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## ANALYSIS OF SUPPLY CHAIN OF FISH CAPTURED FROM THE JAMUNA RIVER IN BANGLADESH

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### ABSTRACT

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A study was conducted in two districts namely Bogura and Sirajgang to investigate the marketing channel and the marketing system of fishes captured from the Jamuna river in Bangladesh during a period of two consecutive years from January 2016 to December 2017. Fish captured from the Jamuna river were marketed through three types of market viz. auction market/ararat, wholesale market and retail market. Operators of the fish market were the fishermen, faria, aratders, paikers or baparies, whole sellers and retailers. Ten channels were identified through which fish of the Jamuna river were shifted from the fishermen to the consumers. The shortest channel was the fishermen to consumers while the longest one was the fishermen→faria→aratders→paikers→whole seller→retailer→consumers. The highest price of fish (BDT 560/kg) was recorded for *Wallago attu* in retail market followed by BDT 500/kg for *Tenulosa ilisha* and *Bagarius bagarius* while, five small indigenous species (SIS) *Tetraodon cutcutia*, *Chanda nama*, *Parambassis lala*, *Parambassis ranga*, and *Esomus danricus* got the lowest price in retail market. Icing, weighing, transportation, capital supply were required in fish marketing channels as supporting function to overcome crisis. Major constraints prevailing in the fish marketing channels were reducing fishing areas, decreasing fish catch per day per fishermen, disturbance by illegal seasonal fishermen, lack of bargaining power and market information, lack of proper fish storage and preservation facilities in the fishing craft and fish markets, wastage of fish due to spoiling during transportation, sanitations, drainage and management problems within the market areas.

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## INTRODUCTION

Fish is the principal source of animal protein for the people of Bangladesh. Although the production from culture fisheries is increasing rapidly, still the popularity, demand and price of capture fish from river is very high. Fish marketing channel is a route or path through which fishes are shifted from the harvesting or capturing spots to the ultimate consumers. Fish supply is affected due to lack of a proper marketing system and channel. To make fish available to the consumers at the right time and in the right place requires an effective marketing system (Bahadur et al., 2004). Many steps are included within a fish marketing channel such as landing center, *arat*, wholesale market and retail market etc. The whole marketing process of fish includes various functions such as buying, weighing, grading, cleaning, storing or preservation, transportation financing, market information, pricing and selling. A large number of people, many of whom living below the poverty line, find the employment in the domestic fish marketing chain in the form of farmers, processor, traders, intermediaries, day labours and transporters (Ahamed et. al., 1993; Islam, 1996 and DFID, 2000). According to Alam et al. (2010) almost all fish trades internally move through the private sector where a large number of people are dealing with fish distribution and marketing system. The marketing chain from producers to retailers goes onward through a number of intermediaries: Traders, Brokers, *Aratdars*, Wholesalers, *Mahajans* and *Dadondars*. In Bangladesh, fish marketing is almost exclusively a preserve of the private sector where the livelihoods of a large number of people are associated with fish production and marketing systems (DFID, 1998).

Because of high demand and scarcity of riverine fishes and with the development of communication system the marketing system of these fishes are changing rapidly. The livelihood of fishermen who are engaged in fishing and marketing of fish from the rivers are affected due to lack of proper marketing system and are not getting fair price. Such information required documentation about the existing marketing channels, marketing practices and prices of riverine fishes for the betterment of fishermen community. With this view in mind, attempts were taken to investigate the marketing channel and the marketing system of fishes captured from the Jamuna River in Bangladesh. Identification of market constraints and opportunities as well as exploration of better fish marketing options was also the objectives of this study.

## MATERIALS AND METHODS

### Study area and respondents

The study was conducted in two districts namely Bogura and Sirajgang which are situated in middle region of the western side of the Jamuna River. Again Sariakandi Upazilla of Bogura district and Sirajgonj sadar Upazilla of Sirajganj district were selected for the study. The main fish landing centers, nearby *Arot* (wholesale market), big marketing sites and some important retail markets were visited fortnightly during the whole study period of two years from January 2016 to December 2017. Data were collected from fishermen, *Faria*, *Arotders*, *Paikers* or *Baparies*, whole sellers and retailers.

