



## **Impacts of Beel Sanctuary Management Project on Fish Production and Socio -Economic Competence: a Study in the HaltiBeelTanki Fish Sanctuary**

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### **Abstract**

The research was conducted to find out the impacts of Beel sanctuary management on fish production of the HaltiBeelTanki fish sanctuary and socio-economic competence of adjacent fishermen, Natore, Bangladesh through random sampling with questionnaire survey and secondary data. The main objectives of the research were- to find out the present status of fish production of the Beel and to know the socio-economic condition of the surrounding fishermen. A total of 68 fishermen were selected and interviewed. In the studied Beel the annual fish production was 8.8 MT in 2012 where Beel sanctuary management increased the production up to 15.2 MT in 2013. The average fish production increased 2.6 MT per year. Fish species such as Ayre, Calbaosh, Pabda, Sharputi etc. were absent before the project (before 2012) but at present available at a rate of 20g, 1000g, 300g, and 1200g per day respectively. The study revealed that about 77% of the fishermen preferred nuclear family where only 23% joint family. It was found that about 63% fishermen were illiterate and there was no H.S.C pass fisherman. The average income of the selected fishermen was 8125 taka/month and about 58% fishers were able to save money 501-1000 taka/month after the project.

**Keywords:** Fish production, HaltiBeel, Impacts, Income, Sanctuary

### **Introduction**

Bangladesh is a Riverine country and possesses enormous area of wetlands including Rivers, Beels, Baors, Haors, and floodplains which support some 265 fish species (DoF, 2010). Fisheries sector plays a vital role in the agro-based economy through employment and income generation, foreign exchange earnings, and providing food and nutritional security to the people. Fish contribute about 60% of our daily animal protein intake and about 10 million people are directly and indirectly depend on the fisheries for their livelihood. But the wetlands are shrinking and degrading day by day due to increased human activities associated with heavy population pressure. Now fish resources, particularly inland capture fisheries, appear to be in decline and some 10 million traditional fishers face poverty and loss of fishing rights (Ali, 1999). The main factors of fish biodiversity degradation are lack of proper management, overfishing, aquaculture practice, exotic species, habitat loss and degradation, sedimentation, pollution, alterations to hydrology, dredging etc. As a result the availability of indigenous freshwater fish species of Bangladesh have declined to a great extent over the years and many of them are either rare or at the verge of extinction (Islam *et al.*, 2012). To reverse this trend and ensure sustainable inland fisheries, various development and management measures such as Development

Management Scheme, Integrated Fisheries Management Project, New Fisheries Management Policy, and Fisheries Management in Jalmohals under New Fisheries Management Policy etc. have been implemented by the government, with international, bilateral and domestic resources (Middendorp *et. al.*, 1999). As a part of these initiatives, the government of Bangladesh launched a sanctuary project in 2012 at the HaltiBeel to revive the declined fish species and increase fish production in the area. This research work was therefore conducted to focus on the impact of Beel sanctuary management in Bangladesh.

The study was conducted - to observe the Present status and temporal changes of ten selective fish species composition and their yield of the Beel, to find out the changes of the socio-economic condition of the surrounding fishermen and to evaluate the potential significance of the sanctuary management project

