn species by trawlers at Mandapam coast

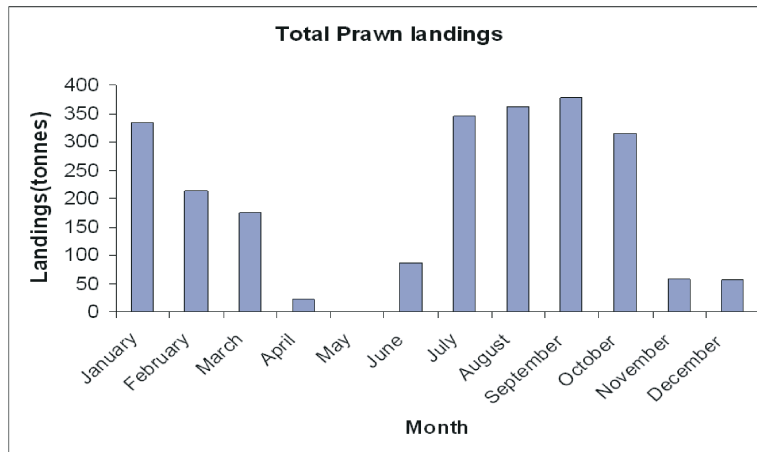


Fig. 2: Annual prawn landings at Mandapam coast

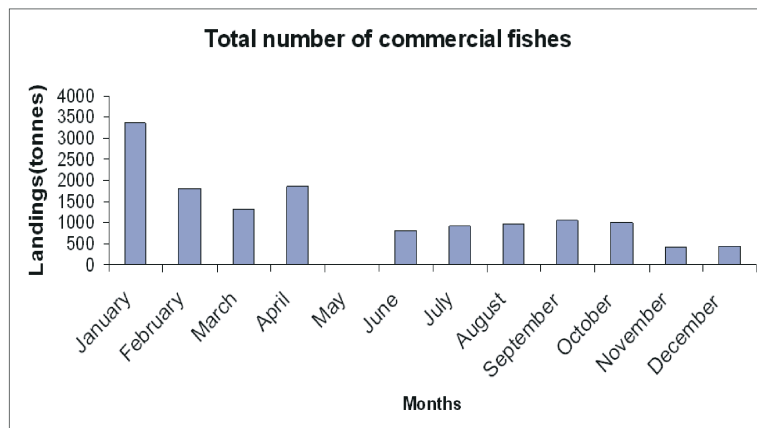


Fig. 3: Annual by catch of Commercial fishes in trawlers

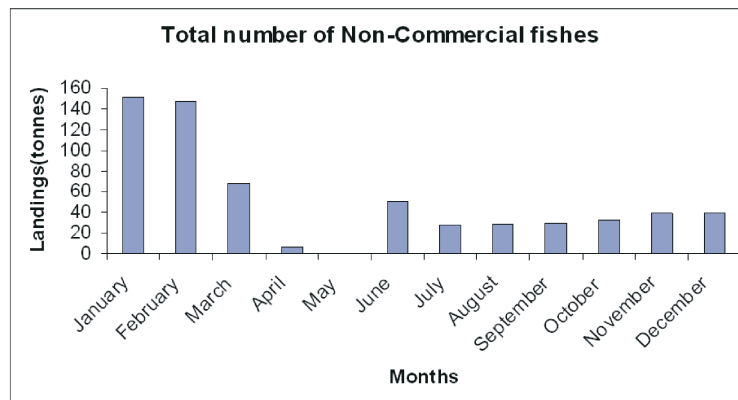


Fig. 4: Annual by catch of non commercial fishes in trawlers

Different species of prawns and their quantity landed due to trawl fishing is graphically represented in Fig. 1. Five species of prawns such as *Penaeus indicus*, *Penaeus japonicus*, *Metapenaeopsis stridulans*, *Penaeus semisulcatus* and *Penaeus monodon* were noted among the prawn catch. Among this five species *Penaeus indicus* (1355.51 t) was dominated and it was

followed by *Penaeus japonicus* (629.318 t), *Metapenaeopsis stridulans* (217.457 t), *Penaeus semisulcatus* (78.885 t) and *Penaeus monodon* (66.44 t). The annual prawn catch are shown in Fig. 2. The result clearly shows that prawn catches were high in January and July to November. Very low catches were noted in April, November and December months. Due to the

