

## **TROUBLESOME ISSUES IN SHRIMP FARMING SECTOR OF GREATER KHULNA REGION, BANGLADESH**

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### **ABSTRACT**

The objective of this research was to look for the existent troublesome issues in shrimp farming sector in Khulna, Bagerhat and Satkhira district of Bangladesh. A total of ninety shrimp farms were visited to collect primary data through questionnaire interview from August-December, 2017. The result showed that, at least fourteen major problems were existing in this sector at present which must be addressed for improving quality shrimp production. Among the major problems identified, disease was the main restraining factor for the development of shrimp farms. Our observations clearly indicated that about 80%, 90% and 80% farms of Khulna, Satkhira and Bagerhat district, respectively suffered from several viral diseases in which WSSV was the most prominent one. Neither of the farmers were found applying appropriate technique to diagnose actual diseases nor even testing any water quality parameter. The farmers were also lacking good quality post larvae, feed, technical knowledge and government patronization. The remaining problems were y land ownership and conflict, leasing duration matter, poor economic condition, high credit loan, poor transportation facilities, insufficient electricity supply, natural calamities, poor post-harvest handling facilities, low product price, and inconsistency in market channel were also existed in this region.

**Key words:** Troublesome, Shrimp, Disease, Conflict, PL

### **INTRODUCTION**

Shrimp, commercially known as “white gold”, aquaculture has become a major sector of global fish farming in terms of space occupied and market value during the last decade. It represents the second largest export industry for Bangladesh, contributing about 4% to national GDP and employing approximately of 1.2 million people for production, processing and marketing activities (Paul and Vogl, 2012). The practice of shrimp farming is widespread in coastal region of Bangladesh. Although the shrimp farming has larger profit, the farmers face lots of problems and constraints threatening its future prospects (Karim and Aftabuzzaman, 1995; Faruque et al., 2008). Therefore, in this study we aimed at identifying the troublesome issues affecting the shrimp farming sector of Khulna, Bagerhat and Satkhira district.

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## MATERIALS AND METHODS

### *Study area and period*

The study was carried out in Khulna, Satkhira and Bagerhat district during August to December 2017 since a large number of people of this area were engaged with shrimp farming. (Table 1)

**TABLE 1: CURRENT STATUS OF SHRIMP FARMS OF THE SOUTH WEST REGION OF BANGLADESH**

District	Area (ha)	No. of Shrimp farm	Visited farm	Extensive culture	Semi intensive culture
Khulna	44831	21601	30	22	8
Satkhira	57886	25381	30	18	12
Bagerhat	44840	27499	30	15	15

### *Data collection*

A set of questionnaire was prepared and pre-tested to verify to develop a final set of questionnaire. The questionnaire was prepared based on some inquiries. Both primary and secondary sources were used for the collection of necessary data. Primary data were gathered through questionnaire survey at farmers' level at the selected regions. A total 30 interviews were taken from different shrimp farms of each district. On the other hand, the secondary data was strictly limited to the background discussion of the research, the designing of the report and construction of the survey questionnaire. As secondary data sources were previous/published thesis papers, published documents, and publication by DoF, newspaper, seminar library of Fisheries and Marine Resource Technology Discipline of Khulna University.

### *Analysis of data*

Both qualitative and numeric data were collected from field survey. All collected data were scrutinized, summarized and tabulated carefully. The collected data were subjected to descriptive analysis by means of the computer software Microsoft Excel 2007.

## RESULTS AND DISCUSSION

### *Current status of shrimp farm in Khulna region*

The culture of shrimp in Khulna region has been drawing greater attention by the farmers. In areas of greater Khulna region having a tropical climate, productive and unpolluted estuarine areas is considered to be a suitable natural habitat for penaeid shrimp culture. Although a huge number of farmers were involved in extensive shrimp culture they were lacking proper knowledge and training facilities.