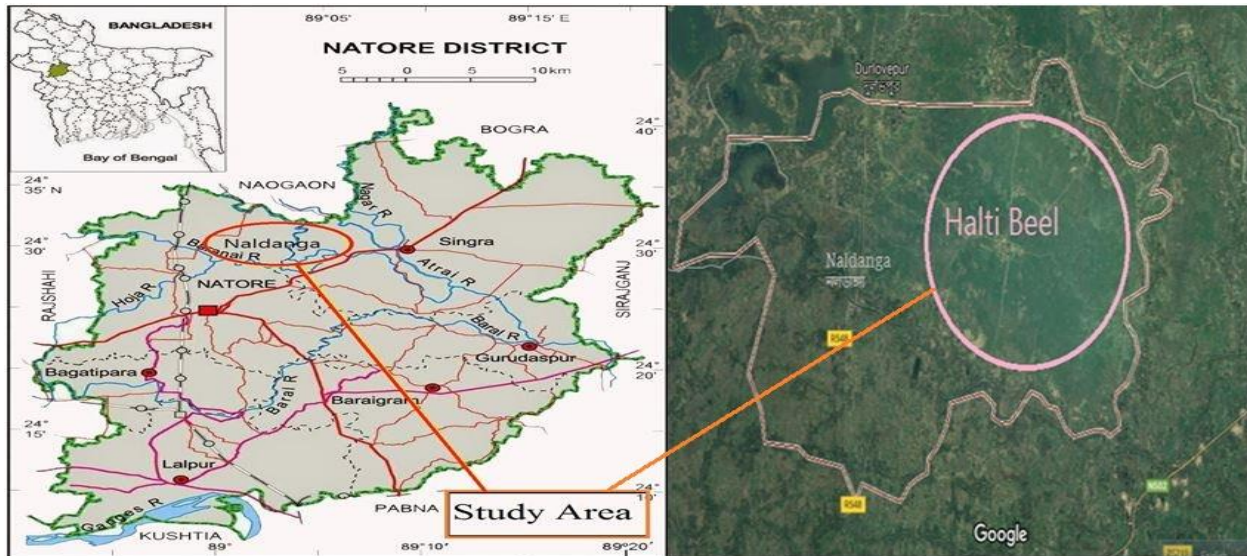
### **Materials and Methods**

#### **Study area**

The survey was undertaken in the HaltiBeelTanki Fish Sanctuary (0.5 hectare) area, situated in Naldanga Upazila of Natore district within the latitudes of 24°28.5' to 24° 32' North and the longitudes of 89°00' to 89°03' East (Fig. 1). It is a semi-closed perennial irregular shaped water body. This wetland is famous for producing

large amount of fishes throughout the year and livelihoods of hundreds of fishermen from adjacent

villages rely on this water body (Galib, 2013).



Map of the Study Area

**Method of data collection**

Both quantitative and qualitative techniques of data collection were used for this study. The research was carried out on the basis of primary and secondary data. Among the fishermen, 68 respondents were selected using random sampling method to collect primary data. The sample size was calculated by the following equation (Kothari, 1990).

$$n = \frac{Z^2 \cdot p \cdot q}{e^2} \quad (1)$$

$$n = \frac{1.96^2 \cdot 0.5 \cdot 0.5}{0.05^2} = 68$$

So, the calculated sample size for the study was 68.

The questionnaire survey was carried out by sequential open-ended and close ended questions and personal interviews of the selected respondents. Besides these, key informant interviews, FGD were also used for primary data collection.

The secondary data were collected from governmental and non-governmental official documents and statistics, yearly reports, various books, research papers, journals,

maps, daily newspapers and internet etc. All the collected data were processed and analyzed by statistical analyzing software Microsoft Office Excel 2010. Key informant Interview was analyzed by qualitative descriptive explanation.

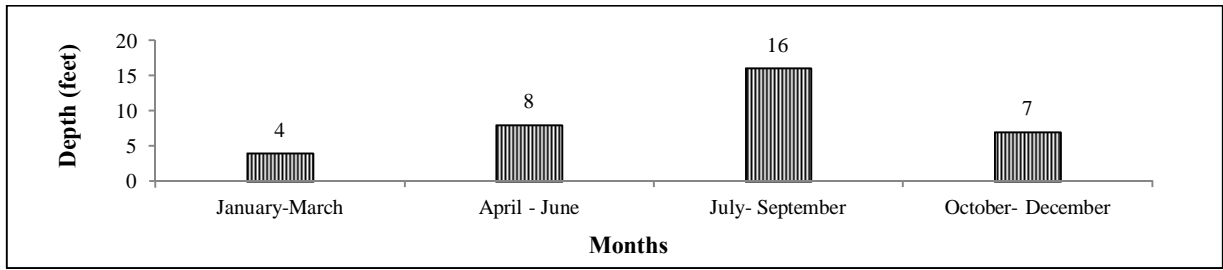
**Results and Discussions**

**Management system of HaldiBeelTanki fish sanctuary**

A management committee was established in 2012 for managing the Beel Sanctuary Project. The Beel Sanctuary Management Committee included the UpazilaNirbahi Officer (UNO), Upazila Fisheries Officer (UFO), local chairman and the fisheries community around the Beel. Beel Management Organization (BMO) performed all kinds of rearing and monitoring activities.

**Depth variation of HaldiBeelTanki fish sanctuary**

The highest water depth of HaldiBeelTanki Fish Sanctuary was found 16 feet from July-September and the lowest depth of water was observed 4 feet in January-March. The average water depth of this Sanctuary was 8.8 feet (Fig. 2).



