

RISK AND COPING MECHANISMS OF THE CARP SPAWN FISHING COMMUNITY OF THE HALDA RIVER, BANGLADESH

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Abstract: To assess the livelihood risks and coping mechanisms of the spawn fishing community of the Halda river, Chittagong, Bangladesh was conducted. Four areas, namely Ankurighona, Gorduara, Madarimukh and Madunaghata were selected on the basis of the aggregation of spawn fishers. A structured questionnaire survey was made on 152 spawn fishers in two categories i.e. boat owner and hired laborers to collect primary data. Three major man-made risks, namely catch of brood fish, non-functioning sluice gates and cutting of river bends related to egg collection were mentioned by the spawn fishers while salinity intrusion, river erosion and fluctuation in weather variables were found as the main natural risks. Willingness to continue egg collection despite the risks was disagreed by most of the respondents while those who were found to continue egg collection mentioned their driving forces as high profit, tradition and hobby. The respondents expressed that they cannot take any measures to mitigate the risks of salinity intrusion, weather fluctuation, mortality of spawn, non-functioning sluice gates, cutting of river bends and political influences. However, informing police and raising awareness to stop illegal catch of brood, construction of proper sluice gates, stop further cutting of river bends and rehabilitation of erosion victims were mentioned as probable solutions.

Key words: Coping mechanisms, risk factors, spawn fishing community.

INTRODUCTION

The water/waterways of Halda, the third main river of Chittagong are used mainly for irrigation, agriculture, fish farming, livestock, drinking and bathing. The river becomes effectors of development of an economically depressed region along with fresh water supply, fish production, transportation, waste assimilation provision of a wide array of recreation and tourism options (Kabir *et al.* 2013). This river is ecologically sensitive (Hossain 2015) and only natural fish breeding ground in Bangladesh (Kibria 2009) from where fertilized eggs of major carps are collected (Tsai *et al.* 1981, Patra and Azadi 1985) directly by

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fishermen (Kibria *et al.* 2009). Total annual indirect and non-use values of the Halda river are estimated to be worth USD 761,977 (Kabir *et al.* 2013). There are around 1100 egg collectors and 2000 fishermen depend directly for their livelihood on this river (Islam 2009). Traditionally, the community people are involved in carp egg collection (such as *Labeo rohita*, *Cirrhinus mrigala*, *Labeo calbasu*, *Catla catla* etc.) from the river where brood fish from the adjoining rivers and tributaries come to lay eggs during the breeding season from May to July each year. After collection the fishermen hold the spawn in small earthen pond or “kua” for the hatching of spawn and later on fries are sold to the fish farmers as they have high market demand across the country.

Spawn fishing communities are one of the most vulnerable groups in the Halda river area and over the years; economic conditions of them have further deteriorated. It should be mentioned that spawn fishing requires large investment whereas spawn fisher folks have limited access to institutional finance as this economic activity is considered as a high risk venture by the lending institutions, Government banks and NGOs. Therefore, they are more likely to depend on informal (possibly exploitative) credit sources. The spawn fishermen work hard through day-night in the rain, wind and inclement weather during egg collection season. Although they earn handsome amount of money during egg collection season but they can hardly save for year round sustenance of their livelihood. Their income is primarily spent to meet the basic needs like food and clothing. The seasonal income does not form any basis of economic footing in the fishing community. Sufferings from financial hardships are common in the life of spawn fishers across the year (Afsar 2001). Recently, the volume of egg collection is declining rapidly due to both natural and anthropogenic causes (Khan 2008, Hossain *et al.* 1988) and this gradual decline in spawn collection will definitely increase the vulnerability of the fisher folks who have been involved in this profession for generations.

Climate change impacts such as delayed or inadequate rainfall, fluctuation in water temperature and water current have become visible in the natural breeding ground of the Halda River. Besides, illegal catching of brood fish, pollution, non-functioning sluice gates, alteration of natural bends of the river are considered as serious threat to the brood stock. The study, was, therefore, designed to examine the present livelihood status of the spawn fishing community of the Halda river.

MATERIAL AND METHODS

The study was undertaken in four areas, namely Ankurighona (Gohira Pouroshova, Raozan upazila), Gorduara (Gorduara union, Hathazari upazila),

Madarikhali (Madarsha union, Hathazari upazila) and Madunaghat (Madarsha union, Hathazari upazila) (Fig. 1). The selection of the sites was based on the concentration of spawn fishers.

