

ECONOMIC INCENTIVE FOR WETLAND BIODIVERSITY AND FISHERIES CONSERVATION: THE CASE OF CHALAN BEEL (WETLAND)

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ABSTRACT

Chalan Beel, a wetland situated in the North Western Bangladesh is a very potential wetland with immense biodiversity and fisheries value. Its management problem has engulfed with suggestions ranging from private leasing, joint administration by public representation and government and community based approaches. However, nothing sustainable so far emerged concerning bio diversity and mother fishery conservations. In the midst of this uncertainty an approach based on economic incentives can be a way out to conserve biodiversity. Incentives are placed to influence people's behavior by making objects more desirable for conservation rather than degrade and deplete it. Economic activities many ways harm biodiversity as it may sometime sounds economically profitable from individual point of view and existence of different failures leading to externalities. Since economic incentives for biodiversity and fisheries conservation can take various forms, the appropriate incentives depend on a wide range of factors, including social, political and economic. Any form of management needs augmentation of clear understanding of right economic signals so that efficient level of resources is utilized. Since the issue is a complex one different incentive have been analyzed with their relevant costs and benefits conducting surveys among the stakeholders where the options based on market based ones have better chance to conserve rare fishery spices and bio diversities rather than using Command and Control ones. For resource valuation Benefit Transfer Method has been used.

INTRODUCTION

Chalan Beel is one of the largest inland depression of marshy character and also one of the richest wetland areas of Bangladesh. It is the largest beel of the country and comprises a series of depression interconnected by various channels to form more or less continuous sheet of water in the rainy season when it covers an area of about 386 sqm. The wetland management problem has engulfed with suggestions ranging from private leasing, joint administration by public representation and government and community based approaches. However, nothing so far emerged which can be coined as sustainable in terms of bio diversity and mother fishery conservations. In the midst of this uncertainty an approach based on economic incentives can be a way out to conserve biodiversity. Economic incentives are subsets of all possible incentives like, positive incentives, disincentives, indirect incentives and perverse incentives. Incentives are placed to influence people's behavior by making objects more desirable for conservation rather than degrade and deplete it. Economic activities many ways harm biodiversity as it may sometime sounds economically profitable from individual point of view. This happens due to the existence of different failures leading to externalities. Since economic incentives for biodiversity and fisheries conservation can take various forms, the appropriate incentives depend on a wide range of factors, including social, political and economic. Any form of management needs augmentation of clear understanding of right economic signals so that efficient level of resources is utilized. Since the issue is a complex one different incentive will be discussed with their relevant costs and benefits. It is observed that options based on market based ones have better chance to conserve rare fishery spices and bio diversities rather than using Command and Control

polices. In accomplishing the tasks certain economic values have been calculated for the resources of Chalan Beel to highlight the fact that proper incentives creation is worth saving a valuable resource. Economists use a variety of primary and secondary economic methods to assign value to environmental objects. Primary methods require the collection and analysis of field data, most often through the development of economic models, while secondary methods rely on the findings of previously conducted primary research. These findings are adjusted according to the parameters of the project being analyzed, and limited, the valuation method most likely to be used in economic analysis is a secondary method called Benefits Transfer Method. This method can be applied without extensive modeling or time intensive research. The present Endeavour used this method for capturing wetland values. Usually the wetland resources in Bangladesh fall in the category of open excess property. As a result of this no appropriate policy in protecting this vital resources have taken any shape except some regulation to control its use. Since poor people are more associated with these resources because of their total dependence on it no government rule worked. Moreover, these resources are treated as free gift of nature and its value always treated without proper valuation. A comprehensive Economic Cost Benefit analysis based on Total Economic Values (TEV) is a mandatory exercise especially if the objects involve environmental benefits and damages. . Wetland as a matter of fact is the kidney of the earth. Its value comprises of direct and indirect values. Direct values are object which have market price like fisheries and other price based products. On the other hand indirect values include values of watershed protection of fisheries, tourism, carbon store, genetic materials, education, medical importance and biodiversity. Once the total value is established the tasks of its management rest on policy choices. We have thoroughly discussed the prevalent laws which include heavy punishment for illegal use of wetland resources but no result has been achieved. The usual outcome of failures include insecurity of existing property rights at local, regional and international level, capital intensive fishing and overfishing. The probable way out remains with market based instruments not command and control policies.

WETLAND IN BANGLADESH

Half of Bangladesh is virtually wetland consisting of rivers and streams, freshwater lakes and haors, baors, beels, water storage reserver, fish ponds, flooded cultivated fields and estuarine systems with extensive mangrove swamps. Wetlands of coastal and marine origin are less important in Bangladesh. The haors, baors, beels and jheels are commonly identified as freshwater wetlands. These freshwater wetlands occupy four landscape units - floodplains, freshwater marshes, lakes and swamp forests. Apart from the major river courses and streams, the major wetlands of fluvial origin occupy the floodplains.