### Tools and techniques of data collection

The study followed both quantitative and qualitative methods of data/information collection. Data were collected through direct interview of the respondents at different stages following different sets of structured questionnaire. For getting some in depth information on different aspects of marketing, Focus Group Discussions (FGD) (one in each selected location) were conducted including different categories of respondents. Besides, direct observation method was also used for capturing existing selling and buying systems of fish at different stages.

## RESULTS AND DISCUSSIONS

### Fish Market Structure

In the study area fish captured from the Jamuna river were marketed through three types of market which are described below:

#### **Auction market/Arat**

These are the primary markets located in landing centers on the bank of the Jamuna river for marketing of fish. Three auction markets were found in each of Shariakandi upazila of Bogra district and Sirajgong Sadar upazila of Sirajgong district (Table-1). Almost 70% fish of the Jamuna river was marketed through this auction markets. The fishermen themselves or in some cases, the *farias* who purchased the captured fish from the fishermen on the spot of capturing in the river transport the fish to the landing centers and carried to the auction markets.

**Table 1.** Daily fish supply in all primary markets in two sampling stations of study area

Name of Auction market or Arat	Distance from upazila Headquarter (km.)	Amount of fish supplied (kg/day)
<b>Shariakandi Upazila</b>		
Shariakandi Bazar	02	110
Mathura para Bazar	08	65
Kutub pur Bazar	12	30
<b>Total =</b>		<b>205</b>
<b>Sirajgong Sadar upazila</b>		
Mati Shaheber Ghat	02	140
Saydabad Bazar	15	120
Songasa Bazar	08	60
<b>Total =</b>		<b>320</b>
<b>Total study area =</b>		<b>525</b>

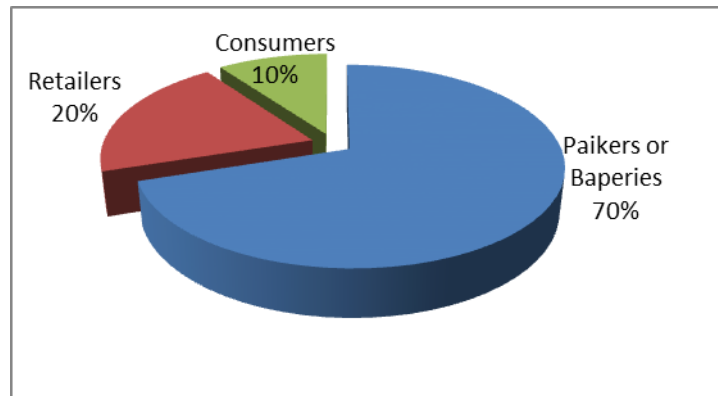
The number of auctioneers or *Aratders* varied from 15 to 20 in each of the auction markets of the study area. Three types of customer viz. the *Paikers or Baparies*, retailers and well off consumers take part in auction of fish and the highest bidder get the fish with cash payment. The major share of fish (60%) was purchased by the *Paikers or Baparies* who shift the fish to the whole sale market in the district or upazila town. The retailers share was found 39% while the consumers purchase 10% of the total amount of fish (Figure 1).

#### **Whole sale market**

These are the secondary fish market located in the district and upazila level. Only one whole sale market was found in each study district Bogra and Sirajgong. The *Paikers or Baparies* who purchased fish from the *Arats* and shifted the fish to the whole sale market. In the whole sale market the *Paikers or Baparies* sale their fish to the retailers through the *Aratders* or commission agents.

#### **Retail markets**

The retailers carried their purchased fish to these markets located in different parts of the town and sell to the consumers in small quantity.



