
Impact of Community-based Natural Resources Management and Co-management on the Livelihoods of People in the Hakaluki Haor Area

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Abstract

Hakaluki Haor is one of the most important wetlands in Bangladesh in terms of the goods and services it provides, not only to local communities living in the surrounding areas and to the broader region, but also as a precious ecosystem with global significance for biodiversity conservation, since various migratory birds visit the wetland each year. Past management initiatives to conserve the wetland natural resources undertaken by the Government of Bangladesh in collaboration with national and international NGOs and other partners have had some positive impacts for both the community and the ecosystem. Nevertheless, there is much yet to do to ensure the integrated and comprehensive management of the dwindling wetlands. This case study intends to assess the major problems or vulnerabilities of the ecosystem posed by man-made interventions, as well as the impacts of community-based natural resources management and co-management on the livelihoods of people depending on these wetlands. A survey was conducted among 20 households to assess current problems and potential solutions. A focus group discussion and a consultation with the representatives of various stakeholders, including local NGO workers and government officials, were also undertaken. The survey responses were analyzed to assess perceptions of community-based natural resources management and co-management among the households, prevailing problems, and the impacts of the projects on the livelihoods of the households. It is evident that initiatives like alternative income-generating activities have had positive impacts on the livelihoods of the community. These findings suggest that an integrated development approach under co-management should be continued to help ensure the long-term sustainability of the wetland ecosystem and to harness benefits for the local community.

Introduction

Co-management requires two or more social actors to negotiate, define, and guarantee among themselves a fair sharing of the management functions, entitlements, and responsibilities for a given territory, area, or set of natural resources (Borrini-Feyerabend *et al.* 2007). Strengthening community-based natural resource

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management or co-management is considered to be one of the best options to conserve wetland ecosystems and their associated goods and services. Several biologically significant wetlands have been designated as Ramsar Sites and/or declared Ecologically Critical Areas (ECAs) by the Government of Bangladesh. The Government of Bangladesh in collaboration with NGOs and local communities has introduced various management initiatives in the Hakaluki Haor ECA under various development projects. Although these projects have all endeavored to implement and uphold community-based natural resources management or co-management, some issues and concerns remain, including gaps between the stated objectives and the reality of co-management.

Village conservation groups (VCGs) constituted through one of the already implemented projects and who are dependent on wetland resources often cannot play an effective role in managing these resources, because the wetlands are leased to influential or elite individuals, or because VCG members possess inadequate knowledge and know-how. For example, some VCGs have insufficient capacity to manage fish sanctuaries and swamp forests, or lack of incentives for conservation. Those who are not members of the conservation groups are not engaged in alternative income generation activities. Furthermore, a lack of coordination among ministries and field-level officials, as well as communication problems between NGOs and government field-level officials, hampers the implementation of co-management programs. In terms of interventions led by government and NGOs to engage communities in natural resource management, there is a need to re-examine the lessons that have been learnt on a case-by-case basis to ensure the long-term sustainability of the ecosystem and its ability to provide optimum goods and services for the community surrounding Hakaluki Haor.

This research aims to identify the major issues faced by people living in the Hakaluki Haor area, and the solutions those residents have suggested for resolving these issues. This inventory of problems and possible solutions may help to improve the decision-making process and the implementation of ongoing or upcoming project activities. The specific objectives of the study are threefold:

- To assess the impacts of community-based natural resources management initiatives and co-management programs on the livelihoods of people living in the study villages of Hakaluki;
- To identify major problems faced by people living in the Hakaluki Haor area; and
- To identify solutions suggested by the local people for resolving these problems.

The findings of this study could be useful to project managers, diverse users, and other stakeholders of wetland resources, including fisherfolk, farmers, NGOs, and concerned government bodies like the Ministries of Land and of Environment and Forests, the Department of Environment, the Department of Fisheries, and the local district and upazila administrations.

Background

The wetlands of Bangladesh are rich reservoirs of biodiversity and natural resources upon which local communities depend for their livelihoods. They are comprised of both *haors* (seasonal water bodies formed during the monsoon) and *beels* (low-lying depressions of the haor system retaining water even during dry months).

