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# ** Investigation on Fish Marketing System and Species Availability at Daulatpur Fish Market in Khulna, Bangladesh

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**Abstract**

An investigation was carried out on the fish marketing system and availability of fish species at Daulatpur fish market in Khulna over 12-months from September 2012 to August 2013. Combinations of the participatory, qualitative and quantitative methods were used for questionnaire interviews for data collection. A total of 115 species of fresh water, brackish and marine water fish and crustacean species were identified during the observation period. The number of fresh water fish species was found 60 including 14 fresh water culture species and 12 SIS whereas brackish and marine water species was found 41 and crustacean species was 14 including 5 fresh water prawn, 6 marine and brackish water shrimp and 3 crabs. During the observation period, it was found that the availability of culture fish species was higher in the market and it was 55.86% including 17% catfish, 15.65 % tilapia, 15.56 % carp fishes, 4.18% koi, 2.47% punti and 1% prawn. Catfish, carps, tilapia, snakehead, baim, shing-magur, punti, koi etc were the major abundant groups among the fresh water fish species whereas ilish and some shrimp were the abundant species of marine and brackish water fish. The highest abundance (55.86%) was found the fresh water culture fish species following to marine and brackish water species (28.01%) and fresh water capture species (16.01%). The market chain from farmers/fishermen to consumers encompassed mainly primary, secondary and retail markets involving local agents (foria and bepari) suppliers, aratdars, wholesalers and retailers. During the observation, it was found that the auctioneers get 3 to 5% commission by performing their activities. Aratdars also get 4 to 5% commission due to arrange auctioning activities and providing other facilities such as clean water supply, electricity, space, communication etc which is called aratdary. In some cases farmers have to pay market tools that locally called khazna which vary from 5 to 10% depending on amount of sales. Market structure, species quality, size and weight have an influence on the price of fish and it was found that the price of fish increases per kilogram with increasing size and it varied with species to species. Every step of intermediaries of marketing channel obtained certain amount of profit and ultimately the farmers/fishermen received an average near about 60 percent of the retail price of fish in the market.

**Key words:** Fish, Freshwater, Marine water, Marketing system, Species availability

## Introduction

Bangladesh is one of the most densely populated countries in the world, covering an area of 144,000 km2 with a population of 164 million (Nesar *et al*., 2012). The most important food crops for the people of Bangladesh are rice and fish. Fish accounts for about 60% of the animal protein intake with annual fish consumption of 17.23 kg per person (DOF, 2010). The average per capita fish consumption in Bangladesh is slightly higher than the world average of 17.1 kg a year, but lower compared with the Asian average of 18.5 kg annually (FAO, 2010a). Nevertheless, the importance of aquaculture as a source of fish food has been well recognized in Bangladesh. In the economy of Bangladesh, the fisheries sector contributes near about 60% of animal protein to the daily diets of the population, about 4.39% to GDP, 2.46% in export earnings and 22.76% to the agriculture in 2011-12 (DOF, 2013). This sector provides full-time employment of 1.5 million and part-time 16.5 million people which is about 11% of total population in Bangladesh. Fish production is an integral part of the marketing process as fish and fishery products are highly traded commodities. The total fish production was estimated at 3.26 million metric tons in 2011-12 of which 2.68 million metric tons (82.26%) and .57 million metric tones (17.74%) came from inland and marine waters respectively (DOF, 2013). Bangladesh is considered one of the most suitable countries in the world for freshwater aquaculture, because of its favorable resources and agro-climatic conditions. A sub-tropical climate and vast areas of shallow water provide ideal conditions for fish production. The fisheries sector is important for socio-economic development, nutrition supplementation, employment generation, poverty alleviation and foreign exchange earning of Bangladesh (Hasan *et al*. 2011). About 97% of the production of fish is marketed internally for domestic consumption while remaining 3% is processing for exported. Domestic market is huge, varied and complex and in terms of volume and as compared to export market, domestic market is great. Fishermen are one of the most vulnerable communities in Bangladesh. They used to live on fishing, staying on the bank of the river from longer period. Now a days, they are faring tremendous pressure to live on the ancestral profession. They are poor by any standard. Over the years, their economic condition has further deteriorated. Alam and Bashar (1995) estimated the average per capita annual income of riverine fishermen families to be Tk. 2442/- which is about 70% lower than the per capita income of the country as a whole. Being an isolated community, fishermen are deprived of many amenities of life. Actual condition of the fishermen community in

