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*Wetlands and Biodiversity: A Case Study of Common Property Resources in Bangladesh.**

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ABSTRACT: Bangladesh, a deltaic floodplain formed by the three major rivers of the world is endowed with vast wetland resources which include 1.03 million hectares of rivers, canals and estuaries, 114,161 hectares of natural depressions, 161,943 hectares of ponds, 5,488 hectares of ox-bow lakes, 68,800 hectares of reservoirs, 2.8 million hectares of seasonal floodlands and 87,300 hectares of brackish water aquafirms. These wetlands support rich biological diversity of flora and fauna. Wetlands and their biodiversity have been contributing substantially to the socio-economic life of the millions of people of rural Bangladesh by providing opportunities of employment, food & nutrition, fuel, fodder, transportation, irrigation and so forth. Men, women and children are engaged in harvesting diverse resources of wetlands. The paper highlights different management patterns of wetlands. It also covers the use and access rights in harvesting wetland-based natural resources and relates these to social stratification and wetland types (including location and seasonality). The paper discusses issues related to conversion of wetlands to croplands and depletion of wetland-based biodiversity. It cites some instances of gradual transformation of common property rights regimes on wetland resources into private property rights. One of the aims of this paper has been to focus on the importance of conducting detailed studies on the existing status of wetland-based common property resources and rights in Bangladesh and to come up with specific recommendations toward building institutions in the country for conserving and protecting biological and cultural diversity of wetlands on a sustainable basis so that the common people are benefitted.

Key Words : Bangladesh, Wetland, Biodiversity, Common property, Conservation, Private property.

Introduction

Bangladesh is often called a land of wetlands. A deltaic floodplain endowed by nature with vast and diverse wetland resources covering an area of about 4.3 million hectares[1]. The wetlands of Bangladesh are highly productive due to its mild to hot climatic conditions with abundant monsoon rains and deposition of allochthonous nutrients carried in by rain fall run off and river flooding.

The resource settings of Bangladesh wetlands have seasonal distinctive characteristics. The biological diversity of the country are very wide and predominantly wetland based that have been supporting this most populous nation over centuries.

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Unfortunately, the wetland-based resources have been declining over the last two decades largely due to man made development interventions aimed at increasing cereal production particularly rice mono cropping in the floodplain. These interventions, brought changes in land use pattern, biodiversity, access arrangements and resources harvesting pattern in the floodplain wetlands of the country. In the past, the development planners ignored the importance of biological diversity of wetlands and their contribution to human life. The common property nature of the wetland resources have been totally undermined.

The paper presents an overview of freshwater wetlands and biodiversity in Bangladesh and then focuses on the issues associated with the access arrangements to wetland resources citing some examples.

Wetland and Biodiversity: Basis for Livelihood

Bangladesh, a small South Asia country known as a country of rivers and canals, *beels*** and floodlands, *haors**** and *baors* (Ox-bow lakes). More than 700 large and small rivers criss-crossed the country. The wetlands of the country are diverse and each has some distinctive features in terms of physiography, seasonality and use patterns. Table 1 shows the types and extent of wetlands in Bangladesh.

Table 1: Wetlands of Bangladesh.

Wetland Types	Area (in ha)
Rivers, Canals and Estuaries	1,030,000
Natural Depressions	114,161
Ponds	161,943
Ox-bow lakes	5,488
Reservoirs	68,800
Seasonal Floodlands	2,800,000
Brackishwater Farms	87,300

Source: Rahman, A.K.A., 1989.

The freshwater wetlands provide home for a considerable number of plant species which have long been adjusted to the dynamic characteristics of Bangladesh wetlands. There are about 140 species of wetland plants under 48 families including 7 species of swamp forest trees[2].

The wetland plants have been contributing substantially to the livelihood of the millions of rural people as a source of food, fuel, fodder, manure, thatching materials, medicine and so forth. Varities of macrophytes are eaten as vegetables and some are eaten raw. During monsoon, water hyacinth extensively used as fodder in many areas. These plants are harvested mostly by the rural poors and thier access for this purpose is almost free all over the country.

** *Beel*: Small saucer shaped natural depression between river levees.

*** *Haor*: Large natural depressions of tectonic origin contains combinations of *beels*.

The natural way of resource avaiability is so balanced that when the land-based sources of food and employment are scarce during June-July, the wetlands, just at that time come forward with their diversity of resources that provide food and employment opportunities of the poverty driven rural people.

