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ORIGINAL RESEARCH ARTICLE

Socio-economic appraisal of fish sanctuary on livelihood of fishermen in Chikadubi beel of Dingapota Haor, Netrokona, Bangladesh

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ABSTRACT

The investigation was conducted on the livelihood status of fishers of Chikadubi beel in Dingaputa haor, Netrokona district of Bangladesh for a period of 6 months from August 2020 to December 2020. A total 50 fishers were randomly selected and data were collected from them through direct interview. Focus group discussions were carried out by a previously made checklist. The results showed that the annual income of fishermen varied from BDT 30000 (270.79 USD) to BDT 70000 (631.85 USD). Maximum (58%) fishers were low-income levels from BDT 30000 (270.79 USD) to BDT 40000 (361.05 USD) and trying to shift their professions to other subsidiary professions. Among them 66% of the respondents indicated that this sanctuary is very effective in improving socio-economic status of the fishers. Relatively middle age group (31 to 40 years) dominated in all study areas. Muslim fishermen are the most dominant in the study area. 68% of the fishers live with nuclear families. The highest percentage (62%) fishers can sign only due to economic crisis and lack of awareness about education, (24%) having Primary level education, (14%) have no education as the children dropped out from school before completing their primary education. Housing and sanitation conditions of the fishermen were not well developed. Based on various livelihood parameters, fishermen are leading very poor state of lives. Sanctuary establishment and Community based aquatic resource management strategies may be undertaken with a view to enhance fish production to improve the livelihood condition of the fishers dwelling in the Chikadubi beel area of Dingaputa haor in Bangladesh.

INTRODUCTION

Bangladesh is an agro-based country. Majorities of the rural people depend on natural resources (land, aquatic resources, forests, livestock etc.) for their livelihoods. This is particularly important for poorer households as they have few opportunities of income generation for their livelihoods. Fish is an integral part of life and livelihood of the people of Bangladesh for food, nutrition, income generation, poverty alleviation, foreign

exchange earnings and it is the part of our cultural heritage (Wahab, 2014). Fish is the major protein source contributing about 58% of the total animal protein intake. At present, fish consumption of Bangladesh is 67.8 g/day against the set target of 60.0 g/day of daily animal protein intake of its people (DoF, 2023). In 2021- 22, fish production was 47.59 lakh MT; which is 55.42% more than the total production of 2010-11 fiscal year (30.62 lakh MT). In 1983-84 the total production of fish in the country was 7.54 lakh MT. At present, 1.24% of the export

income of the countries comes from the fisheries sector (DoF, 2023). Fishing opportunities abound in inland waterbodies. It presents enormous opportunity for fisheries development in terms of the capacity to increase fish productivity and enhance the livelihoods of the people who live near these water bodies Haors are more likely to produce fish among the large inland fisheries resources. The natural ecosystem known as Haor is one of the most notable for Bangladesh's native fish species. In seven districts of Bangladesh; Sylhet, Moulavibazar, Habiganj and Sunamganj in northeast, Netrokona and Kishoreganj in north central and Brahmanbaria in central eastern region of Bangladesh, a number of 423 haors comprising a surface area of about 8000 km^2 are present (Miah, 2013). Netrokona district & Sylhet division is completely haor basin area where many haors and beels are found. The most noticeable haors are Dingaputa haor, Hail haor, Hakaluki haor, Dekar haor, Chayer haor, Maker haor, Tanguar haor, Kawadighi haor and Saneerhaor (Hossain, 2014). Dingaputa haor is a resourceful wetland basin located in the North-East part of Bangladesh, lies between latitude 24°45'N to 24°55'N and longitude 90°55'E to 91°07'E under Netrokona district. The Dingaputa haor covers an area of 8000 ha including 30 beel. In monsoon, it is full of water look like an inland sea, but in the dry season maximum portion of the haor becomes dry except some deeper portions. Fish and other aquatic animals depend on the haor as a vital habitat. Freshwater fish in vast numbers, migratory and native birds numbering in the thousands, as well as aquatic life other than fishes, have all been spotted. There has been a gradual reduction of fish diversity in the Chikadubi beel area that is from the earlier 94 species to present 78 species. Average fish catch per fisherman per day was also reduced from 8.35kg to 1.4kg in the haor within 10-15 years (Pandit *et al.*, 2015). Due to reduction in fish harvest, fishers' income from the Chikadubi beel was declined. However, there is little reliable data about the livelihood status of the fishers in the chikadubi beel. Therefore, a comprehensive study is essential to investigate the livelihood status of the fishers in and around the beel area. Considering the above context, the main purpose of this study is to survey the socio-economic conditions of the fishers dwelling in the chikadubi beel area of Netrokona.