***Editorial note***

*Due to some necessary corrections, this article has been revised in this volume 7(2) and, therefore, has been withdrawn from the previous volume 7(1) with the page numbers 53-57.*

general must be assessed to know the real status of riverine fishing as a source of income.

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 labors and transporters (Ahmed *et. al*., 1993; Islam, 1996 and DFID, 2000). The main aim of this investigation is to evaluate the existing marketing system, the species availability and variation at lean and peak season and to identify the constraints.

## Materials and Methods

***Study area***

The study was undertaken at Daulatpur fish market in Daulatpur Metropolitan thana under the city corporation of Khulna, Bangladesh. It is one of the largest and old fish market near the fish landing centre of Khulna. The availability of space for retailers, aratdars, wholesalers and auctioneers is the special criteria of this fish market. Daulatpur fish market was selected for collecting data due to well communication, high availability of culture and capture fish species, developed market infrastructure and other facilities available in the market.

***Data collection methods***

Primary data were gathered by market surveys initially involving the inspection of the study area over 12-months from September 2012 to August 2013. Combinations of the following participatory, qualitative and quantitative methods were used for primary data collection.

***Participatory rural appraisal (PRA)***

Participatory rural appraisal is a group of methods to collect information on a participatory basis from rural communities. The advantage of PRA over other methods is that it allows a wider participation of the community, and therefore the information collected is likely to be more accurate (Chambers, 1992; Conroy, 2002; Chambers, 1994). For this study, the PRA tool focus group discussion (FGD) was conducted fish farmers/fishermen to get an overview on fish distribution and marketing systems, constrains of marketing etc. A total of 12 FGD sessions were conducted where each group size was 6-8 persons (total 80 fish farmers and fishermen) and the duration of each session was approximately 2h.

***Questionnaire interviews***

Questionnaire interviews with target groups were preceded by preparation and testing of the questionnaire in accordance with the objective set for the study. Before preparing the questionnaire, a draft questionnaire was developed and then pre-tested in the study area. Attention was paid to incorporate any new information that had not been asked in the draft questionnaire. The draft questionnaire was then changed, modified, rearranged and improved according to the experience gained from the survey. For questionnaire interviews, traders, retailers, suppliers and aratdars were selected through simple random sampling. Information about fish marketing, pricing policy, trading actions, constrains of fish marketing and socio-economic conditions of traders are the consequences of the interviews.

***Cross-check interviews with key informants***

Key informants are expected to be able to answer questions about the knowledge and behavior of others and about the operations of the broader systems (Atkinson, 1992; Elmendorf and Luloff, 2006). Key informants are persons with special knowledge on a particular topic. Key informants are expected to be able to answer questions about the knowledge and behavior of others, and about the operations of the broader systems (Theis and Grady, 1991). Cross-check interviews were conducted with Upazila Fisheries O⁄cers, researchers, policymakers, relevant non-governmental organization (NGO) workers and teachers. A total of 20 key informants were interviewed during the study period. Where information was found to be contradictory, further assessment was carried out.

***Data analysis***

Data from questionnaire interviews were coded and entered into a database system using Microsoft Excel software. Results from the data analyses, in combination with qualitative information collected through FGD and cross-check interviews with key informants were used to describe the marketing system, pricing policy, auctioning of fish and marketing constraints.

## Results and Discussion

***Infrastructure of the market***

According to different parts of Bangladesh, infrastructure of fish market frequently behaves to become different from place to place. For marketing of fish or fishery products domestically and for the physical development of markets, infrastructure facilities are most important. Daulatpur fish market is paka ten shed building and clean water, electricity, ice supply, transport facilities etc are well and sufficient nevertheless, fish markets are not well developed throughout the country and daulatpur is not out of these.