The manmade wetlands including ponds, dighis and lakes are distributed all over the floodplains. Some important wetlands of the country are Chalan Beel, Atrai basin, lower Punarbhaba river floodplain, Gopalganj-Khulna Beels, Arial Beel, and Surma-Kushiyara floodplain, Hakaluki haor, Tanguar Haor and Sunamganj haor basin area. The table shows the distribution of wetland in Bangladesh.

Table: 1 Distribution of Wetland in Bangladesh

TYPE	AREA(H)
Permanent Rivers and Streams	48,000
Estuaries and Mangrove Swamps	61,000
Shallow Lakes and Marshes	120,000
Large Water Storage Reservoirs	90,000
Small Tanks And Fish Ponds	150,000-180,000
Brackish Water And Shrimp Ponds	90,0000-115,0000
Coastal Wetlands	5,770,000
Seasonally Flooded Flood Plains	5,770.000

From: A. Quyaam and Dr. Aminul Islam: UNDP

IMPORTANCE OF WETLAND

Wetland plays a wide range of ecological, socio-cultural, economic and commercial importance and its values are immense in Bangladesh. These wetlands are important habitats for a large variety of flora and fauna of local, national and regional significance. In the freshwater wetlands floral compositions are crucial for livelihood of rural Bangladeshi people. Wetlands are no doubt critically important for human settlements, biodiversity, fisheries, agricultural diversity, navigation, communication and ecotourism in Bangladesh

Degradation of wetlands have caused several problems including extinction and reduction of wildlife, extinction of many indigenous wild and domesticated rice varieties, loss of many indigenous aquatic plants, herbs, shrubs and weeds, loss of natural soil nutrients, loss of natural water reservoirs and of their resultant benefits, increase in the occurrence of flooding and degeneration of wetland based ecosystems, occupations, socio-economic institutions and cultures.

THE STATE OF CHALAN BEEL:

Our area of concern is Chalan beel. It is the largest and important wetland in the northwest region of Bangladesh. The area of this beel is 375 sq. km. at during flood period from July to November and 52-78 sq. km. at dry winter and summer. The average depth is more than 2 m during dry season and more than 4 m at rainy season. Hundreds year back, the area of the Chalan Beel was 421 S.qm. In 1909 it was reduced to 33 sqm .In 1913 it was 12.15sqm. In June 1987, the beel was completely dry except for some man made ponds. (Mustan Billah and Hannan Khan 2002)

It is located between 24.35 to 24.700 north latitude and 89.10 to 89.350 east longitudes. It covers an area belonging to Singra, Grudashpur and Boraigram upazila of Natore district, Chatmohar upazila of Pabna district, Tarash, Roygonj and Ullapara upazila of Sirajgonj district and Ahasanganj and Manda Upazila of Noagaon district.

Rivers and their tributaries are formed a water network over the entire Chalan Beel area. The rivers are Atrai, Gur, Korotoa, Boral, Mara Boral, Tulsi, Chenchma, Bhadai, Chikni, Bogomja, Khubjipur, Telkupi and their innumerable tributaries, interconnecting canals and channels.

The average rainfall is 1775 mm, atmospheric temperature is 8-40.90 c. Water temperature is recorded as 11.5-310 c, water transparency 18-55 cm, pH 7.2-8.5, Dissolve O₂ 5.1-9.6 mg/l, Free CO₂ 1.3-12.3 mg/l, Carbonate alkalinity 8.3-15 mg/l, Bicarbonate alkalinity 82-117 mg/l.

The identified species of fish is 129, annelids 8, arthropods 11, molluscs 13, amphibians 7, reptiles 17, birds 34, mammals 8 and aquatic vascular plants 52. The number of cultivable fish specie is 7 and self recruited fish species more than 50. There are 7 main types of nets, 10-14 types of traps, 5-7 types of line, 5-7 types of wondering gears are available.

Chalan Beel is one of the most threatened wetlands in Bangladesh. Chalan Beel is a historical low-lying land of Bangladesh. Originating 2000 years ago, it is hugely diverse in natural resources of numerous types, albeit most are now verging in extinction. Once it was very famous for its fish and aquatic resources. As one of the biggest ditches in the subcontinent, Chalan Beel covers a vast area of 8 upazila under three major districts in the northern region of the country. In this wetland, there are 1,600 villages; more than two million people populate and spread over 823 square miles of its area.

