



## AN ASSESSMENT ON THE BARRIERS IN MUD CRAB (*Scylla* sp.) FATTENING AND MARKETING IN BANGLADESH

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Received 17 April 2012, revised 30 July 2012, accepted 12 September 2012

### ABSTRACT

The present study was conducted in the southwest part of Bangladesh during 2009 in order to identify barriers in mud crab fattening practice and marketing in Bangladesh. Khulna, Bagrhat and Satkhira; three districts were selected for this study as most of the crab fattening farms are located in those areas. From different focus group discussions, a total of twelve (12) important barriers were identified according to the priority. Among different barriers addressed by farmers the insufficient credit and lack of proper knowledge about crab farming ranked 1<sup>st</sup> and 2<sup>nd</sup> in position in barrier ranking. On the other hand, salinity problem and religious constrain ranked as 12<sup>th</sup> and 11<sup>th</sup> in barrier ranking. Well developed co-operation and partnership between farmers, middlemen in marketing sectors, and proper technical supports from government and non-government organizations are needed for farming of this export oriented fishery items as a sustainable level.

**Key words:** Barriers, constraint, fattening, mud crab

### INTRODUCTION

Several species of *Scylla* are collectively known as mud crab, Indo-Pacific swamp crab or mangrove crab. Keenan *et al.* (1998) identified four distinct species of *Scylla*; *S. serrata*, *S. tranquebarica*, *S. olivacea* and *S. paramamosain*. China is playing an important role in the total world production of mud crab in the world. China, USA and Canada contribute 70% of the world crab production together. However, the capture and culture is mainly dependent on the wild catch fisheries till now.

Though mud crab farming become popular throughout the world but still it is not beyond the problems. Different researchers found out different problems related to farming and environment. Culture mostly depends on the wild caught stocks. Unregulated exploitation has become major concern for depleting the mud crab population in many parts of the world. However, mud crab hatchery development has only occurred in few countries as a commercial level. Shortage of seed supply and feed and low survival of the cultured crab reported by Cholikh and Hanif (1991).

Beside this, high rate of mortality also identified in crab farming (Gumarto and Rusdi 1993). According to them, mating and migration can also responsible for this high mortality. Some species of crab are showing the burrowing tendencies for escaping during the spawning stage though it was not observed in *S. serrata*. High mortality and lower production due to escape of crab by digging hole or climbing out over the dykes was reported by Sulaeman *et al.* (1993). In addition to this, cannibalism was reported as a serious problem. The mortality has been largely recognized to cannibalism which also affects survival (Ballio *et al.* 1981). Cannibalism also enhance by mixed sex culture (Cholikh and Hanafi 1992). Farming with different sizes of seed can also increase the mortality due to the predatory behavior of larger species on small crabs (Shelley 2008)

Most of the study in Bangladesh focused on the species identification, distribution and brood stock management of crabs (Islam, 1976; Khan 1992; Obayed, 1998). There is lack of research regarding the problems faced by the farmers involved in mud crab farming in the field level. In addition,

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information about the negative environmental impact of fattening of crabs in coastal region is also unsatisfactory. However, it is necessary to identify the problems or barriers for the future sustainability of mud crab farming in Bangladesh.

The purpose of this study is to identify barriers in fattening practice and marketing of crabs in Bangladesh.

## MATERIALS AND METHODS

The study was undertaken in the southwest part of Bangladesh. Khulna, Bagrhat and Satkhira; three districts were selected for this study as most of the crab fattening farms are located in this region and it is near to the Sundarban mangrove region which is the main source of crab fry for this culture practice.

For questionnaire interviews, simple random sampling method with the key informants was followed for this research. A total number of 150 farmers, 50 for each district were selected and were interviewed through out the period of study. Several Focus Group Discussions (FGDs) were arranged to identify the potential barriers in mud crab farming and marketing. A group of Key informants (Upazila Fisheries Officer, extension workers, teachers, crab fattening farmers) were present in those FGD. From the discussion, a total of twelve (12) important barriers were identified according to the priority. Those selected barriers were incorporated into questionnaire. Each of the selected barrier regarding the mud crab fattening and marketing of the final products was measured by a 4- point rating scale with responses of high, medium, low and no and weights for each of these responses were 3, 2, 1 and 0 respectively. For more clear conception of the seriousness of a barrier to the farmers with respect of mud crab farming, a total barrier indices (TBI) was calculated with the following formula:

$$\text{Total Barrier Indices (TBI)} = (N_{no} \times 0) + (N_{lo} \times 1) + (N_{me} \times 2) + (N_{hi} \times 3)$$