***Species composition***

A total of 115 species of fresh water, brackish and marine water fish and crustacean species were identified during the observation period in the Daulatpur fish market (Table 1). The availability of

(capture and culture) fish species in the market was varied in different months during the study period. 60 fresh water fish species were found including 14 fresh water culture species and 12 SIS (Small Indigenous Species) whereas brackish and marine water species wertr 41 and crustacean species were 14 is show in Table 1. The total fresh water and brackish water fish species in Bangladesh is 289 (DOF, 2012) whereas marine water fish species is 475. According to the red list of IUCN-Bangladesh (2000), 54 species are endangered or somewhat threatened (vulnerable, endangered and critically endangered) though the list is 12 years old. There were many species of fresh water and brackish water fish (According to IUCN-Bangladesh) are being endangered species and their availability in the market were a very few during the observation period. There were about 20 exotic fish species introduced to Bangladesh for increasing fish production (aquaculture), insects and weed control and about 25 species were for ornamental purpose in different time. During the observation period, 4 Indian major carps and 10 exotic fish species were the most dominant fish species in the market. A total of 14 crustacean species was found whereas 5 fresh water prawn, 6 marine and brackish water shrimp and 3 crabs (Table 1). Fresh water pleomonids are referred to as prawn and marine penaeids and pleomonids are called shrimp (FAO, 1985). From the point of view of economic importance, bagda (*Penaeus monodon*) was the remarkable species which was cultured in the coastal region of Bangladesh and shrimps were commercially harvested from the marine and brackish water during the season.

**Table 1:** Availability of fish species in Daulatpur fish market

| **Fresh water capture fish species** | | | |
|---|---|---|---|
| SL No. | Local name | English name | Scientific name |
| 1 | Air | Giant river catfish | *Sperata seenghala* |
| 2 | Boal | Fresh water shark | *Wallago attu* |
| 3 | Bata | bata | *Labeo bata* |
| 4 | Baila | Scribbled goby | *Awaous grammepomus* |
| 5 | Bacha | - | *Eutropiichthys bacha* |
| 6 | Batasi | Indian potasi | *Neotropius atherinoides* |
| 7 | Bhadi punti/jatpunti | Pool barb | *Puntius sophore* |
| 8 | Koi | Climbing perch | *Anabus testudineus* |
| 9 | Koi | Spiketail paradises fish | *Pseudosphromenus capanus* |
| 10 | Kajuli | Gangetic ailia | *Ailia coila* |
| 11 | Khailsha | Banded gourami | *Trichogaster fasciata* |
| 12 | Shing | Stinging catfish | *Heteropneustes fossilis* |
| 13 | Magur | Walking catfish | *Clarias batrachus* |
| 14 | Bheda/mini | Gangetic leaffish | *Nandus nandus* |
| 15 | Chital | Clown knifefish | *Chitala chitala* |
| 16 | Foli | Bronze featherback | *Notopterus notopterus* |
| 17 | Gulsa tengra | Gangetic tengra | *Mystus bleekeri* |
| 18 | Nuna tengra | Long whiskers catfish | *Mystus gulio* |
| 19 | Tengra | Striped dwarf catfish | *Mystus vittatus* |
| 20 | Gura tengra | Hummingbard catfish | *Rama chandramara* |
| 21 | Shillong | Silond catfish | *Silonia silondia* |
| 22 | Pangas | Pangas catfish | *Pangasius pangasius* |
| 23 | Taki | Spotted snakehead | *Channa punctata* |
| 24 | Chang | Walking snakehead | *Channa orientalis* |
| 25 | Shol | Snakehead murrel | *Channa striata* |
| 26 | Gozar | Great snakehead | *Channa marulius* |
| 27 | Dorgi | gobi | *Apocryptes bato* |
| 28 | Gusibaim | Barred spiny eel | *Macrognathus pancalus* |
| 29 | Tarabaim | One-stripe spiny eel | *Macrognathus aral* |
| 30 | Baim/shalbaim | Zig-zag eel | *Mastacembelus armatus* |
| 31 | Kakila | Asian needlefish | *Xenentodon cancila* |
| 32 | Gonia | Kuria labeo | *Labeo gonius* |
| 33 | Chewa | Bearded eel goby | *Teanioides cirratus* |
| 34 | Pabda | Pabdah catfish | *Ompok pabda* |
| **SIS (Small Indigenous Species)** | | | |
| 1 | Chela | Large razorbelly minnow | *Salmophasia bacaila* |
| 2 | Mola | Mola carplet | *Amblypharyngodon mola* |