During the last half-century, development interventions have been undertaken in this area, mainly to increase food production for an increasing population, improve road systems, industrialize, urbanize etc. This all came at the cost of valuable wetlands and their resources. The development interventions like construction of embankments, dams, hydraulic structures, roads and railway lines have not only reduced the total water body, but have led to widely spread damage of the wetland ecology, its resources and navigation. This in turn causes limitless misery in the livelihoods of thousands of people, particularly the poor fishers and others who were dependent on fisheries and other wetland resources and navigation.

Some of the rivers are drying out in the Chalan Beel. During the dry season, some of the rivers Gumani, Atrai and other rivers are drying and that leads to damage of Chalan Beel.

Various faunal and floral resources, species of fish, mammals and amphibians are now locally lost. The migratory birds are reducing in numbers. Destruction and degradation of their ecology and habitat, scarcity of food, deforestation, expansion of settlement areas and massive hunting are the main contributory factors for such rapid reduction and extinction of these species and resources. There was no organized effort by the community people, NGO or government departments for conservation and management of this resource area instead of exploitation of its resources. Chalan Beel is not yet declared as heritage spot or ecologically critical area by anybody. The Chalan Beel is going to be destroyed partially and that some part of this beel is destroyed.

Most of the rivers of Chalan Beel are drying up during dry season. This is because water divert on 'Teesta River' and some impact of "Farakka Barrage". On the other hand, the degradation of water bodies, roads and highway, living pattern change of this area etc. are responsible for potential damage of Chalan Beel. Poverty is the main factor of rapid population growth to over-exploit natural resources like land and water resources also. The nature of agricultural practices, land is losing its potentialities gradually. It is observed that the extensive rice cultivation has already gone!!

As the many rivers are drying up and the beel is congested, so the chances of getting fish and other water resources are decreasing day by day. So the fishermen, and other water resources depended people are affected badly. Their income level is very poor. As a result, most of the people are encouraging their profession on rice field cultivation. This new rice fields are

creating the degradation of Chalan beel also. So again and again the Chalan Beel is decreasing. Some of the beels water is blocked and it is used to fish production, another incoming sources.

OBSERVATION FROM RECENT VISIT

The following parameters are recorded during recent visit in this beel at Singra area. Air temperature 34.420c and humidity 78. Water temperature 26.44-28.520c with an average depth of 30 cm to 100 cm. Water depth 203-290 cm, transparency 51.2 cm, colour grey-greenish, source flood and rain, water duration near about 5-6 months.

The common zooplankton are Daphnia, Cyclops, Moina, Notholca, Keratell and Asplanchna; phytoplankton are Spirogyra, Volvox, Nostoc, Microcystis; aquatic vascular plants are Topa pana (*Pistia stratiotes*), Kachuri pana (*Eichhornia crassipes*), Keshordam (*Jussiaea repens*), Kalmilata (*Ipomoea aquatica*), Malancha (*Enhydra fluctuans*), Arail (*Leersia hexandra*), Shapla (*Nymphaea nouchali*). 20 species of terrestrial tree are available.

16 species of fin fish are very common, 14 species of small indigenes species of fish are dried by sun drying method. Mainly 4 types of fishing net are available here such as Drag net, Frame net, Gill net especially current jal (monophyletic gill net) and khepla jal. Traditional traps, gears and craft are very common and available. Large mechanized boat is usually used for transporting goods as well as traveler.

Literature survey and our observation reveal that a vital wetland with enormous resources is being getting degraded day by day and no concrete efforts have so far been taken from any quarter. Some project work can be applied in case of Chalan Beel taking into account a small area in one of the vital points (9000 hector). This type of work has been quite successful in other wetland like Tanguar Haor. The importance of Chalan Beel can be estimated by taking into account the Total Economic Valuation method. We will show below that just for small area of Chalan beel can produce such a significant amount of values which we usually ignore.

TOTAL ECONOMIC VALUATION OF SOME INITIATIVE

Any project comprising of environmental importance has different ranges of value. Economists use a variety of primary and secondary economic methods to assign value to environment impacts. Primary methods require the collection and analysis of field data, most often through the development of economic models, while secondary methods rely on the findings of previously conducted primary research. These findings are adjusted according to the parameters of the project being analyzed, and limited, the valuation method most likely to be used in project economic analysis is a secondary method called Benefits Transfer Method. This method can be applied without extensive modeling or time intensive research.

Secondary methods, such as Benefits Transfer, sometimes produce less defensible estimate of damages or benefits than primary research methods. Nonetheless, the use of this method does recognize the trade off between the cost and time needed to conduct research, and the level of accuracy needed for the assessment. When carefully applied benefits transfer and other secondary methods will be adequate for many project economic analysis.