### *Diseases*

There were 6 major categories of diseases, namely viral, bacterial, fungal, protozoan, nutrient deficient and other diseases identified in the study area, perhaps contributed from

environmental changes (Table 2). Among the most common diseases, white spot disease alone constituted 80% affecting Bagda farming in Khulna. No farmers were found to apply appropriate technique to trace out actual diseases and to test water quality parameters. These observations were very similar to the findings of Begum and Alam (2002), Hasan (2002), Hossain (1997), Mazid and Banu (2002). Brock et al., (1997) also reported that viral diseases were the most devastating because they are difficult to detect and almost impossible to treat in ponds. Such highly spread disease states of the gher could be contributed from stocking of disease-infected fry in gher, water flow from one disease infected gher to another gher by canal, changes of water quality parameter in the gher, nutritional deficiency as well as changes of environmental condition. It is well known to all that, a sudden change in pH or low dissolved oxygen levels can precipitate an outbreak of Yellow Head Virus disease. In addition, pollution from outside, such as insecticide residues, may have a very high direct toxicity on shrimp and they may serve as predisposing factors for disease (Flegel, 1996). Shivappa (1997) reported frequent fluctuation of environmental conditions, e.g. oxygen, temperature, salinity etc. had significant effect on the virulence of *Vibrio* with salinity being more lethal to shrimp than temperature. In the present study, it was also observed that Penaeid shrimp farming sector had been suffering from severe disease problems along with traditional culture method, lack of government support, lack of extension and motivation on improved culture techniques, making shrimp farming less or non-profitable intervention.

**TABLE 2. DISEASE PROBLEMS IN SHRIMP FARMS IN THE SOUTH WEST REGION OF BANGLADESH**

Serial no	Agent	Disease name	Symptom	Season	Percentage of affected farms		
					Khulna	Satkhira	Bagerhat
1.	Virus	1.White Spot syndrome Virus (WSSV) Disease.	Circular spots on epidermis and exoskeleton.	All year round	80%	90%	80%
		2.Yellow Head Virus (YHV) Disease	Swim slowly near the surface edge at the pond.	More rapid and frequent in monsoon period.	25%	15%	13%
2.	Bacteria	Non-luminous vibriosis	Growth hampered Black lines appear in muscle.	Mostly during rainy season.	30%	25%	20%
3.	Fungus	Fusariosis	White mycelia in the entire body.	During low salinity of monsoon period	15%	5%	10%
4.	Protozoan infestation	Cotton shrimp disease	White opaque muscle.	All the year round.	6%	8%	10%
5.	Nutrient deficiency	Soft shell disease	Soft dark, white shell		21%	15%	18%
		Blue disease	Bluish coloration of shell.				
		Black death disease	Death of juvenile.	All the year round.			

**Water quality**

No farmers had found to have any idea about water quality parameter in the areas of present investigation. In the study areas were also lacking government initiatives and/programs making farmers aware of good water quality. Water quality is one of most prime factors that affect the shrimp culture in a farm; poor water quality could be responsible for bacterial contamination in shrimp. In shrimp farming, often river or canal water is used without any kind of treatment, which might be a threat for the quality of shrimp. Boyd and Fast (1992) suggested that the optimal level of water temperature for *P. monodon* culture is 25-30°C. Predalumpaburt and Chaiyakam (1994) reported that the salinity should be in the range of 20-25 ppt for shrimp production. Additionally, Alam, (2007) investigated that the factors affecting the shrimp yield in south west region of Bangladesh were old aged farms, inadequate water exchange, bad water, instable water parameter and absence of quality post larvae. During the field observation it was found that the increased load of fertilizers, feed and excretory metabolites of the shrimps stocked in the pond tend to change the water quality to an alarming extent, lowering the levels of dissolved oxygen, increasing pH CO<sub>2</sub>, ammonia and nitrate content in water. All of these elements in water might be deleterious to shrimp health, impairment of shrimp growth, in addition to a wide variety of sub-lethal effects. It was also found that organic matter released from decomposition of various plant substances, extra part of feed and the production of faeces led to the depletion of DO. This situation often resulted in black gill disease in shrimps followed by mass mortality.