| | | | |
|---|---|---|---|
| 3 | Dhela | - | *Osteobrama cotio* |
| 4 | Teri punti | Onespot barb | *Puntius terio* |
| 5 | Tit punti | Ticto barb | *Puntius ticto* |
| 6 | Rani/bou mach | Bengal loach | *Botia dario* |
| 7 | Chebli | Giant danio | *Devario aequipinnatus* |
| 8 | Lomba chanda | Elongate glass-perchlet | *Chanda nama* |
| 9 | Ranga chanda | Indian glassy fish | *Parambassis ranga* |
| 10 | Darkina | Flying barb | *Esomus danricus* |
| 11 | Gutum | Guntea loach | *Lepidocephalichthys guntea* |
| 12 | Chuna khailsha | Honey gourami | *Trichogaster chuna* |
| **Fresh water culture species** | | | |
| 1 | Rui | Indian major carp | *Labeo rohita* |
| 2 | Catol | Catla | *Catla catla* |
| 3 | Mrigal | Mrigal carp | *Cirrhinus cirrhosus* |
| 4 | Silver carp | Silver carp | *Hypophthalmichthys molitrix* |
| 5 | Grass carp | Grass carp | *Ctenopharyngodon idella* |
| 6 | Tilapia | Nile tilapia | *Oreochromis niloticus* |
| 7 | Thai pangas | Striped catfish | *Pangasianodon hypophthalmus* |
| 8 | Bighead carp | - | *Aristicthys nobitis* |
| 9 | Kalibaus | Orange-fin labeo | *Labeo calbasu* |
| 10 | Chinese punti | Olive barb | *Barbonymus gonionotus* |
| 11 | Common carp | Common carp | *Cyprinus carpio* |
| 12 | Minar carp | Mirror carp | *Cyprinus carpio var. specularis* |
| 13 | Black carp | - | *Mylopharyngodon pisceus* |
| 14 | African magur | African catfish | *Clarias garipinus* |
| **Brackish and marine water species** | | | |
| 1 | Baghair | Goonch | *Bagarius bagarius* |
| 2 | Bishtara | Spotted scat | *Scatophagaus argus* |
| 3 | Bhetki/Coral | Barramundi | *Lates calcarifer* |
| 4 | Bom maitta | Tuna | *Euthynnus affinis* |
| 5 | Borguni | Jarbua terapon | *Terapon jarbua* |
| 6 | Chewa | Torpedo trevally | *Taenoides anguillaris* |
| 7 | Chapila | Indian river shad | *Gudusia chapra* |
| 8 | Churi | Smallhead hairtail | *Eupleurogrammus muticus* |
| 9 | Churi | Savalani hairtail | *Lepturacanthus savala* |
| 10 | Churi | Ribbon fish | *Trichiurus haumela* |
| 11 | Dhela | Coromondel ilisha | *Ilisha filigera* |
| 12 | Dhela | Bigeye ilisha | *Ilisha megaloptera* |
| 13 | Ghagra | Ghagra catfish | *Arius gagora* |
| 14 | Ilish | Hilsa shad | *Tenuolosa ilisha* |
| 15 | Chandan ilish | Toli shad | *Tenualosa toli* |
| 16 | Kakila | Asian needlefish | *Xenentodon cancila* |
| 17 | Khorsula | Corsula | *Rhinomugil corsula* |
| 18 | kawa | Hardtail | *Megalapsis cordyla* |
| 19 | Lakhua | Indian salmon | *Polynemus indicus* |
| 20 | Lattia | Bombay duck | *Harpadon nehereus* |
| 21 | Lamba poa | Long jewfish | *Sciaenoides brunneus* |
| 22 | Lal poa | Silver jew | *Johnius argentatus* |
| 23 | Poa | Pama croaker | *Otolithoides pama* |
| 24 | Mullet | Flathead grey mullet | *Mugil cephalus* |
| 25 | Med | Giant sea catfish | *Katengus typus* |
| 26 | Maitya | Jack and pompanos | *Cybium guttatum* |
| 27 | Nuna baila | Bumblebee goby | *Brachygobius nunus* |
| 28 | Nuna tengra | Long whiskers catfish | *Mystus gulio* |
| 29 | Phasa | Gangetic hairfin anchovy | *Setipinna phasa* |
| 30 | Potka | Green pufferfish | *Tetraodon flaviatilis* |
| 31 | Rupchanda | Chinese pomfret | *Pampus chinensis* |