Fish from wetlands provide about 80 percent of the country's dietary protein, and food, fuel, fiber, fodder, and building materials are also harvested from wetlands (SEMP 2005). Wetlands provide water for irrigation and domestic use, and act as winter habitat for a rich variety of resident and migratory waterfowl. The economic uses of the wetlands include growing flood-tolerant rice varieties, collecting mollusks, planting vegetable gardens, and rearing fish, ducks, and livestock. Fodder for cattle and dried weeds for fuel are also collected from these wetlands. Furthermore, healthy wetland ecosystems act as a buffer for floods and help to reduce the vulnerability of local communities to droughts.

The wetlands of Bangladesh are being degraded rapidly due to pressures from the population for irrigation, fish, fuelwood, and large-scale habitat conversion for farming. In some places, wetland degradation has arisen from the neglect of waterways that eventually become impassable due to sedimentation. Such sedimentation also fragments water bodies and disrupts the local ecology through disconnecting the fish migration routes, preventing the completion of breeding cycles and resulting in declining fish populations. Historical systems of wetland utilization encouraged maximum exploitation of fisheries and other aquatic resources, as well as the marginalization of local communities. Both community-based natural resource management and the co-management of these resources have strong potential to promote their sustainable use through the active engagement of all stakeholders.

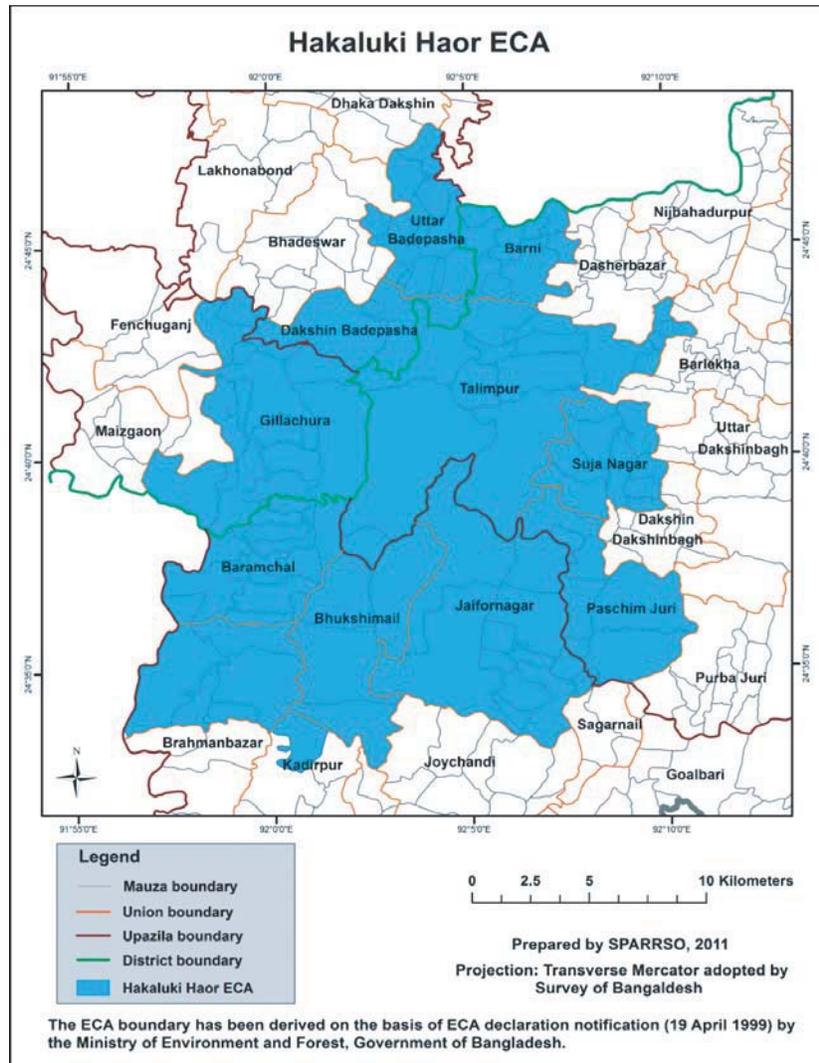


Figure 1: Hakaluki Haor in Sylhet and Moulvibazar Districts (unpublished map produced for the Department of Environment by the Space Research and Remote Sensing Organization of Bangladesh)

