

Collection Procedures of Carp Egg of Halda River along with Marketing and Economic Conditions of the Fishermen and Other Related People

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IJASR 2019

VOLUME 2

ISSUE 4 JULY – AUGUST

ISSN: 2581-7876

**Abstract** – Halda is the only river in Bangladesh where major Indian carps spawn naturally which makes this river an irreplaceable heritage of this country. For this reason a study was conducted to observe present status of Indian major carp breeding and collection management procedures of carp spawn and fry from the Halda River along with marketing process and economic conditions of the fishermen and other people related with it during March 2015 to July 2015. Data were collected through direct interview. During this study it was found that in spawn and fry marketing system of River Halda, a number of intermediaries were involved actively for selling eggs, spawn and fry. Four different types of marketing systems were identified in Halda fry distribution fry seller to final consumer. Fertilized Halda eggs were collected and hatched by the local people using their indigenous method. Those egg collectors sold per kg of spawn and fry at a cost of 50,000-80,000 Tk. to the hatchery owners. Again, hatchery owners sold each and every fry at a cost of 5.0-6.0 Tk. to the local fish farmers. Yearly survey information about Halda River's egg, spawn and fry collection in Raosan Upazila showed that there were ups and downs in the production rate of Halda fry during last 4-5 years. The production status in 2011, 2012, 2013, 2014 and 2015 year was 61.72 kg, 302.65 kg, 80.9 kg, 178.38 kg and 38.42 kg respectively and these types of ups and down indicated a major concerning issue. Different types of transports were used to carry spawn and fry of Halda River. Investigation was also made to find out the economic condition, average income during breeding season and off season, education background, family status etc. of the local people of Halda region involving themselves in fry collecting and marketing process. This study recommends that the habitat of Indian major carp with ecological factors and protection of the breeding ground is needed to ensure availability of eggs, spawn and fry in the Halda River.

**Keywords:** Halda river, Carp Spawn and fry, Marketing channel, Economic Condition.

#### 1. Introduction

Rivers play very important roles in the development of any country. Halda, the third main river of Chittagong after the Karnaphuli and the Sangu, is such a resourceful river of Bangladesh. Originating at the Batnatali Hill Ranges of Ramgarh Upazila under Khagrachari District, Bangladesh, the river flows through Fatikchhari, Hathazari and Raosan Upazilas and Chandgaon Thana of Chittagong before ending into the Karnaphuli River. Halda River is the only river in Bangladesh from where fertilized eggs of major Indian carps are collected (Patra and Azadi 1985 and Tsai 1981). This river is famous as a breeding ground for pure Indian carp fish populations. As a tidal river, this is the only of its kind in the world from where fishermen collect fertilized eggs directly (Kibria, 2009).

Then the fishermen stocked these fertilized eggs in their own ponds near River Halda. In this case, they collect all the eggs at a time and divide the eggs between them. After that, they hatch the fertilized eggs in their ponds. Necessary aeration facilities are provided by them to facilitate the hatching. Then they try to sell the fry immediately before absorbing the yolk sack. It takes 3-4 days to absorb the yolk sack. Within this period, they try to sell the fry. If they cannot sell all the fry within this period, they started to feed the fry and also continue the selling. They do this to avoid the feeding cost of the fry.