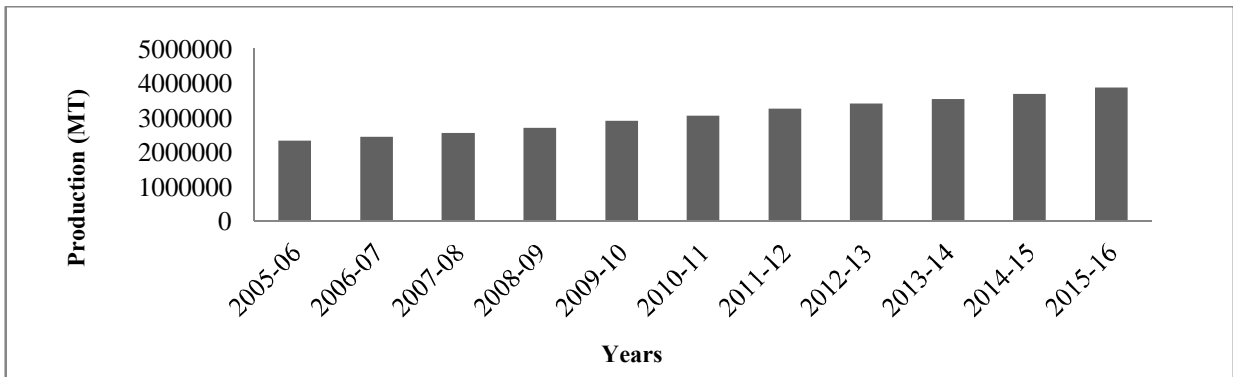
**Fig. 2.** Depth variation of the HaltiBeel

***Impact on fish production of HaltiBeelTanki fish sanctuary management in the study area***

***Annual fish production of Bangladesh from 2005 -06 to 2015-16***

The study showed that total fish production of Bangladesh was 2328545 MT in 2005- 06 and after five

years, it became 3061687 MT in 2010-11 respectively. The fish production was increased 733142 MT by the year 2006-2011 which was average 12219 MT per year. Fish production was also increased 689513 MT by the last five years 2011 to 2016 (Fig. 3).



**Fig. 3.** Annual Fish Production of Bangladesh (DoF, 2017)

***Annual fish production of HaltiBeelTanki fish sanctuary***

The study revealed that fish production of HaltiBeelTanki Fish Sanctuary was 12 MT in 2012 when the sanctuary was established. After the implementation of the sanctuary the increment of fish production was 2.6 MT per year. Islam *et al.*, (2012) found that due to Beel nursery management the annual production was increased 4.7 MT from 2009 ó 2010 in the Dhaka Beel.

***Present status of ten selective indigenous fish species of the sanctuary***

The study showed that the species *Labeocalbasu* and *Ompokpabda* were absent before the project but were very common after the project. On the other hand, *Glossogobiusgiuris*, *Botiadarío* (Rani) and *Puntiassorana* were absent before the project and were significantly increased in the Beel after the project (Table 1.).

**Table 1.** Present Status of ten selective indigenous Fish Species of the Sanctuary

SL No.	Order	Family	Scientific name	Local name	Before project		After Project	
					Avail. g/day	Status	Avail. g/day	Status
01	Cypriniformes	Cyprinidae	<i>Amblypharyng-odonmola</i>	Mola	0	Absent	50	Rear
02			<i>Labeocalbasu</i>	Calbaosh	0	Absent	1000	Very Common
03			<i>Puntiassorana</i>	Sharputi	80	Absent	1200	Common
04		Cobitidae	<i>Botiadarior</i>	Rani	0	Absent	100	Common
05	Perciformes	Channidae	<i>Channamarulius</i>	Gojar	0	Rear	200	Rear
06		Gobiidae	<i>Glossogobiusgiuris</i>	Bele	0	Absent	250	Common
07	Siluriformes	Bagridae	<i>Mystusaor</i>	GojiAyre	0	Rear	20	Very Common
08		Siluridae	<i>Ompokpabda</i>	Pabda	0	Absent	300	Very Common
09			<i>Wallagoattu</i>	Boaal	100	Rear	500	Common
10		Heteropneustidae	<i>Heteropneustes fossils</i>	Shing	10	Rear	70	Rear

Kabeer (2013) reported that Rani was not found; Gojar and Calibaas were endangered before the MACH Project activities in the BaikkaBeel. But all these Fish were commonly found in and around the BaikkaBeel after the project. Kabeer also reported that Sharputi and Pabda which was endangered became available after MACH Project activities in the BaikkaBeel.