**TABLE 3. DISEASES ASSOCIATED WITH PHYSIOCHEMICAL PROPERTIES OF WATER**

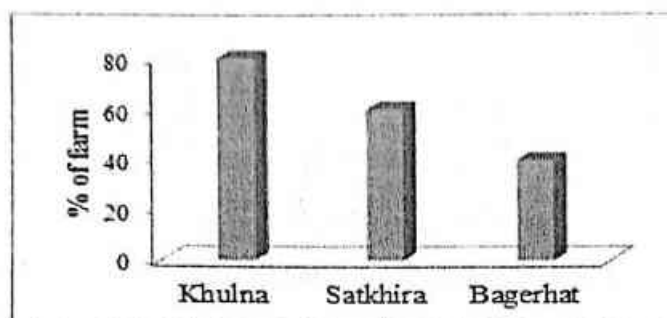
Diseases	Identifying clinical signs	Causes
<b>Body cramp</b>	Lesions on body surface and tail	a. Temperature shock in warm conditions. b. Mineral imbalance (Na, P, Ca)
<b>Muscle necrosis</b>	Opaque areas in the abdomen Hypoxia	a. Low salinity and dissolved oxygen b. Less DO
<b>Black gill diseases</b>	Blackening of gill	
<b>Gill necrosis</b>	Damage in gill tissues.	a) Pollution (heavy metals)
<b>Red disease</b>	Reddish coloration of shell, gill and pleopods	a) Handling stress, detritus rich in organic matter

**Low quality PL supply**

About 60%, 70% and 65% farmers of Khulna Bagergat and Satkhira, respectively reported to get low quality of PL supplied by different hatcheries (Fig. 1). Possible reason behind this situation was wild PL only available in specific season. This finding was similar to Nupur (2010) who stated that, in Khulna district about 60% farmers had the lack of good quality PL of shrimp.

**Low quality of water**

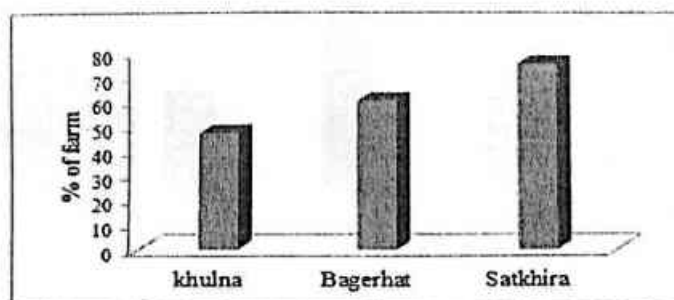
From the farmers' survey data, it was found that 80% shrimp farm of Khulna district and 60% of Satkhira, 50% of Bagerhat did not get good quality water when needed (Fig. 2). This made the shrimp culture stressed and hampered which might be a major reason of frequent disease occurrence. Karim *et al.* (2012) found that 90% farmers of Teknaf did not get good quality water that hampered the culture of shrimp. Alam (2007) also reported that the factors affecting the shrimp yield in south west region of Bangladesh are old aged farms, inadequate water exchange, instable water parameter.



**Fig 2: Unavailability of good quality of water**

**Low quality feed**

There is lack of quality and safe feed supply for shrimp culture. About 47% farmers of Khulna district was found to apply low quality feed in their farm. Whereas, in Bagerhat and Satkhira district 60% and 75% farmers said that because of high cost of artificial feed they rely on natural feed and their farms suffer from lower productivity (Fig. 3). Chandra *et al.* (2010) found that in Bagerhat district about 53.66% shrimp farms use different types of low quality of artificial feed because of high production cost. While Mazid (1996) reported that low quality feed is one of the major constraints to the development of shrimp culture.