In this case, the sex of the fry remains undefined and they sell them in the unit of Kilogram (kg). Each kg of the fry costs about 50,000 - 80,000 Taka. Hatchery owners from the different corners of the country come here to buy these fry with a suitable cost. For this reason, hatchery spawn and fry are mostly unable to reach the highest growth of fish. In this circumstance, hatchery owners need to collect the brood and fry from natural source. River Halda is the only suitable example from which they can collect wild spawn and fry. Although some hatchery owners collect spawn and fry of River Halda to improve their business, but there is no specific information available on quality of Halda spawn and fry over artificial fry, their market acceptance, their marketing channels and as well as profit and loss of Halda spawn and fry. Even people who are involved directly or indirectly with the marketing of Halda spawn and fry are also unknown. As a result, it is essential to determine the growth and survival rate of Halda spawn and fry and identify their marketing channels and potentials for further development and improve the livelihood of the poor people engaged in the collection of Halda spawn and fry. According to DoF, different research works have been done on the River Halda, such as, Conservation and Management of River Halda; Impact of Climate change on River Halda and its Remedy (Azadi et. al., 2005), Restoration of natural Breeding Habitat of the River Halda (Rahman et. al., 2012), So far it was known that, no initiatives were taken for the development of marketing channels of spawn and fry of River Halda. The socio-economic conditions of personnel who are involved with Halda spawn and fry are also unknown. Besides, the quality of spawn and fry and their transportation system are also unknown. This study therefore, would focus to identify different marketing channels, transportation facilities and socio-economic conditions of personnel involved with spawn and fry of river Halda.

## 2. Materials and Methods

### 2.1 Location and area of the Halda River

Halda River is situated in southern-east area of Bangladesh. It originates at the Badantali Hill Ranges in Ramgarh Upazila in the Chittagong Hill Tracts, flows through Fatikchhari, Bhuipur, Hathazari, Raozan Upazilla and Chandgaon Thana of the Chittagong district, and falls into the Karnaphuli River. During study period the 81-kilometre (50 mile) long river had a very turbulent tributary, the [Dhurung River](#). The river was navigable by big boats 29 km into it (up to [Nazir Hat](#)) and by small boats 16–24 km additional (up to [Narayanhat](#)). The depth of the Halda River was 21 feet (6.4 m) in depth and 30 feet (9.1 m) in deepest point.