***Impact of HaltiBeelTanki fish sanctuary management on socio-economic status of the fishermen in the study area***

***Age groups and sex distribution of the respondents***

The investigation showed that majority of the fishers belonged to the 15-30 age group (47%) while the 46-60 aged class had lowest involvement (16%) in fishing.

Results of the study on sex ratio suggested that total 94% male respondents were actively involved in fishing.

***Family types and religion status***

In the study area, it was found that 77% of the respondents lived with nuclear families. The nuclear family was very popular because of getting greater freedom of movement, economic opportunities, better dress, better education and woman authority.

***Educational status of fishermen***

In the study area, 26% fishermen had passed primary and 63% were illiterate (Fig. 5). Islam *et al.*, (2012) reported that 80% fishermen were illiterate while 15% were primary level educated of Dhaka Beel in Madhupur Upazila.

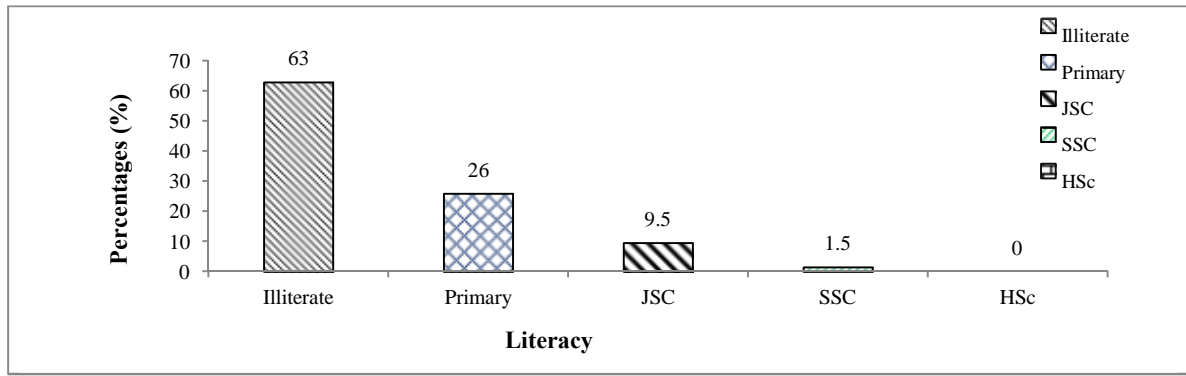


Fig.5. Education level of fishermen (Source: Field Survey - 2017)

**House structure and use of electricity**

The study revealed that 64% respondents house structure was Katcha, 21% had semi Pucca and rest of them had Pucca type house. All of the fishermen had electricity access. Ali (2009) found that 72% fishermen in Birulia had katcha house while 28% fishermen in Birulia had semi-pucca house, respectively.

The study showed that 100% of the fishermen used tube-well water for drinking purposes. It was also found that 94.5% respondent belonged to katcha toilets and there was no Pucca toilet before the project. But after the project 7.3% of the fishermen had Pucca sanitation facilities (Fig. 6). Khan *et al.*, (2013) found that 60% fishermen had katcha and 10% had semi pucca toilet and 30% had no sanitary facility in the Tista River fishing community,