**Figure 1.** Customers in primary fish market in two sampling stations found in two consecutive years of study

### Market Operators

The fish market within the sampling stations as well as in the whole stretch of the Jamuna river was found being operated by six types of operator and the efficiency depends on the activities of the marketing channels which are presented below:

### Fishermen

Fishermen were the primary actors in the fish marketing channel. Three types of fishermen were found capturing fish from the Jamuna river viz. permanent fishermen, seasonal fishermen and subsistence fishermen for their livelihood. The fishermen who were fully dependent on fishing for their livelihood round the year from generation to generation are the permanent fishermen. There were some seasonal fishermen who do not catch and market fish round the year. They go for fishing during the peak fishing season mainly in the monsoon when availability of fish in the river increase and at the same time have had no works with their main profession of agriculture. The subsistence fishermen catch fish occasionally for their family consumption and never sell it. Therefore, the former two types of fishermen were found in the fish markets.

### Faria

*Farias* are small fish traders who were found always moving to different fishing groups in the Jamuna river with boat in search of captured fish. They bought any amount of fish from the fishermen on the spot of capture in the river and carried it to the landing center or wholesale market at the nearest district or upazila level. In most of the cases, each *faria* has their pre-selected *Paikers* or *Aratders* to sale the collected total fish, otherwise, many times directly to consumers at the daily market place. Even, in whole sale market they sold it to the wholesaler.

### Paikers/Bepari

In the study areas *Paikers* purchased fish from the fishermen or *farias* who came to the landing centers with their captured or purchased fish. The *Paikers* took the collected fish to the wholesale market at the district or upazila level and sold it to the retailers through *Aratders*.

### Aratdar

*Aratdasr* were found as the main actors in the fish marketing process at the fish landing centers and in the wholesale market. The *Aratdars* were commission agent who had a fixed establishment and helps the fishermen and *paikers* to sell their fish and charged a fixed amount of commission of Tk.3 to 4 per cent of sale price. The *Aratdars* often provided loan to the fishermen, *farias* and *paikers* on the condition to sell fish through them.

### **Retailers**

Retailers were the last intermediaries of fish marketing channel, did not have any permanent establishment but they have fixed places in the market centre. The retailers bought fish from the landing centers through *Aratdar* or from the wholesalers and sold directly to the consumers. Mostly they purchased fish on cash. In case of very large sized fish, the retailers cut it into pieces and sold to the consumers as their required.

### **Marketing channels**

In the study areas, ten types of channel (Figure 2) were found for marketing fish captured in the Jamuna River which is described below:

**Channel I:** In this channel the fishermen sold their captured fish directly to the consumers.

**Channel II:** In this system the fishermen sold their captured fish to the consumers who took part in the auction done by *Aratders* in the landing centers.

**Channel III:** In this case the fishermen sold their captured fish to the consumers through the *farias* who bought the fish from the fishermen from the capturing spots.

**Channel IV:** In this channel the fishermen sold their captured fish to the *farias* in the capturing spots. Then the *farias* sold it to the consumers who took part in the auction done by *Aratders* in the landing centers.

**Channel-V:** Here the fishermen sold their captured fish to the retailers who took part in the auction done by *Aratders* in the landing centers. The retailers carried the fish to the retail markets of the surrounding areas and sold to the consumers.

