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Crab Fishery Resources from Arukkattuthurai to Aiyammpattinam, South East Coast of India

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Abstract: The data on crab landings of our country is essential to know the contribution of crabs to the Indian economy, but there is no clear cut intimation on the landings of the crabs from Arukkattuthurai to Aiyammpattinam, south east coast of India. So in the present study, it is aimed to assess the fishery resources of the six landings from Arukkattuthurai to Aiyammpattinam for a period of one year (from September 2007 to August, 2008). There are about 12 commercially important crabs were reported in almost all the stations. The crab, *C. truncata* was less in Arukkattuthurai (301.6 kg), Pointcalimere (331.9 kg) and Aiyammpattinam (392.7 kg). However, *C. gladiator* was available less in Mallipattinam (318.9 kg) and Manamelkudi (354.5kg) and *C. lucifera* in Kattumavadi (333.7 kg). The total contribution of crabs (80,554.34 kg), males (38,542.55 kg), females (30,842.25 kg) and berried females (11,169.59 kg) are maximum in Mallipattinam than other stations. However, Kattumavadi centre standing final place in total male (23,718.27kg), female (17, 960.00 kg), berried female (6,015.296 kg) and total crabs (47, 693.492 kg) landed. The conservation measures for catching young, undersized and berried crabs should be done by educating the fishermen through audiovisual aids. Sea ranching should be promoted for over exploited species. And certain regulatory measures and laws should be enforced like, fixing legal minimum size and protection of ovigerous crabs. The law breakers should be fined or punished.

Key words: Crustaceans, *P.pelagicus, P. sanguinolentus, S. tranquebarica, S. serrata,* berried female and audio visually aids

INTRODUCTION

Among the marine crustaceans found along the Indian coasts, crabs rank third after shrimps and lobsters by virtue of importance as an esteemed seafood delicacy and also by the value of fishery they support (Savad and Raghavan, 2001). Due to their increasing demand as a favorite of epicurean gourmets, crabs have captured excellent markets in the developed countries. Of late there has been an increasing demand for live and whole cooked crabs in different Asian and continental markets which has resulted in indiscriminate fishing activity and hence most of the wild resources are under heavy exploitation now. The increased demand for the crabs in different markets and the depletion of resources along the coast has necessitated an urgent need for promoting crab culture in India. The data on the crab landings of India is indeed essential to make out the contribution of crabs to the Indian economy, but there is no clear cut information on the landing of the crabs from the coastal villages. The area from Arukkattuthurai to Aiyammpattinam coast is supplying a significant quantity of seafood for the state, yet there is no comprehensive information on crab catches from this region, as they are very much useful for the development of marketing, management, research, export and policy making. So in the present study, it is aimed to assess the crab fishery resources of the six landings from Arukkattuthurai to Aiyammpattinam, south east coast of India for a period of one year (from September 2007 to August, 2008).

MATERIALS AND METHODS

The crab fishery was recorded from six landing centers, *viz*., Arukkattuthurai, Pointcalimere, Mallipattinam, Kattumavadi, Manamelkudi and Aiyyampattinam. Data of catch and effort of crab landings were collected and recorded from six landing centers. The study was made from September 2007 to August 2008. In this study, weight in 5 grams accuracy was taken individually for males, females and berried females. For the purpose of crab catch estimation; the observation of crab landings and counting of baskets was taken into consideration. Landings of mud crabs have been estimated by personal interviews with the fishermen, since they are directly handed over to the agents of exporting the mud crabs and visiting crab markets and nearby landing centers. The availability of the berried crabs was also recorded from the total crabs landed during the study period. The methodology for the above study is carried out by following the method of (Jonh Samul *et al*., 2004)

RESULTS

Arukkattuthurai: Totally 12 commercially important crabs are recorded in Arukkattuthurai station. All the crab

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species recorded was belonging to the family Portunidae includes the genera *Scylla*, *Portunus*, *Charybdis* and *Podophthalmus*. *P.pelagicus* crabs were landed maximum in Arukkattuthurai landing centre followed by *S.tanquebarica* and *P. sanguinolentus.C. truncata* was available very minimum in this centre. The total crab landings are in the following order; *P. pelagicus* > *S. tranquebarica* > *P. sanguinolentus* > *S. serrata* > *C. feriata* > *C. granulata* > *C. natator* > *C. gladiator* > *C. lucifera* > *C. variegata* > *P. vigil* > *C. truncata*. Male, female and berried crabs are also followed similar trend. This centre standing third place in total male, female, berried female and total crab populations landed (Table 1-5).