**Drinking water source and sanitation condition**

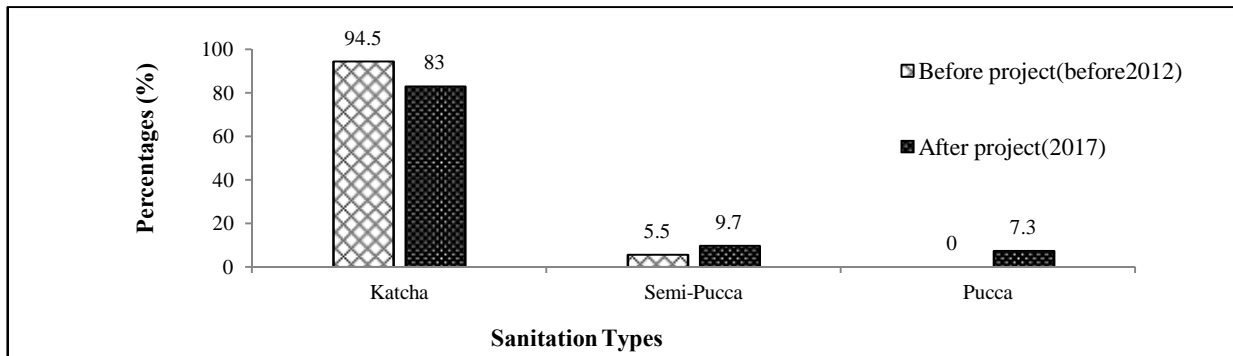


Fig. 6. Sanitation Condition of Fishermen (Source: Field survey-2017)

**Working hour patterns of the fishermen**

The present study divulged that 82% of the studied fishermen involved in fishing daily 5-8 hours. Only a little percent (4.6%) of fishermen worked daily 1-4 hours per day and rest of them worked daily 9 hours above.

April to 15 July). But 84% of fishermen were engaged in fishing as their main occupation during off-fishing period in the pond and other water body except the sanctuary, while 12% was in agriculture (Fig. 7). Kostori (2012) mentioned that 72% fishermen were engaged in agricultural work in ChalanBeel under Tarash Thana of Sirajganj during off-fishing period.

**Occupation patterns of fishermen on off-fishing period**

The present study revealed that the main occupation of all the respondents was fishing on fishing period (15

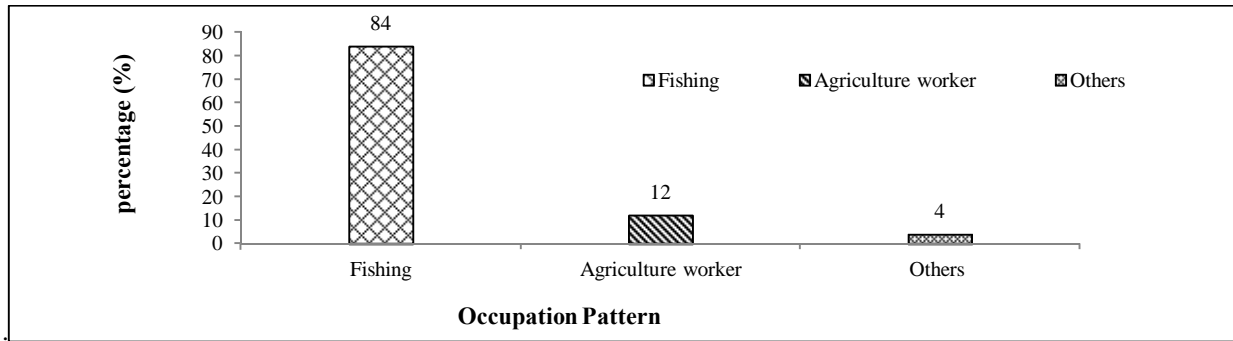


Fig. 7. Occupation Pattern of the respondents on off- fishing period (Source: Field survey -2017)

**Changes of income**

The study showed that 67% of the studied fishermen earned money monthly only 0-4000 taka before project and 76% respondent earned 4001- 8000 taka respectively after the project. The average per capita fisherman’s monthly income was 8125 taka of the study area. The

figure showed that maximum fisherman earned monthly 4001- 8000 taka which was sufficient to maintain their family (Fig. 8).Islam *et al.*, (2012) found that average monthly per capita fisher income in the Dhaka Beel was Tk. 2088 before the Beel management and Tk. 3750 after the Beel management.

