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Full Length Research Paper

Exploitation of marine swimming crabs as by-catch in artisanal fishery of the Bay of Bengal

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The study was conducted during March 2011 to August 2011 in the east southern coastal area of Bangladesh marine territory to record landing trends, percentage composition and exploitation practice of marine swimming crabs from Shahparir dwip, Teknaf sadar, Shamlapur, BFDC fish harbour and Moheskhalia fish landing centers at Cox's Bazaar district. In this study three swimming crab species were recorded under the family Portunidae, such as- Blue swimming crab- *Portunus pelagicus* (Linnaeus, 1758), Three spot swimming crab- *Portunus sanguinolentus* (Herbst, 1783) are abundantly available and Cross crab- *Charybdis feriatus* (Linnaeus, 1758) is found incidentally in the artisanal fishing. A total 74.650 MT of swimming crabs species were landed different select landing centers which exploited from the Elephant point area (in the Bay of Bengal) at Cox's Bazaar district. In the total catch, highest landing amount was recorded 23.480 MT (31.45%) at BFDC fish harbour and lowest was 8.520 MT (11.41%) at Shaparir dwip landing center. The highest landing of catch per boat per day (CPUE) was 1.81 kg in Teknaf sadar landing center in May, 11 and the lowest CPUE was 0.18 kg in August, 11 at Shahparir dwip. Lower grade of male crabs were 30-80 gm in weight and female crabs were 40-90 gm constituted 18.0% and 24.0% respectively in total exploitation.

Keywords: Landing centers, Marine swimming crabs, exploitation practice, landing trends, percentage composition and Elephant point area.

INTRODUCTION

Bangladesh is situated at the northern end of the Bay of Bengal. It is also rich in biological diversity. Among the marine resources by which earning foreign exchange, crab is one of them. Crab fisheries are the fisheries which captured or farming for commercial purpose. With proper attention the exploiting of swimming crab could play an important role in enhancing protein supply, foreign exchange earnings and internal trade development. But

above all, could help to create employment opportunities for the unemployed and underemployed peoples in this coastal area. It would support five to six month of the year round seasonal local fishery at Shahparir dwip, Teknaf sadar, Shamlapur, BFDC fish harbour and Moheskhalia in Cox's Bazaar district. The exploitation of crabs is a new alternative livelihood and have great prospect in Bangladesh.

The population density of swimming crab in the intertidal zones of the estuarine and coastal water swamps of Cox's Bazaar appears to be relatively much higher than that of Khulna, Satkhira, Barisal and Bagerhat coastal district.

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These swimming crabs occur throughout the coastal areas of Cox's Bazaar district but dominantly capture in the Elephant point areas. Main exploitation periods of swimming crabs are March to August, but peak season is May to July, three spot and blue swimming crabs found all the month of the year but it is very little amounts.

The local name of blue swimming crab and three spot swimming crab are "Zaji kakra" and "Tin poilla" respectively. It is captured mainly as by-catch with the Jew or croaker fish, which are exploits Jew fish or croaker fish catch nets and some are fished incidentally by trawl fishing and marine set bag net also; but unreported for its small amounts. Crab fishery has not yet been established in Bangladesh. Bhuiyan and Das (1976) made a taxonomic investigation and reported 15 species of crab from the intertidal zone. There are 15 species of crab available in Bangladesh, among them 04 species inhabit fresh waters, while the remaining 11 species inhabit marine waters (Ahmed, 1991). Mahmood (1977) reported 16 crab species of our coast. Among the identified 16 species, it is reported that only mud crab (*Scylla serrata*) and swimming crab (*Neptunus Pelagicus*) are consumed in Bangladesh (Islam, 1977). Mollah (2012) recorded 22 species of crab to major bed areas of Cox's Bazaar (coastal areas); out of which 13 species found in the mud flat area and the rest 9 species were in rocky and sandy areas.

