Current Status of Crab Fishery in the Artisanal Sector along Gulf of Mannar and Palk bay Coasts

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Introduction

Among the exploited crustacean fishery resources, portunid crabs constitute a significant proportion in the landings along both the east and west coasts of India. From 4% in 1966 the composition of crabs gradually increased and reached 12% in 2006 showing an upward trend from year to year (Rao *et al.*, 1973; Manissery and Radhakrishnan, 2003). This steady increase in the landings of crabs is mainly attributed to the intensification of fishing operation using different types of modern gears and also due to the exploration of new fishing grounds in deeper waters targeting crabs in order to meet the ever increasing demand for the processed crab meats in the domestic as well as in the international markets. Along the coasts of the Gulf of Mannar and the Palk bay, crab resources are exploited mainly by four different types of gears *viz.* trawl net in the mechanized sector and bottom-set gillnet, shore seines and "thallumadi" in the artisanal sector. Although, fishing activities in the artisanal sector by bottom-set gillnets are being carried out from many fishing villages along both the Gulf of Mannar and the Palk bay coasts only one centre each in the Gulf of Mannar and the Palk bay was selected for detailed observations on various aspects of the fishery. Some aspects of the fishery and population characteristics of the swimming crab, *Portunus pelagicus* from the Gulf of Mannar and Palk bay have been studied earlier by Ameer Hamsa (1978), Rajamani and Manickaraja (1997; 2007) and Josileen and Menon (2007). The present paper gives an account of the crab fishery at Vedalai in the Gulf of Mannar and Thirupalaikudi in the Palk bay based on the work done in 2007 and 2008. The current status of the crab fishery in the artisanal sector along the coasts of Gulf of Mannar and Palk bay and the prospects and problems in the fishery are discussed in this paper.

Materials and Methods

Observations were normally made once in a week on the crab catches landed at Vedalai fishing village in the Gulf of Mannar and once in a fortnight at Thirupalaikudi in the Palk bay and data on various aspects of the fishery were collected. Vedalai is a small fishing village and the fishermen colony is located very close to the shore. Thirupalaikudi, on the other hand, is a small town on the Palk bay coast and the fishermen houses are located a little away from the shore. Along both the coasts fishing by bottom-set gillnets is one of the major activities and the fishermen to a very great extent sustain their livelihood from the income they get from the sales of crabs. The crafts used for the fishery were plank-built boats with in-board motors and the gear used was bottom-set gillnets with a mesh size of 85-90 mm at both the centres. The fishing operation was carried out mostly in the inshore waters at a depth range of about 5 metres. On each observation day about 10 to 20% of the units were observed depending upon the number of units operated and from this the total catch of crabs landed on the observation day was estimated which was later raised to monthly landing. The composition of different species of crabs landed were also recorded in the landing centre itself. As the swimming crab *Portunus pelagicus* was the dominant species in the fishery, samples of this species were taken on each observation day for biological studies, which was carried out mostly in the landing centre itself. The biological data on the size of the crabs landed (carapace width), weight, sex and occurrence of ovigerous females of the dominant species, *P. pelagicus* were recorded on each sampling day. For size-frequency analysis (carapace width) the crabs were grouped into 5 mm size intervals.

Results and Discussion

Both at Vedalai and Thirupalaikudi, crab fishing by bottom-set gillnets was carried out round the year. The annual estimated landing ranged from 27.1 t to 31.0 t and from 56.7 t to 98.1 t at Vedalai and Thirupalaikudi respectively. The catch per unit effort was found to be more or less at the same level at both the centres (Table 1). At Vedalai the catch per unit effort was 5.3 kg.unit^{-1} during both the years whereas at Thirupalaikudi the catch rate declined to 4.9 kg.unit^{-1} in 2008 as against 5.5 kg.unit^{-1} recorded in the previous year. During 2007 the peak landing was observed in February and March at both the centres. However, such peak in the landing could not be recorded in the subsequent year.

Marked variations could be noticed in the crab fishery between Vedalai and Thirupalaikudi in three major aspects *viz.* (i) in the species diversity, (ii) in the size distributions and (iii) in the composition of ovigerous females.

