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Changing Livelihood Status of the Halda River Community: An Analysis of Sustainable Livelihood Approach

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Abstract: This study was conducted in the Halda River to find out the socio-economic status of the fishermen and how they cope with the adverse situation during the off-season or forbidden time. A total of 100 fishermen were randomly selected from HathazariUpazilla and RaouzanUpazilla. A well-structured questionnaire was prepared to collect the required data. Income from fishing is very poor and 75.1% of fishermen stated that this low amount of income is not sufficient to maintain their family. They cannot afford their basic needs (e.g. Food, Treatment, Cloth, Education etc.) for their family members. Most of the fishermen were belong to the age group of 20 years (39.5%) followed by 35 years (25.5%), 45 years (11.5%), 60 years (15%), 50 years (8.5%), respectively. About 13% of egg collectors have 30 years of egg collection experience. 66.6% of the fishermen have no boat because of the shortage of capital. Only 7.0% of egg collectors were found to continue the fishing profession for 12 years. During the forbidden time, 38% of the fishermen worked in the agricultural field. 18% of the egg collector worked as day labor. 77.78% of fishermen take a loan from ASA and Grameen Bank to overcome the crisis. 81.25% of them take a loan from moneylenders to maintain their families. 79% of respondents reported that there is no government or non-government savings during the adverse period. Despite of poor conditions, 72% of fishermen want to continue this profession in the forthcoming future. Haphazard/illegal catching of broodstock (50%) is accountable for the reduction of the egg from the river. Moreover, water pollution (52.31%), sand digging (24.62%), tobacco culture (1.54%), boat passage (7.69%) and others (13.85%) also liable for the damage of spawning environment. Meaningful and marginal maintenance of the river environment and fishermen friendly steps must be taken to save this ethnic group of the Halda River.

Key words: Socio-economic · Questionnaire · Maintenance · Fishermen · Halda River

INTRODUCTION

Bangladesh is commonly known as 'land of rivers [1] that cress-crossed by hundreds of rivers [2]. A total of 230 rivers covered more than 24, 000 km rich with a lot of resources [3]. Riverine fishing areas regarded as dynamic components

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that include approximately one-fifth of the entire fishing area of 4.9 million ha of the country [4-5]. Furthermore, around 12 million people directly or indirectly engaged with fishing activities for their livelihood [6]. The fishing sector affords 1.78 million people's full-time and part-time occupationamenities [7]. Fish is the source of capital for the fishing community and only source of protein and essential minerals [8]. A fishing community is a community that largely depend on fishing activities to meet social and economic needs. The fishing vessel owners, operators, crew and fish processors are included in a community [9].

Halda is the thirdmajor river after the Karnafuli and Sangu in Chittagong, Bangladesh. Indian carps such as *Catlacatla*, *Labeorohita*, *Cirrhimusmrigala* and *Labeocalbaus* spawn naturally since it is the only natural spawning ground in the world[10-11]. Carp egg is collected by the local fisherman rely on the egg collection for their livelihood. Halda is retaining about 6% contribution to the national annual income of the fishing department. Approximately 821crores and 10 lac taka income from Halda in four-time within a year [12]. Despite the importance of the river, the river is being polluted day by day [13]. Consequently, the natural gene bank of Halda has been affected by various factors which are responsible for depleting its resources day by day.

A total of about 1100 egg collectors and 2000 fishermen catch fish all the year round [14]. Halda is the main income source and livelihood option for the local egg collectors and fishermen. Halda has become resource depleted but the dwellers have not left their occupation in case of the limited resource. They have faced social (education, health, poverty) economic (income generation, occupation) and environmental problems(climatic factors, degradation and so on). Due to the reduction of egg and fish, the dependent group (e.g. Spawn fishing communities) are the most vulnerable in terms of economic conditions [15]. They have to take assistance from the lending institutions, Government banks and NGOs to meet their basic needs [15]. They earn a handsome amount of money during egg collection season but they can hardly save for year-round sustenance of their livelihood. Sufferings from financial hardships are common in the life of spawn fishers across the year [16]. Thestudy intends to explore the present livelihood status of the Halda river community and an analysis of a sustainable livelihood approach to reduce poverty and how to respond within the vulnerable situation of Halda.

MATERIALS AND METHODS

Study Area: The present study was conducted at Madunaghatbarua para, Garduara area, Angkurigona area, Kagotia and Napiterghat area. Madunaghatbarua para, Garduara area and Angkurigona area located under Hathazari Upazilla (22° 30' 29.88" Nand 91° 48' 29.88" E). While Kagotia and Napiterghat area located under RaozanUpazilla (22° 32' 6.40" N and 91° 55' 9.08" E) (Fig. 1). Egg collectors, fisherman and boatman were selected to find out the present socio-economic condition of their livelihood. Egg collectors collected egg from the HaldaRiver (Fig. 2).

Sample Size for Research: A total of 100 egg collectors, fishermen and boatmen were selected randomly from 2 Upazilla (Hathazari and Raouzan) to explore the expected outputs. Data were collected randomly from the selected stakeholders from each Upazilla.

Data Collection Technique: A well-structured questionnaire survey was used and the targeted candidates were selected indiscriminately [17]. Different data collection approaches (surveys, focus groups discussion, Participatory Rapid Appraisal, Rapid Rural Appraisal, key informant interviews and direct observations) were applied in the field to get the required data [9, 18]. Income and demographic data were collected following regional guidelines [19-20]. The survey design was prepared following the advice from local NGO staff and existing guidelines [9, 18]. Validity recommendations were made following Fink [21].