MATERIALS AND METHODS

The study was conducted in a pre-selected area of Chikadubi beel of Dingaputa haor under Netrokona district of Bangladesh to investigate the livelihood status of fishers (Figure 1). It includes an appropriate geographic area, physical features, and water depth that guarantee adequate coverage in terms of biodiversity and a significant number of dependent fishermen. The study was performed for the periods of 6 months from August 2020 to December 2020 to fulfill the requirements of the research objective. The study was based on both primary and secondary data. A total 50 fishers were randomly selected in three villages named Borantor, Korchapur, and Baniahari under Mohonganj upazila of Netrokona district for the study. Both full time and part-time fishers were randomly selected. Data were collected through personal interview, focus group discussions (FGD) of the fishermen and key informant interview (KII). The primary data were collected through direct interview using a well-structured questionnaire, so that the fishermen could answer chronologically each and every question. Focus group discussions (FGD) were carried out by a previously made checklist. A total of five FGD sessions was conducted in the study areas where each group size was 10-15 fishers. The secondary information was collected from the Department of Fisheries Office, Local Government Engineering Department (LGED) office, of Mohonganj and from different journals regarding the fisheries and socioeconomic condition of the fishermen. Key informant interviews (KII) were made with key person such as manager of BFDC landing center, Upazila Fisheries Officer (UFO), District Fisheries Officer (DFO), LGED officer, local leaders of Netrokona to cross-check the collected data from the fishermen. After collecting, the data were computed, edited, coded, summarized and processed for analysis. These data were verified to eliminate all possible errors and inconsistencies. All the collected data were accumulated and analyzed by Microsoft Excel 10 program.
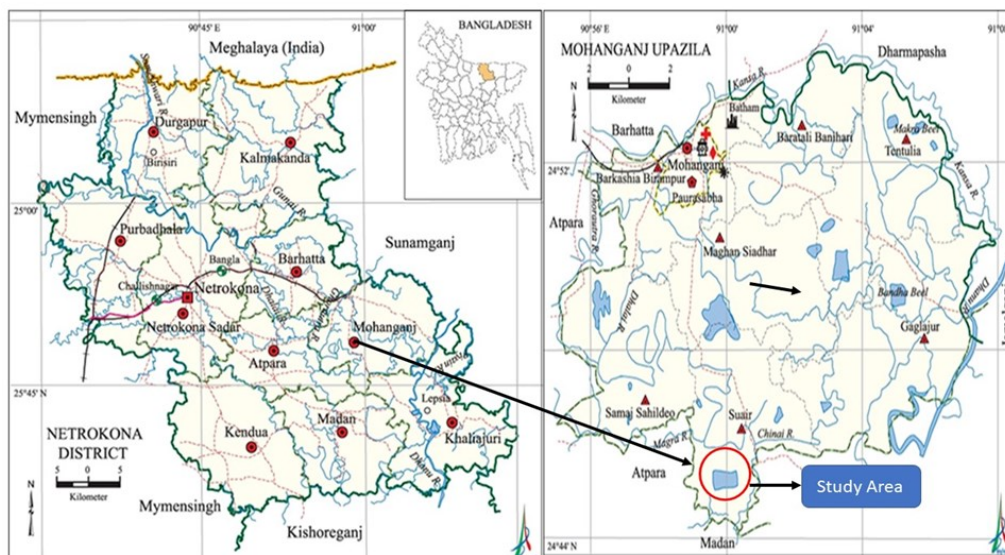