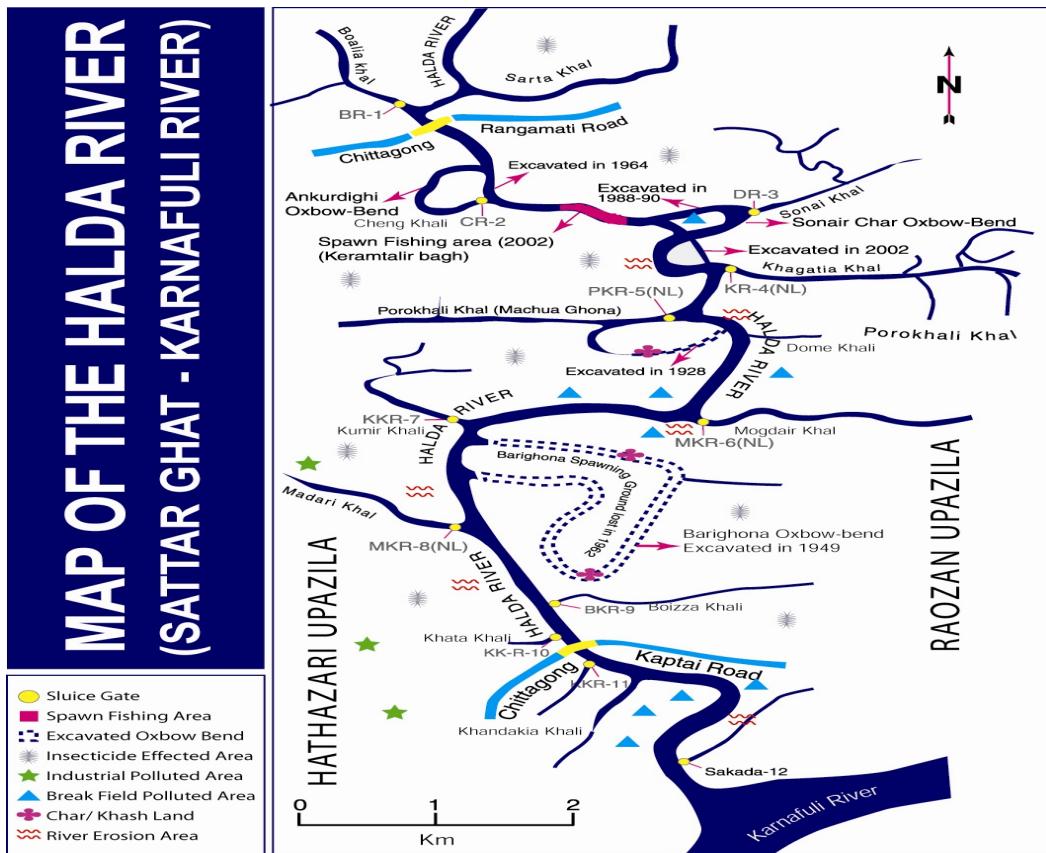


Fig. 1. Map showing the sampling stations of the Halda River.

Data were collected mainly from primary sources. Questionnaire survey was made to collect data randomly from the interviewees (Henry 1990). The survey design was based on expert advice from local NGO staff and guidelines for collecting baseline spawn fisheries data (Kronen *et al.* 2007). A total of 152 respondents were interviewed randomly for this study. All respondents were categorized into two groups: boat owner and hired laborer. Of 152 respondents, 87 were boat owners and 65 were hired laborers. Secondary data were collected from different books, journals, reports, government office, NGOs etc. Risk factors related to egg collection activity were evaluated to understand the perception of the spawn fishers about different types of risks and probable solutions. The findings would help to figure out the entry points that need to be solved on

priority basis to sustain this occupation. In this study, risks were categorized into two groups: man-made and natural. Information on the coping mechanisms adopted by the spawn fishers to mitigate the risks involved in egg collection were assessed to get an insight on the existing situation and required initiatives for improvement.

Descriptive statistics including frequency, percentage means and cross-tabulation were used to represent the data for both boat owner and hired laborer. Multiple response analysis was done for open ended questions where the responses were more than one. Frequency and percentage of the responses were considered in order to find out the priority of the respondents. Data were analyzed by SPSS (v.22) and MS-Excel.