Hakaluki Haor, located in the greater Sylhet division of Bangladesh, represents a complex wetland system having beels in a shallow basin formed between the Patharia and Madhab Hills to the east and the Bhatara Hills to the west (Figure 1). The area was once known as the “fish mine” of the country and the haor was declared an Ecologically Critical Area by the Government of Bangladesh in 1999. Hakaluki Haor supports a rich biodiversity of fish, animals, and plants that provide direct and indirect

benefits to local communities. Beels in Hakaluki Haor provide shelter for fish during the dry winter months, and in the early monsoon these fish produce millions of spawn for the entire downstream fishing community. The main fish species of the haor include kalibaus, boal, rui, ghagot, pabda, and chapila.

Hakaluki Haor contains 276 interconnecting beels (CWBMP 2005) (Table 1). The most important beels are Chatla, Pinlarkona, Dulla, Sakua, Barajalla, Pioula, Balijhuri, Lamba, Tekonia, Haor-Khal, Tural, Baghalkuri, Bala Gojua, Polovanga, and Chinaura (MoEF 2006).

Table 1: Hakaluki Haor at a glance

Division	Sylhet
Districts	Sylhet, Moulvibazar
Upazilas	Fenchuganj, Golapganj, Kulaura, Juri, and Barolekha
Boundary of Upazila	Golapganj (north), Kulaura (south), Juri and Barolekha (east), Fenchuganj (west), and some parts of Kulaura
Unions	11 in number
Area in wet season	Over 18,000 hectares
Beels	276 in total, covering 4,925 hectares in area
Rivers	1760.3 hectares (average) (Juri, Sonai Bardhal, and Kushiyara rivers)
Total fish species (historical)	107 (of this total, there are 32 species threatened nationally, 12 vulnerable, 16 endangered, 4 critically endangered)

(Source: CWBMP 2006)

Some 200,000 people live in the area surrounding Hakaluki Haor (Rana *et al.* 2009). The two main sources of livelihood support for these people are fishing and agriculture. Depending on how water levels are controlled, tensions arise over the areas available for fishing versus those available for agricultural production. An important task facing wetland managers is thus to find equitable ways to achieve balance between these often competing forms of production.

Wetland forested areas have become rare due to clearing, cutting, and burning. Reed beds have been severely reduced due to exploitation for fuel and thatch, and the conversion of marginal wetlands for agriculture. Certain species of aquatic plants have become very rare or disappeared altogether due to a combination of the over-utilization of useful species and changes in water quality. Furthermore, many species of fish, amphibians, reptiles, and mammals have become rare or disappeared due to overfishing and habitat destruction. Human activities that affect the fauna, such as collecting and hunting them for food (e.g. frogs and turtles), persecuting them as pests (e.g. wild boars, otters), and incidental poisoning from use of pesticides (e.g. frogs and fishes) also add to the decline of wetland species and the disruption of the local ecology.

The banks of the beels (*kanda*) are habitat for various animals and birds but used for multiple purposes by the local people. During the dry season, these are the grasslands used for grazing cattle, whereas during the monsoon season the reeds provide shelter and food to young fish, thus increasing fisheries output. Kandas are used to produce goods and services other than fish and rice in the haor area. They are usually utilized by farmers if irrigation facilities are made available and if embankments can be erected for expanding *boro* (dry season rice) cultivation. Kandas are also used for cattle grazing, duck rearing, collection of fuelwood, food, and medicinal plants, and other goods and services. The kandas are losing ecological integrity due to overgrazing or over-utilization by ranching of cattle.