Table 1: Effort, estimated catch and catch rate of crabs landed at Vedalai (Gulf of Mannar) and Thirupalaikudi (Palk bay), during 2007 and 2008

Months	2007			2008		
	No. of Units	Estimated Catch (kg)	Catch rate (kg.unit^{-1})	No. of Units	Estimated Catch (kg)	Catch rate (kg.unit^{-1})
Vedalai (Gulf of Mannar)						
January	388	1680	4.3	422	1205	2.9
February	607	7629	12.6	370	1664	4.5
March	462	3794	8.2	464	1777	3.8
April	508	2298	4.5	642	2783	4.5
May	412	2006	4.9	326	1125	3.4
June	374	1665	4.5	216	1567	7.3
July	533	3305	6.2	352	2965	8.4
August	555	2501	4.5	382	2364	6.2
September	579	1159	2.0	472	3066	6.5
October	588	2121	3.6	613	3814	6.2
November	650	2338	3.6	528	3021	5.7
December	176	500	2.8	286	1758	6.1
Total	5832	30996	5.3	5073	27109	5.3
Thirupalaikudi (Palk Bay)						
January	1625	12253	7.5	1032	1649	1.6
February	1944	14061	7.2	1012	5674	5.6
March	1688	13631	8.1	1020	5352	5.2
April	1938	12385	6.4	1075	4475	4.2
May	1553	10008	6.4	588	2530	4.3
June	336	915	2.7	1038	5001	4.8
July	1610	10259	6.4	850	4928	5.8
August	1339	6238	4.7	1274	4043	3.2
September	1534	6281	4.1	1063	5869	5.5
October	1840	4962	2.7	840	5370	6.4
November	1274	4479	3.5	805	5877	7.3
December	1050	2672	2.5	880	5896	6.7
Total	17731	98144	5.5	11477	56664	4.9

The crabs captured from the Palk bay was supported exclusively by *P. pelagicus*. But in the crabs captured from the Gulf of Mannar, five species of crabs namely, *P. pelagicus, P. sanguinolentus, Charybdis*

natator, C. feriata and *Scylla tranquebarica* were recorded (Fig. 1). However, throughout the period of observation the dominance of *P. pelagicus* was noticed with its monthly composition ranging from 95.3% to 100% and from 83.8% to 97.1% in 2007 and 2008 respectively with an overall composition of 95.3%. It may be mentioned here that *P. pelagicus* is widely distributed and is one of the most important fishery resources in many parts of the world supporting commercial fishery significantly (Chande and Mgaya, 2003). Interestingly, the rock crab *Charybdis natator* came second in the order of abundance constituting 2.1% of the total landings. *P. sanguinolentus,* which supports the fishery in a moderate magnitude next to *P. pelagicus* in the southern part of the Gulf of Mannar off Tharuvaikulam, formed only insignificant proportion of 1.8% in the crab catches in the northern part of the Gulf of Mannar off Vedalai (Rajamani and Manickaraja, 2007). *C. feriata* and *Scylla tranquibarica* formed insignificant proportions constituting less than 1% occurring in the landings only sporadically with total absence during certain months.