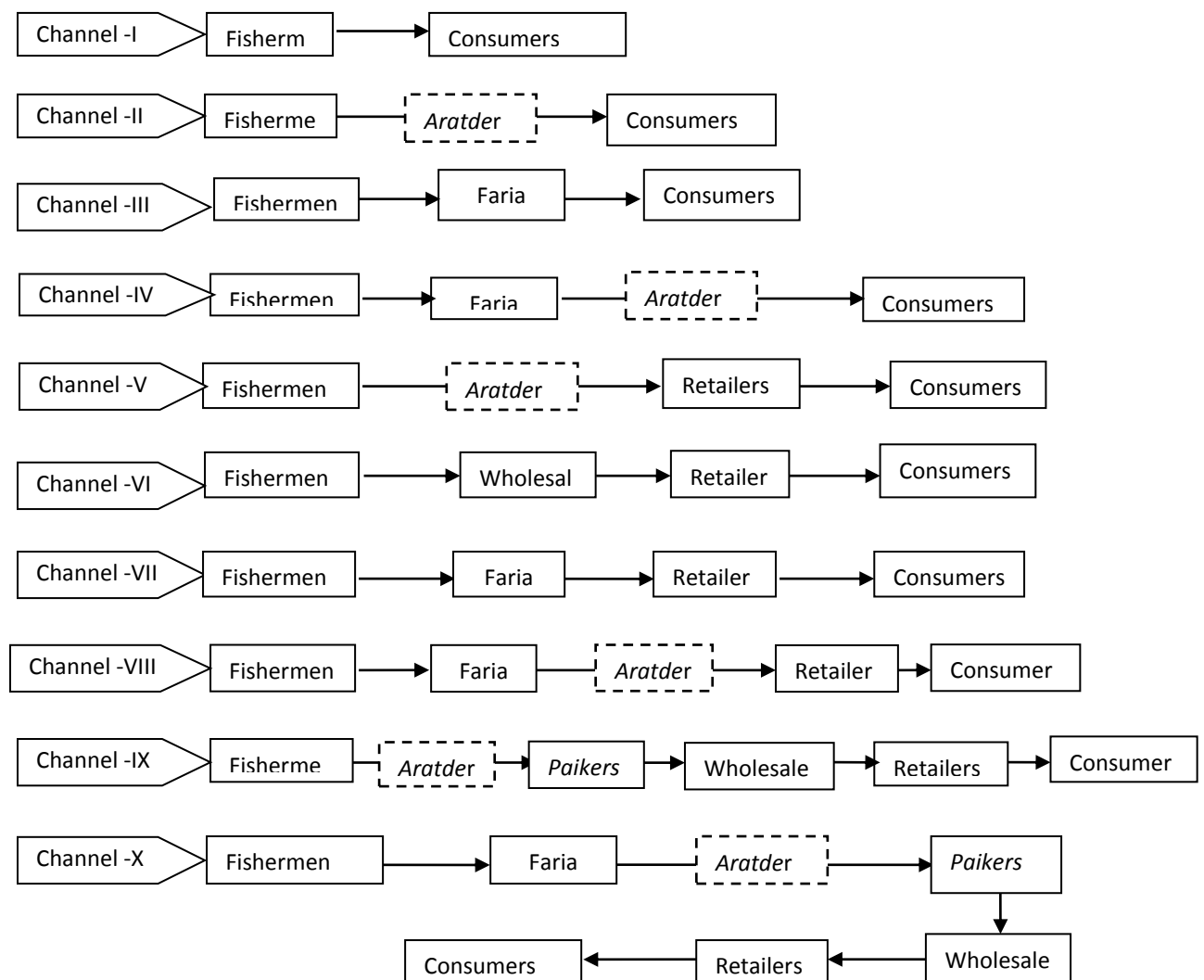
**Channel-VI:** People involved in this channel are the fishermen themselves who directly carried their captured fish to the wholesale markets in the district or upazila level and sold it to the wholesalers. The wholesalers then sold the fish to the retailers. The retailers took the fish to retail markets and sold to the consumers.

**Channel-VII:** It was the most common type of fish trading, where the fishermen sold their catch to the *farias* on the capturing spot. These *faria* carried the fish to the permanent retail markets in the district or upazila level and sold directly to the retailers. The retailers sold to the consumers.

**Channel-VIII:** In this case, the fishermen sold their catch to the *farias* on the spot where they caught fish in the river. The *farias* carried the fish to the landing centers where auction was done by *Aratders*. The retailers took part in the auction and bought fish. They carried the fish to the retail markets of the surrounding areas and sold to the consumers.

**Channel-IX:** Here, the fishermen came to the landing center with captured fish and sold to the *Paikers* through *Aratders*. The *Paikers* carried the fish to the wholesale markets in the district or upazila level and sold it to the wholesalers. Wholesalers sold the fish to the retailers. The retailers took the fish to retail markets and sold to the consumers.

**Channel-X:** In these channel, the *faria* collected fish from different fishing group in the river where the fishermen captured fish. The *farias* carried the fish to the landing centers where auction was done through *Aratders*. The *Paikers* took part in this auction and bought fish. The *Paikers* carried the fish to the wholesale markets in the district or Upazila level and sold it to the wholesalers. Wholesalers sold the fish to the retailers. The retailers took the fish to retail markets and sold to the consumers.



