Wetland value and livelihood assessment of lower Turag-Bangshi river basin dependant population at Kaliakor of Gazipur district,Bangladesh

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ABSTRACT: Wetland resources have certain economic values which in turn play a significant role in the livelihoods of wetland-dependent people thus playing role in addressing poverty issues of Bangladesh. An attempt was made to address the valuation of wetland resources and its impacts on the livelihoods of wetland-dependent people at the lower Turag-Bangshi river floodplain basin at Kaliakor of Gazipur District. The estimated economic value of the studied wetland resources was BDT 10.6 million (106.07lakhs) per year. Fish contributes the highest i.e. 6.13 million which was 57.75 % of the total value. Other resources were boro rice cultivation during the dry season were 1.83 million (17.28 %), Aquatic vegetations 0.05 million, navigation/transport 0.99 million (9.43%), pasture value of 1.61 million (15.15 %).We found 83.89% households around the study area were poor. Among the poor households 90.74% were dependent on wetland recourses and of the non-poor households, 45.28% also somehow depended on wetland resources. Cypriniformes were the most abundant fish species in the studied wetland which presented about 39% of the total fish species. We concluded wetlands add more value to the resources. Reclaiming lands from this water bodies for crop cultivation produces more crops which is also a resource itself but if the proper value is given to the resources that are generated from wetlands and compared with the value of crop cultivated in the reclaimed area by de-watering, only then it can be decided, whether it is better to leave the wetlands remain undisturbed or to reclaim these for crop cultivation.

KEWARDS: Wetland resource, Floodplain, Beel-Fisheries, Livelihood

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1. INTRODUCTION

Wetland comprises of a huge area of Bangladesh which is about 50% of the total area of the country. Considering inundation, about 7 % of the country is permanently remains underwater, 21% is periodically flooded to a height of more than 90 cm and around 35% of the country experiences shallow inundation (IUCN,2005). Wetlands in Bangladesh have the characteristics of four landscape types i.e. floodplains, freshwater marshes, lakes and beels, swamps, and forests (Rahman, 2005). Bangladeshi floodplains are one of the world's most important wetland, harboring 265 freshwater species of fish (Rahman,2005) and 59 species of aquatic plants and many wild faunas (IUCN, 2000) like amphibians, reptiles, and mammals. It has been historically making an important contribution to the livelihoods of rural poor peoples of Bangladesh. Over 70% of households in the floodplain area catch fish either for income or for consumption besides use water for growing paddy of different varieties for commodities (Minkin, 1997). Overall, the fisheries sector in Bangladesh contributes 3.61% to the total GDP, 24.4% to the agriculture GDP, and

60% of total animal protein intake. About 11% of the population's livelihood directly or indirectly depends upon the fisheries sector (DoF, 2009). The greater part of North-Eastern Bangladesh is covered by Haors. They cover an area of about 20, 45,000 hactors. The North-Eastern haor basins contain about 47 major Haors and some 6,300 beels of which about 3,500 are permanent and 2,800 are seasonal. Elsewhere, Bangladesh's vast alluvial plains are comprised of about 6,000 beels surrounded by large areas of seasonally flooded plains. There is also a number of 700 rivers in Bangladesh with a total length of 24,140 km. These rivers are associated with about 5,486,609 hectors of innundable floodplains (IUCN, 2005).

Adaptation of various agriculture technologies, construction of flood embankments and road networks has altered the ecology of floodplains significantly (Khan 1993). Unfortunately, anthropological activities and environmental disturbances are responsible for the degradation of wetland resources, which in turn adversely affect the values and nutritional return from the wetland

ecosystem of Bangladesh. Policymakers for lack of proper knowledge of the economic value of wetlands and due to ignorance to some extent allow interventions and activities which often bring destruction to wetlands. Thus, for the planners, decision-makers, and aquatic resource managers an information base is essential. But information on this aspect in Bangladesh is scarce. Management of Aquatic Resources through Community Husbandry (MACH) Project has conducted a study in Hail-Haor of Sylhet in Bangladesh (Colavito, 2001). The Hail-Haor study shows that the economic value estimation of Wetlands is important. Following that study Hossain, 2003) conducted a study in Malijee Flood Plain wetland at Jhenaigati of Sherpur District in Bangladesh under MACH Project.