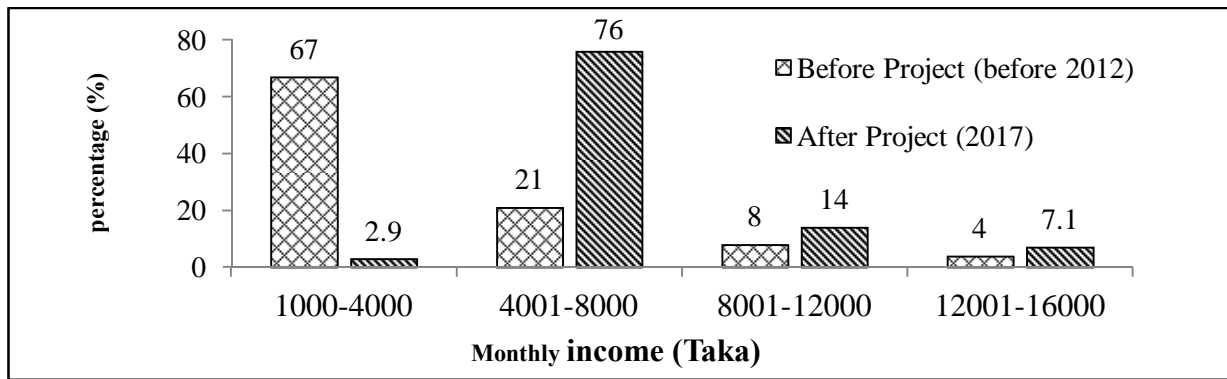


Fig. 8. Changes of monthly income of the fishermen (Source: Field survey)

**Changes of expenditures and savings**

The figure showed that about 71% fishermen saved <500 taka after expenditure of their family before 2012. But it

was noticeable that at 2017 approximately 58% saved 501-1000 taka which was double than before (Fig. 9).

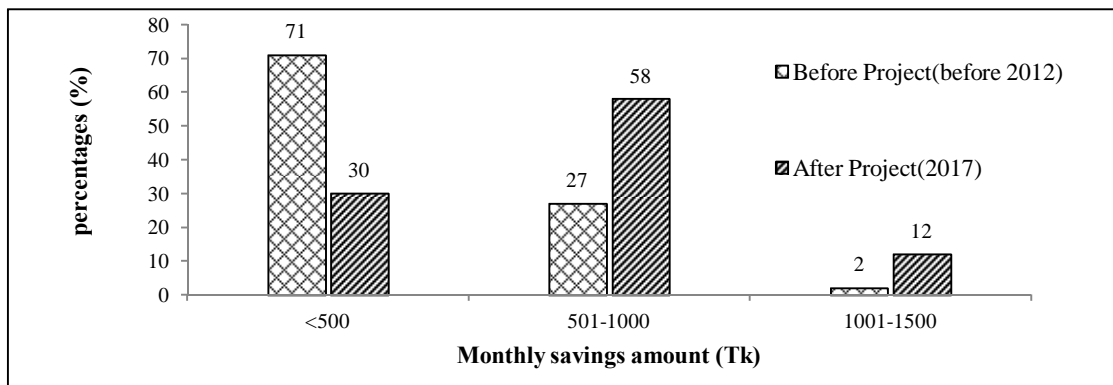
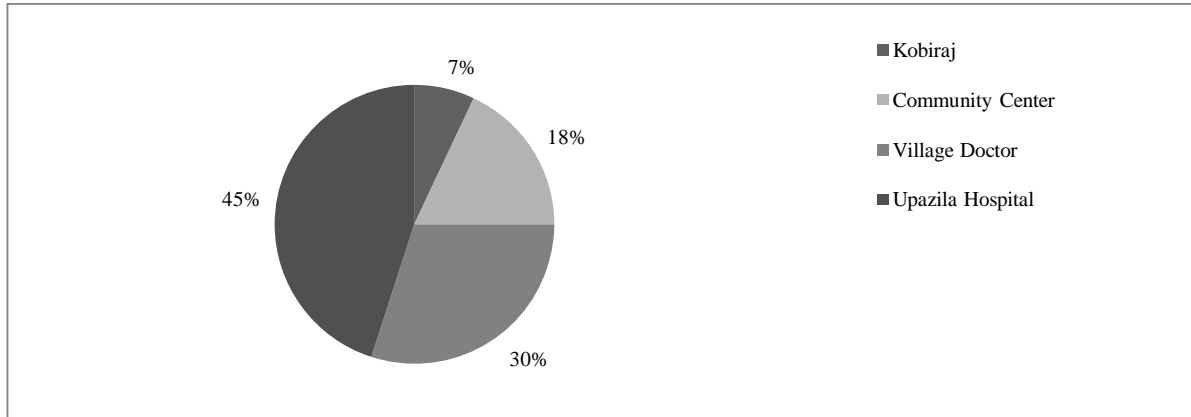


Fig. 9. Savings Amount per month of the fishermen.