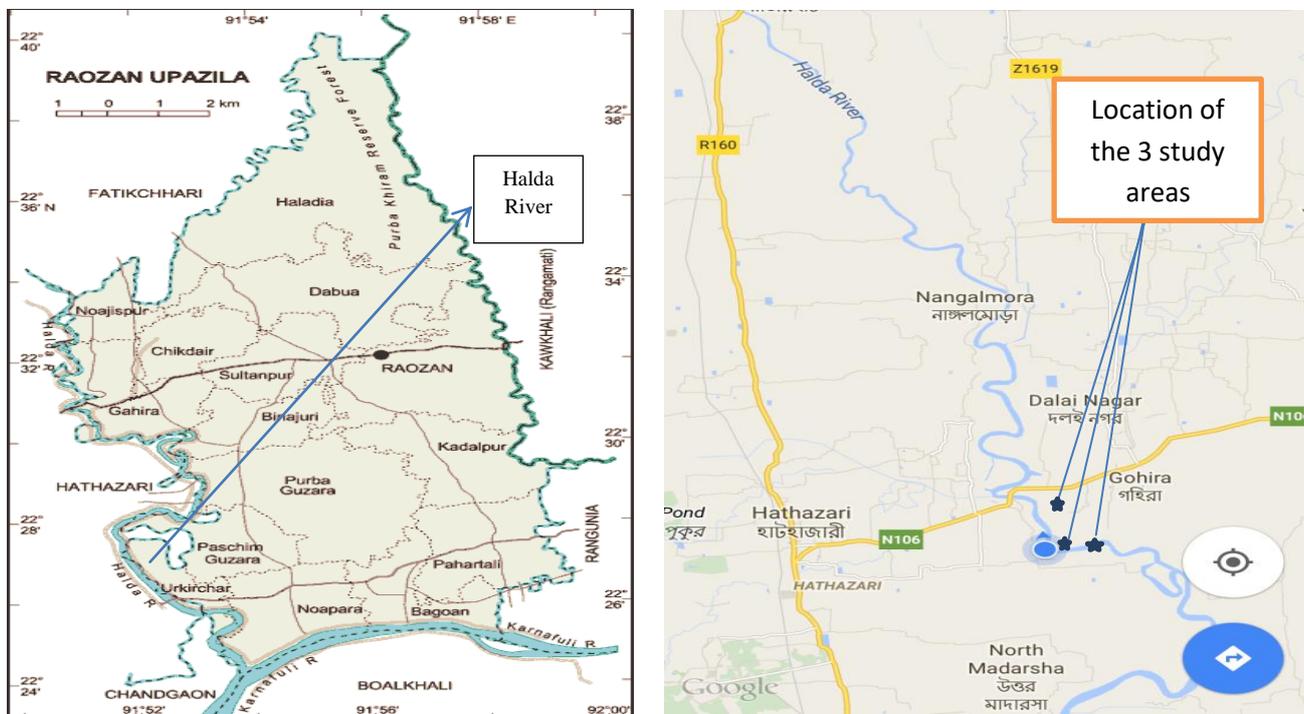


Fig. 1. Map of Raozan Upazila showing the location of Halda River with three study areas (GPS location).

## 2.2 Period of the Study

The study was conducted for a period of 5 months from March to July 2015. Data were collected personally through direct interview. The respondents served information mainly from their memory and personal experiences.

## 2.3 Experimental procedure

The research was operationalized through collection of both primary and secondary data, comprehensive literature review and extracts of local knowledge and information. Collection of primary data was made by field observation of the collecting procedure of egg from Halda River, stocking method of collected egg, spawning of fry, collectors and fry sellers of River Halda, people involved in fry rearing in Halda river areas and in government hatcheries, fry buyer and fish farmers etc. Secondary data were collected from Upazila Fisheries Officer (UFO) and from the local fishers.

## 2.4 Formation of committee and Awareness meeting

Local management committee was formed with the community people living in the vicinity of Halda river region like Gohira, Machuagona and Madunaghat consisting of 25 members from fry collectors, fishermen through participatory discussion.

## 2.5 Data Collection

### 2.5.1 Egg collectors

Egg collectors are those people who are involved in collection of Carp eggs from River Halda. In favorable environmental conditions they collect fertilized eggs and hatch them in hatching tank or in matir quwa made by them. Then they sell them after 5 to 6 days to the hatchery owners and fish farmers.

### 2.5.2 Persons involved in Hatchery

While hatchery owners buy Halda fry from egg collectors, they carry them into their hatchery and rear them in proper technique. In this rearing process some persons are involved by hatchery owners. They involved in for various sectors. Such as, pond preparation, fry conditioning, feeding, sampling and reporting, feed preparing etc. These people are getting experience of rearing Halda fry so that made them as a part of target group of this study.

### 2.5.3 Local fish farmers

Local fish farmers are those people who buy Halda fry from govt. hatchery and culture them up to marketable size. They can give the clear cut information about growth rate and survivality of Halda fry. So, they are also selected as target group.

## 2.6 Sample number

A total of 45 interviewees were selected for questionnaire interviews in three different places (Table 1).

**Table 1.** Sample sizes in three different places

Study area		Category	No. of Persons	Data collection method
Halda River	Gohira	Egg collectors	14	Questionnaire interviews
		Govt. Hatchery worker	03	
	Machuagona	Egg collectors	10	
		Govt. Hatchery worker	03	
Madhuna Ghat	Fry buyer from different regions of Bangladesh	03		
	Egg collectors	12		
<b>Total</b>			<b>45</b>	

### 2.7 Design and test of Questionnaire

A questionnaire was needed for this study. For the present study questionnaires were prepared in consistent with the objectives for collecting relevant information. The questionnaire was composed of both closed and open form of questions.

### 2.8 Method of data collection

The data were collected using snowball technique through questionnaire interviews, focus group discussions and crosscheck interview with key informants (UFO, Raojan).

### 2.9 Snowball Sampling of data collection

In this study, snowball sampling was applied to gather information. Data collection methods can be divided into 3 steps; these are: focus group discussion with hatchery workers, questionnaire interviews with egg collectors, and fish farmers; and cross-check interviews with key informants (Figure).