Pointcalimere: The total crab landings in Pointcalimere are in the following pattern; *P. sanguinolentus* > *P.pelagicus* > *S. tranquebarica* > *S. Serrata* > *P. vigil* > *C. lucifera* >*C. gladiator* > *C. natator*> *C.variegata* > *C. feriata* > *C. granulata* > *C.truncata.* The total male, female and berried female landings are also followed similar trend. This centre is positioned fifth place for male, female, berried female and total crab populations (Table 1-5).

Mallipattinam: The total crab landings in Mallipattinam are in the following pattern; *P.pelagicus* > *S. tranquebarica* > *P. sanguinolentus* > *S. serrata* > *C. feriata* > *C. granulate* > *C. lucifera* > *C.truncata* > *C.variegata* > *P. vigil* > *C. natator* > *C. gladiator.* The total male, female and berried crabs are also followed similar trend. This centre standing second place in total male crabs landed. But in first place as far as female, berried female and total crabs landed (Table 1-5).

Kattumavadi: The total crab landings in Kattumavadi are in the following order; *P.pelagicus* > *S. tranquebarica* > *P. sanguinolentus* > *S. serrata* > *P. vigil* > *C.truncata* > *C. feriata* > *C. gladiator* > *C.variegata* > *C. granulata* > *C. natator* > *C. lucifera.* The total male, female and berried crab landings show that *P. pelagicus* recorded maximum followed by *S. tranquebarica* and *S. sanguinolentus* . This centre standing final place in total male, female, berried female and total crabs landed (Table 1-5).

Manamelgudi: The total crab landings in Manamelgudi are in the following pattern; *P.pelagicus* > *P. sanguinolentus* > *S. tranquebarica* > *S. serrata* > *C. natator* > *P. vigil* > *C. lucifera* > *C. feriata* > *C. granulata* > *C.variegata* > *C.truncata* > *C. gladiator*. The total male, female and berried crabs are also followed similar trend. This centre standing first place in total male crab landings. But second place in female, berried female and total crabs landed (Table 1-5).

Aiyyampattinam: The total landings in Aiyyampattinam are in the following pattern; *P. pelagicus* > *S. tranquebarica* > *P. sanguinolentus* > *S. serrata* > *C. variegata C. feriata* > *P. vigil* > *C. natator* > *C. gladiator* > *C. lucifera* > *C. granulate* > *C. truncata.* The total landings of male, female and berried crabs also followed similar trend. This center standing fourth place in total male, female, berried female and total crabs landed (Table 1-5).

DISCUSSION

In the crab fisheries, majority was contributed by the members of the family Portunidae in the Indian waters (Prasad and Thampi, 1952; Pillai and Nair, 1973; CMFRI, 1998, 2000). In India the best potentials of crab resources are seen in the coasts of Tamil Nadu, Kerala and Karnataka and to certain extend in Maharastra and Gujarat. Tamil Nadu tops the list in crab landing all over India and the coastal belt from Tuticorin to Mallipattinam has been proven as the strongest potential of edible sea crabs (Sanil Kumar, 2000). In the present study also the total contribution of crabs (80,554.34 kg), males (38,542.55kg), females (30,842.25 kg) and berried females (11,169.59 kg) are maximum in Mallipattinam than other stations.