Figure 1. *Geographical location of the study area.*

RESULTS AND DISCUSSION

The aim of this study was to determine the socio-economic status of fishermen. Especially, emphasized was given on such variable namely age, religion, education, family size, education of children, annual income, income sources, training exposure, family type, health facilities and other socio-economic issues. It is very essential to improve the socioeconomic conditions of the fishermen with financial support through increased availability of credit, raising the standards of living, health and sanitary conditions, housing conditions etc. but it was very poor. The establishment of fish sanctuary in Chikadubi beel had positive impact on local fishermen by catching more fish from the beel. The livelihood conditions of the fishermen were evaluated by estimating condition of age structure, educational status, occupation, family type, housing condition, drinking water facilities, sanitary facilities, health facilities, training courses (Table 1) benefit from the fish sanctuary, activities, annual income from Chikadubi beel, status of saving and other socio-economic issues. A detailed analysis was made on the following parameters and presented in this section.

Age structure

The knowledge about age structure of fish farmers is important for estimating the potentiality of working of human resource in a community. Different categories of age groups; such as young (18-30 years), middle aged (31-40 years), the old (41-50 years) and the oldest (above 50 years) were considered to examine the age structure. It appeared that middle and old aged persons in the age range of 31-40 years were highest (48%) and fishermen above 50 years were the lowest (4%) (Figure 2).

Table 1. Distribution of respondents by different parameters.

Major types	Characters	Number of fishermen (n=50)	Percentage
Age structure	(18-30 years)	15	30
	(31-40 years)	24	48
	(41-50 years)	9	18
	(Above 50 years)	2	4
Religion	Muslim	33	66
	Hindus	17	34
	Buddhist	0	0
	Christians	0	0
Family type	Extended family	16	32
	Nuclear family	34	68
Main occupation	Fishing	27	54
	Agriculture	9	18
	Day labor	14	28
Schooling	Going to schooling	41	82
	Not going to school	9	18
Ownership type	Own tube-well	17	34
	Neighbors tube-well	33	66
Receiving of training	Yes	18	36
	No	32	64
Income level (BDT)	30000-45000	29	58
	45001-70000	21	42

Shah *et al.* (2003) showed in their study that the most of the fish farmers (70.66%) were found with a range from 25 to 45 years. Islam *et al.* (2013) studied the livelihood of fishermen in Monirampur sub-district of Jessore district, Bangladesh and found that mean age of the fishermen was 35.22±9.67 years with the maximum and minimum of 80 years and 20 years, respectively. Biswas *et al.* (2021) found that maximum fishermen (50%) were in (31-45) age group, while the minimum number (4%) of fishermen were ranging from (61-75) age group fishermen of the Kannayadaha baor, Jashore which is similar to the above result.

Religious status

Religion can play a very important role in the socio-economic environmental life of fishermen of a given area, and can act as a notable constraint or modifies in social change. It was found that Muslims were featuring as the majority (66%) followed by Hindus (34%) with no Buddhists or Christians (Table 1). The dominance of Muslims may be understood on the ground of changing socio-economic structures, lack of employment opportunity and realization of the beel fishing potential as a source of income. Ali *et al.* (2009) found that 77.78% fishermen were Muslim and 22.22% fishermen were Hindus in the Mymensingh region which is similar as our findings.

Educational status

Education is very important in socio-economic aspects. The fishermen in the locality had varying level of educational background. Most of the fishermen can sign only (62%). Small portion of them have no education (14%). Some are primary level of educated (24%). The educational status of fishermen is shown in Table 1. Whereas Mia *et al.* (2009) reported that 68% of hoar fishermen were illiterate, 28% read up to primary level and 4% had only secondary level education. According to Sunny *et al.* (2019), 41% people of Char Atrai were totally illiterate i.e., couldn't sign but the literacy rate was 85% among the young children that indicated the educational status in the study areas was improving day by day. Majority of them (46%) were within the level of primary education. Here 9% people were in secondary level, 2% in higher secondary and 2% completed their graduation.
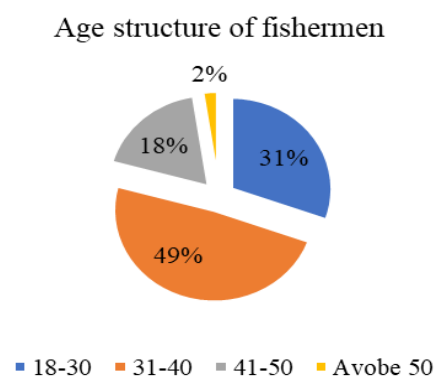