The main occupations of the people of this area are fishing and agriculture. A total of about 14,000 hectares of land in Hakaluki Haor is under *boro* cultivation, which depends on irrigation facilities, labor supply, and soil quality, and is vulnerable to flash floods during early monsoon months. The poorer sections of the community, who do not have land, subsist largely on fishing in the haor. Women take part in repairing nets and drying fish during the monsoon and post-monsoon seasons.

Various governmental and non-governmental initiatives have been undertaken during the last two decades to promote sustainable management, community-based natural resources management, and co-management in the haor. Some of the major initiatives include:

- Community Based Haor and Floodplain Resource Management project: Undertaken by the International Union for Conservation of Nature (IUCN) Bangladesh Country Office as a component of the Sustainable Environmental Management Program (SEMP) of the Government of Bangladesh, and implemented by the Ministry of Environment and Forests (MoEF).
- Coastal and Wetland Biodiversity Management Project (CWBMP): Initiated by the Department of Environment (DoE) in 2002, with technical and financial support from the Global Environment Facility (GEF). CWBMP, completed in June 2011, implemented a number of activities for the conservation of natural resources of Hakaluki Haor by local communities.
- Integrated Protected Area Co-management (IPAC) project: Implemented by the Government of Bangladesh with financial and technical assistance from the United States Agency for International Development (USAID). The project seeks to ensure the continuation of CWBMP and community engagement with conservation and the sustainable use of globally significant wetland biodiversity.

- Biodiversity Conservation and Social Protection (CBAECA) project: Developed by the Department of Environment under the Ministry of Environment and Forests. The project aimed to foster community-based adaptation in ECAs through the participation of local communities.
- Vulnerability and Impact Assessment and Ecosystem-based Adaptation (VIA and EbA) case study in the Hakaluki Haor undertaken as part of the development of the study report on Bangladesh Environment and Climate Change Outlook (ECCO): Implemented by the Department of Environment with the technical assistance of the United Nations Environment Programme (UNEP).

These projects were implemented little by little, and have not considered how to involve the whole wetlands ecosystem or whole community in conservation activities. Therefore, there are still gaps to be filled in order to ensure the sustainability of the efforts as well as the ecosystem goods and services.

Methods

This study seeks to identify both the problems faced by the people living in Hakaluki Haor and possible solutions for enhancing community-based natural resources management and co-management initiatives undertaken by the government. I began my study by conducting a literature review on Hakaluki Haor, with special reference to documents on community-based natural resource management projects, activities, and co-management policies programs being implemented by the government and NGOs. I looked primarily at the accomplishments of the projects so far in terms of livelihood improvements and the establishment of sanctuaries and swamp forests. I also referred to socio-economic baseline information from the SEMP, CWBMP, IPAC, and CBAECA projects. I collected data from the Bangladesh Bureau of Statistics including information on economic activities, main sources of income, impacts of co-management initiatives on livelihoods, threats or vulnerabilities to livelihoods and ecosystem goods and services, and suggestions for enhancing the co-management of natural resources and the conservation of biodiversity.

I developed a structured questionnaire to utilize in interviews with households and key informants. I led focus group discussions with VCGs and attended a consultation workshop with staff members from government and non-government organizations, and with representatives of the VCGs (Figure 2). I collected information on the perceived benefits and outcomes of community-based natural resource management and co-management programs by asking whether respondents felt these newer management interventions had changed household income levels, provided alternative income-generating activities, affected the involvement of village conservation groups in resources management, resulted in success stories and/or management bottlenecks, and whether they had any suggestions for improving co-management practices.

I conducted a survey of 20 households from a total of seven villages bordering Hakaluki Haor: Shadipur (five households), Barogaon (four households), Mirshonkor (one household), and Bhrommateka (one household) in Kulaura Upazila of Moulvibazar District; and Judisthipur (three households), Badedeuli (two households) and Ashighor (four households) in Fenchuganj Upazila of Sylhet District. All of these villages have village conservation groups. Moreover, the IPAC project introduced co-management activities in Baia Gojua Beel through the involvement of Judisthipur-Badedeuli and Ekota Bahumukhi Somobay Samity in Kalimpur Union of Barolekha Upazila of Moulvibazar District. The government has declared these beels fish sanctuaries. The IPAC project has started implementing co-management activities in these areas of Hakaluki Haor.



