

## A study on mud crab (*Scylla serrata*) marketing system in West Bengal

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### ABSTRACT

Mud crab is a cheap source of protein and also palatable food which are liked by the consumers of internal and foreign markets. The mud crab fishery in India has in recent years emerged as an export-oriented trade with prime potential. Due to lack of marketing system, information and expertise, development of crab marketing system has not been achieved a sustained route. Despite providing important means of livelihood for fishermen of Sunderbans region, there is no organized marketing system of crab and studies related to these are also lacking. For this, the present study was conducted with the objectives to determine the present status of crab marketing system and constraints in five crab markets namely, Canning market, Namkhana market and Ukilerhat market from South 24-Parganas and Dhamakhali market and Nazat market from North 24-Parganas and 50 crab fishers / producers, 50 middlemen and 20 exporters were selected by simple random sampling without replacement technique. Thus, a total of 120 respondents were considered for this study. It was found that majority of crab fishers (54%) were belonged to middle-age group, Below Poverty Line (BPL) category (76 %) and SC category (68 %). Crab markets were mainly dominated by middlemen and aratdars. 95 per cent of male crab fishers dominated the crab market whereas, only 5 per cent of females were involved in crab farming and management practices. Income from crab fishers fluctuated throughout the year but the peak season for highest earning was reported as winter. In existing crab marketing system, 50 per cent of crab fishers were facing the problem of involvement of large numbers of middlemen followed by transportation problems (38%), reduced amount of catch (8%) and diseases (2%). Thorough infrastructure development and improved information dissemination, there is an immense scope of developing a lucrative crab marketing venture.

**Keywords:** Constraint, marketing, mud crab, West Bengal

The crab fishery in India is yet to be recognized as a major fishery despite the abundant occurrence of edible crab all along the Indian coast. There are about 600 crab species found in Indian waters. However, only few of them are used for human consumption and most important among these are *Scylla serrata*, *S. tranquebarica*, *Portunus pelagicus*, *P. sanguinolentus*, *Charybdis crusiata*, *C. feriata*. Among these, the *Scylla serrata*, commonly known as mud crab or green crab, forms the mainstay of crab fishery in India and is economically most important. It has wide distribution, occurring abundantly along both east and west coast of India.

Annual crab Landings from the natural population in 2012 was estimated to be 50,444 tonnes per year of which 40,956 tonnes were marine crust crabs and 9,488 tonnes were crust crabs (Handbook on Fisheries Statistics, 2014). Live crabs are exported from India to countries like Japan, USA, France, Hong Kong and Malaysia. Crab supports a subsistence fishery and appreciable importance in fishery sector. Crab export and marketing of West Bengal totally depends upon the crab fishery of Sunderbans region of South 24 Parganas and North 24 Parganas. A large section of people inhabiting in this region are engaged in this trade. This trade also provides as importance means of livelihood for fishermen community.

Estimation of catches from interior markets was comparatively difficult and subject to certain sampling fluctuations due to seasonal variations. The season for crab harvesting is from November to April but the peak season lies in December to February. The trade is virtually a monopoly in the hands of *Aratdars* and *Paikars* (middleman). The total landing in the wholesale market is controlled by *Aratdars*. The greater portion of total landing is brought by the *piakars* at the local markets and by the *Aratdars* at the wholesale markets. The local consumers from different landing centres purchase a small portion of catch. The landing centres are located on the banks of rivers and are connected by the river routes of South 24-Parganas district. The large sized crabs (300-500 g) are collected by the export agencies and are exported to Thailand, Japan, Sumatra, Malaysia and other countries (Nandi and Pramanik, 1994).

*Scylla serrata* has much demand in the domestic markets and fetches a good price, compared to other species of crabs. It was observed that *Scylla serrata* can be successfully marketed in live condition only, as there is a prejudice hinders in purchasing medium and large sized dead crabs with 14 cm claw. As crab stay alive out of water for a maximum period of 72 hours, they are generally exported to major cities by train. The crabs are packed in bamboo baskets, each basket

accommodating about 20-30 kg. Middlemen, who collect the crab from the fishermen, often mark up the price by about 50-100 per cent, depending upon the size while re-selling them to the retailer at the market. There is again a mark-up ranging from 50-100 per cent by the retailer in the local markets (Motoh, 1983).

The fish and fisheries of Sundarbans estuaries, mangrove bound water, brackish water, mud flats, Gangetic delta region and 158 km of coast line have changed the socioeconomic status of about 2.5 lakh fishers of those regions. The zone provides opportunities for harvesting of several species of migratory and non-migratory fishes, prawns, turtles, crabs etc. These coastal wetlands are very productive, mainly, because of presence of rich sources of marine bio-diversity *i.e.* flora and fauna.