| | | | |
|---|---|---|---|
| 32 | Rupchanda | Black pomfret | *Parastromateus niger* |
| 33 | Falichanda | Silver pomfret | *Pampus argenteus* |
| 34 | Ruppan | Japanese threadfin bream | *Nemipterus Japonicus* |
| 35 | Rupsha | Skipjack tuna | *Katsuwonus pelamis* |
| 36 | Samudra chela | - | *Thryssa purava* |
| 37 | Samudra koi | Atlantic tripletail | *Lobotes surinamensis* |
| 38 | Sagor rita | Whale catfish | *Rita rita* |
| 39 | Saplapata | Pale-edged stingray | *Dasyatis zugei* |
| 40 | Tulardadi | Lady fish | *Sillaginopsispanijus* |
| 41 | Tapasi | Paradise threadfin | *Polynemus paradiseus* |
| **Crustacean species** | | | |
| 1 | Golda chingri | Giant fresh water prawn | *Macrobrachium rosenbargii* |
| 2 | Doda chingri | Goda river prawn | *Macrobrachium scabriculum* |
| 3 | Dimua chingri | Dimua river prawn | *Macrobrachium villosimanus* |
| 4 | Kunchu/gura chingri | Kuncho river prawn | *Macrobrachium lamaerrei* |
| 5 | Chatka chingri | Monsoon river prawn | *Macrobrachium malcolmsonii* |
| 6 | Bagda chingri | Giant tiger shrimp | *Penaeus monodon* |
| 7 | Sada/Bagtara chingri | Green tiger shrimp | *Penaeus semisulcatus* |
| 8 | Chapta chingri | White shrimp | *Penaeus indicus* |
| 9 | Harina chingri | Brown shrimp | *Metapenaeus monoceros* |
| 10 | Harina chingri | Yellow shrimp | *Metapenaeus brevicornis* |
| 11 | Chamua chingri | Brown shrimp | *Metapenaeu spinulatus* |
| 12 | Shela kakra | Mud crab | *Scylla serrata* |
| 13 | Sagor kakra | Horseshoe crab | *Carsinoscorpius rotandicand* |
| 14 | Sataru kakra | Swimmer crab | *Neptunus sanguinolenta* |

***Variation in species abundance***

The availability of fish in the market depends on the demand and supply of fish in the market, transport and communication facilities and season of capture and culture of fish. The availability of fish species was varied from 41 to 89 in different months and the highest number (89) was found in September and lowest (41) in January during the observation period (Fig. 1).