I also conducted qualitative analysis of FGD perceptions on income levels, AIG activities, suggestions to improve co-management, and adaptive activities to address or cope with climate change impacts, success stories, and bottlenecks to achieving project initiatives.

Results and Discussion

Household Interviews

I interviewed 20 respondents in seven villages of Kulaura and Fenchuganj Upazilas of Moulvibazar and Sylhet Districts. In terms of involvement in co-management activities, 10 respondents (50%) were members of a village conservation group (VCG), while the other 10 were not VCG members. Five (50%) of the 10 respondents who did not belong to a VCG had heard of co-management initiatives, but the other five (50%) were not familiar with these projects. In terms of livelihoods, nine of the 20 respondents (45%) were engaged in agriculture or related activities; seven (35%) were involved in fishing or related activities; three (15%) operated small businesses (grocer, carpenter, day laborer); and one (5%) was an electrician. Thirteen respondents (65%) reported that smaller amounts of fish are being caught because of seasonal aberrations or the late arrival of the monsoon; and eight respondents (40%) reported lower crop yields because of erratic rainfall and unpredictable seasonal weather patterns.

The respondents described differences in their income-generating activities and the amount of their incomes before and after the AIGA was initiated. AIGA activities are small business, duck rearing, cow rearing, agriculture-equipment rent fish trading etc. Among the 10 respondents who were VCG members, eight (80%) reported their income levels had increased under co-management AIGA grants, and the other two respondents (20%), who did not receive AIGA grants, reported no change in their income levels. This suggests that VCG members' incomes increased due to their participation in co-management initiatives. In addition, I concluded from the household surveys and the key informant interviews that respondents who were not VCG members were less informed and/or less encouraged about the benefits of co-management. Respondents also offered suggestions for strengthening development through co-management activities. Twelve respondents (60%) emphasized the need for developing fish sanctuaries and restoring fish habitats through excavation or re-excavation of important beels, canals, and rivers to enhance fish production, drainage, water retention, and in-situ conservation; 10 respondents (50%) recommended changing cultivation practices to include varieties more tolerant of floods and other climatic stresses like drought; three respondents (15%) said that streams should be excavated for draining flash floods; establishment of a swamp tree plantation, adoption of flood and drought tolerant crops, and non-agricultural AIGAs like pulling rickshaw-vans and operating sewing machines were each suggested by two respondents (10%); and several other activities were suggested by one respondent each. These findings are presented in Table 2.

Table 2: Activities suggested by the household respondents for strengthening co-management initiatives

Suggested activities	Number of respondents
Fish sanctuary development	12
Crop variety change	10
Excavation of streams for draining flash floods	3
Swamp tree plantations	2
Improvement of indigenous agricultural crops for flood and drought tolerance	2
Non-agricultural income-generating activities	2
Bird sanctuary development	2
Management of haor resources under VCG	1
Release of fish fingerlings in water bodies	1
Embankment construction	1
Improvement of irrigation systems	1
Fishing restrictions during breeding period	1
Swamp forest protection and restrictions	1
Adopting short-duration varieties for boro (dry season rice cultivation)	1
Agricultural income-generating activities	1
Construction of deep tube well to expedite irrigation	1
Restoration of fish habitat	1
Deployment of full time conservation guard for the protection of haor resources	1

Focus Group Discussions and Interviews with Key Informants and Stakeholders

I conducted a focus group discussion (FGD) on October 3, 2012, with 20 VCG representatives, along with local NGO workers, in Ashighor village. I also held a consultation at Kulaura Thana on February 2, 2012, with 25 representatives, including the VCG chair and government and NGO representatives working in the area. Based on these discussions, I concluded that the wetlands of Hakaluki Haor are under tremendous pressure from various natural and man-made causes that need immediate and urgent attention; in some cases long-term action is required. Focus group discussants outlined a number of problems, which I discuss below.