Bangladesh started crab export in 1977-78 and became a stable business in 1982 and ranked third among frozen foods that were exported for earning foreign currency from Bangladesh (Ali, 1986).

As exportable items, four species of edible crabs were *Scylla serrata*, *S. olivacea*, *Portunus pelagicus* and *P. sanguinolentus* which were sought for harvesting, while some other non-traditional species were caught that were sun dried, and used as a raw material in shrimp and poultry feed industries (Mollah, 2012).

In 2008 total commercial crab production was 1,319,953 tons in the world (FAO, 2008). In the year 2009-2010 total crab production of Bangladesh was 7707.70 MT which is less than 1.0% of the world crab production. Among our total crab production total exported quantity was 6347.70 MT (81.61%), total earnings of foreign currency were 375.88 crore taka (48.19 million US dollars) and exporting countries are China, Japan, Korea and Taiwan (Monthly Fisheries and Livestock Berta, 2011). Mainly three crab species (mud crabs, three spot crabs and blue swimming crabs) are exported from Bangladesh. Among them blue swimming crabs are costly and high demand in the international market for its sweet meat and high quality food value.

From March, 2011 to August, 2011, in the study period total 74.650 Metric Tons (MT) of swimming crab species were recorded. Among the crab species- blue swimming crabs, three spot swimming crabs are abundantly available and cross crabs found incidentally in the Bay of Bengal of

Bangladesh region. In the total catch more than 80% were blue swimming crabs.

Most of the harvested crabs usually transported from Cox's Bazaar to Dhaka to get foreign market and others are usually used to make fish meal, poultry meal etc (Mithun, 2010).

MATERIALS AND METHODS

The main five landing centers are Shahparir dwip, Teknaf sadar, Shamlapur, BFDC fish harbour and Moheskhalia at Cox's Bazaar district in order to cover a wide range of the most marine swimming crab species landing, retail and whole sale marketing from the Bay of Bengal. Totally more than 500-600 numbers of boats were engaged for marine swimming crab harvesting. These artisanal fishing boats are typically 8.0-9.0 meters long, width 2.13 to 2.50 m, having engine horse power (hp) ranges from 20 hp -22 hp, the numbers of fishermen were 6-7, active fishing days per month were 25-27 and trip duration per day was twice.

The most common type of commercial fishing gear for swimming crab species is Jew fish or croaker fish catching net which is monofilament modified small mesh drift gill net (SMD). The total length is about 3000-4000 meters (m), depth from 2.75-3.57 m. and mesh size of 5.0-5.2 centimeters (cm). Another type of crab fishing gear is **crab pot**, which is a rectangular bamboo made trap with two entrance and height is 60 cm and width 40 cm, it is used in bottom and fixed with a rope. This crab pot is used as a gear less than 5% fishermen. And sometimes are caught incidentally by the marine set bag nets and trawl nets also. Data collection sampling was conducted by the Marine Fisheries Survey Management Unit, Chittagong from March, 2011 to August, 2011. Collected data were processed and analyzed using Microsoft Excel.

RESULT

A total of three species of Marine swimming crab were recorded in the study period. Among them the most common 02 species are Blue swimming crab - *Potunus pelagicus* (Linnaeus, 1758) and Three spot swimming crab- *Portunus sanguinolentus* (Herbst, 1783). And Cross crab- *Charybdis feriatus* (Linnaeus, 1758) found incidentally in our marine fleets of Cox's Bazaar district in artisanal fishery (Figure: 3)