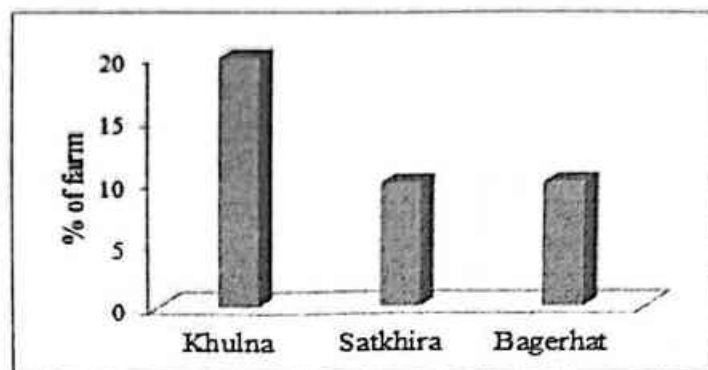


**Fig 3: Low quality of feed**

**Lack of technical knowledge**

Most of the farmers did not have knowledge about modern method of shrimp farming that might be the main reason behind reduction of shrimp production. Only 20% farm owner had technical knowledge about shrimp farming in Khulna district and the number was only 10%

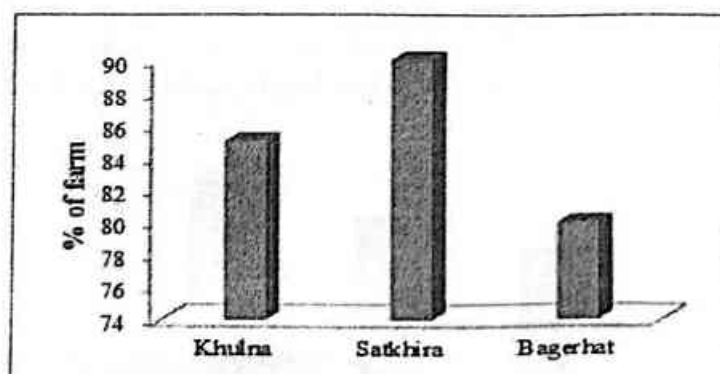
in Bagerhat and Satkhira sub-districts (Fig. 4). These observations clearly indicated that most of the farm fall in damage due to lack of technical knowledge. Karim *et al.* (2012) found that only 10% farm owner had technical knowledge about shrimp farming in Chittagong Sadar and 20% found in both Chokoria and Teknaf sub-district. Begum and Alam (2002) reported that lack of technical knowledge, lack of extension and motivation on improved culture techniques have made shrimp farming less or less-profitable in Khulna district.



**Fig 4: Technical knowledge status of owners**

#### *Insufficient government patronization*

About 85-90% farmers of Khulna Sadar, Bagerhat and Satkhira opted that Government support were not adequate when they needed (Fig. 5). Similarly, training and development program for shrimp producer were not adequate at all. Moreover, training and development program for shrimp producer might enrich their technological knowledge. Chandra *et al.* (2010) found that (60.16%) farmers of Bagerhat district had no training on shrimp farming. As they are untrained they have no knowledge about the scientific method of shrimp culture.



**Fig 5: Insufficient government patronization**

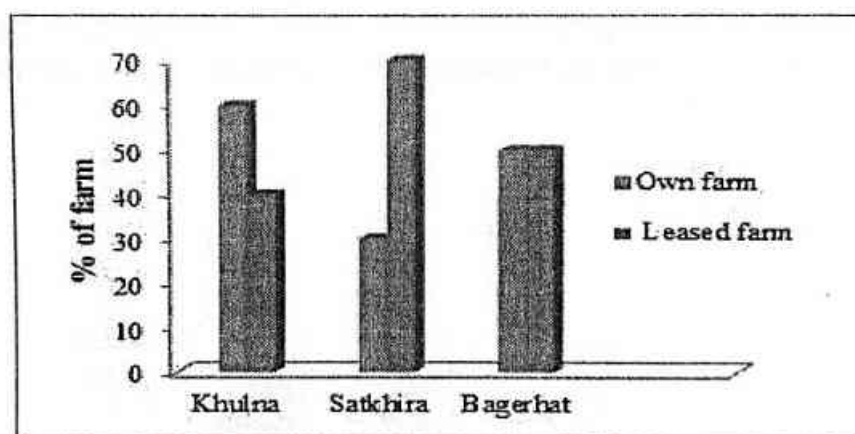
#### *Ownership of the farm and leased period*