Crab landings along the Parangipettai coast was reported by Radhakrishnan (1979) and John Samuel *et al.* (2004). They also recorded 12 commercially important crabs, *viz*., *S. serrata, S. tranquebarica, P. pelagicus, P. sanguinolentus, P. gladiator, P. vigil, C. feriata, C. natator, C. lucifera, C. variegata, C. granulata* and *C. truncata.* In the present study also the above mentioned 12 commercially important crabs were reported in almost all the stations. The total annual crab landings of the Parangipettai cost were 79,445.6 kg (John Samuel *et al.*, 2004). But the total crabs landed in the present study area are 3, 88,196.032 kg. The differences in the crab landings in the past two decades are due to many reasons, including development of improved fishing craft and gear, importance of crab meat in the national and international markets and changes in the environmental parameters etc. The crab meat is not only used for the human consumption but recently most of the crabs, especially *Charybdis* spp. are being fished as the source of fishmeal.

The *P. pelagicus* and *P. sanguinolentus* constituted around 71% of the total landings forming a major crab fishery along Parangipettai coast. However, in the present study two species *viz*., *P. pelagicus,* and *S. tranquebarica* are available throughout the study periods in almost all stations. This might be due to their continuous breeding activity and the fecundity up to 0.5–2 million eggs (Radhakrishnan, 1979). These two crabs are found in profuse quantities in the Tamil Nadu coast and the fishery is round the year (Sanil Kumar, 2000). Chhapgar (1962) also reported that *P. pelagicus* supports fishery throughout the year on both the coasts.

In the present study *P. vigil, P. gladiator, C. feriata, C. natator, C. lucifera, C. granulata, C. truncata* and *C. variegata* fishery is purely seasonal and contributes very less as far as total crab fishery is concerned. Radhakrishnan (1979) also observed similar trend in his study. Among total crabs reported in six landing centers, *C. truncata* was less in Arukkattuthurai (301.6kg),

Table 1: Total crabs (Kg) landed from different stations during September 2007 to August 2008

Crabs	Stations					
	I	II	III	IV	V	VI
S. serrata	3826.6	3437.8	6852.6	2920	6253.4	3408.5
S tranquebarica	18876.4	11092	18870.9	10314.6	13192.34	11523.2
P. pelagicus	27326.4	13588	29891.19	17575.86	33766	23313.6
P. sanguinolentus	16316.2	14277.2	16416.5	9223.8	15599.6	9846.8
P. gladiator	935	1184.6	8620.5	909.4	709	1063.8
P. vigil	851.8	1628.8	933.5	1205.466	1457	1439.467
C. feriata	1115.2	957.6	1293.5	1054.6	1189	1476.2
C. natator	976.4	962.4	876.1	757.8	1495	1398.6
C. lucifera	920.6	1214.2	1107	924.5	1204.534	1060.667
C. granulata	1054.6	835.6	1247.2	806.6	915.866	1004
C. truncata	3826.6	3437.8	6852.6	2920	6253.4	3408.5
C. variegata	18876.4	11092	18870.9	10314.6	13192.34	11523.2
Total	73,717.2	50,760.4	80,554.34	47,693.492	77,652.64	57,817.96

I- Arukkattuthurai , II- Pointcalimere, III- Mallipattinam, IV- Kattumavadi V- Manamelkudi, VI- Aiyyampattinam

Table 2: Total male crabs (Kg) landed from different stations during September 2007 to August 2008

Crabs	Stations					
	I	II	III	IV	V	VI
S. serrata,	1913.3	1718.9	3328	1460	3126.7	1704
S tranquebarica	9438.0	5546.0	9438.4	5157.3	6596.17	5761.6
P. pelagicus	13663.2	6794.0	14112.45	8787.93	16883	11656.8
P. sanguinolentus	8158.1	7138.6	8158.1	4611.9	7799.8	4923.4
P. gladiator	467.5	592.3	318.9	454.7	354.5	531.9
P. vigil	425.9	814.4	419.2	602.733	728.5	719.7
C. feriata	557.6	492.8	539.6	527.3	594.5	738.1
C. natator	488.2	481.2	336.9	378.9	747.5	699.3
C. lucifera	460.3	607.1	460.3	333.7	602.267	530.3
C. granulata	527.3	417.8	527.3	403.3	457.933	502
C. truncata	301.6	331.9	446.2	594	495.5	392.7
C. variegata	457.2	459.2	457.2	406.433	437.9	748.933
Total	36,858.6	25,394.2	38,542.55	23,718.196	38,824.27	28,908.733