The freshwater wetlands are also characterized by the presence of a broad spectrum of faunal diversity that include fish, amphibians, reptiles, birds and mammals.

About 932 species of wildlife (excluding fish) have so far been reported by various workers[3]. About 269 species are reported as freshwater wetland dependent which include 208 species of birds, 11 species of amphibians, 32 species of reptiles and 18 species of mammals[4].

Apart from wildlife fauna, a rich ichthyodiversity blended the wetland resources of Bangladesh which form the basis for maintaining livelihood of millions of rural people in the floodplain of Bangladesh. A total of 260 fish species have been described in the wetlands in Bangladesh[5]. However, the list could go up around 400 if systematic sampling could be done year round covering different microhabitats including near coastal waters[6].

Of the wetland-based resources, fish stands at the top due to its quality, quntity and socio-economic contribution. More than 80 % of the animal protein consumed by the Bangladeshi people comes from fish. Fish also provide other nutrients in the form of vitamin A, fat and calcium to the diet. Around 75 percent of rural families in the floodplain are engaged in seasonal consumption fishing mostly in floodlands, canals, and *beels*[7]. About two million people are engaged in commercial fishing and associated activities. Fish constitutes nearly 6 percent of the gross domestic product and more than 12 percent of the country's export earnings[8]. The rural families consume 50-75 varities of fish species during the course of a year[9].

Wetland Management and Resource Harvesting Pattern

During pre-British period, the wetlands were traditionally managed by the people living around them. The local community evolved and enforced various complex and localized tenurial systems for harvesting fisheries resources (Capistrano et al, 1994)[10]. The traditional management systems aslo varied from place to place and types of water-bodies.

During British period, the wetlands (more precisely the fisheries resources) came under the control of Zaminders (Land Lords) as a part of their revenue earnings estates. In 1950 when the Zaminder system was abolished, the government got the ownership of most of the wetlands.

The goverment owned wetlands (*khas*) are managed by the Ministry of Land (MOL). The major objective of the MOL has been observed to

earn revenue through leasing out the wetlands to highest bidders for fishing purposes (for 1-3 years). Some wetlands also lease out temporarily for collection of sand and boulders. The MOL do nothing related to management and development of the resource bases. They also do not care the about the access issues of the real fishermen and the rural poors who have been surviving on these common property resources for generations.

Despite having a rule of giving priority to the fishermen society, there are evidences that most of the government owned wetlands are leased out to local elites, money lenders and politicians. These elites are powerful class in the society often managed to obtain the lease of wetlands. If required, they can produce vague papers of fishermen society to obtain the lease.

Wetlands as Common Property Resource

Among the natural resource bases in the country, wetland have been most effectively treated as common property resources from time immemorial. Over centuries, the wetlands in Bangladesh have been providing wider opportunities for the millions of rural people to make up their livelihood through harvesting diverse resources of both plant and animal origin. During pre-British regime, the wetlands were exclusively used as common property resources for fisheries, cattle grazing and other various purposes round the year.

The access regulation to leased wetlands found to enforce strictly for fisheries purposes. Harvesting of other resources from wetlands are almost unregulated. Most the poor women and children collect plant based resources such as food items, vegetables, fodders almost freely. Access to the resources by the poor people is unregulated for at least part of a year particularly during the wet monsoon.

Statistics shows that substantial numbers of rural households in the floodplain still carry out subsistence fishing in the wetlands. A study revealed that 51% of the total fishermen in two *beels* was subsistence fishermen and they fished almost round the year[11]. In many leased waterbodies, the poors, to some extent, allowed to catch fish with small gears for their family consumption. The access arrangements to wetlands for the subsistence fishing families is very complex and varied from place to place. FAP-16 fish study observed 5 different systems of fishing rights in the leased wetlands in Bangladesh[12]. These are:

- people enjoy the traditional rights for own consumption;
- No fishing is permitted, but it is done clandestinely. sometimes the lessor or owner overlooks consumption fishing by the poors;
- The lessor or owner allow with a share of the catch;
- catch under subsleasing arrangement for part of a year;
- people are allowed to pick up any fish left after the final harvesting by the lessor or owner.