From the present research, it was found that only 30% farmers had their own farm in Satkhira district while 60% farmer in Khulna and 50% in Bagerhat district had their own farm (Fig 6; Table. 4), affecting proper maintenance of the farms with well

understanding and getting the desired profit. Furthermore, among the leased farms, leased periods 6-60 months with an average  $19 \pm 17$ ,  $13 \pm 4$  and  $21 \pm 16$  months in Sadar, Bagerhat and Satkhira, respectively. Such short leasing period was found to be one of the major factor for farm infrastructure development as the farmers usually do not much interest in investing for infrastructure development. Therefore, measures should be taken for increasing farm ownership and/or extending the leasing period for betterment of shrimp farming in Bangladesh.

**TABLE 4. STATUS OF LEASED PERIOD OF SHRIMP FARMS IN THE SOUTH WEST REGION BANGLADESH**

District	High leased period (Month)	Lowest leased period (Month)	Average leased period (Month)
Khulna sadar	60	12	19
Bagerhat	24	6	13
Satkhira	60	12	21



**Fig 6: Ownership matter of the shrimp farm**

**Social, land and labour conflict**

It has also been observed that there was conflict between shrimp producer and cereal crop producer, especially in Khulna region. 60-80% of the farmers from study areas complained conflict for shrimp cultivation, especially for saline water shrimp. In addition, there was a conflict between local land owners and outside shrimp producers; 65% farmers of Khulna, 70 % farmers of Bagerhat and 75% of Satkhira had the same experience and opinion on landowner-shrimp producer conflict. Furthermore, 60% farmers in Khulna, 70% farmers in Bagerhat and 75% farmers in Satkhira experienced conflict between local and outside labour as well (Fig. 7). These three conflicts, even at present, are the major causes for deterioration and destruction of shrimp production in these regions (Rahaman *et al.*, 1995; Islam *et al.*, 2003).

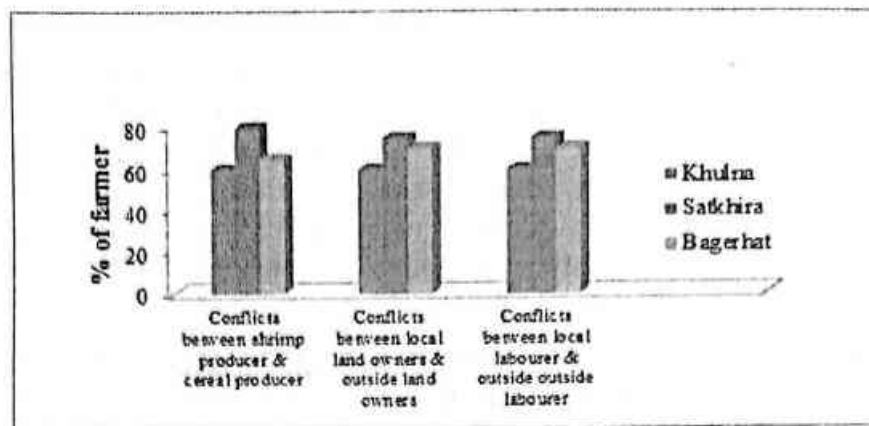


Fig 7: Social, land and labour conflict

**Financial Condition**

About 80% farm owner found in Satkhira sub-district who had financial crisis where as 60% and 40% found in Bagerhat and Sadar sub-district (Fig. 8). Because of financial crisis, most of the farmer had choice on extensive shrimp culture instead of semi intensive culture, Akter *et al.* (2002) reported that lack of finance and appropriate technology, scarcity of quality PL, diseases and inadequate extension work were major problem of shrimp culture in Bangladesh.