**Figure 2.** Schematic diagram showing marketing channels operating all along the Sariakandi and Sirajonj sadar major fish areas and landing centers in the Jmuna river

### Fish price

It was observed that the price of fish of the Jamuna River varied from species to species depending upon the size, weight and freshness of fish, marketing channel and consumers' preference. A total of 65 species of fish were found capturing and marketing during the study period of two years. Very wide variations in the prices of different species of fish at different level of markets have been observed. Among the available species the highest consumers' level price BDT 560/kg was recorded for *Wallago attu* in Sirajong Sadar retail market followed by BDT 500/kg for *Tenualosa ilisha* and *Bagarius bagarius*. In contrast, the lowest consumers' level price BDT 120/kg was recorded in retail market for five small indigenous species (SIS) *Tetraodon cutcutia*, *Chanda nama*, *Parambassis lala*, *Parambassis ranga*, and *Esomus danricus*, while other four SIS viz. *Puntius chola*, *P. ticto*, *Rasbora daniconius* and *Osteobrama cotio* got the second lowest price in retail market. Furthermore, the whole sale or auction price varied from BDT 480/kg to 100/kg according to fish species. The highest price (BDT 480/kg) was recorded for *Wallago attu* followed by BDT 420/kg for *Bagarius bagarius* and BDT 400/kg for *Tenualosa ilisha* in Sirajong Sadar and Shariakandi landing centers. Again the lowest whole sale or auction price BDT 100/kg was found for four SIS *Tetraodon cutcutia*, *Parambassis lala*, *Parambassis ranga*, and *Esomus danricus* (Figure 3).