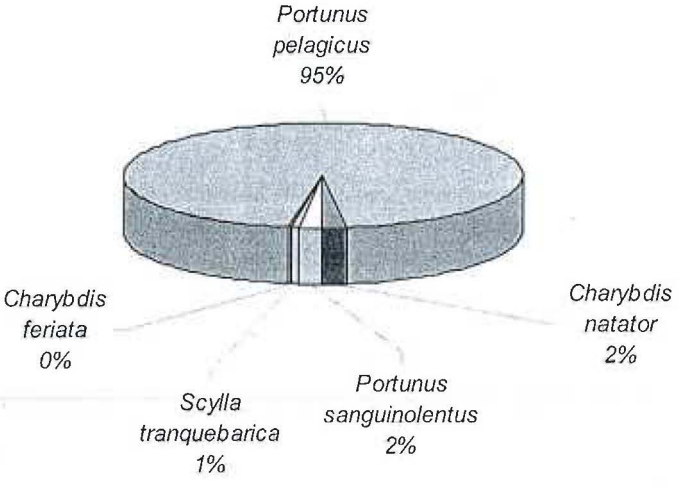

Fig.1. Species composition of crabs landed in Gulf of Mannar during 2007-2008

Next important variation noticed in the crab fishery between the two coasts was in the size distribution of the dominant species, *P. pelagicus*. During the two year period of observation, the size (carapace width) in the male *P. pelagicus* ranged from 78 to 173 mm and from 48 to 188 mm at Vedalai and Thirupalaikudi respectively. In females, the size ranged from 73 to 173 mm and from 48 to 188 mm at the two centres respectively. At Thirupalaikudi smaller sizes were recorded in significant proportions

in both the sexes as compared to the crabs landed at Vedalai. *P. pelagicus* normally attains full maturity when it reaches a size of 90 mm in carapace width. During the two year period of observation the minimum size of berried female recorded was 96 mm. Therefore, in the present investigation *P. pelagicus* measuring less than 100 mm was considered as under-sized and it was observed that such under-sized crabs constituted significant proportion in the landings at Thirupalaikudi. *P. pelagicus* measuring less than 100 mm in carapace width formed 9.3 and 19.1% in male and female at Thirupalaikudi in 2007 as against 6.8 and 12.4% recorded at Vedalai. The landing of under-sized crabs from the Palk bay was even higher in the subsequent year with a composition of 24.1% and 27.8% respectively for males and females as against only 3.0% and 5.5% recorded in *P. pelagicus* landed from the Gulf of Mannar (Fig. 2). According to Currie and Hooper (2006) the minimum legal size in Australian waters is 110 mm in carapace width which would have produced at least two batches of eggs. In order to conserve the resource of *P. pelagicus* in Indian waters also, such restriction should be followed.

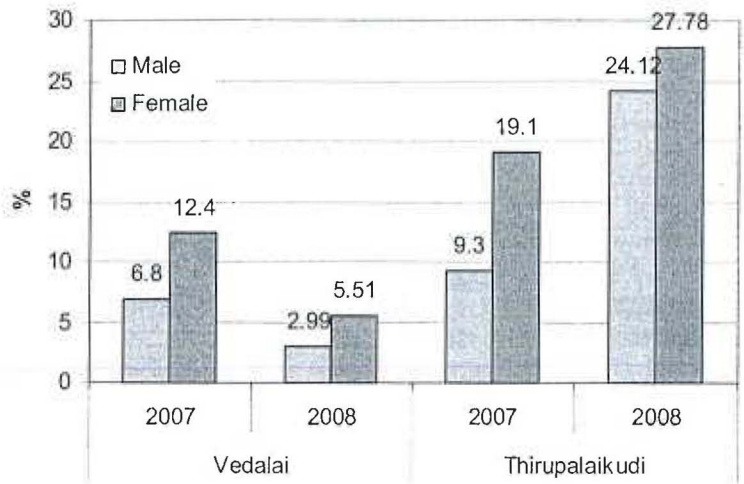

Fig. 2. The landings of under-sized male and female crabs in Vedalai and Thirupalaikudi, during 2007-2008

At both the centres females of *P. pelagicus* were found to dominate the landings with its average annual composition ranging from 59.3% to 62.1% and from 62.0% to 62.4% at Vedalai and Thirupalaikudi respectively (Fig. 3). Berried females were seldom recorded in the landings at Thirupalaikudi whereas at Vedalai berried females were recorded during all the months with maximum composition of 33.3% and 14.7% in March

in both the years of observation. During the preceding and succeeding months also the composition of berried females was high indicating that the peak breeding activities of *P. pelagicus* in the Gulf of Mannar extends from February to April every year (Fig. 4). Contrary to this, during the entire period of observation only five berried females were recorded at Thirupalaikudi out of 1325 females observed. The colour of the berry of all the five crabs were only yellow indicating the early developmental condition of the eggs. Josileen and Menon (2007), who has made a detailed study on the crab fishery resources of the Palk bay along the Mandapam coast during the years 1995-98 has also reported that berried females of *P. pelagicus* were seldom recorded in the landings of bottom-set gillnets. The berried *P. pelagicus* landed at Vedalai from the Gulf of Mannar were recorded in the size range of 96 to 175 mm with the composition exceeding 10% in the size group of 126 to 145 mm, the maximum being in the size group of 131-135 mm.