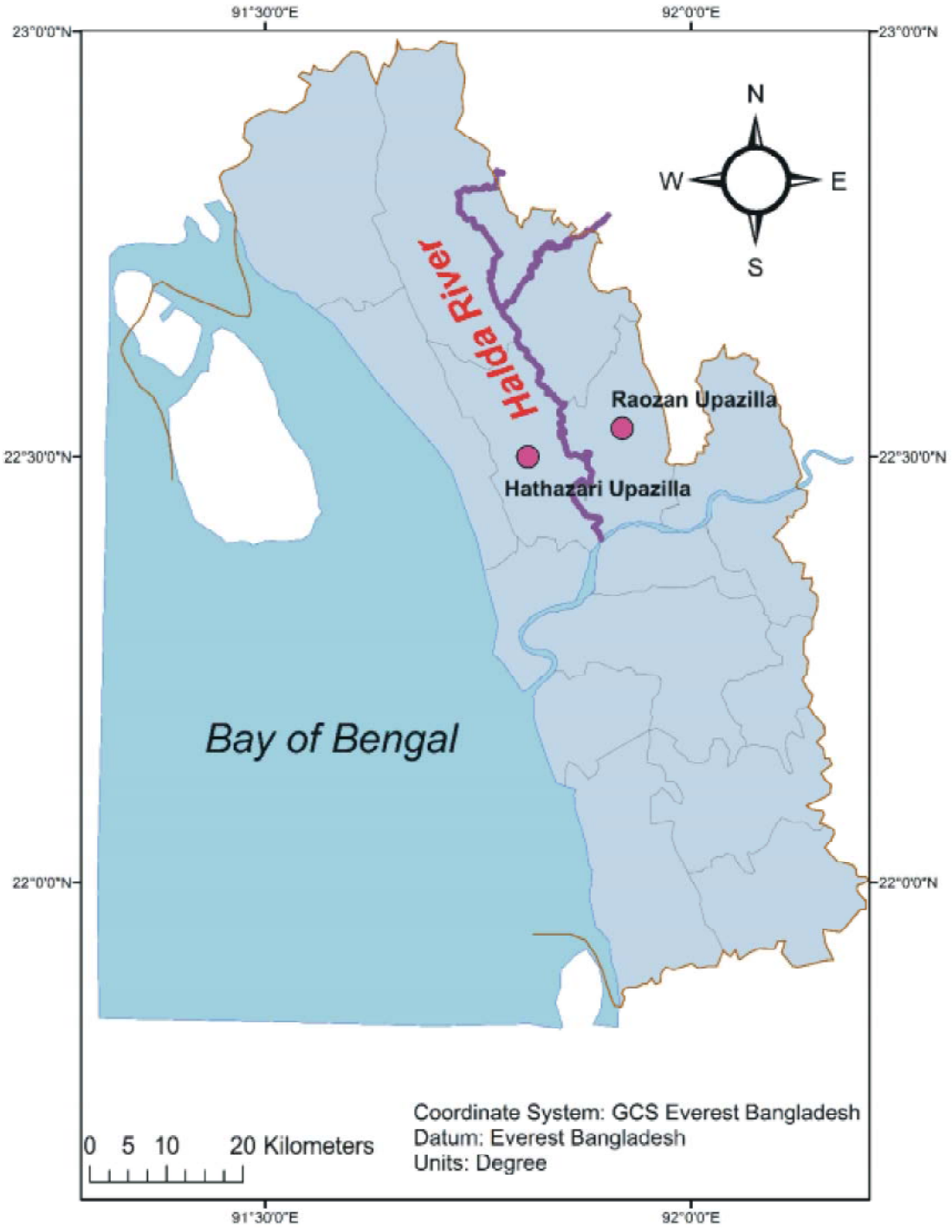

Fig. 1:Map showing the sampling sites

Fig. 2: Egg collectors in the Halda River

Fig. 3:Data collection from the egg collectors

Preparationof a Well-Structured Questionnaire: To find out the relevant data from the egg collector, fisherman and boatman to meet the research objectives a questionnaire was prepared. Firstly, a draft questionnaire was made to test in the field. After testing in the field, theexisting questionnaire was reformed, revised and reorganized. The final questionnaire was then developed to collect the data on livelihood status and their adaptation strategies. At first, a questionnaire was constructed into Bengali and then into English. Bengali was used for face to face interviews in the field. The prepared questionnaire was then validated with key informants.

Primary Data Collection: Primary data were collected using field surveys to find out the existing socio-economic status of the targeted groups and the coping strategies during adverse conditions (Fig. 3).

Questionnaire interviews were carried out using simple random sampling methods for 100 respondents in the two (2) targeted areas. Egg collectors, fisherman and boatman were interviewed at the riverside during fish-catching under the tree. Few interviews were conducted in their home to collect information. Each fisherman required 1 to 2 hours for the interview. Photographsand videos were taken during the interview to visualize the interview part.

Fig. 4: Focus Group Discussion (FGD)

Focus Group Discussion (FGD) was executed to get an overview of the present socio-economic condition of targeted groups (Fig. 4). Their adaptation strategies during the crisis period/ lean period. The recommendations to overcome the issues adverse to the river environment and improved their existing livelihood status. FGD parts were conducted under the trees where fishermen gathered naturally. Collected data were checked for validation. If few data were found to be self-contradictory then the data were validated from the key informants (e.g.Upazilla Fisheries Officer, AFO and relevant NGO workers).

Secondary Data Collection: Secondary data were collected from the thesis, term paper, project papers, books, government office, NGO and others. Both local and international journals were used to get the required data and comparison of the present findings.

Data Analysis: The collected data were analyzed using SPSS (v.22) and MS-Excel. One way Analysis of Variance (ANOVA) was executed to find out the significant effects of parameters on the livelihood of the fishermen.Descriptive statistics including frequency, percentage means and cross-tabulation were executed to represent the data for egg collector. Multiple response analysis was used for open-ended questions where the answers were more than one. Frequency and percentage of the replies were counted in order to find out the priority of the respondents.

RESULTS

Socio-Economic Condition of the Fishermen: Data were collected from the fishermen of HathazariUpazilla (75%) and RaouzanUpazilla (25%) to know the egg collection pattern, their livelihood status and coping methods.Most of the interviewees were belong to the permanent resident of Gorduara (33%), Uttar Madarsha (24%) and DakkhinGohira (12%) Union, DakkhinGarduara (8%) respectively.

Among the 100 respondents, only 13% of fishermen have 30 years' experience of collecting eggs. Whereas only 7.0% of egg collectors continuing this profession for 12 years. Most of the fishermen (71%) continuing this profession forthe last 10 years. They are following their ancestors though they have to face different problems. Unfortunately, most of them have no other option to do or they are not accustomed to doing other jobs. Only 9% have continued the egg collection for the last 3 years which indicates fishermen are leaving this profession day by day. This also indicates that the socio-economic condition of the fishermen is not good.