This study aimed to provide information on the value of wetland resources in lower Turag-Bangshi river basin in terms of its economic, ecological, and social aspects for the communities. The outcomes will help in better understanding of value estimation of wetland resources and its role and impacts on the people's life and policymakers respectively.

2. MATERIALS AND METHODS

The study was conducted at the lower Turag-Bangshi river floodplain basin at Kaliakor Upazilla of Gazipur District in Bangladesh from October 2014 to September 2015. Participatory Rural Appraisal (PRA) was conducted through community meetings during the study. Household survey was conducted with a semi-structured questionnaire among 1713 households around the studied wetland. Focus group discussion (FGD) and Key interview (KI) was extensively used during the study. Special methodology was used for the collection of data and the valuation of resources. Catch effort method (catch rate/person/day) was used for calculation of the value of commercial fishing and for subsistence fishing information. In calculating the value of aquatic organisms; *Ipomoea aquatica* locally named as "Kolmi Shak", *Nymphaea nouchali* locally named as "Saluk" and *Trapa natans* locally named as "Panifal, Singra or Nikna" were considered because a large number of people were involved in harvesting these for their own consumption and livelihoods. The values of these were estimated by surveying local markets several times. In non-fish aquatic organisms, snails and mussels were considered. Estimation was made by the natural consumption of these by ducks. In vegetations, some

important grasses were considered and included under grazing value. Pasture value was estimated by how much amount a farmer saves without buying foods for their livestock. The benefit transfer method was used to do this. For identification of various fishes, aquatic vegetations and non-fish animals were collected, preserved in 10% formaldehyde, and identified at the Advanced Fisheries Research Laboratory (AFRL) of Department of Zoology, University of Dhaka. Besides these, existing data from MACH project and DoF(Department of Fishes), Bangladesh were also collected as a secondary source for estimating fish production, value estimation, beel boundary identification, and the socio-economic status of the resource users. The graphs were produced by using the MS-excel program.

3. RESULTS

3.1 Geomorphic Features and Topography

The study site having characteristics of a typical wetland environment with a diversity of aquatic and terrestrial habitats. Typically, the area is of as most of the other low- lying floodplains of Bangladesh. The Turag-Bangshi river runs through the site with several beels on either side of the river. Within the site, a total of 26 beels exist. The water surface was about 1000 hector at full flood condition which diminishes to less than 700 hectors at the end of the dry season. Of all the 26 beels, mainly three beels namely Mokosh, Kaliadoho, and Alua (Fig.1) possess the majority of the resources and major consisting parts of the selected wetland. The resource use and land ownership pattern were favorable for the inhabitants. People from various professions including fishermen, farmers, collectors, and boatmen associated with water transportation are engaged in resource use all year-round.
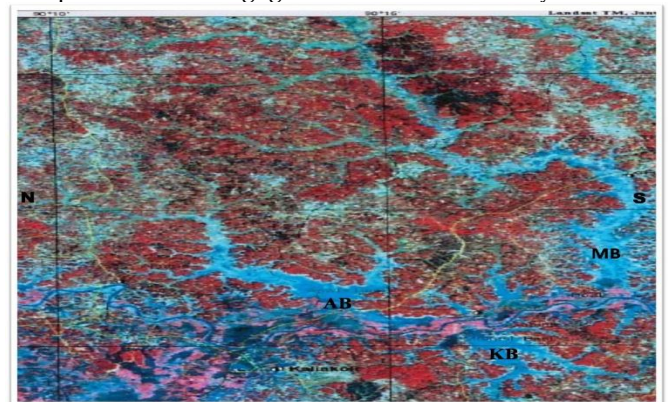

Fig. 1 Arial view of Turag-Bangshi Floodplain (Source-Google)

3.2 Wetland Dependence

A total of 1713 households were surveyed, of which 1437 were poor households which were 83.8 % of the total households. Among the poor households, about 90.7 %