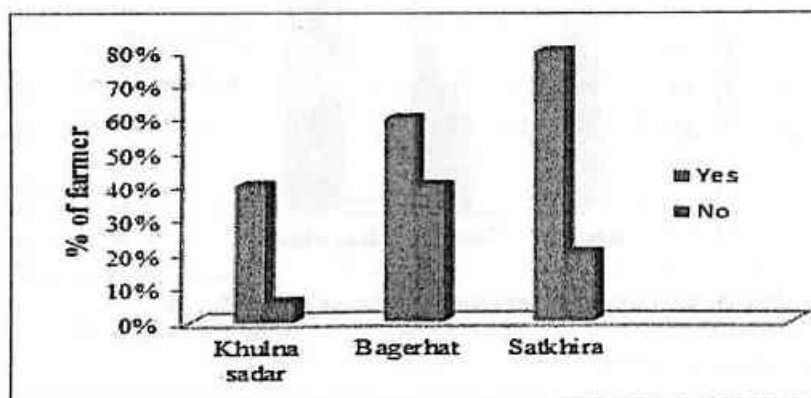


Fig 8: Financial status of shrimp farm owners

**High interest of loan**

About 80% farmer of Khulna district and 85% of both Bagerhat and Satkhira district said that loan provided by non-government organization demand high return or interest (Fig. 9). From the investigation, it was identified that lack of money was a single most important problem for shrimp farming. Das (1993) and Mahmud (1998) however, mentioned the same problems of shrimp farms lack of credit and high amount of interest.



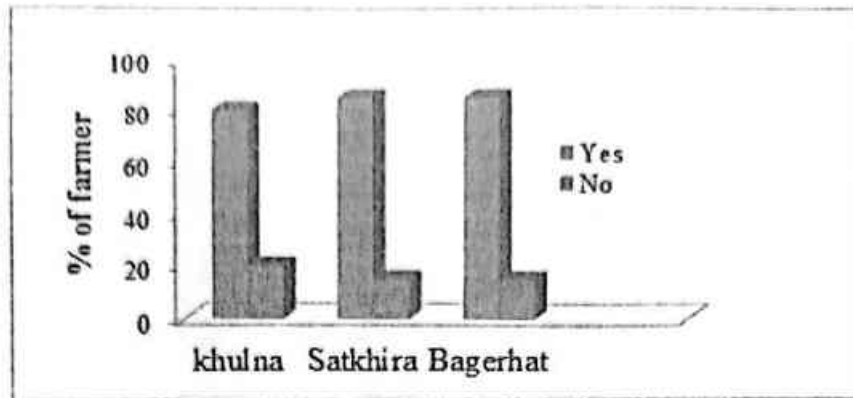


Fig 9: High interest of loan.

*Poor transportation facilities*

Among the three sub-district 60% farmers of Khulna district said that they suffered from lack of proper transport facilities. About 75% shrimp farm owner of Bagerhat district and 80% of Khulna district expressed the same opinion (Fig. 10). This problem was even more acute in the case of the shrimp had to be transported. Farmers had to bear high transportation cost. They needed more time for carrying the shrimp by van or small-taxi on rural rough road to the distant depot.

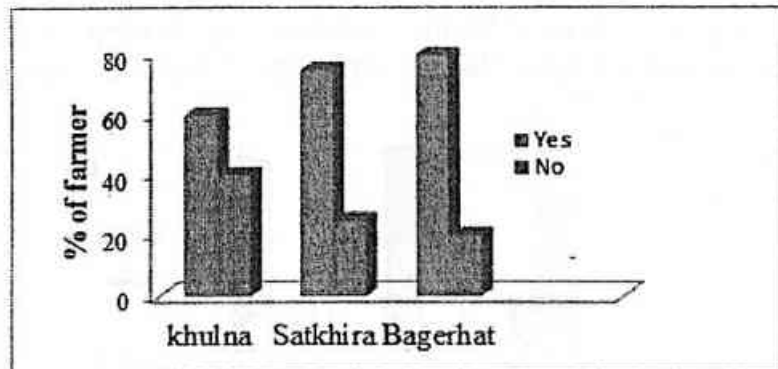
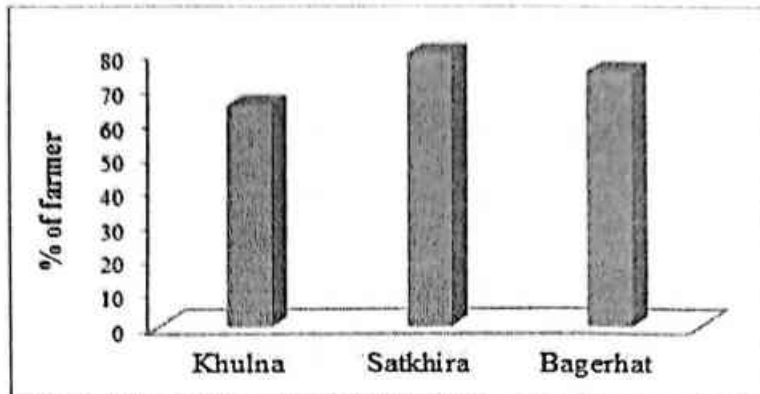