$N_{no}$  = Number of mud crab fattening farmers having no barrier

$N_{lo}$  = Number of mud crab fattening farmers having low barrier

$N_{me}$  = Number of mud crab fattening farmers having moderate barrier

$N_{hi}$  = Number of mud crab fattening farmers having high barrier

## RESULTS AND DISCUSSION

A total of twelve (12) barriers were identified from FGDs (Focus Group Discussion). Table 1 is showing the TBI (Total Barrier Indices) of those identified barrier faced by farmers in Bangladesh. From the survey results, it was observed that total barrier indices ranged from 21 to 443 against a possible range of 0 to 450. Figure 1 is showing the total barrier indices (TBI) according to their ranking.

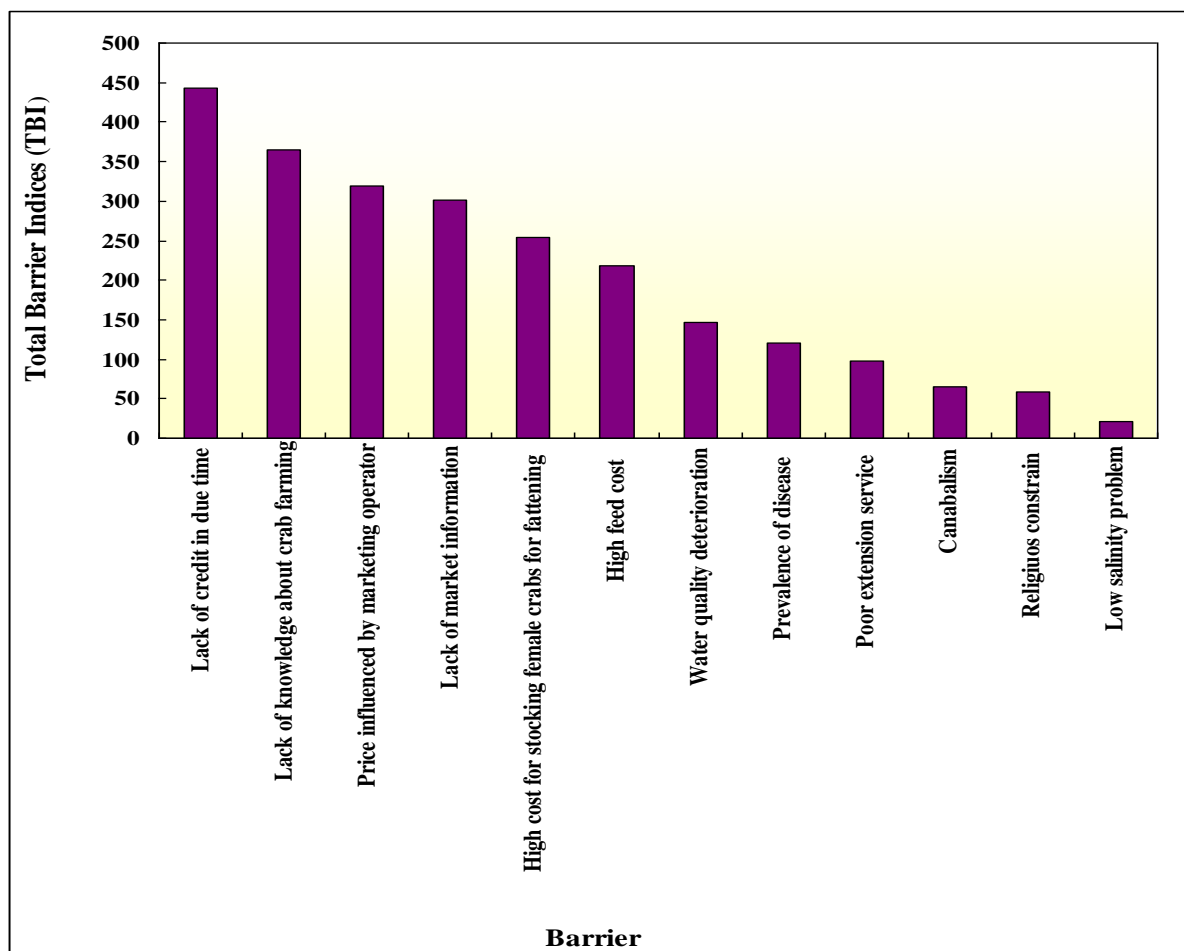
Capital is the prime factor to run any business. In Bangladesh, the credit situation for fish farming is very poor. The TBI (Total Barrier Indices) for mud crab farming from this survey also addressed that problem as a major credit problem which ranked as 1<sup>st</sup> in position. There is available loan facility for shrimp and prawn farming from different government and commercial banks. However, loan for crab farming is still not easily available from government bank. Loan for crab farming from commercial banks is also sometime complicated. On the other hands, NGOs proved credit but it is still not sufficient for crab farming. All of those limitations influenced them to take loan from the financier or moneylender with high interest rate. Some farmers in the survey areas were also found to take loan from different crab depot owners with a verbal contact, which bound them to sell their product to that depot owner at low price.