RESULTS AND DISCUSSION

Risks involved in egg collection and reasons behind inclination to this occupation: Multiple responses were received from the participants and the boat owners were found to respond for catch of brood fish (77%), non-functioning sluice gates (55%) and cutting of river-bends (60%) while hired laborers responded as non-functioning sluice-gates (45%), cutting of river-bends (40%) and catch of brood fish (23%) (Fig. 2).

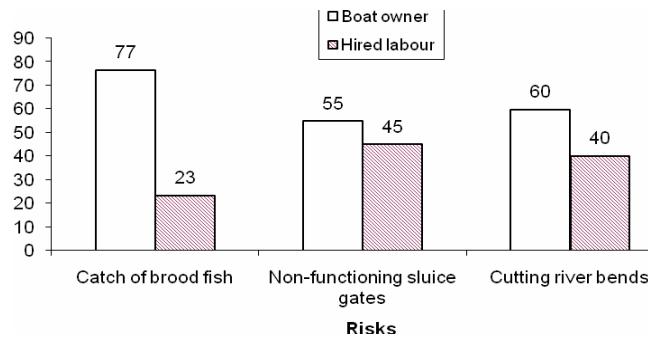


Fig. 2. Man-made risks in egg collection.

A number of sluice gates were built in the study area many years back to control flood and facilitate irrigation; however, almost all of them were found non-functioning, thus blocking the natural habitat and migratory path of brood fish. Cutting of river-bend has destroyed the natural breeding ground of mother fish while catch of brood fish is a direct threat to the sustainability of egg collection. In fact, all these man-made risks are interrelated and need integrated approach to resolve. In multiple responses, the boat owners were found to respond for river erosion (66%), weather fluctuation (58%) and salinity intrusion

(56%) (Fig. 3). Besides, the hired laborers responded for salinity intrusion (44%), weather fluctuation (42%) and river erosion (34%).

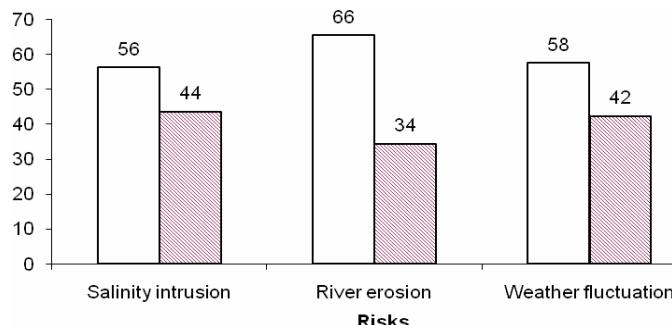


Fig. 3. Natural risks in egg collection.

According to the respondents, negative impacts of weather fluctuation have become visible in the egg collection activity of the Halda river over the last couple of years. Due to low rainfall in the upstream, saline water is intruding more interior causing the mortality of hatchlings. Besides, fluctuation in temperature, rainfall and water current altogether have made the breeding time of fish unpredictable causing loss for the spawn fishers. Further, river erosion has changed the natural breeding areas that people knew by tradition; and therefore, egg collection has often become uncertain leading to financial loss.

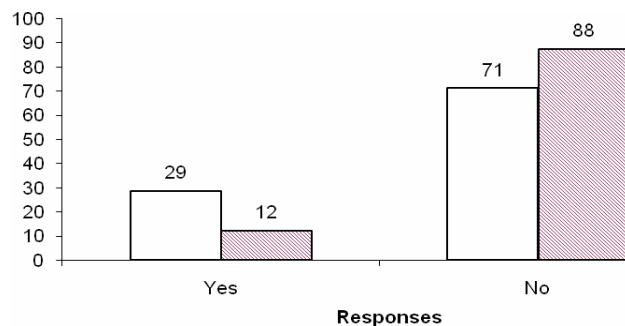


Fig. 4. Willingness to continue egg collection.

River erosion destroying houses and other physical assets of people has also increased their vulnerabilities. Majority respondents (71% boat owner and 8% hired labor) said that they do not want to continue this egg collection while 29% boat owner and 12% hired laborers responded positively regarding their willingness to continue their occupation (Fig. 4).

Multiple responses revealed that boat owners are ready to continue the tradition of egg collection (80%) due to high income in short time (78%) and hobby (74%). However, the hired laborers responded as hobby (26%), high income in short time (22%) and tradition (20%) (Fig. 5). This can be said that egg collection from the Halda river is not only an income generating activity but also a part of their heritage and that is why they wish to continue this occupation despite the risks.