Major Problems Identified

Sedimentation or silting up of the beels. Erosion in upstream areas is increasing due to destruction of vegetation and stone extraction on the river banks. The destruction of forests and the excavation of hills for various development purposes, such as mining, quarrying, and construction is accelerating the sedimentation process.

sand and silt flowing into the beels through some of the rivers and canals during the monsoon season reduce the productivity of the beels. Paddy land is also threatened by sand deposits coming through the rivers. Water flow has been reduced in the streams as their beds have risen, and this has led to degraded fish habitat and reduced fisheries production.

Reduction in fish catch and diversity. All of the lease owners with rights to catch fish from specified areas are, in most cases, violating the terms and conditions of their leases and causing loss of fish species and abundance due to over-exploitation. Informants reported that reduction in fish catch and diversity are caused by lease owners using destructive gear (small mesh-size), draining beels to maximize fish catch, fishing during the breeding season, and poisoning fish using an herbal extract (bishlata), as well as by the run-off of herbicides and pesticides from nearby tea gardens or agricultural lands and by the release of pollutants from urea-fertilizer factories upstream. Beel lease owners using improper fishing techniques thus destroy present as well as future stocks of fish, fry, and eggs. Respondents felt that not enough area has been set aside under fish sanctuaries for conserving brood fisheries, a step that is essential to increase production and conserve fish diversity.

Limited availability of fishing grounds and increased cost of catching fish. Population pressure, unemployment, and lack of alternative livelihood choices put tremendous pressure on fisheries resources. The government's practice of leasing beels to investors restricts access to common fishing grounds for poor and marginal fishermen and grants access to these resources to richer members of society. The destruction of beel vegetation destroys food sources and habitats for fish species. During the breeding season, fishing is restricted in sanctuaries, but marginal fishermen have no capital for pursuing other work or alternative choices for their livelihoods. Consequently some fishers engage in illegal fishing.

Environmental factors affecting the ecosystem. Respondents have reported climatic changes, including a later monsoon season, which affect the mating and spawning of fish and thus result in reduced fish abundance; more frequent flash floods, which place boro crops at risk; and a trend of higher temperatures.

Destruction of important habitats (swamp forests and kanda). Residents also noted that swamp forests that had once been abundant in Hakaluki Haor are now reduced to remnants due to the *bathan* grazing of domestic animals (ranching of cattle, mainly cows and buffalos, during the dry season) and the use of swamp plants as fuelwood (Figure 3). The main species found in these remnants include hijol (*Barringtonia acutangula*), koroch (*Pongamia pinnata*), and barun (*Crataeva nurvala*). These remnants are under pressure and are becoming sparse due to conversion to agricultural land, grazing, and felling. Therefore, respondents identified swamp forest restoration as one of the most important activities for sustainable development and management of the wetland ecosystem.

Further, the kandas, which provide habitat for wildlife and birds, are also threatened by degradation because of overgrazing by cattle and buffalo.



Figure 3: Hakaluki Haor with swamp forest (picture taken October 3, 2011)

Agriculture-related problems. Respondents reported that the lack of available land for cultivation is a problem for crop production to maintain a growing population, and there is frequent partitioning of land into small pieces and an excessive use of fertilizer and chemicals to produce higher yields. They reported that the water-retention capacity of soil has decreased while the invasion of insect pests has increased. Other problems include the lack of water and insufficient technological support for irrigation.

Possible Solutions

While the FGD participants, interviewees, key informants, and stakeholders identified an extensive number of problems facing Hakaluki Haor and its inhabitants, they also suggested some possible activities to solve or mitigate these problems. I discuss these below.

The FGD participants and interviewees suggested that sediment control is a major issue, both for fishers and for rice producers. As a result, any effort to improve people's livelihoods in Hakaluki Haor will require a well-designed policy for controlling silt deposits in beels and paddies. In general, people suggested the periodic excavation of the beels and streams and the construction of embankments in suitable places to increase water retention capacity in the beels.