For successful farming, farmers should have some good technical knowledge on different aspects of mud crab farming; otherwise they can not make the business profitable. A high TBI 365 is indicating that it is a major barrier of mud crab fattening in Bangladesh after credit. Majority of the farmers (65%) mentioned that they were lack of proper knowledge about crab farming and technical training. Lack of knowledge on mud crab farming ranked 2<sup>nd</sup> in position (Table 1). They addressed this one an extreme level of barrier among all barriers. They need proper technical supports like training to do their farming as a sustainable level.

Farmers also faced problems in marketing of their final products. Besides credit and knowledge problems, insufficient market information and price influenced by the middle-men are major ones. Lack of information about actual price in the market as well as the actual demand of mud crab in the domestic and international market was also reported

**Table 1.** Barrier faced by farmers throughout the crab fattening and marketing of mud crab in the study area.

SL	Barrier	Extent of Barrier				TBI (Total Barrier Indices)	Rank Order
		No	Low	Medium	High		
1	Low salinity problem	135	9	6	0	21	12
2	Cannibalism	85	65	0	0	65	10
3	Water quality deterioration	55	56	27	12	146	7
4	Prevalence of disease	55	70	25	0	120	8
5	Stocking cost	1	60	73	16	254	5
6	High feed cost	10	74	54	12	218	6
7	Religious constrain	91	59	0	0	59	11
8	Lack of knowledge about crab farming	0	33	19	98	365	2
9	Lack of market information	0	40	69	41	301	4
10	Price influenced by the marketing operator	1	24	79	46	320	3
11	Poor extension service	58	86	6	0	98	9
12	Insufficient credit	0	0	7	143	443	1



**Figure 1.** The ranked order for the selected barrier in mud crab fattening in Bangladesh



**Figure 2.** Water quality deterioration during the fattening period



**Figure 3.** Dead crab due to the occurrence of diseases

during the survey period. It was reported that, the TBI indicates 320 for price influenced by the marketing operator and 301 for lack of market information ranked these two problems as 3<sup>rd</sup> and 4<sup>th</sup> in position (Figure 1)

In the present survey, almost all farmers leveled lack of market information barrier as low, medium or high level of barrier. Among them, more than 27% farmers reported this one as high level of barrier they were facing. As the crab is exported only as live condition, due to the lack of sufficient market information could make the farmers as failure to get the actual price as well as the benefit.

Fattening mostly involved stocking empty or lean crab for a short period. Stocking lean or empty crabs for fattening is the major operating cost in crab fattening. Hatchery production is not well developed through out the world. Most of the crab farming in the world generally depends on the natural stocks. Its availability and abundance are playing as a limiting factor for expansion of the mud crab industry (Chong, 1993). With the expansion of crab farming throughout the world persuaded the population under the overexploitation of the stock, which became a major concern for the environmentalists. Farmers in Bangladesh faced the higher stocking cost for empty or lean crabs due to

unavailability of the crab during the production time. Most of the interviewed farmers in this survey addressed this barrier as high, medium or low level of problem. Among them, more than 10% farmers said they counted the higher seed cost as high problem and farmers placed this barrier in 5<sup>th</sup> position in barrier ranking. Hatchery production of crab seeds and protect the wild stock from overexploitation could be solution of this problem.

The feeding cost is another major operating cost in crab fattening. Crab fattening mostly involved feeding the low cost feed such as different trash fish. Though the fattening practice is short period, some farmers also found difficulty in feed cost. About 8% of the surveyed farmers ranked this problem as high level, however, most of the farmers (49%) reported this as low level of barrier. Farmers are not using any formulated feed like shrimp farming. According to their statements, the higher feed cost mainly occurred due to the scarcity of the fish in the local market during.