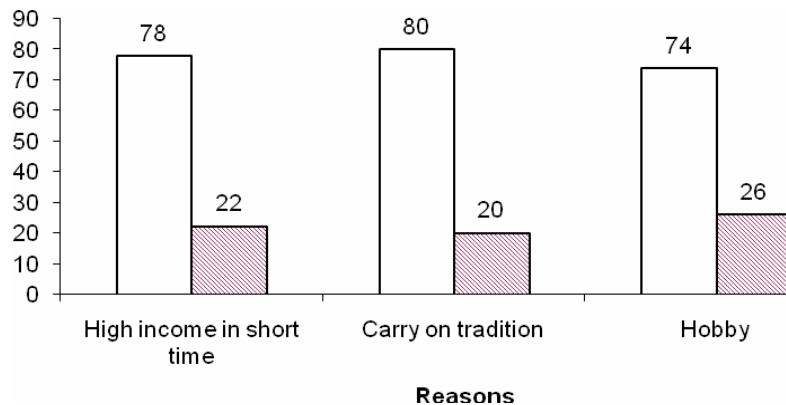


Fig. 5. Reasons to continue egg collection.

Willingness to engage children in egg collection is an indirect way to understand the probability of transferring this indigenous skill to future generation and the result shows that 54% boat owner and 85% hired laborers expressed their unwillingness while 46% boat owner and 15% hired labor said positively about their willingness (Fig. 6).

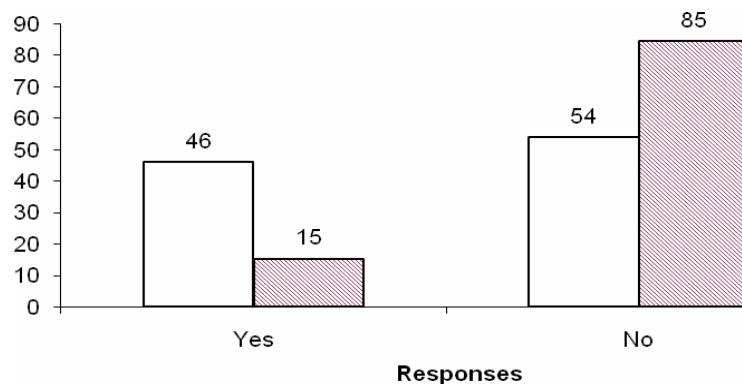


Fig. 6. Willingness to engage children in egg collection.

Coping mechanisms for mitigating risks related to egg collection

Measures adopted to reduce man-made risks: In response to the measures adopted to reduce man-made risks (i.e. catch of brood, non-functioning sluice gates and cutting of river bends), the general response from the spawn fishers came as they are unable to take any measures. However, regarding illegal catch of brood the result shows that 49% boat owner and 29% hired laborers inform police and 8% boat owner responded for awareness build-up (Fig. 7).

While some proportion of the respondents (i.e. 43% boat owner and 71% hired laborers) expressed that no measures can be taken to stop illegal catching. In fact, there are a number of reasons like political influence, lack of strong community pressure group, poor support from law enforcing agencies, and absence of responsible attitude from the concerned departments of the government which need to be considered before any fruitful measure can be suggested. During the study, it was found that there are several instances when the community sent illegal brood catchers to the police but they managed to escape by using political influences. Therefore, there is single point solution to this situation and all the stakeholders are required to come into common agreement for the protection of this resource of the Halda river.

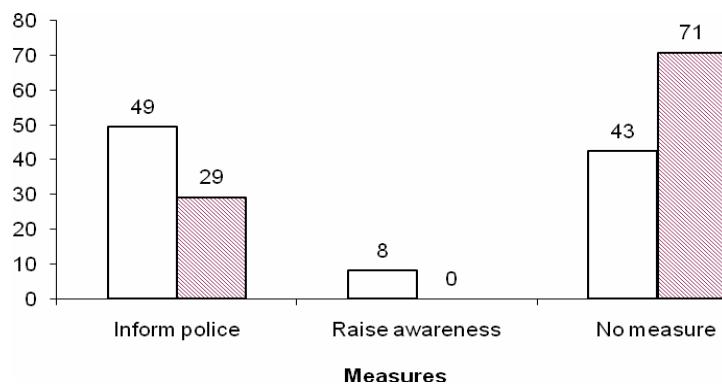


Fig. 7. Measures adopted to reduce illegal catch of brood fish.