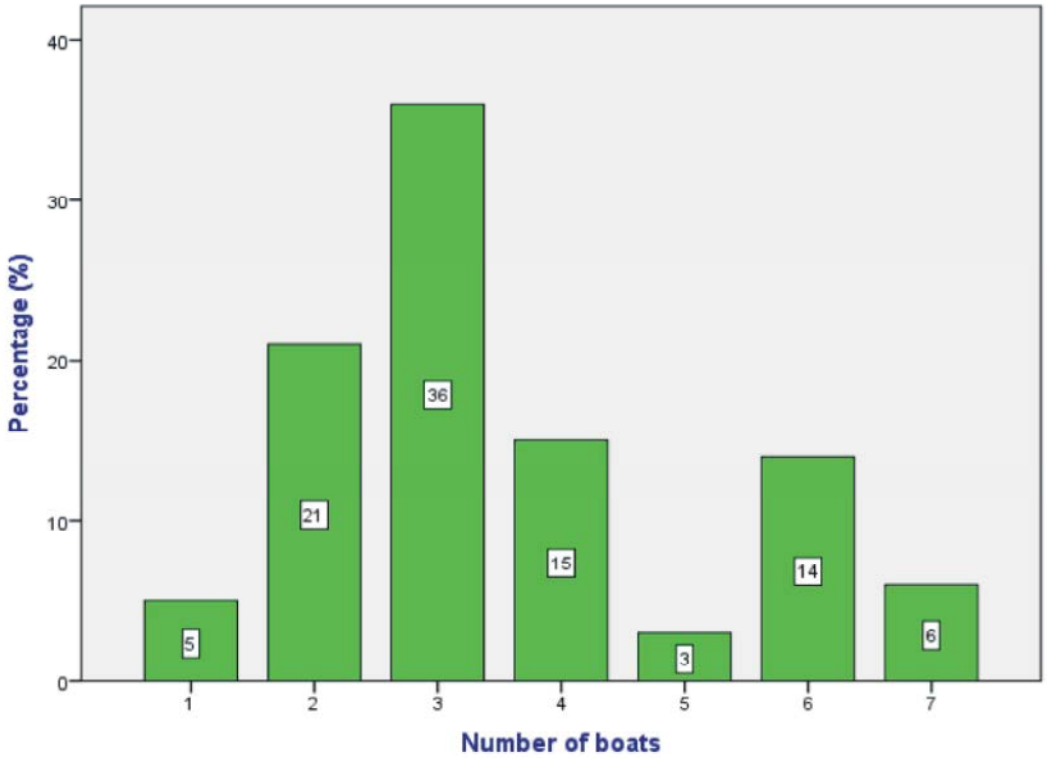

Fig. 5: Boats possessed by the fishermen in the study area

In the study area, most of the fishermen were belong to the age group of 45 years (11.5%) followed by 50 years (8.5%), 60 years (15%), 20 years (39.5%), 35 years (25.5%), respectively. Most of them have no boat (66.6%) because of the shortage of money. Among the 100 respondents, 36% of egg collectors have3 boats for egg collection whereas 21% have 2 boats for their subsistence. 15% of fishermen have 4 boats to collect the eggs (Figure 5).

During the past years, most of the fishermen belong to 3 boats (37%) and 4 boats (25%) (Fig. 6).

Income from fishing/egg collection is very poor and this low amount of income is not sufficient to maintain their family (75.1%). They are unable to meet their basic needs (e.g. Food, Treatment, Cloth, Education, etc.). They are taking a loan from relatives and different NGOs to maintain their family [15]. As a result, most of the fishermen leaving this profession (92%). It was found that about 72.0% of fishermen are not satisfied with their income while only 28% satisfied with their income. This scenario indicates that the condition of the fishing community is not good (Figure 7).

Respondents were asked about the diseases. Most of them are sufferings from allergy (5.21%). Some people experienced with the foot or leg pain (5.21%). Knee pain (3.13%), cold (2.08%) and cough (2.08%) were also experienced by the fishing community though most of them are not affected by diseases (79.17%) (Fig. 8).

During the outbreak of the disease, most of the fishermen (48.48%) used to go to local medical for the treatment. 21.21% of fishermen go to Hathazari medical in severe condition and 12.12% used to take medicine from the pharmacy. This is a clear indication of their socio-economic condition. Only 3.03% of fishing communities go to the city for their treatment (Fig. 9).

During the off-seasons/ban seasons, 38% of the fishermen engaged themselves in agricultural work. While some of them working as Chauffeu(22%). 18% of the fishermen worked as a day laborer for their livelihood. Another 22% of the respondents earn their livelihood by doing various works.