Table 2: Two-way ANOVA analysis of landing of seafoods in different months

Prawn landings	SS	df	F	P-value	Remarks
Between prawns catch	47439.39	11	3.802392	0.000716	p<0.05
Between months	99093.22	4	21.8421	5.54E-10	p<0.05
Total	196437.4	59			
Fish landings of commercial seafood's					
Between fish catch	2054218	29	16.37639	3.06E-47	p<0.05
Between months	280101.5	11	5.886981	1.02E-08	p<0.05
Total	3714134	359			
Landings of non-commercial seafood's					
Between fish catch	11901.53	13	15.71193	1.12E-21	p<0.05
Between months	1883.785	11	2.93906	0.001561	p<0.05
Total	22117.64	167			

government ban on trawl fishing for 45 days during April 15th and May 30th as a part of conservation of fishery resources the catch was very low in April and no catch was recorded in the month of May.

By Catches: All the mechanized boats doing trawling for catching prawns, but they incidentally catch lot of commercially important and non commercial fin and shell fishes as by catches. The total number and quantity of commercially important fishes are shown in Fig. 3. The commercially important shell fishes include crabs, cephalopods, gastropods and lobsters. The fin fishes were mainly dominated by Silver bellies, cat fish, Elasmobranchs, Hilsa keeli and Sardine. Commercially more important and highly prized fishes like seer fish, pomfrets, belonoids, Goat fishes, Lobster and barracuda landed in small quantities. Crabs and Cephalopods were landed in considerable quantities. Total of 13,927.898 tonnes of commercial fishes were landed and this includes *Leiognathus* sp., *Upeneus* sp., *Lutjanus* sp., *Mugil cephalus*, *Plotosus lineatus*, *Scarus* sp., *Siganus* sp., *Epinephalus* sp., *Carangoids* sp., *Sepia* sp., *Sardinella* sp. and *Pelagicus* sp., etc. Among these *Leiognathus* sp., was dominant (5092.408 t) followed by *Sardinella* sp., (1257.690 t). Fish catch was high in January and low during November and December months.

Non Commercial Fishery Resources: Total of 620.673 tonnes of non commercial fishes or trash fishes were landed and it is shown in Fig. 4. Trash fish catch includes *Congresox* sp., *Channa punctata*, *Tetradon* sp., *Canthigaster* sp., *Etroplus* sp., *Lactoria* sp., *Narcine timlei*, *Chaetodon* sp. and *Saurida tumbil*. The catch was dominated by juvenile fishes (404.695 t) and small sardine (45.368 t).

The landing data of prawns, commercial and non commercial seafood's between months are statistically analysed by Two-way ANOVA and the results are presented in Table 2. The results reveals that the landings of prawns, commercial and non commercial fishes between months are statistically significant (p<0.05).

DISCUSSION

Shrimp fishing nets usually fish shrimps and other seafood's as by catches and are discarded. Total global discard from shrimp fisheries alone was estimated and reported as 6.7 million [8]. The quantity of fisheries by-catch and discards in various oceans and seas around the world was reported as 27 million tonnes from 1980 and early 1990s and this is more than the half of the fishes fished for human consumption [9]. Subsequently the food and agricultural organization estimated 20 millions tonnes [10]. FAO estimated the discard during 1992 -2002 and reported that 8% of the total catch is being discarded [11]. Trawl fishing is having direct and indirect impacts on the marine ecosystem as well as on biodiversity, as this method of fishing collects and kills huge amount of non target species and young ones of commercially valuable species and mechanically disturb the sea bottom and causes injures to a wide variety of marine benthic creatures. The indirect effects of fishing are less obvious are important in defining the structure of marine benthic communities [12].