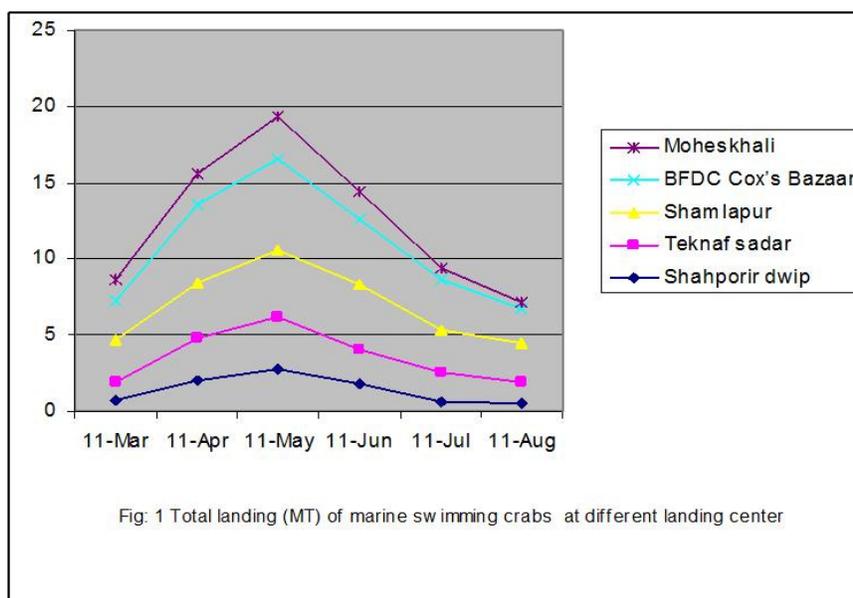
During March, 2011 to August, 2011 total 74.650 MT of swimming crabs (blue swimming crabs and three spot swimming crabs) were exploited from selected 05 landing centers at Cox's Bazaar district. In the total landing, highest landing was 23.480 MT in BFDC fish harbour and the lowest was 8.520 MT in the Shaparir dwip fish landing

Table 1. Total landing of marine swimming crabs at Cox's Bazaar district.

Sl. No.	Name of the landing center	March,11 (MT)	April,11 (MT)	May,11 (MT)	June,11 (MT)	July,11 (MT)	August,11 (MT)	Total landing (MT)
1.	Shahporir dwip	0.800	2.000	2.820	1.800	0.600	0.500	8.520
2.	Teknaf sadar	1.120	2.800	3.400	2.280	2.000	1.400	13.000
3.	Shamlapur	2.800	3.600	4.350	4.200	2.750	2.600	20.30
4.	BFDC Cox's Bazaar	2.500	5.210	6.000	4.310	3.260	2.200	23.480
5.	Moheskhali	1.400	2.000	2.800	1.850	0.800	0.500	9.350
	Total :	8.620	15.610	19.370	14.440	9.410	7.200	74.650

Table 2. Percentage compositions of marine swimming crabs at Cox's Bazaar district

Sl. No.	Name of the landing center	March,11 (%)	April,11 (%)	May,11 (%)	June,11 (%)	July,11 (%)	August,11 (%)	Average (%)
1.	Shahporir dwip	9.28	12.81	14.56	12.47	6.38	6.94	11.41
2.	Teknaf sadar	12.99	17.94	17.55	15.79	21.25	19.45	17.41
3.	Shamlapur	32.48	23.06	22.46	29.09	29.22	36.11	27.19
4.	BFDC Cox's Bazaar	29.00	33.38	30.98	29.84	34.65	30.56	31.45
5.	Moheskhali	16.24	12.81	14.45	12.81	8.50	6.94	12.53
	Average :	11.55	20.91	25.95	19.34	12.60	9.65	-



center during the same study period (Table, 1 and Figure, 1).

In the landing center wise maximum and lowest landing at Shaparir dwip were 2.820 MT and 0.500 MT in May, 11 and August, 11 respectively (Table, 1 and Figure, 1).

At Teknaf sadar, the maximum landing was 3.400 MT in May, 11 and minimum was 1.120 MT in March, 11 (Table, 1 and Figure, 1).