were dependent on wetland resources. Among the non-poor, about 45.2 % of households also used wetland resources. On an average totally 83.4 % of households were identified as wetland resource users and only 16.5 % were non-user (Fig.2). Thus it is clear from this study that, the wetland has many user values to the local inhabitants.
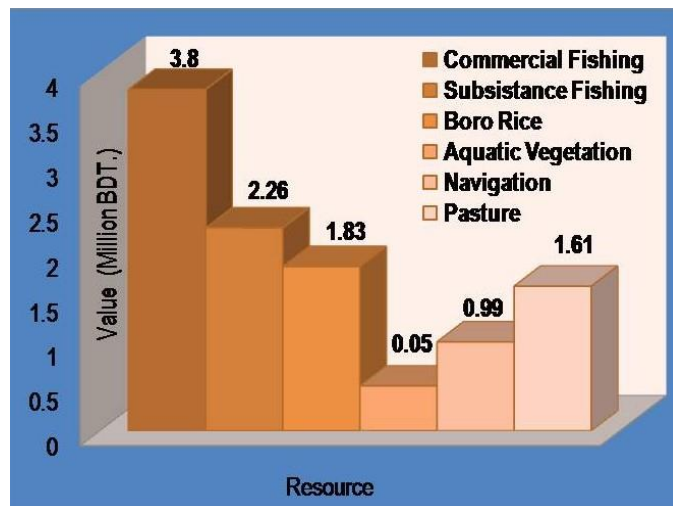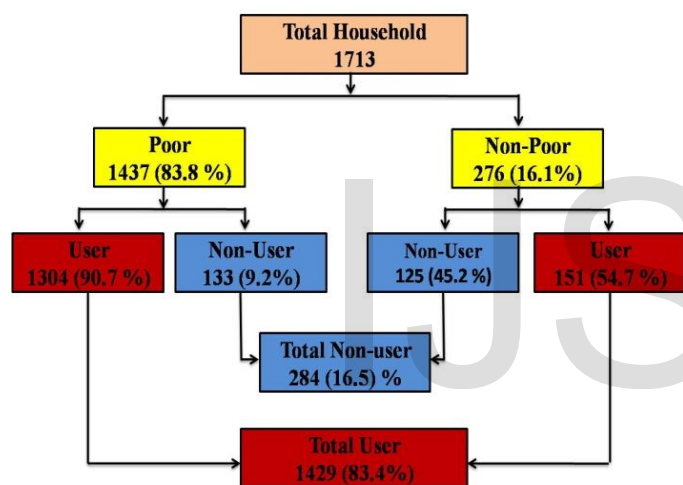

Fig. 3a Sector-wise value of resources

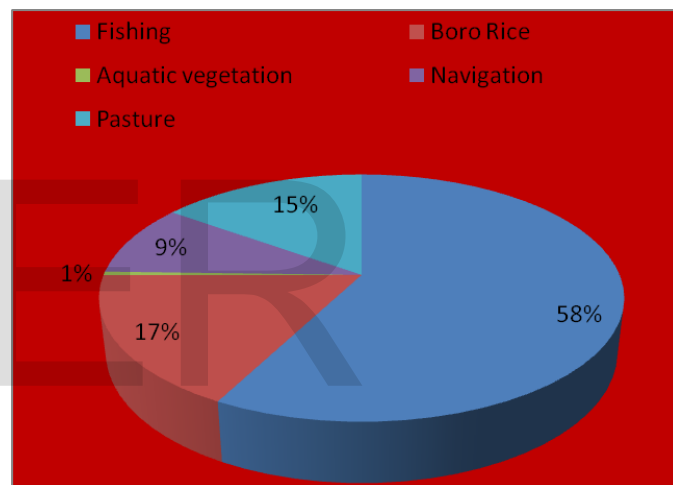**Fig. 2** Wetland resource dependence of the population of research area

Fig. 3b Contribution of individual resource value to the total value

3.3 Economic values

The estimated annual value of the wetland resources of Turag- Bangshi floodplain was about BDT 10.61million. Values came from fishing was estimated as BDT 6.13 million (Commercial 3.87 million and Subsistence 2.26 million) which was about 58% of the total value. The value came from boro rice cultivation in the wetland vicinity during the dry season was BDT 1.83 million which was about 17 % of the total value. Aquatic vegetation contributed BDT 0.051 million or around 1% of the total value. The value of navigation/transport was BDT 0.99 million which was about 9% of the total value and pasture

value was estimated as BDT 1.61 million which was 15% of the total value (Fig. 3a-3b).