Figure 2. *Age structure of fishermen in Chikadubi beel.*

Marital status

Marital and family status is important indicator due to its active influence on occupation, income, socio-economic status, food consumption and nutritional status of the households. In our present study from the total 50 respondents, 42% was found unmarried and 58% was married in the study area. The marital status of fishermen in Chikadubi beel. Biswas *et al.* (2021) found that 84% of fishermen were married and 16% were unmarried from a study of fishermen of the Kannayadaha baor, Jashore. Zaman *et al.* (2006) conducted a survey on 90 fish farmers of 52 villages under 6 unions in Mohanpur upazila and found married 87.8% and unmarried 12.2%.

Family type

Family set up is changing from joint to nuclear type. Nuclear and Extended family were present in the study areas where nuclear families included husband, wife, children and extended family included parents, husband, wife, children, brother-in-law, sister-in-law, nephew etc. Size of the family was 3.1 ± 1.2 members (mean ± standard deviation) persons in nuclear families and 5 ± 2.05 members (mean ± standard deviation) persons in joint families. In the fishermen community of the study area, it was found that 32% fishermen' lived with Extended family and 68% lived with nuclear families. Hasan *et al.* (2014) found that among fishers of the Padma River in Rajshai region 78% had average five members in their family and 14% had 3 members while 8% had nine members in their family that support the findings of the present study.

Occupation

Most of the fishermen around the beel area were involved in fishing as their main occupation. However, some were also engaged in agriculture and day labor as their main occupation. The present study revealed that 54% of fishermen were engaged in fishing as their main occupation, 18% was in agriculture and 28% in daily labor (Table 1) which was more or less similar to the findings of Alam *et al.* (2004). According to Sunny *et al.* (2019) people of Char Atrai areas, 55% fishermen were involved solely in fishing, 15% in fishing with agriculture, and remaining 30% in day labor with other profession

Child education

Schooling of children is an important indicator to assess the livelihood status of fishermen. In the study that 82% children were going to school and 18% children did not go to school (Table 1). Some of the children could not achieve any formal literacy due to engaging themselves into income at an early age, poor economic condition and lack of awareness about education among their parents. Thus, it is justified in saying that illiteracy and poor economic conditions are the two major blockages for the development of the fishermen in the study areas.

Housing condition

In the study area houses of fishermen were of three main types as, i) Kacha house (made of straw, bamboo and wood) and ii) Tin shed (semi-bricked) iii) Bricked. In the study area housing condition of fishermen were dominated by tin-shed (76%), followed by kacha (22%) and bricked house (2%) (Table 1) Islam *et al.* (2009) observed that about 75% of fishermen's houses were kacha, 17.5% were tinshed and only 7.5% were half building. Alam *et al.* (2004) found that about 82.22% of household structures were kacha, where 11.11% were semi-pucca and only 6.66% were pucca of the Basantapur beel fishermen.

Drinking water facilities

The provision of clean and safe drinking water is considered to be the most valued elements in the society. The study showed that 100% of the fishermen households used tube-well water for drinking and among them 34% fishermen used their own tube-well, 66% used neighbors' tube-well as a source of water for drinking (Table 1). This scenario was very common among the fishermen in most areas of Bangladesh and similar results were noted by Hasan *et al.* (2012). Islam *et al.* (2009) observed that 95% of the fishermen household used tube-wells for drinking water, while 5% used of kua water due to arsenic and other problems in tube-wells. According to findings of (Sunny *et al.*, 2019) in three fishing communities of Char Atra union of Naria upazila under Shariatpur district almost 100% people of this community used safe drinking water from their own tube-wells or neighbors' tube-wells as a source of water for drinking. They used safe water not only for drinking but also for cooking and bathing etc. which is closely related to the findings.