### 2.10 Crosscheck interviews with key informants

After collecting the data through questionnaire interviews, it was necessary to check the information for justification of the collected data. Crosscheck interviews were conducted with key informants (Mohammad Nazim Uddin, UFO, Raojan) where information was contradictory or requested for further assessment.

### 2.12 Analysis of experimental data

The data were analyzed using Duncan's Multiple Range Test to find out whether any significant difference existed among collected data (Duncan, 1955; Zar, 1984). Standard deviation in each Parameter was calculated and expressed as mean  $\pm$  S.D.

## 3. Results

### 3.1 Halda Spawn & fry marketing systems

Spawn and fry marketing system of Halda River, there were a number of middlemen involved in the selected region. Spawn and fry of the river distributed in four different ways.

Firstly, most of the Halda spawn and fry were marketed from egg collectors to the local fish consumers by following channels- Spawn and fry seller's  $\rightarrow$  Local fish farmers  $\rightarrow$  Pond owners and other fish farmers  $\rightarrow$  Local Markets/Consumers.

Secondly, a number of the Halda spawn and fry were marketed from egg collectors to the consumers of nationwide by the following channels- Fry sellers  $\rightarrow$  Agents of Hatchery owners  $\rightarrow$  Drivers  $\rightarrow$  Hatchery Supervisor  $\rightarrow$  Hatchery workers  $\rightarrow$  Fry distributor  $\rightarrow$  Fish cultivators  $\rightarrow$  Market consumers.

Thirdly, some of spawn and fry were distributed to the government Halda brood restoration projects to restore the brood fish of Halda River by the following channels- Fry sellers  $\rightarrow$  Govt. Halda Brood Restoration Projects  $\rightarrow$  River Halda.

Fourthly, a few numbers of spawn and fry were marketed from egg collectors to the renowned public hatchery owners (such as- Raipur and Mymenshingh fish hatchery) in order to make mother fishes by following channels - Fry sellers  $\rightarrow$  Hatchery owners  $\rightarrow$  Persons involved in making mother fishes.

### 3.2 Egg collection techniques

During the full moon or new moon in monsoon, when it was rained torrentially with thunderstorm, strong current of hill flood from upstream comes to Halda with nutrient rich turbid water. It was brought about changes in the physico-chemical characteristics of water in Halda River which was created the favorable environment for brood fishes to lay eggs. Brood fishes laid eggs when the current became stable right after the ebb or following the tide.

As the right environment ensured, the long period of patient waiting came to an end. Brood fishes laid eggs. The whole river gets flooded with small pearl-like carp eggs within few minutes (Fig. 2).



Fig. 2. Pearl-like eggs of Carps

### 3.3 Uses of fishing Craft and gears

In general, they need a 10-12 feet long wooden boat (Plate 2), two persons, a mosquito net (Fig. 3) specially prepared for egg collection, two anchors, two long bamboos, a big plastic bucket and a bowl. The egg collectors collect eggs together in a festive mood. This indescribable heavenly scene is unique to the River Halda only.



Fig. 3. Egg collection methods

### 3.4 Egg Hatching Techniques

After collecting eggs the egg collectors return home with boat full of eggs. Again the technology used for hatching and rearing fish fries from collected eggs, are completely indigenous to the people living in the vicinity of Halda river. They hatch eggs by using two different methods. In the first method, eggs are hatched in mud scoops dug by the local people on the river bank using their indigenous knowledge. The egg collectors are using this method since time unknown. The second method is to use the government hatchery where cement built circular tanks or plastic built rectangular tanks are used for hatching.

### 3.5 Price variation in Halda Spawn and fry

Prices of Halda spawn and fry varied in different stages of the marketing channel. Egg collectors sell per kg of fry at a cost of 50,000-80,000 Taka to the hatchery owners. But Hatchery owners sell each fry at a cost of 5-6 Taka to the local fish farmers.