3.4 Fish species diversity

Fishes were the main resource of the studied wetland like most other wetlands/floodplains. In this study area, a total of 88 species of fishes were identified during the study period which belonged to 12 orders. Cypriformes was the most abundant of all which presented about 39% of the total fish species (Fig.5). Another important order was siluriformes presented about 22% of fish species (Fig.5).On the other hand, the less abundant fish species were recorded under the order beloniformes, mugiliformes and symbranchiformes each of which presented only 1% of the total fish species (Fig.5).
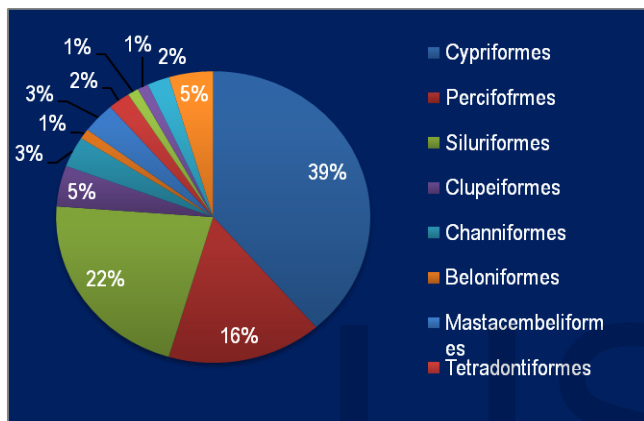

Fig.5 Fish species diversity in the study area.

3.5 Socio-economic condition and livelihood options

The socio-economic condition of the wetland resource-dependent people in the study area was average. Most of the people were poor because most of their lands are low-lands and goes underwater during the rainy season so they could not cultivate them all year-round. Alternative income-generating opportunities were also limited. Most of the people were directly or indirectly depend on the wetland resources for maintaining their families. There were full-time fishers who totally depend on fishing in these wetlands. Seasonal migration of occupation also found during the research as they could easily migrate to the capital city (Dhaka) for work during the lean season.

The rate of literacy was not high in comparison to other districts of Bangladesh although nearer to the capital city of the country. Most of the people are poor and they have no or less capacity to bear the educational expenses for their children rather than engaging children in income-generating activities at their very early age. So, year after year the young generation remains off the school and becomes illiterate. Recently the trend has been changing and the people started sending their children to schools due to the free school support provision from the government.

TABLE 1
SOCIO-ECONOMIC PROFILE OF THE POPULATION OF THE STUDY AREA

Total Population	10276
Avarage Family Size	6
Rate of Literacy	48%
Household involved in Fishing	88%
Full Time Fishing Household	15%

4. DISCUSSION

This study underscores the reality that Lower Turag-Bangshi floodplain constitutes an important source of natural capital which yields high economic and livelihood values to surrounding populations and the country as a whole. Study findings showed that 83.43% of local households in the study area depend on the wetland resources. The wetland also generates a series of economically important ecosystem services.

Bangladesh is one of the world's most densely populated nations and population density in 2002 was estimated to be 1253 persons per sq km as of 2019 (Worldoeter). The population is still dense in rural areas, with the great majority living in more than 85000 villages, life expectancy at birth is 73 years and infant mortality rates remain high (UNFPA 2019). The high number of populations has severely limited natural resources. Nearly all arable land is already cultivated and land under forests and water has been severely reduced by expanding agricultural activities.

Estimation of the economic value of wetland resources was done in many parts of the world (Barbier et.al. 1997). But is a new concept in the context of Bangladesh. The valuation was done on large scale comprising many parameters as a whole in other studies but in the case of a few particular beel the resources are very limited and some resources were ignored due to some limitations like time, technology, manpower, and financial support in this study. Therefore the estimated economic value of this study though apparently seems not so high but very significant for the planners, policy makers, the future researchers and for the sustainable management of wetlands.

With the growing population and increasing pressure on limited resources, Bangladesh is under constant pressure to be able to produce ample food to feed its population. Fish and rice have been the staple food of this deltaic country for years. The country is very much dependent on its open water capture fisheries for the supply of animal protein to the poor. This fishery to the last twenty years has been in decline and fish consumption per capita has declined due to a decrease in supply and an increase in population.

5. Conclusion

From the present study a number of activities may be put forward as an interesting observation. Changes of wetlands to paddy cultivation or further encroachment by influential will not limit to affect survival but may lead to the migration of poor people to the urban area. Floodplain fishes are an easy and major source of animal protein and vitamin for poor people so these should be protected or manage for future use, It is evident that those who are concerned about the convention on wetlands should try to convince the policymakers to take the value of wetland resources into consideration during any development plan that alters wetlands. Wetlands should not be drained out totally for paddy cultivation eliminating fish, destroying the aquatic environment, and threatening biodiversity.

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