In general, the environmental effects of bottom trawling have been found to be more destructive in structurally complex rich marine habitats such as sea grass meadows, coral reef, sea mounts and deepwater areas subject to little natural disturbance [13, 14]. Depletion of polychaete fauna due to trawl fishing was

observed in Kerala coast, India [15]. Excessive trawling has also resulted in decline in the proportion of the larger size group of commercial species of shrimp in Indian coast. The trawl net, being an efficient but unselective fishing gear with a small cod end mesh size, captures numerous small sized species as well as juvenile of larger species, compared to any other fishing gear [16]. The increase in prawn landing in Kakinanda andhra Pradesh, during 1970s had been due to the gradual reduction of cod end mesh size of trawl nets; this ultimately results in the reduction of average size of prawns [17]. The quantity and quality of juveniles and sub adults in the by-catch depends upon the type of trawl net used. In the south Indian states, annually an average of 6200 tones of juveniles / young fishes landed by trawl nets [18]. In tropical waters trawl nets can catch over 400 species and the diversity of species discarded due to trawling in tropical waters would be considerably higher than that in the temperate waters [19]. The by-catch landings by trawlers in Karnataka, Kerala and Tamil Nadu during 1985 to 1990 was studied and reported 20 genera of fishes, 26 genera of crustaceans, 23 genera gastropods, 15 genera of bivalves, 10 genera of echinoderms, polychaetes, anemones, sponges, gorgonids, ascidians and echiuroids, besides a large number of juvenile fishes and cephalopods [20]. The impact of bottom trawling on the ecology of fishing grounds and living resources of the Palk Bay and the Gulf of Mannar have shown by ground fish, stomatopods, undersized prawns, gastropods, bivalves, inedible crabs, echinoderms, sea weed and sea grass [21].

The discards due to bottom trawlers in Kerala coast were represented by 103 species of fin fishes, 65 gastropods, 12 bivalves, 8 shrimps, 2 stomatopods, 12 crabs, 5 cephalopods, 3 echinoderms and 4 jelly fishes and the discards were represented mainly by epifaunal species and juveniles of commercially valuable species [19]. In India, the total catch is deposited in the deck of the trawler after each haul is stored and economically valuable species such as shrimps, lobsters, large crabs, large cuttle fishes, edible fishes and gastropods [22]. In large trawlers performing 'stay-in fishing', the target species are stored in refrigerated fish holds and non-targeted species are thrown back to the sea and the lost days by-catches are brought to the shore and used as animal feed. Larger economically valuable fish and shell fish in the by-catches were marketed fresh. Smaller sized fishes of larger species present in abundance (soles, Lactarius, Lizard fishes, Anchovies, Carangids,

Sardines, Mackerels, etc.) are salted and sun-dried. Major quantity of the sun-dried specimens is used for local consumption, while some quantities are exported [23].

In Palk Bay prawn catches are dominant by *M. affinis* followed by *P. semisulcatus*. Recent report suggested that *P. semisulcatus* was dominant species followed by *M. stridulans* and May to august was the peak season for prawn fishery in Palk Bay of Mandapam coast and Prawn fishery was declined during 1986 -1993 [24]. In the present study results reveals that *P. indicus* was dominant species followed by *P. japonicus* and August to September was the peak season for prawn fishery in Palk Bay of Mandapam coast. Also prawn fishery is being demolishing in Palk Bay of Mandapam coast due to over fishing by more number of boats along with the by - catches of commercial and non commercial fishes.

Larger economically valuable fin and shell fishes in the by-catches are marketed as fresh ones. Smaller varieties or larger species present in abundance (soles, Lactarius, Lizard fishes, Anchovies, Carangids, Sardines, Mackerels, etc.) are either sun-dried or salted and sun dried. Major quantity of the sun-dried specimens is used for local consumption, while some quantity is exported.

CONCLUSION

Most of the developing countries the focus is only on food production and on the economic growth rather than on the conservation of biodiversity. Therefore, there is a need to explore the economic value and other practical benefits of conservation of diversity. Participation of the local people in the conservation of biodiversity is the need of hour so awareness creation is essential among the inhabitants about the need of the sustainable use of biodiversity and suitable fishing of prawn to protect prawn and commercial and non commercial fishes.

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