I- Arukkattuthurai , II- Pointcalimere, III- Mallipattinam, IV- Kattumavadi, V- Manamelkudi, VI- Aiyyampattinam

Table 3: Total female crabs (Kg) landed from different stations during September 2007 to August 2008

Crabs	Stations					
	I	II	III	IV	V	VI
S. serrata	1913.3	1718.9	3328	1460	3126.7	1704
S tranquebarica	9438.0	5546.0	9438.4	5157.3	6596.17	5761.6
P. pelagicus	13663.2	6794.0	14112.45	8787.93	16883	11656.8
P. sanguinolentus	8158.1	7138.6	8158.1	4611.9	7799.8	4923.4
P. gladiator	467.5	592.3	318.9	454.7	354.5	531.9
P. vigil	425.9	814.4	419.2	602.733	728.5	719.7
C. feriata	557.6	492.8	539.6	527.3	594.5	738.1
C. natator	488.2	481.2	336.9	378.9	747.5	699.3
C. lucifera	460.3	607.1	460.3	333.7	602.267	530.3
C. granulata	527.3	417.8	527.3	403.3	457.933	502
C. truncata	301.6	331.9	446.2	594	495.5	392.7
C. variegata	457.2	459.2	457.2	406.433	437.9	748.933
Total3	6,858.6	25,394.2	38,542.55	23,718.196	38,824.27	28,908.733

I- Arukkattuthurai , II- Pointcalimere, III- Mallipattinam, IV- Kattumavadi, V-Manamelkudi, VI- Aiyyampattinam

Pointcalimere (331.9 kg) and Aiyammpattinam (392.7 kg). However, *C. gladiator* was available less in Mallipattinam (318.9 kg) and Manamelkudi (354.5kg) and *C. lucifera* in Kattumavadi (333.7kg).

The crabs, *P. pelagicus* and *S. tranquebarica* berried crabs are available all the months of the year. In general the total number of berried crabs is maximum in Mallipattinam (11,169.54kg) and minimum in Kattumavadi (6,015.296 kg) which is directly reflects the total number of crabs landed. Radhakrishnan (1979) reported that *P. pelagicus* breeds round the year with peak in premonsoon where as *P. sanguinolentus* had three distinct peaks during August, January and March along Parangipettai coast. Raffi (2003) recorded higher densities of portunid larvae throughout the year than other families in Parangipettai coast. Similar study is not conducted in the landing centres of the present study. But this supports the present study that all the portunid crabs, especially *Portunus* spp. breeds round the year. The larval and juvenile abundance was at maximum level during late post monsoon and summer, and minimum during December in the Vellar estuary (Sethuramalingam, 1983; Raffi, 2003). Pillai and Nair (1971) were recorded the peak seasons of berried crabs *S. serrata* (January), *P. sanguinolentus* (November to March) and *C. feriata* (April to July) in southwest coast. In the Calicut

Table 4: Total berried crabs (Kg) landed from different stations during September 2007 to August 2008.

Crabs	Stations					
	I	II	III	IV	V	VI
S. serrata	478.1	429.3	760.55	364.7	781.4	425.9
S tranquebarica	2359.3	1386.2	4182.1	1288.9	1649.02	1440.25
P. pelagicus	3415.4	1698.2	2729.04	2196.53	4220.4	2914.2
P. sanguinolentus	2039.3	1784.3	2278.4	1152.5	1949.85	1230.7
P. gladiator	116.5	147.8	164	113.4	88.6	132.9
P. vigil	106.2	203.3	131.6	150.433	181.75	180.017
C. feriata	139.2	115.8	188.25	131.5	148.2	184.6
C. natator	121.7	120.1	133.8	94.4	186.55	174.8
C. lucifera	114.9	151.6	127.95	172.7	150.317	132.617
C. granulata	131.5	104	228.95	100.5	114.233	125.5
C. truncata	75.1	82.7	159.4	148.3	123.5	98.233
C. variegata	113.9	114.5	85.5	101.433	110.3	187.183
Total	9,211.1	6,337.8	11,169.54	60,15.296	9,703.82	7,226.717