Measures adopted to reduce natural risks: In response to the measures adopted to reduce natural risks (i.e. salinity intrusion, river erosion and fluctuation in weather parameters), they responded that they are unable to stop it. However, this is obvious as the impacts of global climate change are inevitable but at least adaptive measures for particular area and their implementation need to be considered. For example, the damage of river erosion can be reduced by proper rehabilitation of the community. Besides, active erosion can be stopped by building embankments or any such measures.

Measures adopted to reduce other risks

Mortality of spawn: In response to the measures adopted to reduce mortality of spawn, all respondents expressed that nothing can be done. However, hatcheries established under the “Halda restoration project” are intended to help the spawn fishers to use the scientific knowledge in successful hatching and rearing of spawn so that maximum survival of spawn is ensured. Moreover, saline water is responsible for spawn mortality which can be avoided if the spawn fishers have access to the hatchery facilities where fresh water source is used. Therefore, it can be said that the spawn fishers are not well aware of the project activities in the study area.

Declining trend of spawn: Gradual decline of egg collection is a visible threat for the spawn fishing community and in response to that 21% boat owner and 14% hired laborers stated that they survive the risk by increasing price while 79% boat owner and 86% hired laborers depend on other income options (Fig. 8). In the present investigation, egg collection though providing handsome amount of money within short time was found as not the main income source for all spawn fishers, therefore, they are not completely dependent on this option. However, declining amount of egg definitely has effects on their income, tradition and skill.

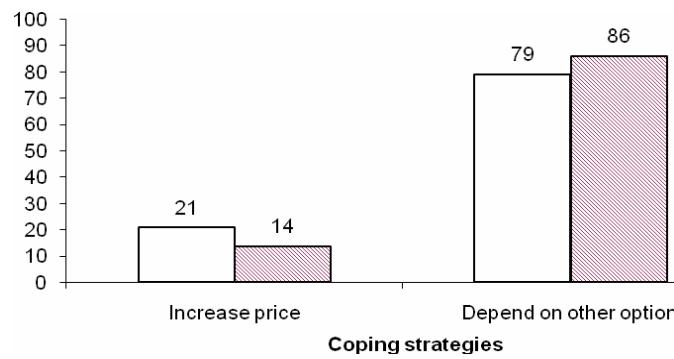


Fig. 8. Measures to cope declining amount of eggs.

Political influence: Political influence can act both positively and negatively for the interest of the target community. Although it was a sensitive issue and not comfortable for the respondents to answer yet 23% boat owners ad 59% hired labors agreed the problem of political influence in the study area while 77% boat owner and 42% hired labor disagreed the problem (Fig. 9). In reality, this kind of negative influence can be resolved only through strong commitment of the public representatives, motivation and strong voice of community organizations which is a long process to materialize.

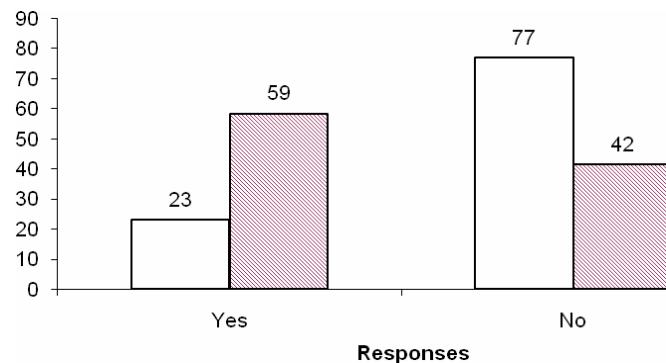


Fig. 9. Problem of political influence.

Status of legal support, role of media and community strength in support of egg collection

Legal services: In response to the status of legal support majority (i.e. 86% boat owner and 91% hired laborers) stated that the service as poor while some (i.e. 14% boat owner and 9% hired laborers) rated the service as moderate (Fig. 10). Egg collection is a profitable economic activity; therefore in recent years people tend to adopt unethical practices such as mixing of hatchery spawn with natural spawn of the Halda river just to gain short term profit and damaging the long reputation of this resource. According to the respondents, a few powerful people are engaged in such corruption which demands strong legal action. But unfortunately, the required support is inadequate as is expressed by the spawn fishers.