Fig 10: Poor transportation facilities

*Effect of natural calamities*

The effect of natural calamities in shrimp industry was found very dangerous. About 67% farmers of Khulna district, 80% of Bagerhat district & 85% farmers of Satkhira district said that the natural calamities like flood, Sidre like storms could be able to fully destroy the cultured shrimp (Fig. 11). Over rainfall could also change the salinity of the brackish water. Damages of infrastructures because of these disasters such as roads, culverts and bridges because of flood make difficult to transport the shrimp to the market and therefore, poor farmers are forced to sell them at a cheaper price. Mazid (1998) noted that lack of infrastructure, in terms of shortage transport communication, electricity and natural

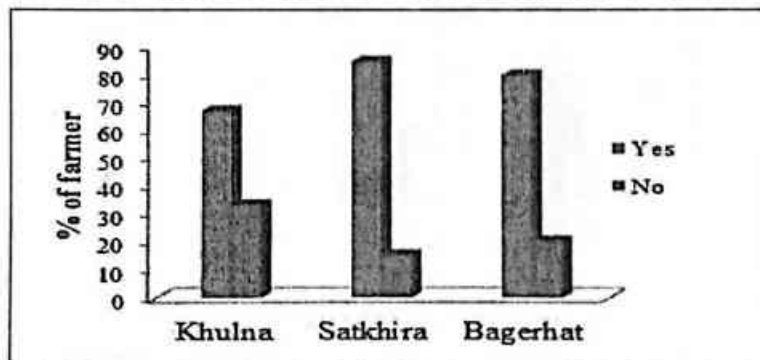
calamities are the major constraint in the development of shrimp culture in Bangladesh. Selim (1994) reported that poor infrastructure and transportation facilities which seriously constrain shrimp culture of Bangladesh.



**Fig 11: Lower price**

***Bound to sell at a lower price***

During the field visit, about 65% farmers of Khulna district said that in the most cases they took loan from the depot owners and were bound to sell shrimp to the particular depot at lower price. In Bagerhat and Satkhira district about 80% & 75% farmers were found to express the same opinion (Fig. 12). Karim *et al.* (2012) observed that in Chittagong, most of the cases, the farmers lent money from middlemen who was the primary collectors of shrimp. Usually they gave loan to farmers without any interest on condition that the farmers would have to sell shrimp to them at a lower price that the actual market price.



**Fig 12: Disasters problems**

**CONCLUSION**

Shrimp farming has been playing an important role in the economy of Bangladesh. The achievement from shrimp sector is not impressive on all counts. The major facts playing major role behind this situation are low financial condition of farmer, high interest loan facilities, poor transportation facilities, natural calamities and farmers' binding to sell the products at low price to Arottdar. Therefore, well planned policy measures and strategies are indeed inevitable to

deliver and facilitate knowledge and skill acquisition for improved shrimp production. Professional training on sustainable shrimp culture, government investment and participatory planning and management linking different stakeholders may contribute uplifting shrimp production and its contribution to national GDP. These measures would facilitate the learning process and enhance the sharing of pragmatic ideas and responsibilities to address major problems of the emerging shrimp farming and sustainable development.

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Manuscript received on 18.07.2018; Accepted on 15.12.2019

*The Chittagong University Journal of Biological Sciences, Vol. 9 (1 & 2). Page No.141-152*