Sanitary facilities

It was observed that sanitary conditions of the fishermen were very poor. Two types of toilets were found to be used by fishermen: i) Kacha and ii) Semi-pucca. In the study 74% of the toilets were kacha, 14% of the toilets were semi-pucca and 12% of the fishermen had no sanitary facilities (Figure 3). There was no trace of pucca sanitation system used by fishermen (Table 1) The present study revealed that the sanitary conditions of the fishermen were not satisfactory. Ali *et al.* (2009) in his study found that 62.5% of the fishers had semi-pucca, 25% had kacha and 12.5% had no toilet. Mia *et al.* (2009) found that 47.5% of the fishermen used kacha toilet, 42.5% used semi pucca toilet and the rest of them used pucca toilet of Meghna River fisherman. Rahman *et al.* (2015) found similar result where 80% of fishermen used kacca latrine in Talma River. Kabir *et al.* (2012) reported that only 5% used semipacca latrine and 30% used no latrine in Old Brahmaputra River. Biswas *et al.* (2021) found the opposite result that majority of the fishermen (66%) used semi-pacca latrine, (24%) households used kacca latrine and only 10% used pacca latrine from fishermen of the Kannayadaha baor, Jashore.
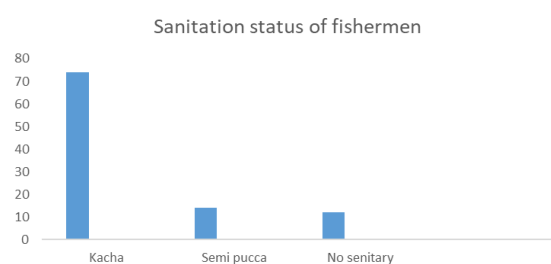

Figure 3. *Showing the sanitation status of fishermen.*

Receiving of training courses of fish sanctuary management system

In the study, of the total (50) interviewed fishermen, 38% respondent receiving training and 64 % were no receiving training of management system (Table 1). Any kind of training related to the management of fish sanctuary will be helpful for the fishers to enrich knowledge about proper management of sanctuary and improving their livelihood. Rahman *et al.* (2003) reported that about 49% farmers received formal training on prawn farming in Mymensingh area, which is higher than the present findings.

Benefits to local fishermen from fish sanctuary

To assess the positive effects local fishermen, receive from the fish sanctuary, The Researcher asked all 50 fishermen about both direct and indirect benefits. The present fish catch in the study area was, on average, 3.3 kg per fisherman per day and it was increased than previous years. 37 respondents (74%) believe that their fish catch has increased due to the establishment of the fish sanctuary; 29 respondents (58%) reported that they have benefited from a better food supply and 24 respondents (48%) reported that they have benefited by saving money. Views on the specific direct and indirect benefited, and the number of fishermen who reported receiving them, are shown in Table 2.

Annual income of the fisherman from Chikadubi beel

Annual incomes of fishermen were increased than previous years by catching more fish for the establishment of fish sanctuary in Chikadubi beel. In the present study annual incomes of fishermen were increased than previous years by catching more fish for fish sanctuary establishment in Chikadubi beel. Annual incomes of the fishermen were recorded to vary from BDT 30000 to BDT 70000. The selected fishermen were grouped into two categories based on annual income and it was estimated that about 58% of the fishermen income between BDT 3000 to BDT 45000 and 42% of the fishermen had in come in the range of BDT 45001 to BDT 70000. The income profile is the main economic indicator of national development. In most cages the income of fishermen in Bangladesh is below poverty line

(Hossain *et al.*, 2007). The present result which are more or less similar to findings of Ali *et al.* (2009). Zaman *et al.* (2006) conducted a survey in Mohanpur upazila, Rajshahi found that the higher percentage (33%) fish farmers earned BDT 25,000-50,000 per year, 32% earned BDT 50,000-100,000 and the rest 25% earned above BDT 1,25,000 annually. Hossain *et al.* (2015) found that it has been observed in this study that 60% fishermen had moderate income. The highest income percentage was 37%. Only 3% had lower annual income because they were involved with other activities. Islam *et al.* (2013) found that mean monthly income of the fishermen was BDT 9,470.00 in Monirampur subdistrict of Jessore, Bangladesh. A daily income of BDT 51- 75 was found for the fishermen of Dahia Beel in Natore district (Flowra *et al.*, 2009).