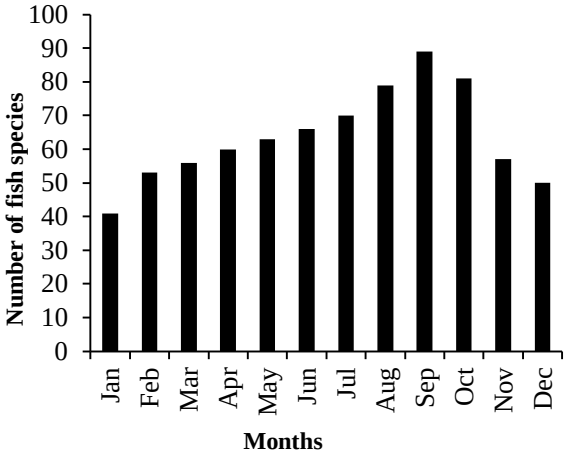


**Fig. 1.** Availability of fish species in different months

The percentage (%) and the availability of culture fish species were found higher during the month of January, May and December (Fig. 3) in the market and it was 55.86% including 17% catfish, 15.65 % tilapia, 15.56 % carp fishes, 4.18 % koi, 2.47 % punti and 1% prawn. Catfish, carps, tilapia, snakehead, baim, shing-magur, punti, koi etc were the major abundant groups among the fresh water fish species whereas ilish and some shrimp species (crustaceans) were the abundant of marine and brackish water species (Table 2).

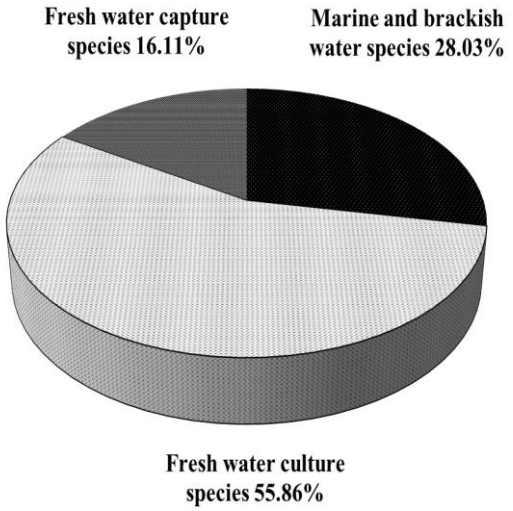


**Fig. 2.** Percentages (%) of fresh water culture species, capture species and marine and brackish water species during the observation period

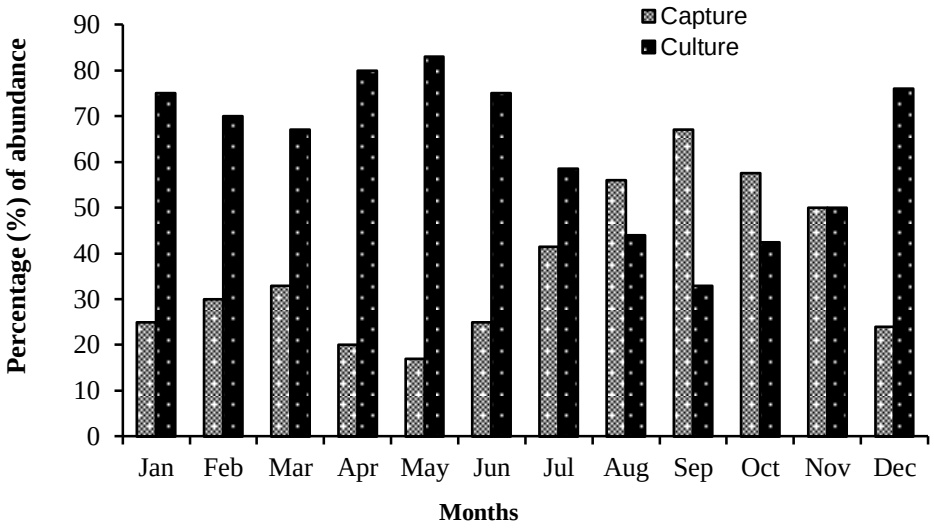


**Fig. 3.** Percentage of capture and culture fish species in different months

The highest abundance (55.86%) was found the fresh water culture fish species following to marine and brackish water species (28.03%) and fresh water capture species (16.11%) (Fig. 2) during the observation period in the market which indicates that the capture fish species in the market reduced day by day. The value of this observation is supported to the reported by DOF (2013) where the total fish production in Bangladesh was estimated 3.26 million metric tons whereas culture and capture fisheries were estimated 52.92% and 47.08% respectively in the 2011-2012. The percentage of capture fish species was found higher between the month of August and October when ilish (*Tenuolosa ilisha*) was the dominant species (Fig. 1 and Table 2) and the number of fish species were varied between 79 and 81. Ilish was the most dominant species among the marine and brackish water capture fish species and it was found the highest abundance in the months between August and November (Table 2). Ilish was found all the year round but July to October was the peak season of ilish when larger size ilish was found available in the market and rest of the time smaller size ilish was also found which are called Jatka. According to the crustacean species, harina chingri, sada/bagtara chingri and chatka chingri were found all the year round during the observation period.