Table 2. Yearly survey information about Halda river’s egg and fry collection, Raozan upazila

Serial no	Year	Number of Egg collecting person	No. of boat	Amount of collected Egg (Kg)	Production rate of egg (Kg)
1	2011	684±3.01	340±5.29	4908±3.01	61.72±1.86
2	2012	753±3.60	341±2.88	11741±3.01	302.65±4.23
3	2013	298±2.34	143±0.93	4390±3.01	80.9±0.94
4	2014	504±4.32	235±1.78	7235±3.01	178.38±1.57
5	2015	449±3.05	197±1.62	2775±3.01	38.42±0.99

### 3.6 Spawn & Fry Transportation System

#### 3.6.1 Transport vehicles and equipment's

Different types of equipment's are used in spawn and fry transportation. Fry are transported from the Halda River to the nearest hatchery by using buckets. In the hatchery, eggs are spread in a hatching tank covering with a mosquito net and continuous water flown on it. After hatching, hatchlings are carried using poly bag. During transportation in the long distance, spawn and fry are transported using oxygenated polybags. In this case, Micro, CNG, auto-rickshaw etc. are used as transport vehicles.

**Table 3.** Vehicles and equipment's involved in spawn and fry transportation

Places	Vehicles/Equipment's	Percentage
From Halda River to Nearest hatchery	Hand carry by Bucket	03
From Seller to Driver/Buyer	Oxygenated poly bag	62
From Carrier (Driver) to Private Hatchery	Micro/CNG/Auto-rickshaw etc.	18
From Private Hatchery to Fish farmer	Hand carry/Rickshaw/Honda/Micro	07
From Fish Farmer to Fish Market	Rickshaw/CNG	10
<b>Total</b>		<b>100</b>

#### 3.6.2 Transport Mechanisms

Spawn and Fry are transported in a very careful mechanism in every stage of marketing channel. When spawn and fry are carried in polybag, adequate oxygen (O<sub>2</sub>) was supplied in the polybag. In the Micro bus, oxygenated polybags were handled with so much caring. Assistant driver of the micro bus observed the fry continuously. AC was used in the micro bus to homogenize the temperature of the micro bus with the water. After long journey fry were conditioned in the pond for half an hour.

### 3.7 Spawn and Fry rearing technique in Private Hatchery

Two types of ponds were used in case of Halda spawn and fry rearing in private Hatchery. One was nursing pond (Locally called, Atur Pukur) and another was rearing pond (Locally called, Lalon Pukur). In the nursing pond, the spawn and fry became 1-1.25 inch and then the spawn and fry was transferred to the rearing pond. In the rearing pond, 40-50 thousand fries were reared per Bigha. (1 Bigha = 33 decimal)

In the nursery pond, 1<sup>st</sup> feed was given after 6-8 hours of fry release. Egg yolk was used as 1<sup>st</sup> feed of Halda spawn and fry for first three days. One egg yolk was applied for 1 lakh fry and thus four egg yolks was applied for 4 lakh fry in each feeding frequency. Halda spawn and fry were fed for three times in a day. Thus totally twelve egg yolks were used for each day. Boiled egg yolks were crushed by hand fingers and mixed with water to apply into the pond. After three days, they use normal nursery feed which contain desired feed ingredients. Feed was applied by using a tray. After completion of treatment in the rearing pond, Halda spawns and fries were about 4-5 inch. Then they are ready for selling to the fish farmer.

### 3.8 Formation of committee and Awareness meeting

About 5 meeting was held with the community people living in the vicinity of Halda river gohira region through participatory discussion during the study period. The members of the management committee and Upazilla Fisheries Officer discussed about the activities and progress of the Halda river and to stop catching mother brood fish. The highest number of attendances was recorded in every meeting. Every awareness meeting and the progress of the management works were remarkable.

### 3.9 Socio-economic Condition of the traders

#### 3.9.1 Average Age of the Interviewee

Interview was taken in 3 different places among 42 different persons. Most of the interviewee was higher than 30 years old and represents 32% in the age distribution chart. Minimum number of interviewee was greater than 70 years old and represents 4% in the age distribution chart.