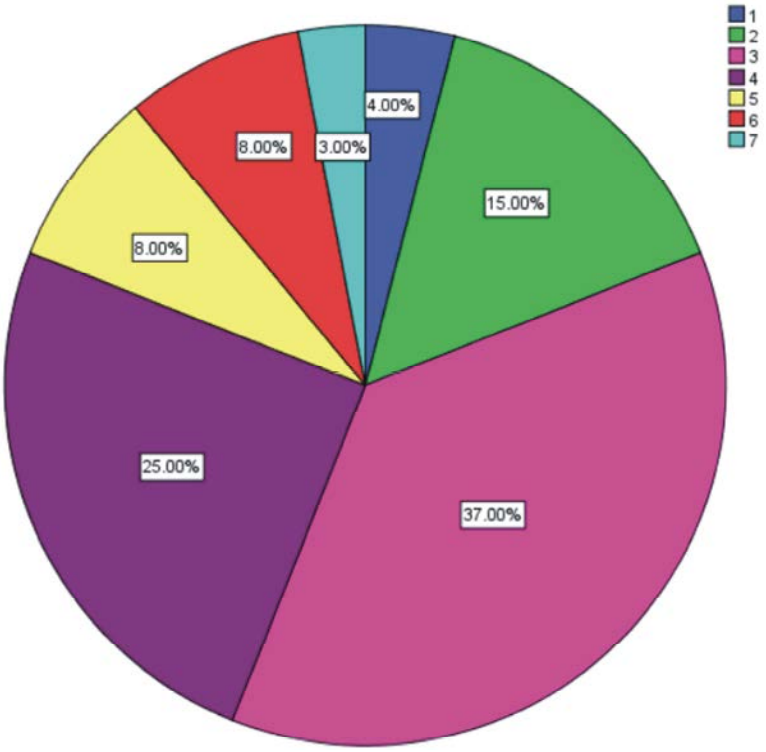

Fig. 6: During the past years, the number of boats possessed by the fishermen

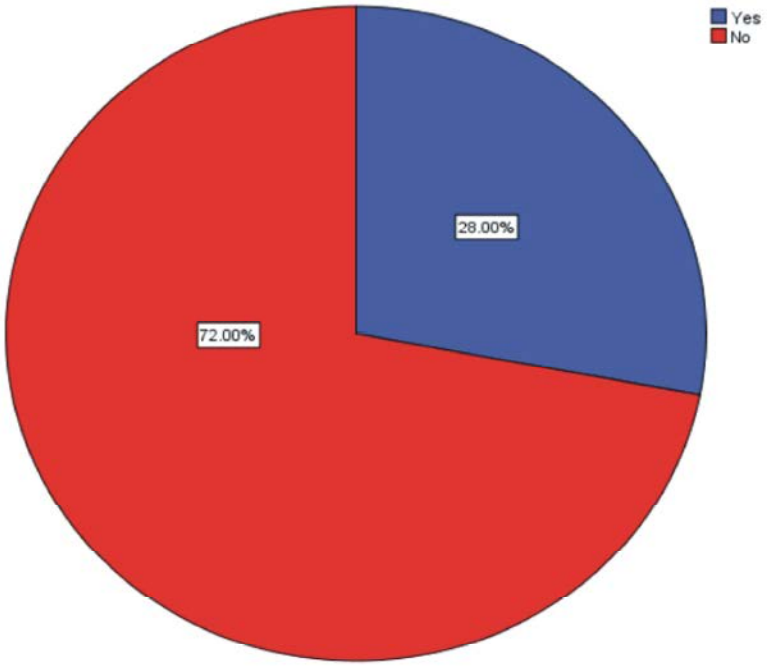

Fig. 7: Percentage of respondents' perceptions regarding whether their income is enough

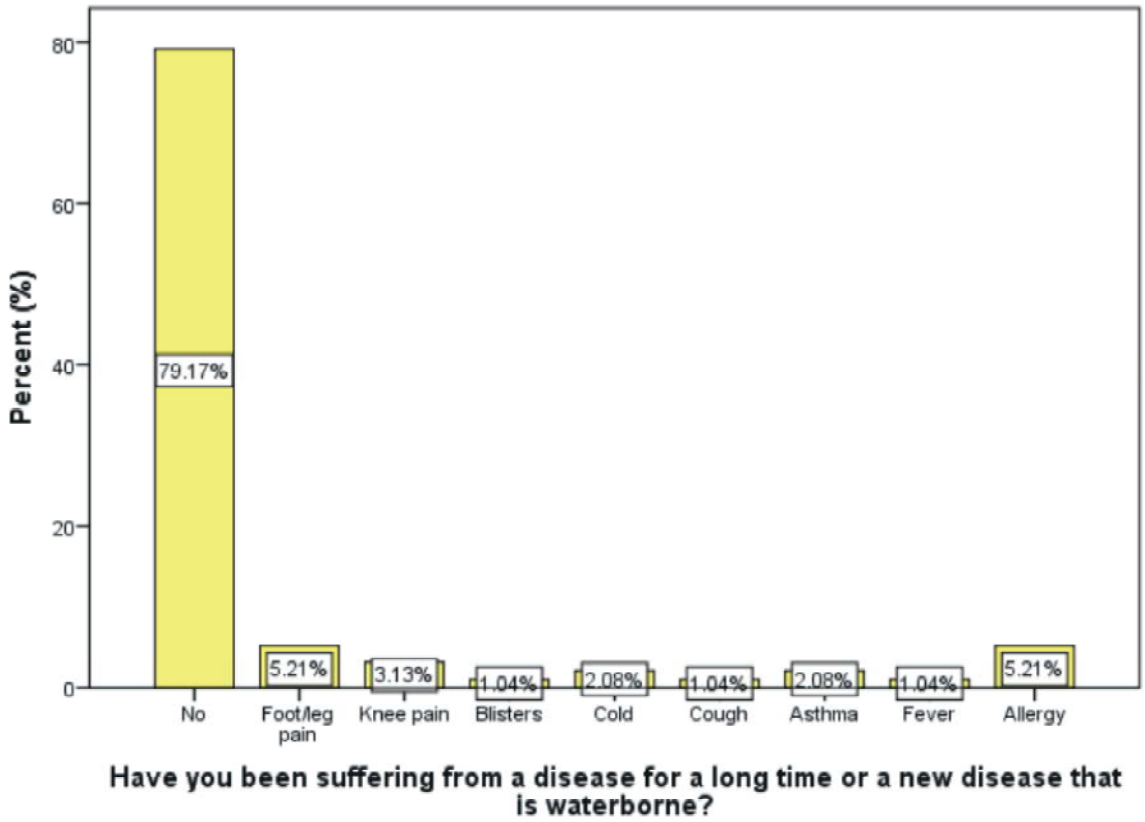

Fig. 8: Fishermen suffering from diseases

Table : Off-season activities of the fishing community

Off season activities	Frequency	Percent	Valid Percent	Cumulative Percent
Agricultural work	38	38.0	38.0	38.0
Day labor	18	18.0	18.0	56.0
Business (e.g. vegetable, spawn)	5	5.0	5.0	61.0
Run store	5	5.0	5.0	66.0
Chauffeu	22	22.0	22.0	88.0
Poultry business	2	2.0	2.0	90.0
Paintman	2	2.0	2.0	92.0
Farming	3	3.0	3.0	95.0
Dependent on children's income	3	3.0	3.0	98.0
Masonry	2	2.0	2.0	100.0
Total	100	100.0	100.0	

Scenarios of Egg Collection in Recent Years: Fishermen reported that profession changing (37.50%) is the cause of not collecting eggs. Physical illness is another cause of reducing egg collection (20.83). 41.67% of the egg collectors mentioned multiple causes like insufficient instruments, overseas going, agriculture and study etc. for not collecting the egg (Figure 10).

Most of the fishermen (72%) want to continue the egg collection profession in the future (Fig. 11). These findings are quite similar to the findings of Kibria et al. (2018). Kibria et al. (2018) showed (76%) of the fishermen are interested in fishing in the HaldaRiver. But 27% of them expressed that they have to stop egg collection since they did not get enough eggs and they are unable to run their family.