**Table 2:** Percentages (in weight) of major groups of fish species in different months

| Name of month | Ilish (%) | Carps* (%) | Catfish * (%) | Tilapia (%) | Snakehead (%) | Baim (%) | Shing & Magur (%) | Koi & Thai Koi (%) | Punti (%) | Shrimp & Prawn (%) | SIS (%) | Others (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **January** | 2 | 5 | 35 | 15 | 5 | - | 14 | 15 | - | 5 | 2 | 2 |
| **February** | 8 | 4 | 33 | 15 | 6 | 2 | 11 | 10 | 4 | 2 | 1 | 4 |
| **March** | 5 | 6 | 26 | 17 | 11 | 4 | 10 | 8 | 3 | 3 | 4 | 3 |
| **April** | 2 | 31 | 14 | 20 | 4 | 2 | 6 | 10 | 2 | 1 | 3 | 5 |
| **May** | 2 | 35 | 9 | 22 | 3 | 1.5 | 5 | 7 | 3.5 | 5 | 3 | 4 |
| **June** | 10 | 32 | 11 | 17 | 4 | 1 | 3 | 8 | 2 | 4 | 2 | 6 |
| **July** | 32 | 22 | 12 | 15 | 1.5 | 1 | 2 | 4 | 0.5 | 4 | 1 | 5 |
| **August** | 44 | 15 | 10 | 12 | 1 | 0.5 | 2 | 3 | 1.5 | 2 | 1 | 8 |
| **September** | 56 | 5 | 9 | 8 | 0.5 | 0.5 | 1 | 2 | 1.5 | 2 | 1.5 | 8 |
| **October** | 50 | 12 | 8 | 14 | 2 | 0.5 | 1.5 | 2 | 1 | 5 | 1 | 3 |
| **November** | 43 | 13 | 12 | 15 | 1 | 0.5 | 2 | 4 | 1.5 | 4 | 2 | 2 |
| **December** | 8 | 6 | 24 | 17 | 3 | - | 8 | 15 | 9 | 5 | 2 | 3 |
| ***Carps**-Indian major carps and exotic carps**; *Catfish**-Thai pangas and African magur | | | | | | | | | | | | |

***Marketing channel of fish***

Marketing channel includes the involvement of some intermediaries or middlemen through which transformation of fish take place from producer to consumer. Farmers/fishermen are the primary producers in the fish marketing systems. With a few exceptions, farmers/fishermen never directly communicate with the consumers. The market chain from farmers/fishermen to consumers encompassed mainly primary, secondary and retail

markets involving local agents (foria and bepari) suppliers, aratdars, wholesalers and retailers (Fig. 4). In Bangladesh, fish marketing is almost exclusively preserve of the private sector where the livelihoods of a large number of people are associated with fish production and marketing systems (DFID, 1997). There is no pricing policy by the government and trade association. Prices are set by different methods such as open auction, bargain and whisper. The price is settled by competition among intending bidders. In presence of buyer, the bids are loudly announced by auctioneers. During the observation, it was found that the auctioneers get 3 to 5% commission by performing their activities. Aratdars also get 4 to 5% commission due to arrange auctioning activities and providing other facilities such as clean water supply, electricity, space, communication etc which is called aratdary. Besides, in some cases farmers have to pay market tools that locally called khazna which vary from 5 to 10% depending on amount of sales. Market structure, species quality, size and weight have an influence on the price of fish and it was found that the price of fish increases per kilogram with increasing size and it varied from species to species. It was also found that every step of intermediaries of marketing channel obtained certain amount of profit and ultimately the farmers/fishermen received an average near about 60 percent of the retail price of fish in the market.