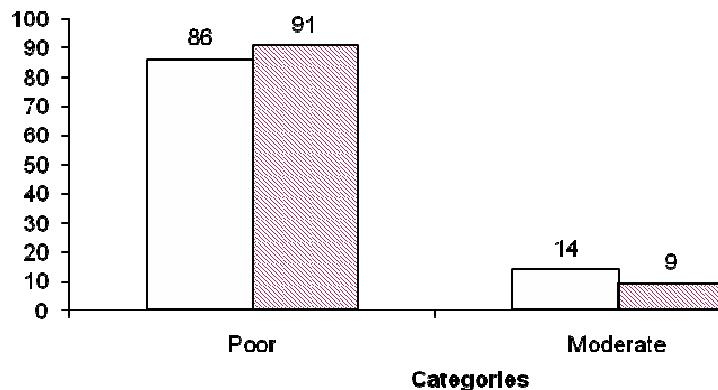


Fig. 10. Legal support from law enforcement agencies.

Performance of media: Regarding the media support 53% boat owner and 34% hired laborers responded as very good while 47% boat owner and 66% hired laborers rated it as good (Fig. 11). Media can play a vital role in raising

people awareness and ask for proper government action to conserve such important common property resource. In recent years, both print and electronic media have tried to figure out the problems of the spawn fishers and required actions from the government in series of reports and video documentaries (Kibria *et al.* 2009).

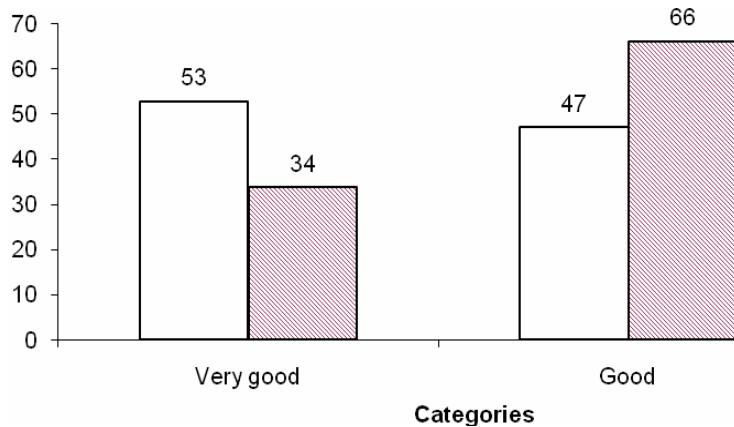


Fig. 11. Support from media to the spawn fishers.

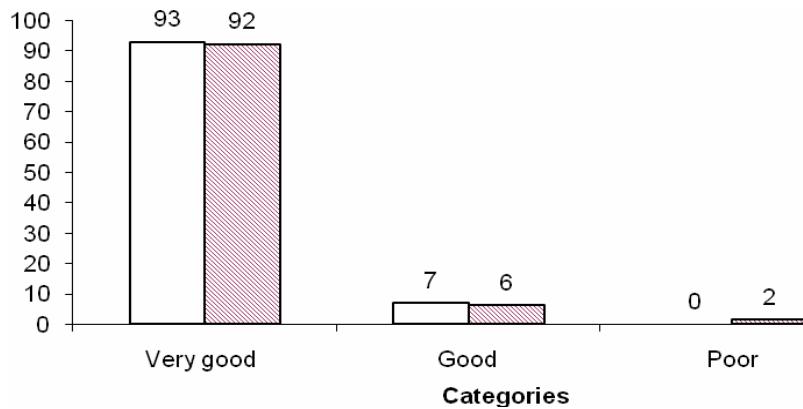


Fig. 12. Unity among the community to protect their rights.

Unity among community: Majority (i.e. more than 90%) respondents perceived that their unity regarding their common rights is very good (Fig. 12). This perception of the spawn fishers is an expression of their social strength which can be potentially used towards the better management and conservation of the fisheries resources of Halda.

CONCLUSION

The aim of this study was to understand the livelihood conditions of the spawn fishing community of the Halda River of Chittagong through identifying the risk factors involved in egg collection and assessing their respective coping mechanisms.

The major man-made risks were identified as catch of brood fish, non-functioning sluice gates and cutting of river bends while salinity intrusion, river erosion and fluctuation in weather parameters were found as the main natural risks. Rehabilitation measures for community people were recommended as probable solution for river erosion. Regarding the sustainability of egg collection in the Halda river, majority of the spawn fishers were found optimistic provided that the government take responsible actions in mitigating the identified threats to this occupation.