I- Arukkattuthurai , II- Pointcalimere, III- Mallipattinam, IV- Kattumavadi V- Manamelkudi, VI- Aiyyampattinam

Table 5: Total (Kg) male, female, berried female crabs landed from different stations during September 2007 to August 2008

Stations	Male	Female	Berried	Total
Arukkattuthurai	36858.6	27647.5	9211.1	73717.2
Pointcalimere	25394.2	19028.4	6337.8	50760.4
Mallipattinam	38542.55	30842.25	11169.54	80554.34
Kattumavadi	23718.196	17960.00	6015.296	47693.492
Manamelkudi	38824.27	29124.55	9703.82	77652.64
Aiyyampattinam	28908.733	21682.51	7226.717	57817.96
Total	1,92,246.549	1,46,285.21	49,664.273	3,88,196.032

coast, Saradha (1998) recorded berried crabs of *P. anguinolentus* from December to May and July to August. Prasad and Thampi (1952) recorded *P. pelagicus* as a continuous breeder with maximum intensity during September – March near Mandapam on southeast coast of India. Ameerhamsa (1978) reported the occurrence of berried females of *P. pelagicus* throughout the year with pronounced abundance from January to March and September to December in Palk Bay and Gulf of Mannar. Joel and Raj (1982) estimated the preponderance of berried *S. serrata* and *P. pelagicus* during post monsoon and in the months from August to October. Rajamani and Manickaraja (1998) along Tuticorin Bay observed that the maximum breeding activity in *P. pelagicus* during June followed by a gradual decrease in consecutive months and maximum in December. The changes in the seasons of berried crab availability in two coasts might be due to different monsoonal periods, current patterns and environmental parameters. The peak breeding seasons also depends on the wave action and the turbidity of the surrounding waters.

The mud crab is now being treated as a delicacy both in India as well as in foreign countries. The live mud crabs are exported to Singapore and Malaysia daily (Fatima, 1990). The chelipeds of each crab is tied to avoid fighting themselves and the live bigger animals are packed in plastic baskets for export and sent to Chennai from there to Singapore and Malaysia. The market value for crabs weighing more than 850 g costs Rs. 350/kg. Apart from this a nation-based company is exporting nearly 500kgs of *P. pelagicus* and *P. sanguinolentus* daily. In this the large sized crabs (>100 g) were boiled and transported to Tuticorin, from there the processed frozen meat is being exported. The demand has been increasing for live and whole cooked crabs in different Asian and continental markets which has resulted in indiscriminate fishing activity and hence most of the wild resources are under heavy exploitation now (Savad and Raghavan, 2001). Hence conservation measures should be made to avoid over exploitation of these commercial Portunid species.

The coast from Arukkattuthurai to Aiyammpattinam supports a major crab fishery along southeast coast of India. The increased demand for crabs in different markets and the depletion of resources along the coast has necessitated an urgent need for promoting conservation and management. The possible conservative measures to increase the crab landings and to make it available throughout the year are given as follows;

The large-scale destruction of young crabs would obviously have adverse effect on the crab resources; therefore a specific size (For example, *Scylla* spp. is 140 mm of carapace width) for harvest is to be fixed. The fishing areas should be closed or the fishing effort should be minimized for certain period of time or seasonal banning of the shipment of crabs should be done. The conservation measures for catching young, undersized and berried crabs should be done by educating the fishermen through audiovisual aids. Sea ranching should be promoted for over exploited species. And certain regulatory measures and laws should be enforced like, fixing legal minimum size (across the broadest part of carapace) and protection of ovigerous crabs. The law breakers should be fined or punished.

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