Boro crops are often threatened by early monsoon flash floods. Focus group discussants and key informants reported that the probability of crop damage is very

high in the haor basin. Consequently, it was suggested that embankments be constructed so that rice could be salvaged from the onslaught of early monsoon floods. Although popular, this proposition runs counter to environmental interests for two reasons. First, such embankments would lead to the expansion of boro (irrigated paddy) land and thus to a reduction of dryland habitat for wildlife. Second, it might prevent fish migration during crucial periods of fish movement and could reduce fish stocks.

Fishing is the life-blood of the people living in haor areas. The FGDs and stakeholder consultations suggest that fisherfolk are quite aware of the consequences of overfishing, but due to the leasing of major beels, there is growing pressure on the stock of fish in the remaining unleased wetlands. In recent years, pressure on the fisheries has grown more intense because some leaseholders drain their beels in order to catch fish. As a result, the entire fish stock is being depleted. It was also clear from the interviews and focus group discussions that there is popular support for the establishment of sanctuaries in various parts of the haor.

The swamp forests in the haor basin are unique forests that survive deep flooding during the monsoon months. However, due to human pressure these forests are virtually non-existent today. As a result, poor people suffer the most. The ecology also suffers as fish stocks decline and erosion occurs. Focus group discussions and stakeholders also requested assistance with reforestation programs. This is also a pro-poor issue because much of the benefits from such programs would, if designed properly, accrue to poor people in the haor area who would collect fuelwood, construction materials, and medicinal herbs from these new plantations. Some of the various respondents' specific suggestions for improving management of the wetland resources in the Hakaluki Haor region are included in Box 1.

Box 1: Suggestions for improving resource management in Hakaluki Haor
<ul style="list-style-type: none">• Stop upstream excavation of hills, deforestation, dam construction, and unsustainable stone quarrying.• Construct embankments or raise the level of the banks of large beels to retain water in the dry season and protect some areas from flash floods. This kind of development should be undertaken with prior hydrological surveys and environmental impact assessment.• Dredge or excavate silted-up beels, to ensure restoration of fish habitat.• Carry out afforestation or reforestation activities on the banks of beels to restore the habitat of avi-fauna.• Declare and manage beels that have high potential for fish reproduction or migratory waterfowl habitat as sanctuaries.• Deploy guards to protect sanctuaries and migratory waterfowl.• Protect coppices of swamp vegetation through the active participation of communities.

Box 1: Suggestions for improving resource management in Hakaluki Haor

- Designate grazing areas to protect swamp vegetation from overgrazing by livestock.
- Stop leasing of the beels to promote the long-term sustainability of the ecosystem and broader benefits for the local community.
- Designate some beels for fish harvesting to provide a source of income for the local community for the conservation and maintenance of the sanctuary, which implies commercial fish culture.
- Prohibit use of small-mesh fishing gear.
- Restock threatened or rare fish species to increase their density in the sanctuary.
- Introduce short-duration, flood-tolerant rice species that are well suited for wetlands.
- Introduce and cultivate suitable new varieties of rice to reduce pest infestations.
- Develop an agro-weather forecasting system capable of warning of flash floods to help ensure minimal loss of standing mature crops.
- Introduce new irrigation technology to reduce stress from seasonal variation in the monsoon.
- Farmers, owners of tea gardens, and owners of rubber plantations should apply integrated pest management (IPM) techniques to reduce use of chemical pesticides.
- The government should undertake successive programs or projects in collaboration with local communities or VCGs to develop and manage sanctuaries and swamp forests.
- Promote alternative income-generating activities under government programs and projects.
- Hold regular meetings between VCGs and Upazila ECA committees to ensure proper monitoring and enforcement of laws, and to understand and resolve management problems.
- Develop an integrated master plan to conserve and manage the Hakaluki Haor wetland ecosystem, in order to ensure its capacity to provide goods and services for future generations.