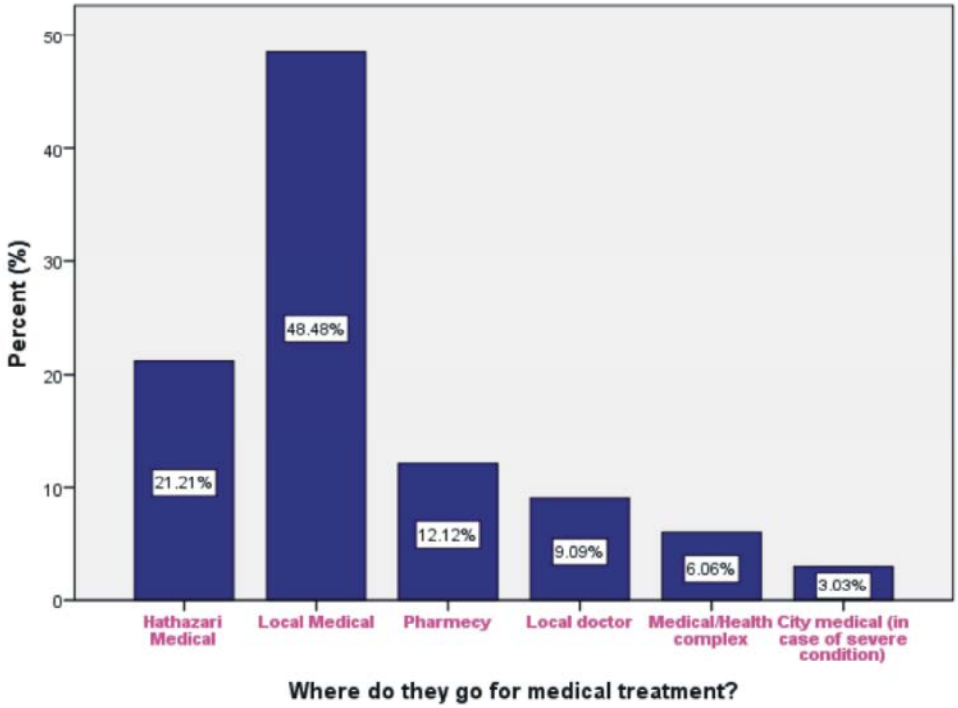

Fig. 9: Medical facilities for the fishermen in the study area

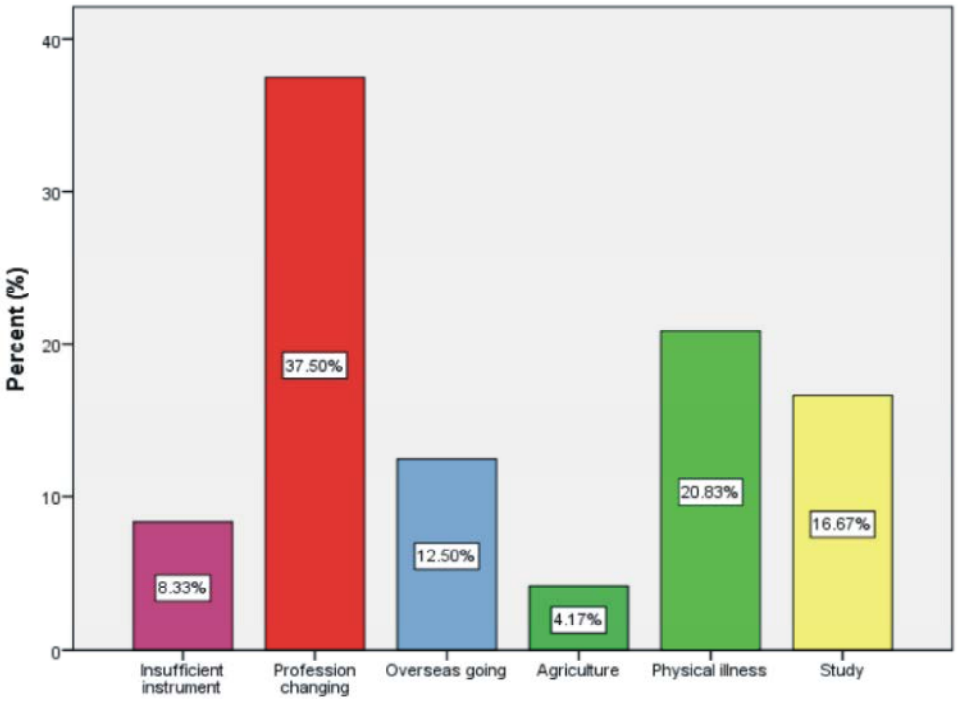

Fig. 10:Causes for reducing pattern of egg collection

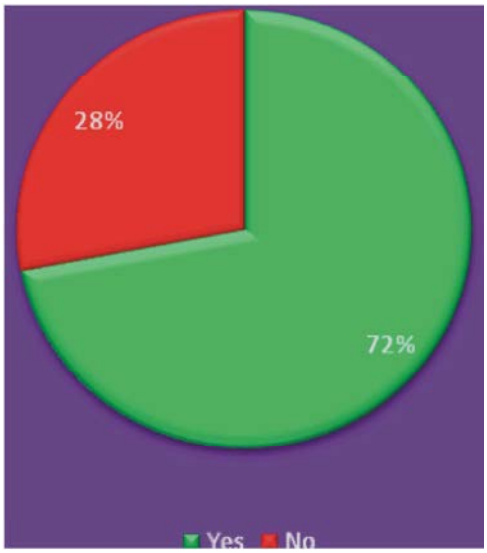

Fig. 11: Fishermen perceptions whether they want to continue egg collection in the future