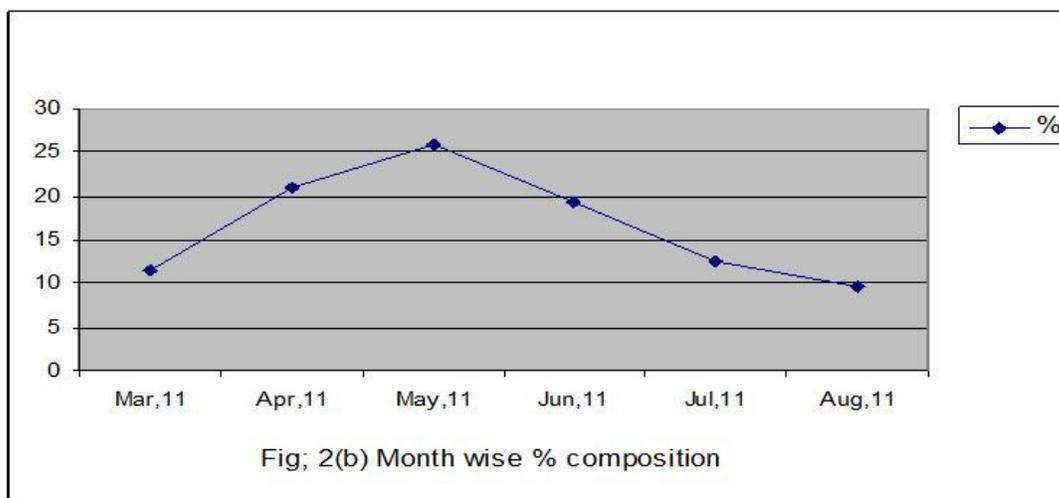
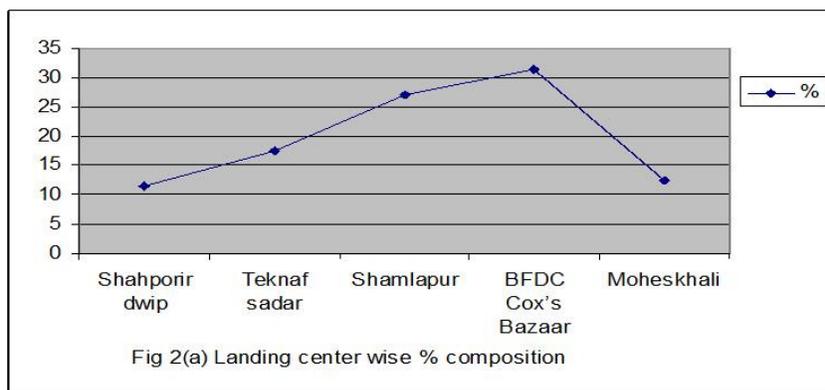


Figure 2 – Landing center wise & Month wise Percentage composition by weight

In Shamlapur highest and lowest landings were 4.350 MT and 2.600 MT during May, 11 and August, 11 respectively (Table, 1 and Figure, 1)

At BFDC fish harbour the maximum landing was 6.00 MT in May, 11 and minimum 2.200 MT in August, 11 (Table, 1 and Figure, 1).

In Moheskhali fish landing center the maximum and the minimum landing were 2.800 MT and 0.500 MT in May, 11 and August, 11 respectively (Table, 1 and Figure, 1).

The highest total percentage composition of swimming crab was 34.65% in July, 11 at BFDC fish harbour and the lowest was 6.38% in July, 11 at the same landing center (Table-2).

Landing center wise (average) highest percentage composition was 31.45% in BFDC fish harbour and lowest was 11.41% at Shaparir dwip landing center (Graph-2A).

In the month wise maximum and minimum average percentage compositions of total landing were 25.95% and 9.65% in May, 11 and August, 11 respectively (Graph-2B).

DISCUSSION AND CONCLUSION

The aim of this study is to describe the present condition of exploitation system, patterns and the marketing of marine swimming crabs in Bangladesh. During March to August some fishermen are engaged them in permanently and some fishers are in part time basis for crab fishery. In each selected swimming crab market where a number of depots are also available here. These depots are permanently engaged in crab trading for 5 to 6 months in each year. In Cox's Bazaar district the existing marketing system was starts with the crab collectors. From collectors to the exporters, there exists a small marketing chain with 3-4 numbers of middle-men. The collected total crabs were supplied to Dhaka for export. So, a potential marketing system also exists here.