During the observation period, it was found that fishes were collected by foria and bepari which are called local agents and then they send these fish to the suppliers and to the arat.

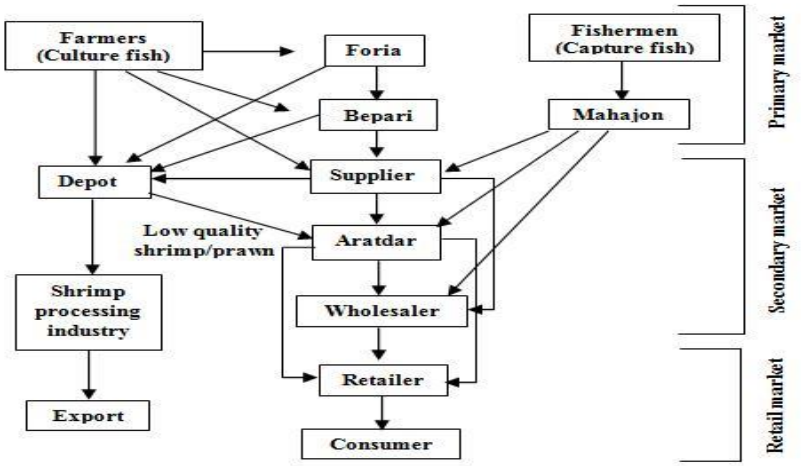


**Fig. 4.** Marketing channel of fish and prawn

Most of the fishermen were encompassed to the mahajan who gave money to the fishermen which is called dadon and fishermen bound to sale their fish to the dadondar. The dadondar (mahajans) supply this fish to the arat and to the wholesale market through suppliers. Aratdars also supply their fish mainly to the wholesale markets and in some cases little amount of fish supply to the retail market. Retailers purchase their fish from the wholesale market and small amount of fish from the arat and then ultimately fish reached to the consumers. In case of prawn and shrimp, the local agents (foria and bepari) and suppliers purchase prawn/shrimp and supply to the depot and sometimes farmers also send their prawn/shrimp to the depot directly. The depot sends their collecting prawn/shrimp to the processing industry and then industry processed them for exporting. Depot also supply low quality prawn/shrimp to the arat and ultimately for the consumers in the market.

***Constraints***

Main constraints of fish marketing were related to infrastructure, plant management and institutional management aspect. From the infrastructural constrains lack of modern and hygienic landing centre; storage of adequate ice-plants with sufficient capacity, cold and freezer storage; lack of handling and preservation facilities; illiteracy, ignorance, lack of awareness and poor socio-economic condition of the fishers etc were the most severe. There was a little or no initiative was taken to improve the quality of fish market because the demand of fish was always higher than the supply. As a result, fish of any quality were sold in the market although the traders were faced serious problems including heavy losses, wastage and poor price. After harvesting all the fishes were passed a number of channels and intermediaries and transported by bus/track in road and by boat/launch in water mainly using bamboo baskets. Road and water transportation were used to carry fish to the distant places from landing point and it was taken 7-9 days after harvesting which was less than normal shelf-life of tropical species if the condition and of handling and storage is ideal (Uddin and Das, 1994). The loading and unloading at different stages of transportation, long exposure to high temperature, improper used of ice, rough and

unhygienic method of handling, contamination and lack of knowledge on quality aspects among the actors involved were the main contributing factors for the quality loss.

## Conclusions

The common indicator of marketing efficiency is the size of marketing margin which makes a huge gape between the producers (farmers/fishermen) and consumer's level of prices. Some management measures such as more new policies and strategies should be taken by the government and research organizations to conserve the valuable native endangered fish species. In order to sufficient supply of fish in the market, it is worthwhile to increase transportation and communication facilities, sufficient icing facilities, improvement of preservation and shipment facilities, provide institutional and organizational support, government support, extension services, more researches and public private partnership. It is important that the public-private relationship and public awareness can improve the existing system of fish marketing.

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