It is the common practice in Bangladesh in mud crab fattening to apply trash fish as raw. Feeding with all of those raw animals prone to problem with water quality deterioration due to fouling. In the present study, small size category owned farmers found to have more water quality deterioration than medium and large size categories ponds owners. It might be due to the higher stocking density they maintained in their small ponds. About 8% of the interviewed farmers mentioned this problem as high level. Most of them found to operate small size ponds. However as a barrier, it ranked as 7<sup>th</sup> in position. During the survey period it was also observed that farmers who exchanged water during fattening period did not faced such kind of water quality deterioration problem.

Unlike with shrimp and prawn, different types of disease in crab were not reported as a major problem in culture. Nevertheless, septicemic or orange crab disease in floating cage culture in Singapore and different parasitic disease like *Hematodinium* sp. was also reported in digestive organ of juveniles and adult of *S. serrata* in Australia. Mortality in cage farming can also occur through cirripede infection in the gill chambers. All of those can cause enormous loss if not reported and unsolved during culture period. Most of those diseases related to poor water quality and soil nature. Farmers in Bangladesh also reported parasite infection in the gill chamber of their stocked crabs

(Figure 3). However, about 47% and 17% interviewed farmers reported this problem as low and medium level of barrier. They ranked this barrier 8<sup>th</sup> position in TBI ranking. Most of the infected farms found to have poor water quality due to the absence of water exchange facilities in addition to higher stocking density.

The number of field extension workers in Bangladesh is very limited. Farmers also reported this one as a barrier. They were unable to get the necessary information and helps in time of need both from the government and non government site. Beside government, the NGOs only set their extension service to the target farmers. Moreover, they also do not have sufficient technical knowledge about crab farming. However, responded farmers did not mention this problem as high level. Only 4% farmers said this one as medium level of barrier. Among all barriers, this problem ranked as 9<sup>th</sup> in position in TBI ranking. Government of Bangladesh should pay attention to develop this site for the sustainable development of this export oriented species.

The mortality of the crab is also caused by their cannibalism behavior. The higher stocking density and mix sex culture can enhance cannibalism (Baliao *et al.* 1981 and Cholik and Hanafi 1992). Different crab shelters like providing seaweeds or other materials in the pond can minimize cannibalism as well as improve crab survival and yield (Fielder *et al.* 1988; Chen 1990). It revealed from the survey that most of the mud crab farmers provided some branched of trees or bamboo in the bottom of their pond. However, about 43% farmers from the surveyed areas reported cannibalism as low level of barrier. Among twelve barriers it also ranked 10<sup>th</sup> in poison on TBI ranking. Farmers who reported this problem also found to maintain higher stocking density with different sizes of mud crabs in small areas.

The Hindus mostly involved in this sector. However, the situation is changing now. Due to alternative income source it is getting acceptance among the Muslim farmers. Last few years, many Muslim fish farmers found to be involved in mud crab farming and trading. Especially the poor Muslim farmers are found to involve in fattening practice while wealthy one mostly involved in trading site. However, they placed religious constrain toward farming and trading as 11<sup>th</sup> in position in TBI ranking.

Mud crabs can tolerance high level of salinity. The ideal salinity range for their growth is approximately 15 to 25 ppt. Most of the surveyed farmers did not face any salinity problem during their fattening period. It also ranked in 12<sup>th</sup> in TBI ranking. However, some farmers in the Bagerhat district reported this as barrier in crab fattening. According to their statements, during the wet season they faced low salinity problem in their fattening pond which might be the cause of mortality of their stocked crabs. Only 39% farmers addressed this barrier as low level. According to their reports, salinity problem in crab farming placed the last position among 12 problems during culture period. Only 65 farmers reported cannibalisms as a barrier. However, the problem faced by them as low level.

### CONCLUSION

Considering the economic profitability of mud crab fattening in a short time, recent year the mud crab fattening become popular in the southeast and southwest part of Bangladesh. But still this farming has some potential barriers that are working behind the production and development of this culture practice. Without identifying and eliminating those barriers it is difficult to attain the satisfactory growth of this potential farming. In conclusion, it could be said sufficient supports from the government and nongovernmental organization in needed for the sustainable development of this farming practice in Bangladesh. In addition adequate and proper market information can also encourage the farmers to expand their farming more sustainable level.

### ACKNOWLEDGEMENT

The authors would like to express their gratefulness to all mud crab fatteners and the associate groups in the southwest part of Bangladesh that have given a lot of valuable information without which the study could not have been completed. The authors would like to express their gratitude to China government for funding this research works.

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