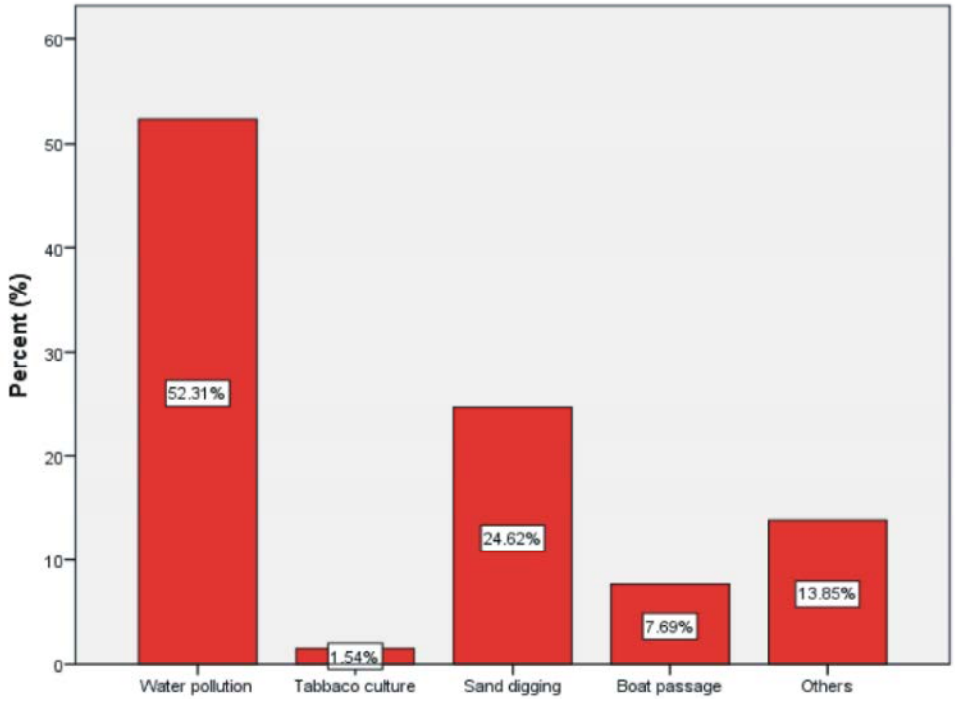

Fig. 12: Factors that contribute tothe degradation of the spawning environment

In recent years, egg collection pattern is being changed day by day. Various issues are responsible for this reducing pattern of the egg.The most serious cause is the degradation of the spawning environment (52.31%). Almost similar findings (76.5%) reported by Kibria et al. (2018). Spawning environment is being degraded by water pollution (52.31%), sand digging (24.62%), tobacco culture (1.54%), boat passage (7.69%) and others (13.85%) are notable causes (Figure 12).

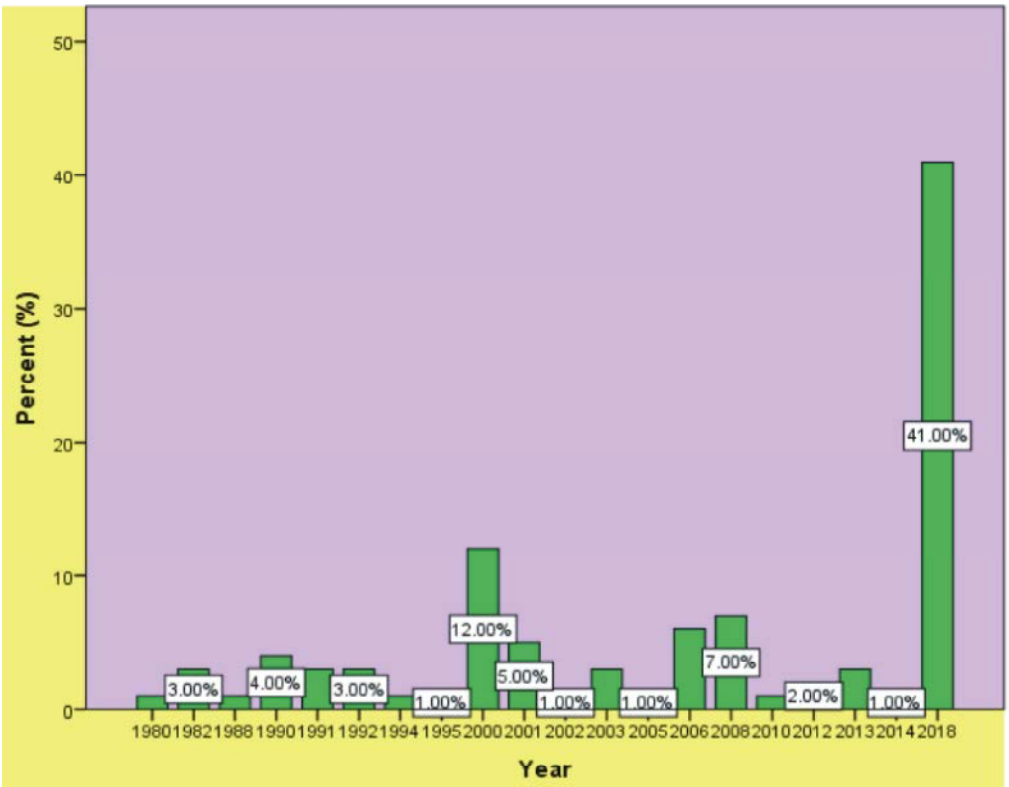

Fig. 14: Egg collection pattern from 1980-2018 by egg collectors

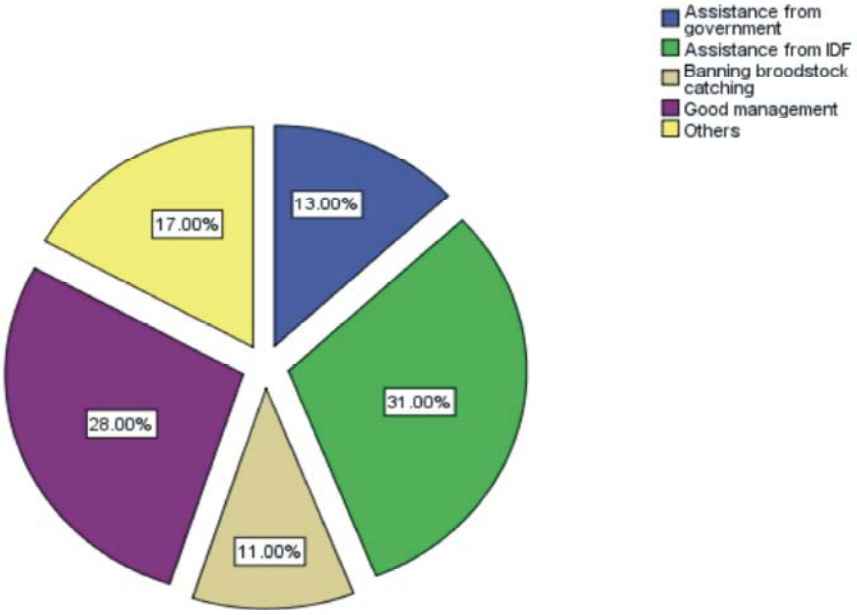

Fig. 15: Factors for getting a massivequantity of egg in the HaldaRiver

Indiscriminate catching of broodstock (50%) is responsible for the reduction of the amount of egg from the river. Respondents reported water pollution (16.67%) is another big problem besides mother fish catching. Motorized boat, oxbow bend, dredger and others are also liable for the declination of eggquantity. Kibria, *et al*., (2018) and Islam, *et al*., (2017) also documented the same causes for the damage of the spawning ground of the Halda River.