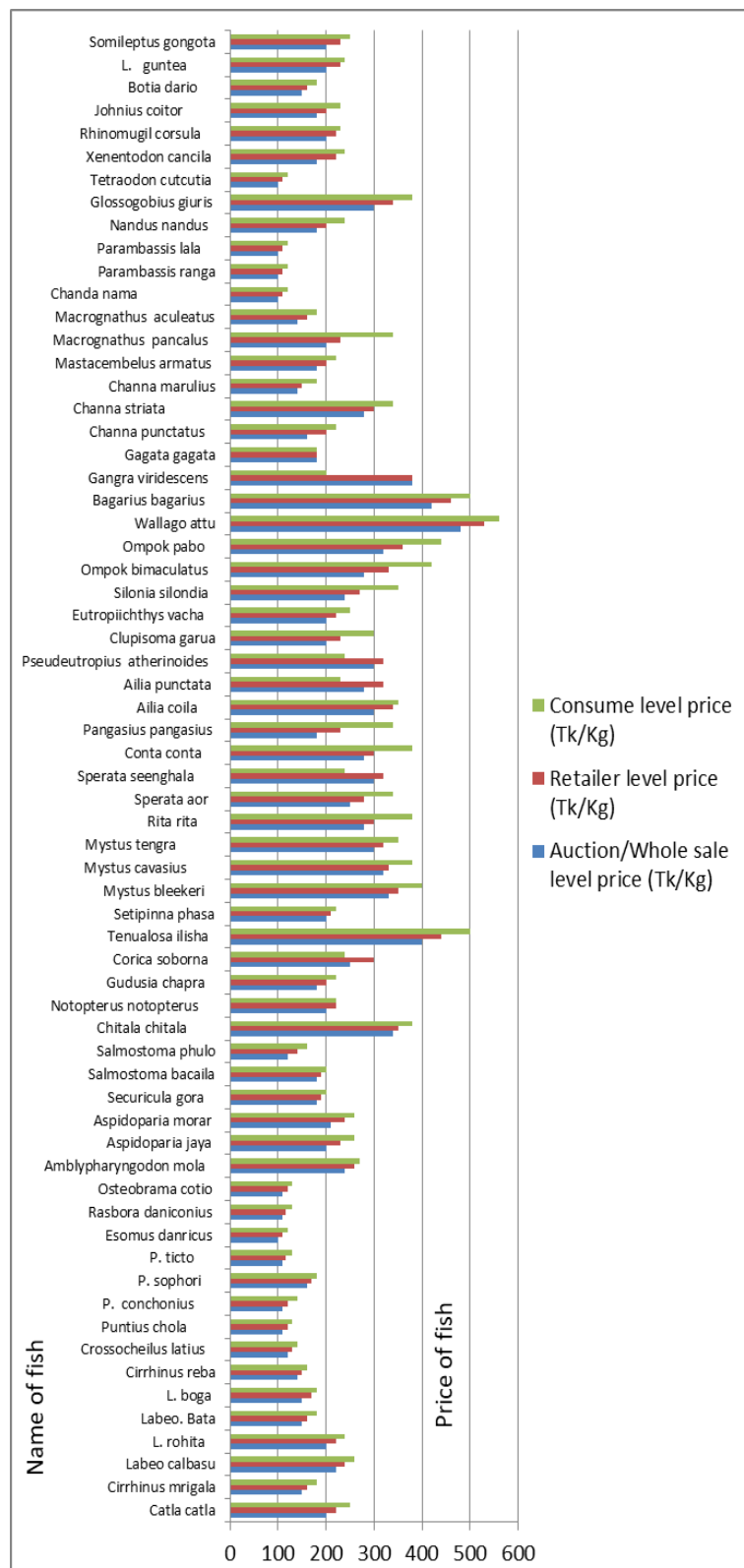


Figure 3. Price of fish in three types of market at Sariakandi and Sirajgonj sadar and landing centers in the Jmuna river

### Supporting functions in fish marketing channels

Fish marketing activities include a series of supporting functions perform by different market actors at various levels which are as follows:

**Icing:** The fishermen who go for fishing in a group with large boat for a long time, carried ice in the boat and the captured fish was kept with ice until it was shifted to the market for sale.

**Transportation:** At the end of the fishing trip the fishermen came with captured in the boat to the nearest point of landing center where auction of fish is arranged. The captured fish is carried from the boat to the auction place through head loads. From the auction place the collected fish is transported to different markets through van, rickshaw and pickup.

**Weighing:** In the landing centers and auction places of the study area auction of fish is done in eye estimation without weighing. In the retail market weighing machine is used for selling the fish to the consumers.

**Capital supply:** In the study area the fishermen and fish traders borrowed loan from different sources for facilitating their fishing and fish trading activities. According to sources three types of loan were found in both Shariakandi and Sirajgong upazila which are described below:

**Bank loan:** Bank loan was taken by *aratders* and whole sellers. Out of 50 *aratders* and whole sellers of two upazila 15 (30%) borrowed loan from three commercial banks.

**NGO loan:** Some fishermen were the beneficiaries of NGOs working in the study areas. Three NGOs namely TMSS, ASA and Grameen Bank were providing small amount of loan to the fishermen and retailers. Out of 100 fishermen of two upazilas, 27 fishermen got loan from these NGOs ranging from BDT 5,000/ to 25,000/ with interest rate varied from 12 to 15% per year.

**Private loan:** In the study area some fishermen and traders were taking private loan in the form of *dadan* which is very traditional system of money borrowing in the fish marketing channel. Out of 100 fishermen of two upazilas, 35 fishermen borrowed money from the *aratders*. The important condition of this type of loan is that the borrower fishermen must sell their fish through the respective *Aratder*.

### Constraints of marketing of fish of the Jamuna River

A number of constraints for marketing of fish in the Jamuna river were reported by different actors of the fish marketing channel within the study area. The constraints of marketing of fish are mentioned below:

#### Constraints in the fishermen level

Fishing areas in the Jamuna river reducing due to formation of islands;

- Fish catch per day per fishermen decreasing due to decrease in fish production in the Jamuna River and more and more increasing number of seasonal fishermen;
- Could not go for fishing every day due to natural calamities;
- Disturbance by illegal seasonal fishermen;
- Disturbance by robbery;
- Lack of bargaining power and market information;
- Lack of proper storage of fish in the craft during summer after harvesting; and
- Lack of necessary amount of capital.