#### 3.9.2 Educational Background

Educational background varies greatly from man to man. Some of the interviewee was highly educated, such as, Hatchery owner, Hatchery Manager, Technician etc. They occupy only 4% in the education percentage category.

But most of the interviewee was not fully educated. Some have just the knowledge of primary education. Such as, egg collector, driver, fish farmer etc. They occupy 24% in the education percentage category.

**3.9.3 Experience on spawn and fry of River Halda**

Experience of interviewee on Halda spawn and fry varies according to their ages. Most of the interviewee has about one or two year’s knowledge on Halda spawn and fry. Highest 52% persons are slightly experienced on Halda spawn and fry. Besides some much more experienced persons are also involved in the marketing channels of spawn and fry of River Halda. Lowest 12% persons are very highly experienced on Halda spawn and fry.

**3.9.4 Family Type**

Most of the interviewee is married and living in single or joint family with their parents. In some cases they are the only earning member of their family.

In rural Bangladesh, families are classified into two types.

**I) Nuclear family** – married couple with children, and

**II) Joint family** – group of people related by blood and/or by law.

In this study maximum 60% interviewees were found to live with nuclear and minimum 40% interviewees were found to live with joint family.

**3.9.5 Income Source**

In the “On season” of Halda fry, the income source of most of the interviewee is fry collection, hatching, rearing, selling etc. But in the “Off season” of halda fry, interviewee earns money by involving them in daily labor, agriculture, fish culture etc.

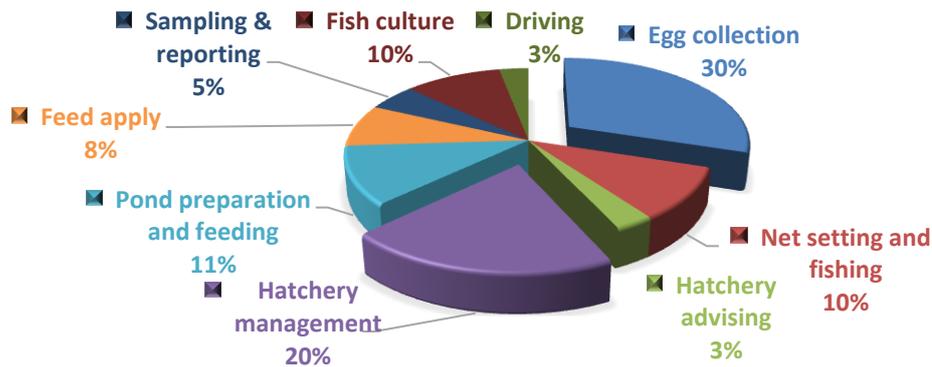


Fig. 4. Percentage of the interviewee on the basis of one season income

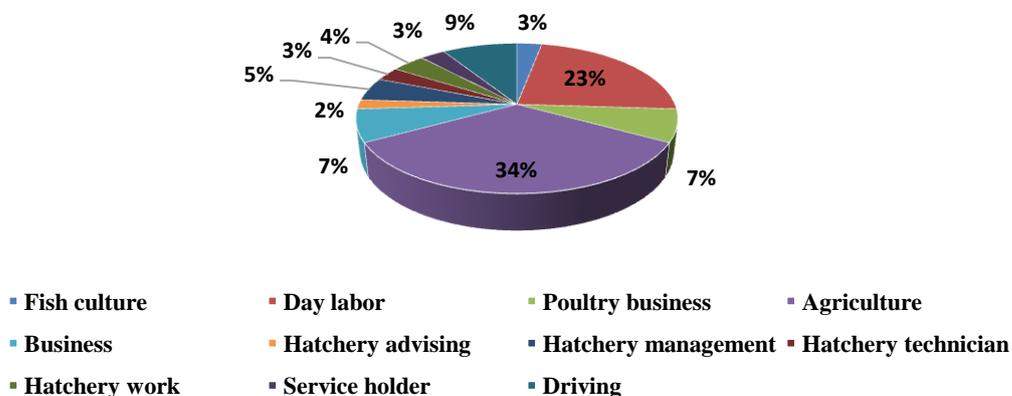


Fig. 5. Percentage of the interviewee on the basis of off-season income

### 3.9.6 Average Income

#### 3.9.6.1 Income of Egg Collectors

In this study, average income varies among egg collectors and persons involved in hatchery. Interviews were taken from total 8 egg collectors. Average income of egg collectors depends on the availability of eggs in River Halda in a given year. But average income of hatchery workers is the same all the year around.