Aratders (depot owners) usually bought crabs and sold them after grading. Usually five grades for blue swimming crabs as XL, L/LM, M/MM, SM and SSM which represent

the weights in grams of 500+, 400+, 300+, 200+ and 100+ respectively. And three spot grades were FF1, F1, F2 and F3 that represents the relative weights in grams of 200+, 180+, 150+ and 100+. In case of blue swimming first four grades and for three spot first three grades were bought from the collectors and prepared for sale. The other grades were usually sold to the local market for local consumption.

In April to July they showed a usual upward trend (offshore to onshore) and caught by the local fishermen in their selected nets and traps in huge amount. In late autumn migrate downward trend (inshore to offshore) and harvested by different trawl, but in very small amount. When rainfall was in peak then the collection of crabs in this area was higher and heavier in weight. May to July is the peak time of the year to catch large heavy swimming crabs which were about 65 -70% female of the total catch.

In the total catch more than 85-90% was blue swimming crabs which were found in April to July and their average weight more than 400 gm and the rest 10-15 % were three spot swimming crabs and their weight range were 150-200 gm. In July to mid -August the catch of three spot swimming crabs were lightly increasing, but not more than 30% of the total catch. Among the total harvesting 15-25% crabs were under sized. This under sized swimming crabs comprises of 30-80 gm for male and 40-90 gm for female in individual weight.

The exploitation of these crabs much higher in full moon period than that of new moon and other times in the main captured period. In the artisanal fishing all swimming crabs are exploiting within 10-30 meter depth zone of the marine fleets. Maximum swimming crabs harvested in the coast of Elephant point area. The peak harvesting period of the mud crabs (*Scylla spp.*) extends from November to March, While that of *Portunus spp.* extends from May to June, although harvesting goes on round the year (Mollah, 2012).

Portunus sanguinolentus catch was poor in September to November. Similarly, for *Portunus pelagicus*, fishing is extended from September to late May or early June. Stray catch was only occurred during September to November (Sukumaran, 1995).

Crabs are landed mainly as a by-catch of trawlers. Indigenous gears, such as gill nets and traps are also used to exploit the resource and mostly caught from a depth of about 10 – 60 meters (Manisseri, 2004).

The blue manna crab, *Portunus pelagicus* were widely dispersed throughout Peel Inlet, Harvey estuary and the saline regions of Tributary Rivers, Australia; during the summer and autumn, they were found mainly near the estuary in the winter and spring (Potter, 1983).

Crabs can be caught round the year, but become inactive in winter when water temperature falls below 50-55 o F. As temperatures rise in March and April, catch rates increase rapidly (Whitaker, 2010).

Present study indicate that the tendency of female crabs being heavier in weight and higher numbers than males crabs under Portunidae, which is in conformity with the

earlier observation in *Portunus pelagicus* and *P. sanguinolentus*.

It was observe that in the study period, among the three swimming crab species mainly *Portunus sanguinolentus* & *P. pelagicus* dominantly exploited only in Cox's Bazaar district in the inshore areas from March to August where peak in April to June and the maximum exploiting crabs was blue swimming crabs (*Portunus pelagicus*) and in the other times found incidentally very poor amount as by catch of shrimp and fish trawl in the on shore areas of our marine territory. And the Elephant point area may be the breeding ground of these three swimming crab species, because in the March to September about 70% female crab species found with eggs, which is similar to the Manisseri, 2004, Whitaker, 2010 and Mollah, 2012 study and some dissimilar observed to the study of Sukumaran-1995 & Potter, 1983.

This study was conducted properly utilize this resource in maintaining sustainable livelihood of coastal people as well it could contribute in the country's economic growth.

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