Status of savings

Fishermen in the surveyed areas usually lived from hand to mouth. They had very little savings and it was possible for catching more fish from Chikadubi beel. Only 58% fishermen reported to have their savings in the magnitude of BDT 1200 to BDT 2000 per month. It was found that 56.67% of the fishermen did not borrow money but 20% borrow money from their neighbor's, 13.33% from relatives, 10% from NGOs for their fishing business which was similar to the findings of Alam *et al.* (2004) in Natore district.

Daily activities of fishermen in Chikadubi beel

Every fisherman follows a routine work in his daily life. Out of 50 fishermen, every fisherman showed a routine activity. They usually get up from bed early in the morning and after washing face and hands and prayer. After having breakfast, they go for fishing in the beel at 9-10 am. They remain in the beel up to 2-3pm. Returning home from beel they take their launch and take some refreshment and sometimes they again go to the beel for fishing and then their sell their fish in the fish market near the beel. At about dark they come back to their home and after evening prayer they maintain household work. Then they pass their time with family member. They go to bed at 10-11 pm after having their dinner.

Table 2. Perceived benefits from fish sanctuary.

Direct benefits	Number of respondents
Increased fish catch	37 (74%)
Increased income	28 (56%)
Increased fish consumption	31(62%)
Saved money	24 (48%)
Indirect benefits	**Number of respondents**
Improved housing facilities	36 (72%)
More food available	29 (58%)
Improved sanitation facilities	21 (42%)
Better health facilities	17 (34%)
Improved education facilities	38 (78%)

Socio-economic constraints of the fishermen

Fishermen have had to deal with a variety of issues. The main issue was recognized by the local extortionist as injustice; additional issues were insufficient credit facilities, a shortage of fishing gear, and disturbances by robbers, thieves, and others. The majority of fishermen are impoverished, and they must rely on loans to purchase nets and other fishing equipment. They are ostracized in society. They are mostly illiterate and live hand to mouth. Because they are poor, their children prefer to go fishing instead of going to school. As a result, they stay illiterate generation after generation, unable to contribute to the advancement of their community. Another socioeconomic limitation is the occurrence of natural disasters, which the fisherman must deal with virtually every year.

Benefits to local fishermen from fish sanctuary

Fish sanctuary was very effective to increase fish production in Chikadubi beel. The fish production was figured by asking about the daily individual catch of the 50 fishermen and then calculating the average to compare their catch with the IPAC fish catch monitoring report of 2011. According to the report (IPAC 2011), the daily fish catch by individual fisherman was, on average, 2.83 kg per fisherman per day. The present study was nearest level; the present fish catch in the study area was, on average, 2.6kg per fisherman per day. To assess the positive effects local fishermen, receive from the fish sanctuary, The Researcher asked all 50 respondents about either direct or indirect benefits (Table 2) Thirty-three respondents (66%) believe that their fish catch has increased due to the establishment of the fish sanctuary, As a result of establishment of fish sanctuary 74% Participant believe that their total fish catch increased, as a result they can save little more money than before stated by 48% and 17 respondents (34%) reported that they have benefited from a better food supply nearest result was found by Haque *et al.* (2013).

Conclusion

The Socio-economic condition of fisher is not satisfactory. They are deprived of many amenities. The education of the fishermen is very due to lack of knowledge as well as poor economic condition of the fisher's family. Government or privet educational institution can be established to improve the educational condition of the fishermen. For improving fish production establishment of fish sanctuary may be an effective way but during ban period or banning time government should provide relief as support through VGF programme. The maintenance of a fish sanctuary, particularly protection against poaching, is the most important aspect. In many circumstances, community participation and co-management have shown to be more effective than traditional methods. Precautionary measures have to be taken to protect major species and to maintain the sustainability of the Chikurubi beel resources. During peak breeding season, the usage of current Jal should be restricted. In addition, the local community's strong dependency on fishing must be decreased.

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