FGD participants and other stakeholders also suggested that several major beels should be managed as fish sanctuaries (see Table 3). Participants mentioned that two beels in particular Baia Gojua and Polovanga in Barolekha Upazila of Moulvibazar District have already been declared as sanctuaries by the Fisheries Department. IPAC started its co-management activities in Baia Gojua Beel involving existing VCGs to conserve and manage beel biodiversity. Baia Gojua Beel is under good management because of the well-organized VCG. In the case of Polovanga Beel, poor management has been reported due to the absence of a VCG; instead there is a committee administered by the Union Council.

Table 3: The beels identified for conservation as fish sanctuaries

Beel Name	Upazila/Thana	Approximate area (hectares)
Chatla	Juri	210
Futo-Borna	Kulaura	32
Nagua	Juri and Barolekha	53
Kangli	Kulaura	10
Nerai	Barolekha	53
Haor-Khal	Barolekha	223

Conclusions

The importance of Hakaluki Haor for the livelihoods of the community living in the immediate area, and in that part of Bangladesh in general, is immeasurable. This case study examined the pitfalls in the existing wetlands management systems, and the obstacles hindering good management and development of the wetlands in the form of policy and governance challenges, natural and human-initiated environmental problems, and socio-economic challenges.

The total ecological and economic value of the ecosystem outweighs the relatively negligible earnings from the leasing of the beels. Therefore, leasing of the beels should be stopped for long-term sustainability and to ensure benefits for the community as a whole. Fish sanctuary conservation through co-management of the wetlands, habitat restoration and conservation, and a regular program of controlling silt deposits are some immediate and urgent steps to be undertaken in Hakaluki Haor.

There are complex interlinkages between wetland ecology and livelihoods of the community. This study showed that alternative income-generating activities have had a positive impact on the livelihoods of the local community. Therefore, the study's findings strongly support the value of institutionalizing AIGA initiatives for the betterment of both the surrounding community and the ecosystem.

This study revealed that there are burning issues to be resolved in order to maximize the co-management benefits for both the community and the wetland ecosystem. Government officials at the top policy-making levels should take into account the prospects, and the goods and services of the ecosystem, towards the goal of securing the long-term sustainability of the wetlands in Bangladesh. Co-management with an integrated development approach is vital for ensuring the long-term sustainability and benefits of these crucial wetland ecosystems.

References

- Borrini-Feyerabend, G., Farvar, M.T., Nguingui, J.C., and Ndangang, V.A. 2007. *Co-management of Natural Resources: Organizing, Negotiating and Learning-by-Doing*. GTZ and IUCN, Kasperek-Verlag: Heidelberg, Germany.
- CWBMP (Coastal and Wetland Biodiversity Management Project). 2005. Hakaluki Haor Management Plan (Draft). Department of the Environment, Government of Bangladesh: Dhaka.
- CWBMP (Coastal and Wetland Biodiversity Management Project). 2006. Hakaluki Haor ECA Fish Biodiversity Conservation Management Plan. Department of the Environment, Government of Bangladesh: Dhaka.
- MoEF (Ministry of Environment and Forests). 2006. Natural Resource Economic Evaluation of Hakaluki Haor. IUCN-Bangladesh in association with the Center for Natural Resource Studies (CNRS) for the Department of the Environment, MoEF, Government of Bangladesh: Dhaka.
- Rana, M.P., Chowdhury, M.S.H., Sohel, M.S.I., Akhter, S., and Koike, M. 2009. Status and Socio-economic Significance of Wetlands in the Tropics: A Study from Bangladesh. *iForest* 2:172–177. [Accessed February 15, 2012] URL: <http://www.sisef.it/iforest/contents/?ifor0512-002>
- SEMP (Sustainable Environmental Management Program). 2005. Rapid Internal Evaluation of the Community Based Haor and Floodplain Resource Management Project (Draft Final Report). IUCN-Bangladesh: Dhaka. [Accessed February 15, 2012] URL: [http://cmsdata.iucn.org/downloads/rapid internal evaluation of the community based hoar and floodplain resource managem.pdf](http://cmsdata.iucn.org/downloads/rapid%20internal%20evaluation%20of%20the%20community%20based%20haor%20and%20floodplain%20resource%20managem.pdf)