Kabeer (2013) reported that about 60% MACH village fishers of BaikkaBeel were able to save money after their expenditure. Islam *et al.*, (2012) also found that after maintaining minimum standard of living fishers of Dhaka Beel in Madhupur were able to save money.

**Health facilities**

The study revealed that near about half of the fishermen got access health care service from Upazila Hospital and only 7% and 30% fishermen were dependent on kobiraj and village doctors respectively who did not have enough knowledge of medical science (Fig. 10).



**Fig. 10.** Health Facilities of the respondents.

Mahmud *et al.*, (2015) reported that about 14% of the fishermen in the Pairariver received health service from kobiraj, 24% from village doctors, 40% from Upazila hospital and remaining 22% got health service from MBBS doctors in health care center.

**Problems faced by the fishermen**

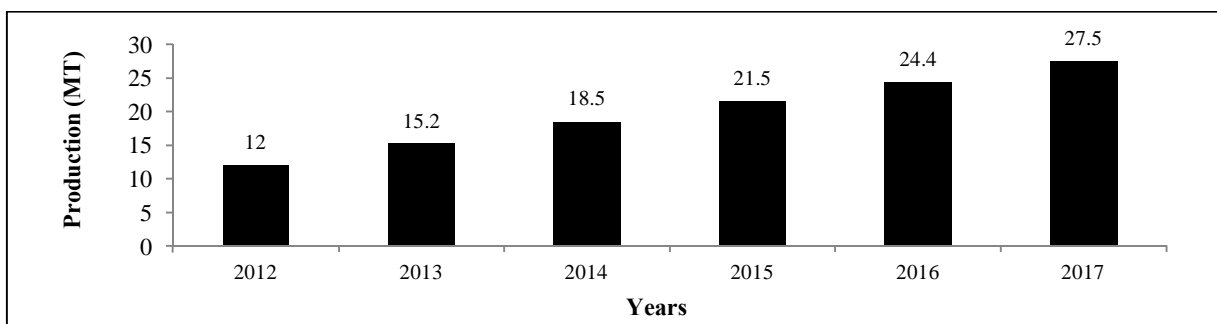
A number of problems were reported by the fishermen including poor level of knowledge, non-availability of adequate equipment during fishing period, lack of money, lack of credit source, natural disasters, conflicts between farmers and fishermen and influence of the local heads etc.

**Significance of the HaltiBeelTanki fish sanctuary**

The study revealed that the per capita income and tendency of savings of the fishers were increased due to fishing in the sanctuary. The housing condition,

education; food habit of the fishermen was moderate. They did not intake meat every day but could take fish everyday which meets the protein demand of the body. The study also showed that most of the fishers were debt before 2012 due to lower income, large family and absence of educational awareness. When the fishers engaged in the project and at present, there is no one in debt, moreover they can save money after fulfilling their family needs.

Sanctuary project has increased the fisheries production in the HaltiBeel from 12 MT to 15.2 MT in 2013. The average fish production was increased 2.6 MT per year. The fish production had increased four times than 2012 (Fig. 4). Many fish species Sarputi, Pabda, Ghania, Meni, Raikhor, Gagor, Bowmas etc. were absent and rare in the Beel before project, were available, abundant and very common after the project (Table 1).



**Fig. 4.** Annual Fish Production of HaltiBeelTanki Fish Sanctuary (Source: Upazila Fishery Office, Naldanga)

Many floras such as Helencha, Malancha, Kolmilota, Topapana etc. were also re-developed in the Beel (UFO, 2017). Tortoise, Pankori, Masranga etc. were also returned in the Beel (UFO, 2017).

### Conclusions

The rapid use of chemical fertilizer and pesticides in the agricultural fields result in the degradation of water quality of the Beel area of Bangladesh. As a result, the production of fish was declined since 1990 and the people were suffering from protein deficiency. The Government of Bangladesh took some steps such as establishment of fish nursery, Fish sanctuary, MACH project etc. to increase fish production and meet the demand of protein. The major findings of the study were overall fish production has increased in the study area, the availability of native selected fish species has also increased, economic condition of the fishermen has enhanced, the people can save money after their expenditure. The findings suggested that sanctuary management project is economically profitable for the society and favorable condition for the fish production. It is clear that community based fish sanctuary management areas may be an excellent example to stimulate income generation, employment opportunity, increase fish production and ensure sustainable livelihood security.

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