The collected crabs were landed in landing centres of canning town, Taldi, Raidighi, Nischintipur, 5 no. Hat, Kakdwip, Ukibazar (Budhkhali), Namkhana, Chandranagar, Satmile, Bashirhat, Haroa, Hasnabad, Kendua, Choumatha, Malancha and Nazart. Total 11 species of crabs from Sundarbans delta are considered as the commercially important species among which nine species are marine, one fresh water and one brackish water. Although, the crabs provide important means of livelihood for fishermen of Sunderbans region but there is no organized marketing system of crab and there are no such studies were found in this aspect. That too, no systematic efforts were observed to study the present status of crab marketing practices in West Bengal.

Keeping these facts in mind, the present study was undertaken with the objectives to determine the present status of crab marketing system and constraints faced by the crab collectors/fishers, middlemen and exporters in existing marketing system of West Bengal.

## MATERIALS AND METHODS

The study was conducted in South and North 24-Parganas districts of West Bengal as these districts were bestowed with a vast resource of brackish water with high concentration of mud crabs. Apart from these, traditional marketing facilities were adopted for live mud crab marketing in these two districts where, highest concentration of crab fishers / producers and traders were engaged in crab marketing. For the present study, five crab markets were selected, namely, Canning market, Namkhana market and Ukilerhat market from South 24-Parganas and Dhamakhali market and Nazat market from North 24-Parganas as these five markets were achieved the prime performances in crab marketing in Sundarbans region.

A list of crab fishers/producers of South and North 24-Parganas districts was prepared. Out of 200 crab fishers/producers, 25% of total population *i.e.* 50 crab fishers/producers were selected by simple random sampling without replacement technique and 50 middlemen and 20 exporters were also considered as the sample of the present study, making a total of 120 respondents as sample size. Primary data were collected by administering a specially constructed interview schedule. Research information was collected, tabulated and analysed using appropriate statistical method *viz.* percentage, mean, correlation other parametric and non-parametric tests. On the basis of systematic and scientific analysis the salient finding of study are as follows-

## RESULTS AND DISCUSSION

### Price-profile of crabs

Live mud crabs fetched in the local markets with a good market value only during the winter period not throughout the year. Berried female crabs were sold at Rs.250-450 Kg<sup>-1</sup>. Kolkata market seasonally occupied by mud crab of various sizes and weight groups with a price range of Rs.100-300 Kg<sup>-1</sup> for 60-350 g weight group. Besides Kolkata, 60-200 g weight class of crabs fetched at Rs. 50-200 Kg<sup>-1</sup>. The main consumers of crabs from Sundarbans were Bihar and Orissa.

### Seasonal variation of price of crabs :

The results of the present study revealed that the price of crab was highest in winter season and price decreases simultaneously thereafter. Except winter, crab markets depend upon the cultured crabs. The rates of female crabs became double in winter with respect to the price of rest of the seasons. Female crabs (Egg less), locally known as “*Khosa*”, fetched at Rs. 300 Kg<sup>-1</sup> during winter, while Rs. 100 Kg<sup>-1</sup> for rest of the period.

### Characteristics of crab markets

Existing crab markets were divided into two general parts, *i.e.* export market and local market. Innova Export and Saha Traders at Baghajatin, Kolkata were the two export agencies, from where the export related data were collected.

**Table 1: Age wise distribution of respondents**

Age groups	Percentage of crab fishers (N=50)	Percentage of middleman (N=50)	Percentage of exporters (N=20)
Young (18-25 years)	29	30	35
Middle (26-45 years)	54	62	45
Old (> 46 years)	17	8	20

It is clear from the table 1, that majority of crab fishers (54%), middleman (62%) and exporters (45%) were belonged to middle age group.

**Table 2: Distribution of respondents according to level of education**

Age Groups	Percentage of crab fishers (N=50)	Percentage of middleman (N=50)	Percentage of exporters (N=20)
Read and write	28	0	0
Middle	36	14	10
Secondary	16	28	15
Higher	16	32	40
Secondary Graduate and above	4	26	35

Table 2 depicts that majority (36%) of the crab fishers were educated up to middle class, whereas, most of the middlemen (32%) and exporters (40%) were educated up to Higher Secondary level.

**Table 3: Distribution of profit percentage according to weight of male crab during export.**

Symbolic representation	Average Weight (gm)	Purchasing price (Rs Kg <sup>-1</sup> )	Selling Price (Rs Kg <sup>-1</sup> )	Profit (%)
XXL	475	300	630	110
XL	425	200	400	100
L	350	100	180	80
M	250	100	160	60

It was found from the study that weight of both male and female crabs were varied from 200gm to 500 gm. Table 3 highlights the relation between weight and profit earned by the exporters. Correlation analysis was done to find out the relation between weight and profit earned. The 'r' value (0.998) was found to be significant at 1 per cent level of probability, which indicated that there was a high positive correlation between weight and profit gained. According to the exporters, XXL sized crabs were preferred most in the foreign market.