#### Constraints in the *farias* level

- Increasing number of *farias* in this profession;
- More and more reducing in the per day harvested fish; and
- Lack of necessary amount of capital.



**Constraints in the *Aratders* level**

- Sufficient amount of fish was not found; and
- Absence of permanent infrastructural facilities.

**Constraints in the *Paikers/ Baperies* level**

- Lack of capital;
- Lack of appropriate transport;
- Wastage of fish due to spoiling during transportation.

**Constraints in the *Wholesalers* level**

- Lack of adequate storage and preservation facilities;
- Lack of necessary amount of capital; and
- Fishermen, *Farias* and *Paikers* did not maintain the freshness of fish.

**Constraints in the *Retailers* level**

- Wastage of fish due to spoiling;
- Lack of proper price of riverine fishes due to huge supply of cultured fishes;
- Lack of permanent sitting arrangement in the retail markets of the rural areas;
- Sanitations, drainage and management problems within the market areas;
- Lack of capital; and
- Insufficient supply of ice in necessity during the summer season.

In the study area fish captured from the Jamuna River were marked through three types of market such as auction market or *arat*, whole sale market and retail market. Main operators of fish market in the study area were the fishermen, *faria*, *aratders*, *paikers* or *baparies*, whole sellers, retailers and consumers. Goon *et al.* (2012) also found that fish marketing channel consists of fish farmers, *beparies*, *aratdars*, *paikers*, retailers and consumers. The auction markets are the primary fish market located in landing centers on the bank of the Jamuna River for marketing of fish. Three auction markets were found in each of Sariakandi upazila of Bogra district and Sirajgang Sadar Upazila of Sirajgong district. Almost 70% fish of the Jamuna River was marketed through this auction markets. The fishermen came to the landing centers with their catch and carried to the auction markets. The *aratders* arranged for the auction of fish. Three types of buyer viz. the *paikers* or *baparies*, retailers and well off consumers took part in auction of fish and the highest bidder get the fish with cash payment. The *aratders* took three per cent of the sale price from the fishermen as their commission. The major share of fish (70%) was purchased by the *paikers* or *baparies* who shift the fish to the whole sale market in the district or upazila town. The retailers share was found 20% while the consumers purchase 10% of the total amount of fish. The *paikers* or *baparies* shifted the fish to the whole sale market. The whole seller purchased from the *paikers* or *baparies* and sold it to the retailers. The retailers carried their purchased fish to these markets located in different parts of the town and sell to the consumers in small quantity.

The fish of the Jamuna River were taken from the fishermen to the consumers through 10 channels. The shortest channel was the fishermen to consumers while the longest one was the fishermen→*faria* →*aratders* →*paikers* →whole seller →retailer →consumers. The supporting functions in fish marketing channels included icing, transportation and weighing capital supply from different sources like, bank, NGO, *aratdars* and private loan. The price of fish of the Jamuna River varied from species to species depending upon the size, weight and freshness of fish, marketing channel and consumers' preference. Very wide variations in the prices of different groups of fish at different level have been observed both at landing center and consumer markets. The highest price (BDT 550/kg) was recorded for *Ompok bimaculatus* in Sirajgong Sadar retail market followed by BDT 500/kg for *Tenualosa ilisha* and *Ompok pabo*.

## CONCLUSION

Three types of market such as auction market or *arat*, whole sale and retail market were found for marketing the fish of the Jamuna River which were operated by fishermen, *faria*, *aratders*, *paikers* or *baparies*, whole sellers, retailers and consumers and fish was channelized through ten different channels from the fisherman to the consumers. Price of fish varied from species to species, even within the species according to the size of the fish. As the Jamuna River is the one of the most important sources of many indigenous fish species, it is the prime need to address the problems of the fisherman who were engaged in fishing in the Jamuna River to conserve its fish diversity as well as to ensure the sustainable livelihood for the fisherman. The concern laws and regulations should be imposed by the authorities properly in case of fish harvesting in the river.

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