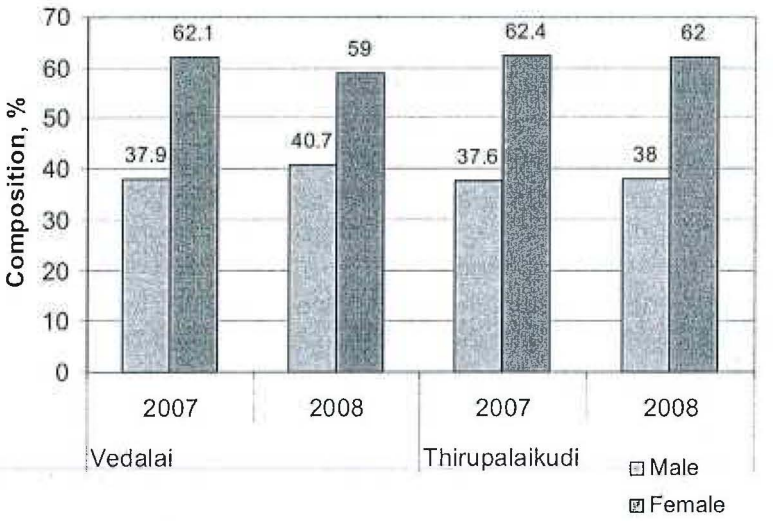

Fig. 3. Percentage of males and females of *Portunus pelagicus* caught in Vedalai and Thirupalaikudi, during 2007-2008

The landings of sizeable proportions of berried females at Vedalai, some in advanced stage of development of the eggs as could be noticed from the black colour of the berry during all the months is a matter of concern for the biologists from the point of view of management of this resource. As implementing a ban on the operation of the bottom-set gillnets in inshore waters by the Government will adversely affect the livelihood, the fishermen on their own should realise the importance of

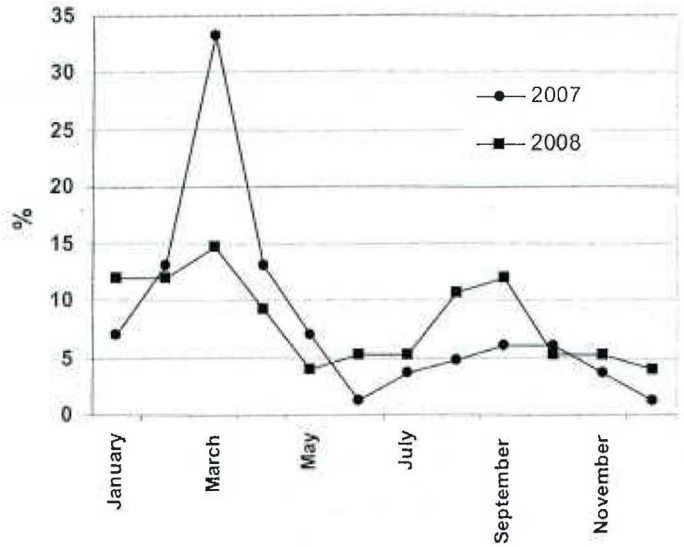

Fig. 4. Month-wise percentage of berried females in the landings of *Portunus pelagicus* at Vedalai, during 2007-2008

berried crabs and should come forward to return the berried females back into the sea. Such voluntary act on the part of the fishermen apart from sustaining the production of crabs in the sea will ensure good yield which will benefit the fishermen themselves in the long run. The importance of releasing the berried females back into the sea has earlier been emphasized by Josileen and Menon (2007) citing the management strategies adopted for the conservation of crab fishery resources in Australia.

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