Women and children form a major section of landless family who are engaged in harvesting fish and other forms of resources. An investigation on the participation of the fishing people in two floodplain wetlands in Tangail district (North central region of Bangladesh) revealed that 12 % of the total fishing population was women and more than 40% of the subsistence fishermen was children[13]. Even, in the leased *beel* their participation was open for most part of the year where. Of the total annual fish harvested from the two beels, 21% was caught by the subsistence fishers whose access was almost unregulated.

However, utilization and management practices of common property resources has spatial, topological and temporal variations. For example, common people have open access to floodplain wetlands for fishing during the whole inundation period but the access is limited for fishing in canals during early and late monsoon at places. Access to river for fishing is mostly confined to the lease holders, sub-lease holders and licensee. Subsistence fishing found less in the rivers due to strong fishing regulation by the lease holders as well as unability of poors to organize expensive gears required in river fishing.

Compared to river, common access are widespread in seasonal floodlands, *beels, haors* and canals particularly during monsoon months. When the flood water receded from the floodlands, fish congregate in the *beels* and *pagars*[****] and most of these are privately owned and or under leasing system. The access of poor to leased *beels* and *pagars* become restricted during post monsoon and pre monsoon. However, the children and women are often allowed to gleaning the left over fish after major fishing is done by the owner and operators.

The fishing regulations and leasing system also vary from place to place. In the *haor* basin of North-eastern Bangladesh which is rich in fisheries, access by others is strongly regulated by the leaseholders. There exist conflicts is obtaining lease between fisher groups and local elites and money lenders.

Changes of Resource Base: Changes in Access Rights

The wetland of the country are under increasing pressure due to man-made interventions-notable among those are flood control embankments, closures, regulators and drainage of perennial wetlands. In addition, unplanned rural roads negatively impacted the wetland and biodiversity. Natural factors such as siltation, and drought also reduce the quality and quantity of resources. These processes, in turn, negetively impacted on common property resources available to the society at large and the poor who are most dependent upon them.

[****] *Pagars*: Small ditches in the floodplain excavated by the owners for trapping fish.

In 1950s, introduction of irrigated HYV boro rice cultivation, initiated the process of degrading wetlands in terms of size and biodiversity. Huge numbers of embankments, regulators and closures were built in the rural area that altered the natural environment of floodplain wetlands. These also brought changes in the physical and resource settings of wetlands as well as on the pattern of wetland management and access arrangements. In many places, the *beels* have been drained and handed over to land lords for crop production and eventually the common property regime of the resource bases have been transformed to private property rights.

An ICLAMR study revealed that the development interventions aimed at increased rice production depleted many wetlands and natural resources in the central part of Bagladesh as well as completely changed the common property rights of the resource bases to private property regimes (Table 2).

Table 2: Benefit and Access Pattern of Floodplain Wetlands in Central Point of the Country.

Resume & use pattern	Before 1950s	After 1950s	Recent
Uses	Capture fishing, other forms of food, fodder, manures, bathing washing and other household uses dry season cattle grazing.	HYV crop cultivation initiated capture fish started to reduce, bathing, wasting collection of food and fodder, livestock grazing	Crop cultivation Aquaculture
Access rights	Open access for fishing, grazing and other forms of resources harvesting by the local community.	Capture fishing restricted in the dry season. Land owner solely catch fish in dry season. Other uses restricted.	Total restriction on community access.
Benefits	local community at large	Benefits of fisheries and crops mostly goes to land owners. Local poor get fisheries benefit in monsoon	Fisheries benefit goes to a few land owners and share holders. Access of local poor is almost lost.

Adapted from Annual Progress Report, August 1993. Socio-economic Impact of Fish Culture Extension Program in Bangladesh, ICLARM.

Besides introduction of crop cultivation in wetlands, fisheries development projects also negatively impacted on the access arrangements of the wetlands. The carp stocking program in floodplain and beels, and existing leasing system has eroded the

traditional rights for consumption fishing by the poor who have been doing so over generations.

Changes in the physical and resource settings and access patterns are also very rapidly changing in places where development programs are initiated.