As coping mechanism to stop illegal catch of brood; informing police and raising awareness were mentioned by the respondents. While the respondents could not mention any adaptive measures to reduce risk of salinity intrusion or weather fluctuation. To mitigate the mortality of spawn, avoiding use of saline water of the river is the best solution. But the spawn fishers were found unaware about the government owned hatchery facilities. Contradictory picture regarding the existence of political influence was found in the study as majority of the hired laborers agreed with it while not by the boat owners. Diversification of income opportunities was identified as the main coping strategy of the spawn fishers for gradual decline in the amount of egg.

Based on the study, it can be recommended that sensitizing and raising awareness among the community people is very important to protect the brood fish in the Halda river and its tributaries. In addition, strict implementation of law is equally important to protect the carp brood stock which is the main source of egg. Moreover, stringent monitoring is needed to stop further cutting of river bends which is mainly responsible for erosion and destruction of the breeding grounds. Hatcheries need to be provided with adequate facilities and skilled technician to help the spawn fishers in successful hatching of spawn and the information gap between them should be minimized. To increase the resilience of spawn fishing community, government khas (bare) land should be allocated to those who have lost their homes and assets by river erosion. Alternative options for income generation should be introduced and allowance to be provided to the fishermen during fishing closure season to secure their livelihood. Finally, it should be worthwhile to mention that integrated approach is needed to address the risks involved in egg collection activity and all the

stakeholders should come forward to protect and sustain this unique resource of the Halda River.

LITERATURE CITED

- AFSAR, R. 2001. Sociological Implications of Female Labour Migration in Bangladesh. In: Rehman Sobhan and Nasreen Khundker (eds.) Globalisation and Gender: Changing Patterns of Women's Employment in Bangladesh (Dhaka, Bangladesh: University Press Ltd.), pp. 91-165.
- HENRY, G.T. 1990. Practical Sampling. SAGE Publications, Newbury Park, CA, USA. DOI: 10.3390/f3020244.
- HOSSAIN, M.M., KIBRIA, G., MALLICK, D., LAU, T.C., WU, R. and NUGEGODA, D. 2015. Pollution Monitoring in Rivers, Estuaries and Coastal Areas of Bangladesh with Artificial Mussel (AM) Technology- Findings, Ecological significances, Implications & Recommendations. Research collaboration between scientists of the IMSF, University of Chittagong, Bangladesh, RMIT University, Australia, the City University of Hong Kong, and the University of Hong Kong. 57 p (summary of research findings was presented at an International seminar/conference held in Dhaka, Bangladesh on 16 January 2015). DOI:10.13140/2.1.1808.4646.
- HOSSAIN, M.M., MAHMOOD, N. and BHOUYAIN, A.M. 1988. Some water quality characteristics of the karnafully river estuary. Mahasagar- Bulletin of the National Institute of Oceanography, 21 pp.183-188.
- ISLAM, M.T. 2009. Livelihood Condition of spawn carp fishing community at the western part of Halda River, Chittagong, Bangladesh. 81 pp.
- KABIR, M.H., KIBRIA, M.M., JASHIMUDDIN, M. and HOSSAIN, M.M. 2013. Economic Valuation of Tangible Resources from Halda-The Carp Spawning Unique River Located at Southern Part of Bangladesh, International Journal of Water Research, 2013, <http://www.urpjournals.com>.
- KIBRIA, M., FARID, I. and ALI, M. 2009. Halda River natural breeding ground restoration project: People's expectation and reality. pp. 57.
- KRONEN, M., STACEY, N., HOLLAND, P., MAGRON, F. and POWER, M. 2007. Socioeconomic Fisheries Surveys in Pacific Islands: A Manual for the Collection of a Minimum Dataset. Secretariat of the Pacific Community (SPC), Noumea, New Caledonia, Available at: <http://www2008.spc.int/DigitalLibrary/Doc/FAME/Manuals/Kronen07SocioFishSurveys.pdf> (accessed 10.09.12).
- PATRA, R.W.R. and AZADI, M.A. 1985. Hydrological conditions influencing the spawning of major carps in the H.R, Chittagong, Bangladesh.
- TSAI, C., ISLAM, M.N., KARIM, M.R. and RAHMAN. K.U.M.S. 1981. Spawning of major carps in the lower Halda River, Bangladesh. Estuaries. 4: 127-138. DOI: 10.2307/1351675.

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