41% of respondents mentioned that a huge amount of egg was collected in 2018 in the HaldaRiver (Figure 14). About 43% of the egg collector caught 150 kg, while 23% of the egg collector collected 190 kg and 15% of fishermen caught 250 kg of egg, respectively in 2018. Moreover, the expected amount of fry was produced from the collected egg 52% of the fishermenstated that they were able to produce 3 kg fry, whereas 27% produced 2kg fry this year.

Different factors are responsible for getting a huge amount of egg in 2018. Local people, NGOs along with government worked hard to protect the healthy environment of the Halda River. 31% of fishermen stated that IDF (NGO) plays a great role in getting a massive amount of this year. Good management (28%) also helps in getting this huge amount. Regular monitoring and punishing the culprit and other fruitful activities are the key point to get these results. Help from the government (13%) and banning broodstock catching (11%) during the spawning phase also contribute a lot to get a massive volume of the egg (Fig. 15).

Different factors act as a powerful tool in increasing egg production. 16% of respondents identified that the ban on poisonous water helps a lot in augmenting egg production. 10% of fishermen reported that the ban on catching mother fish also help in egg production. The reduction of pollution from different sources contributes a lot to the huge amount of egg production. In the present study, 67% of the fishermen were found with mud scoop method since it ensures the huge production (20%).While rest 30% were found to use cemented sistern due to lack of mud scoop for the egg fertilization.

Coping Techniques Adopted by the Fishermen: Fishermen adopt some adaptation methods during off-seasons or crisis periods to manage their families. Sometimes they have to stop fishing in the River due to government prohibition. But there is nogovernment or non-government employment scheme taken during the forbidden time (stated by 80% fishermen). 20% of fishermen reported that there are some steps taken by the authority (Fig. 18).

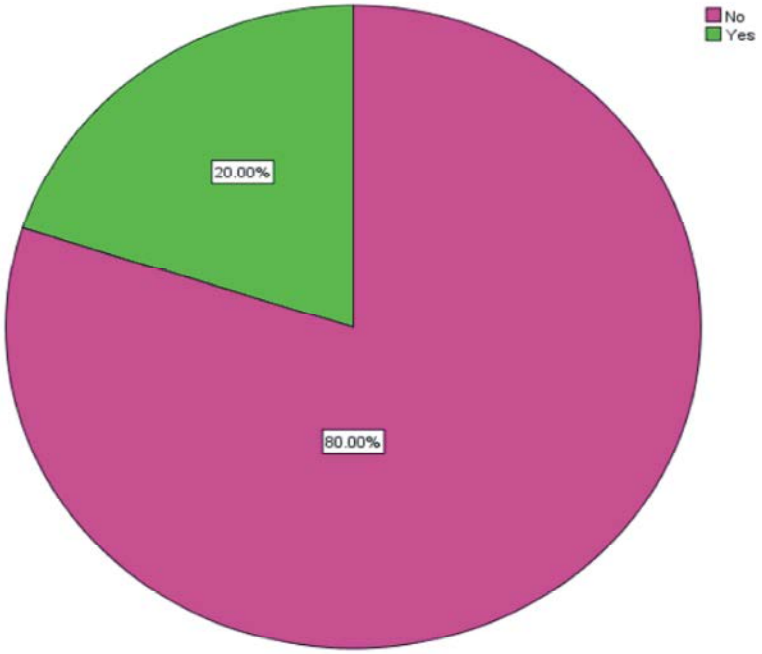

Fig. 18: Is there any govt. or non-govt. employment scheme taken during the forbidden time?

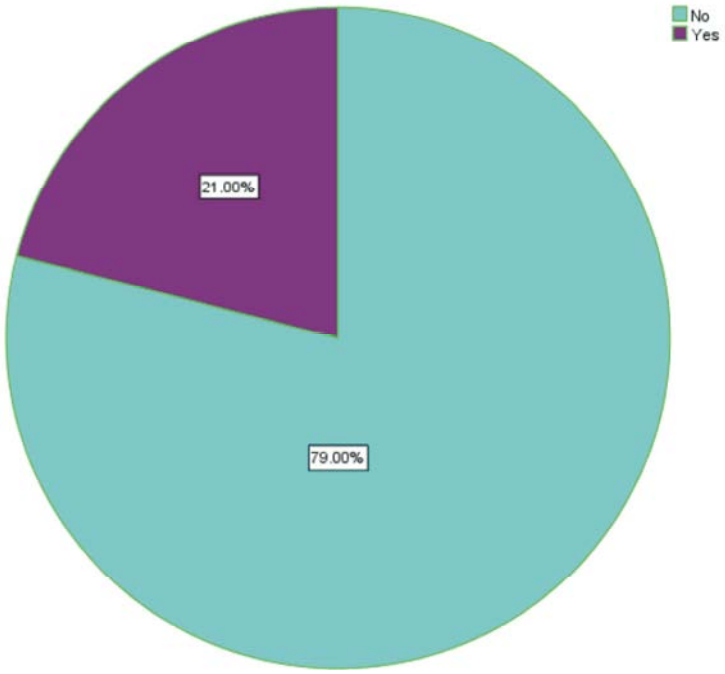

Fig. 19: Is there any savings scheme taken by the govt. or non-govt. organization?