In our case data to the project Economic benefits has been derived through on the field survey in case of direct use values, others values have been calculated taking into view the similar studies done at home and abroad. In case of indirect use values, option values and existence values, data adapted from studies that employ primary research. The actual project cost in

financial terms is quite low compared to values one derive from wetland resources. Below we give an estimate of values using Total Economic Valuation approach in calculating wetland projects.

Table: 2 Economic Valuation (Benefits)

Direct Use Values	US\$ 337,698
Sustainable Harvest Products:	
Fuel Wood	US\$ 68,906
Fishing	US\$ 72,000
Duck Keeping	US\$ 33,692
Tourism	US\$ 48,635
Genetic Materials	US\$ 68089 one-time Use Value
Education	US\$ 5,000
Human Habitat	US\$ 41,376
Indirect Use Values:	US\$ 888,354
Ecological Function	US\$ 525,258 one-time Use Value
Protection of Endangered Species	US\$ 93,096
Carbon Store	US\$ 270,000
Option Values:	US\$ 155,632
Future Uses: Medical Importance	US\$ 155,632
Existence Values:	US\$ 204,267
Biodiversity	US\$ 204,267
Total Economic Value	US\$ 158,5951

BASIS OF CALCULATION AND SOURCES OF DIFFERENT VALUE

Protection of Endangered Species: This value reflects a compilation study of developed nations, mostly conducted in the USA and estimated using Contingent Valuation Method (CVM). Average value per ha US\$ 8 has been used. (Source: Economic Valuation of Environmental Impact ADB 1996)

Watershed Protection of Fisheries: The calculation of value here refers to the similar studies done in Cameroon. US\$ 54 ha. Total hectare $9727 \times 54 = \text{US\$ } 525,285$ (Source: Measuring Environmental Quality in Asia. ADB and Harvard University 1997)

Tourism: Values for this activity has been collected from the study done in Cameroon using Travel Cost Method. However, it has been adjusted to a reasonable level of Willingness to

Pay (WTP) value considering the low- income level of resident. Calculation of total value for this section has been accomplished in the following fashion: US\$ 5 per ha. Total ha 9727. $9727 \times 5 = \text{US\$ } 48,635$. (Source: ADB 1997) .

Carbon Store: Values of carbon store has been adjusted from US\$ 1300 to US\$ 300 per ha as these Studies were done in the developed countries where income level is high and WTP is naturally higher than ours. Total value: US\$ 300×900 ha of swamp forest = US\$ 270,000 (Source: ADB 1997)

Genetic Materials: This activity carries value from the study done in Cameroon. Calculation is based on US\$ 7 per ha. Total value US\$ $7 \times 9727 = \text{US\$ } 68,089$ (Source ADB 1997)

Education: This value refers to the value calculated in a case study in Thailand. Value for this object varies from US\$ 33- US\$ 77000. (Source) ABD 1997)

Human Habitat (improved sanitation and water availability): Values for this part has been derived from the studies done in Nigeria using CVM based on WTP. However, Values have been adjusted due to low income of our beneficiaries US\$ 8 per household. Total benefit: Total Household US\$ $= 8 \times 544.5 = \text{US\$ } 4,376$ (Source: ADB 1996)

Medical Importance of Wetlands: Values have been derived from Indonesian case study. Per ha US\$ $16 \times 9727 = \text{US\$ } 155,632$ (Source: ADB 1997)

Biodiversity: Values have been derived from case studies done in the developed countries. The adjusted value for our purpose is calculated in the following fashion: US\$ 21 ha. Total value $9727 \times 21 = \text{US\$ } 204,267$ (Sources: ADB 1996)

WAY OUT:

Different laws and regulations have been made in different times to protect wetland in Bangladesh and it showed little result except a few. The command and control policies seem to be helpless in controlling the rapid degradation of our valuable wetland resources. Moreover, international research has revealed that wetlands around the world serve a critical role in maintaining biodiversity, contributing to the overall health of the planet. Unfortunately, lack of knowledge regarding the role of wetlands has led to humans encroaching on these areas in one way or another. The probable way out using market based instruments call for removal of policy failure, tradable quotas, clearly defined secure property rights, fishing input pricing and for giving rights to fishing based on grand fathering principle. Grand fathering principle relates family tradition of fishing. With their long association with fishing the preservation is achieved as they take care of the resource more than the surrogate ones. So any conservation management plan must include the original fisherman for its sustainability. All these are possible if the resource is left to Community Management option with mild supervision of NGOs and other indigenous partners.

REFERENCE

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