**Table 4: Distribution of profit percentage according to weight of female crab during export.**

Symbolic representation	Average weight (gm)	Purchasing price (Rs. Kg <sup>-1</sup> )	Selling price (Rs.Kg <sup>-1</sup> )	Profit (%)
FF <sub>1</sub>	475	300	750	150
F <sub>1</sub>	425	250	600	140
F <sub>2</sub>	350	180	350	94.44
F <sub>3</sub>	250	120	230	91.66

Table 4. represents the relation between weight and profit earned by the exporters in marketing of female

crabs. The 'r' value (0.919) was found to be significant at 5 per cent level of probability, which indicated that there was a high positive relation between weight and profit gained. The price ranges of female crabs are in consonance with the findings of a study by Bhattacharya (2002). So this finding simply highlights the instances of high profit gain through exporting the female crab to foreign markets.

**Table 5: Seasonal variation of income (Winter, Summer and Monsoon) of the crab fishers**

Seasons	Months	Income month <sup>-1</sup> (Rs.)
Winter-Spring	November	4500
	December	5000
	January	6000
	February	6000
Summer-Monsoon	March	4000
	April	3500
	May	3500
	June	3000
Monsoon-Spring	July	2000
	August	1000
	September	1500
	October	2500

Monthly income of crab fishers was varied from Rs.1000-6000/- throughout the year. It is clear from table 5 that during the peak season i.e. in winter, crab fishers earned much more and simultaneously it decreased in summer and monsoon period. It is worthwhile to mention that during November to February, the amount of wild crab collection was high due to great influence of lunar cycle in crab landing.

**Table 6: Distribution of crab fishers according to their choice of different channels of markets**

Markets	Exporters (%)	Middleman (%)	Local markets (%)
Canning	46	38	16
Ukilerhat	22	44	34
Namkhana	28	40	32
Dhamakhali	22	32	46
Nazat	18	44	38

It was observed that the crab fishers preferred different crab marketing channels in different crab market. As depicted in table 6 and the results of Least Significant Difference (LSD) test suggest that the choice of crab fishers were varied with the different channels of markets. The result showed that the mean difference were significant at 5% level and negative value implies that crab fishers sold their commodity to exporters increased then selling tendency to middlemen and local markets decreased and vice versa. In case of canning

market, out of 50 crab fishers the majority (46%) preferred to sale their product to the exporters whereas majority of crab fishers in Ukilerhat, Namkhana and Nazat market sold their catch to middlemen and in case of Dhamakhali market out of 50 crab fishers, majority (46%) sold their catch in Local markets.

#### Problems associated with crab marketing

**Table 7: Distribution of problems associated with crab marketing**

Types of problems	Percentage (%) N=50
Involvement of large numbers of middlemen	52
Transportation	38
Amount of catches	8
Diseases	2

It was clear from table 7 that out of 50 respondents, 52% of crab fishers mentioned that involvement of large number middlemen in the crab trading is the major problem, followed by problems associated with transportation, amount of catch and diseases. Nandi and Pramanik (1994) also reported 'Dadan' system among the crab traders and presence of too much middlemen as major constraints in crab marketing. Through this study, it was also attempted to solicit the constraints faced by exporters, middlemen and crab collectors and those are presented in table 8.

**Table- 8: Constraints faced by different marketing stakeholders**

Stakeholders	Constraints
Exporters	<ul style="list-style-type: none"> <li>• Mortality at transit point.</li> <li>• Transportation Problem due to delay of air and sea route. Bhattachariya (2002) also reported that the inadequate transport facilities often delay the crab-carrying vehicles bound for Kolkata.</li> </ul>
Middlemen	<ul style="list-style-type: none"> <li>• Fluctuations in market price.</li> <li>• Some of them are often cheated by the crab collectors.</li> <li>• It was found that 40-50 incidents of tiger attack occurred in every year.</li> </ul>
Crab collector (crab fishers)	<ul style="list-style-type: none"> <li>• Some physical injury occurred on their body, legs by hard crustacean shells and sharp mangrove roots while they were working under knee-deep mud.</li> <li>• Rough weather and turbulence in rivers took many lives.</li> </ul>

Crabs support a sustenance fishery of appreciable importance in Indian water (Nandi and Pramanik, 1993)

and in turn contribute significantly to the protein intake of resource-poor households (Rajasekharan and Whiteford, 2001). Crab meat is virtually cent per cent fat-free, rich in protein and offers no carbohydrates. According to dieticians, crab meat fits in perfectly with the new dietary guidelines, which suggest high-protein foods that are lean and either low-fat or fat free (Dana *et al.*, 2015). The present research highlighted the export and marketing system of crabs of Sundarbans region. The result of the research will also help the marketing and fishery extension personnel to get proper information about existing marketing systems. So, it will also help to device new extension programmes by the policy makers, administrators and extension personnel in more scientific and inclusive way. This has also thrown light to the distribution of profit from farmer to exporter in the marketing channels. The study also depicts the actual picture of marketing system of crab and roles of stakeholders of crab farming in West Bengal. Special attention needs to be given to develop and strengthen the export potentialities as crabs provide new opportunities of lucrative export market and Information related to extension services and technical supports need to be focussed for developing marketing system (Ghosh *et al.*, 2013).

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