Fig. 20: The percentage of respondents take a loan from organizations

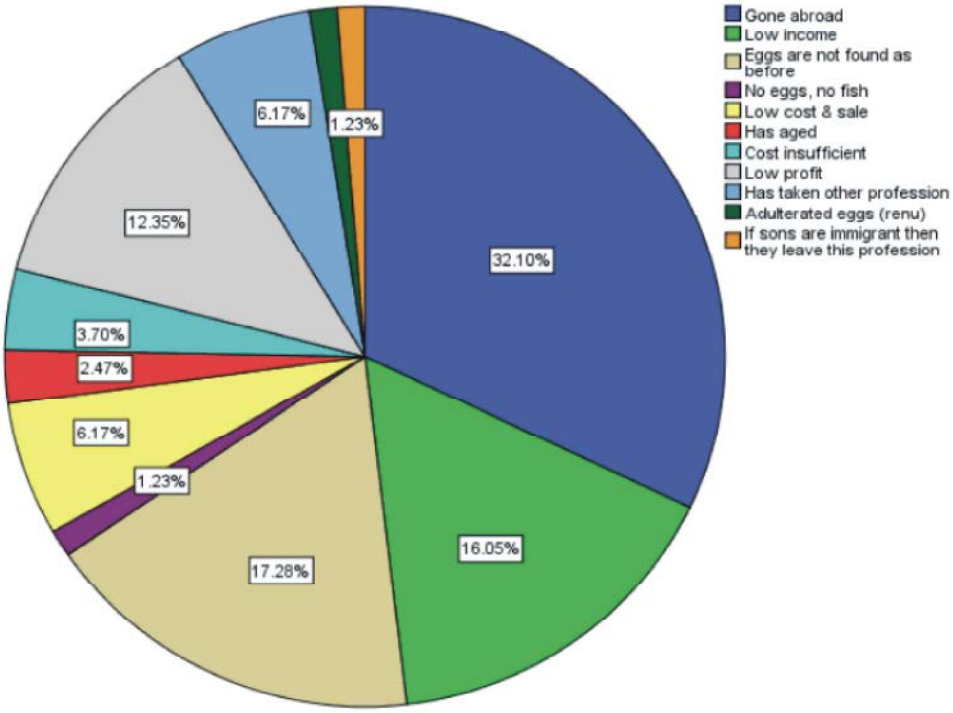

Fig. 22: Reasons for leaving the fishing profession

Besides the employment scheme, 79% of respondents mentioned that there is no government or non-government savings scheme taken during the extreme condition (Fig. 19). These scenarios make their life more difficult.

To overcome this crisis or extreme period, they have to take a loan from their relatives. But relatives cannot afford much to maintain their family. So, they have to take a loan from ASA and Grameen Bank (reported by 77.78% of respondents), etc. with interest (Fig. 20).

They have to sell all the catch to moneylendersata low cost in the next year. 81.25% of the egg collectors take a loan from the moneylender to maintain their family, to repair their boat and net also.

If the economic condition gets worse, they have to leave the fishing profession. 32.10% of the respondents go overseas to earn more money and to provide a healthy life for their families. 17.28% of egg collectors reported that they are not getting enough egg, they usually caught in the past. That's why income is very low (16.05%) from the egg collection (Fig. 22). That's why they are leaving this profession but they are not interested to leave their ancestor's profession. They want to continue this profession.

To change these scenarios, local people and NGOs along with the government can work together.

DISCUSSION

Livelihood assessment is a key tool to know the present status of the target groups. The present study was carried out to find out the status of fishermen in the Halda River. To explore the coping strategies during the lean season or ban period. From the findings of the present study, the amount of egg is low during the past years though this pattern increased in 2018 through some effective measures taken by different stakeholders. The overall condition of the fishermen was not up to the standard. It was reported that the fishing income exerted a great impact on the overall socio-economic condition of the fishermen ($p < 0.05$).

Respondents mentioned that the government ban is not responsible for decreasing the pattern of a boat, the identified that money is the main problem. From the findings, it is clear that the number of the boat is decreasing. Financial constraints and degradation of the spawning environment of the river are regarded as the root problem of this reduction. This indicates that the socio-economic condition of the Halda River fishermen is getting worse gradually.

Most of the respondents mentioned that a huge amount of egg was collected in 2018 in the Halda River. This was a record for the Halda River fishing community. Similar results were reported by Kibria, *et al*., (2018) in the Halda River. This quantity surpassed the amount found in the previous year. Most of the fishermen were found to be satisfied with the amount of egg caught in 2018.

After getting a huge amount of egg, it was a challenge to get fry from these eggs. Since most of them used traditional knowledge to fertilize the egg of the carp fish. Both egg collection and egg fertilization were done using indigenous knowledge. Traditionally, mud scoop is being used for the fertilization of the egg.

They have to pay interest to these organizations. As a result, their livelihood condition/ socio-economic condition never gets a good appearance. They live below the poverty line. They cannot send their children to school, cannot provide medical facilities etc. Their economic condition getting worse day by day.

Besides ASA and Grameen Bank, they have to go to the local moneylender for the loan. Who takes a loan from a moneylender, most of them do not know the process of taking a loan from organizations or they are not eligible to take a loan from organizations. Some of them are afraid of taking a loan from organizations. Fishermen take a loan from a moneylender with a condition.

CONCLUSION

The socio-economic condition of the fishermen/egg collectors in the Halda River is getting worse. They are unable to meet the basic need of their family. Fishermen are living below the standard line though the huge egg was collected in 2018. But only one year cannot change their living condition. It is good to see stakeholders are working hard to make the river environment eco-friendly. Fishermen are using indigenous knowledge to fertilize the egg. The advance fertilization technique will increase the fertilization rate. In 2018, a huge amount of eggs were collected and fishermen got more money beyond their expectations. This only happens due to good management of Government and assistance from NGOs and local authorities. If this feature continues in the future, the socio-economic condition will be good in the future. It will help to add GDP to the national economy. Participation of all stakeholders will help to protect the river and fishermen's participation will be a welcome addition in that case. This research will advance the understanding of the livelihood and adaptation capacity within limited resources. In other words, it will be contributed to conserving biodiversity require the preservation of local habitat which may help researchers and policymakers in formulating a sustainable strategy for reducing the vulnerability of livelihood and river restoration.

Recommendations: Based on the present findings, the following recommendations can be outlined below:

- Fishermen should get easy access to the loan.
- Create alternative jobs for fishermen during off-seasons/ forbidden time and monthly allowance (e.g. rice, money etc.) can be arranged.
- Government Khas land should be allocated to increase the resilience of the spawn fishing community who have lost their homes and assets by river erosion.
- Creating awareness among the fishermen, local authority and local managementto protect the broodfish.
- Construction of co-operative society of fishermen.
- The egg collectors should be encouraged to sell their fish directly to the market without engrossment of the intermediaries.
- Stopping illegal catch of broodstock/mother fish
- Cutting of river bends should be banned that is responsible for river erosion and destruction of the breeding grounds.

- Pollutants from industries, domestic sewage and agricultural pollutants must be controlled.
- To ensure the natural flow of river water, the sluice gate should be redesign and a rubber dam and concrete dam must be removed.
- Government hatcheries need to be provided with adequate facilities and skilled technician to help the spawn fishers in successful hatching of spawn.
- Strict law enforcement can be an effective measure to protect the broodstock.
- Different stakeholders (e.g. police, coastguard, army, local folk etc.) should work together and an integrated approach must be taken.
- Strict enactment of the law is key to protect the carp broodstock that is the main source of egg.
- The illegal influence of local politicians in the hatcheries must be reduced.

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