#### 3.9.6.2 Income of Drivers

A driver and an assistant driver were involved in carrying fry from River Halda to the Hatchery of different districts. In this case, the driver paid 6,000 Tk. And the assistant driver paid 1,800 Tk. for transporting the fry.

## 4. Discussion

In this chapter the results of the study has been discussed below and compared with the findings of other studies in the relevant field.

### 4.1 Selection of the study area

In current study, three different areas of Halda River were observed in collection and distribution channel of Halda spawn and fry. Roy (2008) found four different marketing channels of fish fingerlings in Dakshin Dinajpur District of West Bengal, India which is similar to the present study.

### 4.2 Price switching of Halda spawn and fry

Prices of Halda spawn and fry switched in different stages of the marketing channel. Egg collectors sell per kg of fry at a cost of BDT 50,000-80,000 to the hatchery owners generally, an ordinary hatchery fry of 1-1.5 inch size is sold at a cost of BDT 1-2 whereas similar sized Halda fry is sold at a cost of BDT 5-6.

He also reported that the price was high at the beginning and end of the season but comparatively less when the supplies of fries were available. Islam et al. (2015) reported that considering both government and private Fish Seed Farms (FSFs), per kg sale price of spawn for GFSFs (BDT 2250) was higher compared to PFSFs (BDT 1660). It is clear that the price of Halda fry is much higher than the ordinary hatchery produced fry. The finding reveals that the quality and subsequent good-will made this elevated price for Halda fry.

### 4.3 Transport mechanism and cost of Halda spawn and fry

Halda River spawn and Fry were transported in a sophisticated mechanism in every stage of marketing channel. Adequate oxygen (O<sub>2</sub>) was supplied in the polythene bag during transportation of fry. Oxygenated polythene bag were handled carefully in micro bus. Air Conditioning (AC) system was used in the micro bus to control the temperature of the water in polythene bag. Transportation cost is varied with time and distance of places.

### 4.4 Survival rate of Halda River spawn and fry

According to hatchery operators, the survival rate of the Halda River spawn and fry during different stages of the rearing process and transportations was more than 95% and as a result the mortality rate was less than 5%. Rahaman et al. (2013) found that the fry mortality was 24% due to improper management in Jessore district of Bangladesh which is much more than this finding.

## 4.5 Socio-economic conditions of the involved people

### 4.5.1 Age, family types and educational condition

Most of the interviewee was higher than 30 years old (32%) and minimum number of interviewees was greater than 70 years old (4%). Pravakar et al. (2013) reported that age group of 41-60 years was the highest (44%) and 20-30 years was the lowest (20%) considering all fish farmers in Shahrasti Upazila of Chandpur, Bangladesh which is totally different to present study as because young and energetic persons are becoming more interested to culture Halda fry. Most of the interviewee was married and living in single or joint family with their parents. Maximum 60% interviewees were in single and minimum 40% interviewees were in joint family. Abdulla-Al-Asif *et al.* (2015) found that most of the fry traders (73%) had single family but only 27% had joint family in Chachra of Jessore which is more or less similar to present study. Some of the interviewee was highly educated, such as, hatchery owner, hatchery manager, technician etc. They occupy only 4% in the education percentage category and most of the interviewee (24%) had just the knowledge only to primary class. Abdulla-Al-Asif *et al.* (2015) found that 46% of traders have institutional education that range from primary to higher education and

other 54% of traders have no experience in education in Chachra region of Jessore which is different to present study.