Recently, a case has been observed within the Compertmentalization Pilot Project (CPP), Tangail (personal observation). A natural flood-fed wetland Jugni Beel, covering an area of 7 hectares has been converted into a big pond over the last three years from 1992 to 1994. The fisheries production of the wetland is now almost exclusively culture-based. This process initiated in 1992-93 when, for the first time, a non-fishermen, money lender managed to obtain the lease. The new leaseholder stocked the *beel* with carp fingerlings and imposed regulation on fishing, even for the poors who use to fish for their own consumption. Even the traditional fishermen who use to fish in the *beel* for generations, were not allowed. They however, hired by the leaseholders for harvesting of fish under share arrangement.

In 1994, the process of wetland conversion and access regulation have been further intensified. This year, another rich man live in Tangail town obtained the lease. He removed all the macrophytes from the *beel* and stocked large quantity of carp fry. Dumped huge quantity of fertizers and cow dung which degraded the water quality.

All his activities help to destroy the natural settings of the wetlands, biodiversity, habitats for wetland dependent wildelife, opportunities local poors to collect varieties of macrophytes as food, fodder and manures. Now the wetland is simply a big pond being managed and directly benefitted by a single operator. The changes observed are given in Table 3.

Table 3: Changes in Resource Base and Access Rights in Jugni Beel, Tangail.

Year	Changes
Before 1992	• Natural Environment • Annually renewed the resource-base by river floods • Rich biodiversity • Fishermen society got the lease • Lease value Tk. 2,000 per year in 1982-83; and Tk. 7,000 per year in 1991-92 • Open access for poors • Fish fauna composed natural stock
1992-93	• Natural environment • Rich Biological Diversity • Fishermen society got the lease • Lease Value Tk. 13,000 per year • Small scale stocking of carp fry collected from natural stock • Open access to poor people
1993-94	• Natural environment started to change • Macrophytes were partially removed from the beel • Non-fishermen money lender got the lease • Lease value Tk. 30,000 per year • Large scale carp stocking with natural and hatchery sources • Biological diversity reduced • Access of the poor restricted
1994-95	• Natural environment completely changed • Macrophytes were completely eliminated • Non-fishermen money lender got the lease • Lease value Tk. 53,000 per year • Large scale carp stocking with natural and hatchery sources • water quality degraded due to application of cowdung and fertilizers • Further reduction in Biological diversity • Access of the local poor and fishermen completely restricted

The changes in the natural resource bases whether man made or natural, bring rapid changes in management regimes, access rights, ecology, socio-economics and nutritional aspects of the commonity. Table 4 shows some changes in characteristices and use patterns due to changes in the physical setting of resource bases.

Table 4: Common Property Characteristics under Changing Scenario.

Parameters	Non Changed Situation	Changed Situation
Management	• Community Participation	• Community not involved • Mal Managment,
Access	• Open access	•Limited access •Private access
Biodiversity	• Rich biodiversity	•Loss of biodiversity
Ecological	• balanced ecosystem	• Ecological imbalance
Socio-economics	• Social Harmony • benefit goes to total community • Sustainable resource base	• Social conflict • Wide gap between rich and poor • benefit goes to a few people
Health & Nutrition	• Equal opportunity of acquiring adequate nutrition	• Mass deprivation • Under nutrition

Conclusion and Recommendation

So far, very little attention has been given to understanding the importance of the common property resources in the context of socio-economics of the resource users and sustainable functioning of the resource base. Lack of information on common property resources impedes appropriate policy planning for sustainable resource management and development.

No institutional structure exists for coordinating and integrating activities related to common property resources at local or national level. Furthermore, it is not possible to assess the rate of change caused by natural as opposed to anthropogenic causes. Such basic data is essential for planning environmentally sound projects meeting basic human needs.

The development initiatives and models, so far, adopted in Bangladesh, in general, did not emphasize conservation and maintenance of common property resources for the interest of commons. Consequently, national as well as donor driven development interventions could not achieve desired goal of environment and natural resource management as well as poverty alleviation. In concluding remarks, it may be mentioned that greater the emphasis on maintenance of common property resources are given better the development approach would be towards sustainable development and poverty alleviation of the country.

As of yet no systematic study on the use of common property resources and their environmental and economic value has been

carried out in Bangladesh. A detailed inventory of common property resources should be carried out covering different ecoregions of the country. It is also better to do the study before destruction of the resoures base. The findings of the studies can be potentially used by the people who are involved in Environmental Assessments of development projects as well as those involved in planning of sustainable use and development of resources.

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