#### 4.5.2 Income of egg collectors

In this study, the 'On-season' income of maximum (37%) egg collectors was Tk. 851-900 and minimum (6%) egg collectors was less than BDT 800 per day. Besides, 'Off-season' income of maximum (30%) egg collectors was BDT 451-500 and minimum (10%) egg collectors was less than BDT 450. Abdulla-Al-Asif *et al.* (2015) reported that the average monthly income of traders in the on-season was BDT 18000/month (i.e., 600/day) and in the off-season was less than BDT 7000/month (i.e., 233/day).

#### 4.6 Production Percentage and Present Status of Halda River Spawn and Fry

The catch statistics indicate that ecosystem health decreased and egg collecting pressure of the Halda River was increased day by day. As a result, yearly production percentage of the river was decreased from 61.72% to 38.42% within five years, which was very similar to the study of Moyle and Leidy, 1992. He found that worldwide 20% of all freshwater species are extinct, endangered or vulnerable. The total catch statistics of the Halda River indicates that production percentage of different year was sharply decreased in the year 2011, 2013, 2015 and increased in year 2012, 2014 consecutively. So, commercial importance of spawn and fry were facing a higher risk in the breeding ground of Halda River between the year 2011 and 2015, which is more or less similar to IUCN, Bangladesh 1998. According to IUCN, Bangladesh about 56 freshwater fish species as critically or somewhat endangered. Due to over-exploitation and various ecological changes in natural aquatic ecosystem health of Halda River, this breeding ground is in very risk position, which was similar investigation of Sarker (1993).

The study is clearly indicated that the Spawn and fry of Indian major carps of the Halda River were over exploited and poor generation is coming from poor brood stock in the next year. In addition, aquatic ecosystem health is changing due to construction of Rubber dam, flood control barrage, soil erosion, siltation and drainage structures and agro-chemicals. The genetic stock structure of aquatic populations is reduced due to pollution and destructive fishing practices. Therefore, the ecosystem health and biological diversity of the Halda River have been depleting at an unprecedented rate, which was similar investigation of Chakraborty and Mirza (2007). Intervention to control floods, adoption of new agricultural technologies and construction of road networks has changed the ecology of River significantly, which was similar investigation to Khan, 1993. Stock of the wildlife broad fishes and other species in the breeding ground have suffered significant damages, resulting in a reduction of biodiversity as well as a decline in the socio-economic importance of Halda River as a source of broad fish which was very similar investigation of Nishat, 1993 and Zaman, 1993.

The action plan efforts for saving the stock of aquatic lives will be as, develop community based co-management and management policy; declared the river as sanctuaries; enforcement of fishing rules; prevention of killing brood fish and juveniles; stocking every year with fingerlings; ensure unplanned construction of flood control, embankments, drainage system and sluice gates; controlling use of pesticides and agrochemicals; and controlling use of water in irrigation.

The Halda River is the only Indian major carp breeding ground in Bangladesh from where fertilized spawn and fry were collected by local fisherman and egg collectors during March to June, 2015. The collected eggs were hatched in the artificial mud-made scoop on the riverbank to produce carp fries. In spawn and fry marketing system of River Halda, a number of intermediaries were involved actively for selling fry. There were four different types of marketing channels whose were involved in Halda spawn and fry distribution seller to final consumer. Transportation of spawn and fry were made through oxygenated poly bags and extra care of handling was maintained to avoid the mortality. In this study the Halda River's egg, spawn and fry collection in Raozan Upazila was found in 2011, 2012, 2013, 2014 and 2015 year was 61.72 kg, 302.65 kg, 80.9 kg, 178.38 kg and 38.42 kg respectively and these types of ups and down indicated a major concerning issue.

#### 5. Conclusion

This study finds out the economic condition, average income during breeding season and off season, education background, family status etc. of the local people of Halda region involving themselves in fry collecting and marketing process. This study suggested that, the habitat of Indian major carp with ecological factors and protection of the breeding ground is needed to ensure availability of eggs, spawn and fry in the Halda River.

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