

Community-based Wetland Co-Management in Bangladesh

Introduction

In an attempt to find new solutions to problems resulting from top-down approaches to resource conservation and sustainability, community-based co-management over an *entire* wetland ecosystem (comprising beels, seasonal wetlands, rivers and streams), not just a single water body, recognizes that local communities should have direct control over the management, utilization and benefits of local resources in order to value and use them in a sustainable manner. Developing successful community based co-management arrangements that ensure sustainable wetlands, productive fisheries and the needs of resource users and other stakeholders is a challenge. This case study brings together the importance of adaptive management, successful leadership, holistic multidisciplinary participatory approaches, and lessons drawn from over eight years developing and implementing methods to support community based co-management in the Management of Aquatic Ecosystems through Community Husbandry (MACH) project in Bangladesh. The holistic integrated approach that MACH took enabled the achievement of sustainable and environmentally sound development.

Background & Setting

Despite its small area (144,000 km²), the inland freshwater fish production of Bangladesh ranks third in the world behind China and India. With extensive rivers and floodplain wetlands of the Ganges-Brahmaputra delta, over half of the country can be termed as wetlands that are a source of food and income for about 70 million rural households.



80% of rural people in Bangladesh depend on wetlands for fish and other aquatic resources, but fish consumption fell by 11% in recent years and about 40% of fish species are now threatened with national level extinction

In Bangladesh about 4 million hectares of land are inundated with water every year in the monsoon (rainy) season, and over half the country is under water in an exceptional flood year (Ali 1997). In the dry season, the wetlands reduce in size to form a system of rivers, *beels* (depressions and lakes that hold water permanently or seasonally), and *baors* (oxbow lakes). The floodplains of Bangladesh are one of the world's most important wetlands and home to hundreds of species of plants, fish, birds and other wildlife. The wetlands provide the habitat for over 260 fish species (Rahman, 1989) and hundreds of thousands of migrating birds (BirdLife International 2004), and are an important source of

income and nutrition for millions of households in rural Bangladesh, especially the poor. As many as 80% of rural households catch fish for food or sale (FAP 16, 1995) and about 60% of animal protein consumption comes from fish (BBS, 1999). In addition, poor and marginal households catch many small fish that are not included in official statistics or policies, and use aquatic plants and animals for food or as feed for livestock.

Unfortunately, the wetland resources of Bangladesh are in decline due to over fishing and loss of habitat and connectivity. Wetlands in the past were thought to be “wastelands” in Bangladesh and the goal of many government projects was to drain out and “recover” for agriculture production (albeit for one crop a year

during the dry season). Even in areas that have not been converted to agriculture, wetland ecosystems have been threatened by other pressures:

- The government leases out fishing rights in public water bodies, but short-term leases awarded to the highest bidders have encouraged maximum exploitation for short-term income at the expense of sustainable yields, and conservation of resources for the next generation.
- Physical changes in watersheds and floodplains have drastically reduced the area and quality of wetlands: flood embankments and water control structures have blocked fish migration routes and expanded cultivated areas; irrigation and expanding areas of winter rice cultivation have reduced the water available for aquatic life to survive in the six-month dry season; industrial development causes locally severe pollution that kills breeding fish populations during the dry season; and loss of tree cover and poor hillside cultivation practices in watersheds cause high rates of siltation in rivers and loss of floodplain wetlands.
- More and more people fish destructively using fine mesh nets in order to have high catch levels that consequently capture small catch severely limiting fish ability to regenerate.

As the dry season progresses, water in even the deeper parts of wetlands becomes shallow and fish have few places to shelter. To make matters worse for fish, the water that remains is sometimes pumped out so that all the remaining fish can be caught, also destroying other aquatic animals and plants. When this happens, parent fish stock is not available to breed in the next monsoon with the result that fish stocks decline. Similarly, the populations of other aquatic flora and fauna including water fowl are declining due to habitat degradation.

The decline in wetlands has resulted in more than 40% of freshwater fish species being classed as threatened with national extinction (IUCN Bangladesh 2000). Since 1985, natural carp spawn catches have declined by 75% (Ali 1997) and major carp and large catfish have declined by 50% in national catches. A recent review found that fish consumption fell by 11% between 1995 and 2000 and by 38% for the poorest households (Muir 2003). Having earlier grown at 5% per year, presumably through high fishing pressure, these fisheries now appear to be in crisis with catches falling at 5% per year. Despite changes in national policies that call for an end on drainage of remaining wetlands (MWR 1999), wetlands continue to be encroached with no sign of abatement.

Since 1998, USAID has supported the MACH project, which translates as “fish” in Bengali. Before beginning the project, MACH staff built on lessons learned in previous fishery management projects. In the past, the central government used top-down approaches and tried to impose “best practices” that they thought would bring improved wetlands use and better livelihoods. These often failed because the local community was not involved in the planning, the projects were not locally feasible, and local communities were knowingly or unknowingly sabotaging the programs. In reaction to these failed programs, community-based management methods were tried but only involved the local poor fishing users in the planning and management of smaller wetland bodies of water. Some of these attempts have been successful, while many others have failed because the beneficiaries were dependent on unsustainable project activities and there was no involvement of either local government or the local power structure. Consequently after the project finished the fisheries management system reverted back to the previous situation and elite in the area captured fish for their own benefit.

MACH benefited from these earlier examples to design a project that weaves activities in to the fabric of the local community/society and the local government structure. First, MACH considered all users of the wetland including the poor rural fishers and the community elite who could strengthen the community based

organizations as champions for best management practices. Second, MACH engaged resource users and government bodies to share responsibilities and decisions.

Further, the MACH project was formulated to develop new approaches to floodplain and wetland resource conservation and management with the aim of ensuring the sustainable productivity of all wetland resources – water, fish, plants and wildlife– over an *entire* wetland ecosystem (comprising beels, seasonal wetlands, rivers and streams), not just a single water body and thereby to help ensure food security and increase biodiversity. The MACH project works in three large wetland systems covering about 25,000 hectares:

- Hail Haor, one of the large deeply flooded basins in the north-east,
- Turag-Bangshi floodplain, a typical river-floodplain system close to Dhaka in central Bangladesh, and
- Kangsha-Malijhee basin, a flash flood prone system in Sherpur bordering the hills of India.

Project Objectives & Approach

The dual goal of MACH is to improve wetland ecosystems and improve the livelihood of the resource users by demonstrating to communities, local government and policy-makers the viability of a community approach to natural resource management and habitat conservation in Bangladesh over an entire wetland. MACH adopted a community-based management, multidisciplinary, multi-sectoral, participatory approach to address declining fisheries and environmental degradation of wetlands in Bangladesh. Rather than solely focusing on fisheries management, MACH sought to increase the sustainable productivity of all floodplain resources, including fish, plants, and wildlife, over an entire floodplain ecosystem, while recognizing that many wetland problems are actually watershed management issues. The relatively intensive MACH approach is most appropriate for larger wetland systems in need of restoration, and preferably where there is the scope to protect sufficiently large areas to act as core areas with restored wetland ecology that will enhance fish catches in the remaining areas.

“The internal design of MACH was well thought out and took account of previous experience in Bangladesh and elsewhere. In particular, the concept of **co-management** built on past experience, by avoiding a top down, Department of Fisheries (DOF) led approach, on the one hand, or relying on user groups composed only of poor fishermen on the other.”
External Project Evaluation Team, 2006

Adaptive Management Approach

Adaptive Management is based upon a flexible framework that allows programs to change their management behavior as situations change and merit different approaches and activities. Since adaptive management is a “learning by doing” approach, it involves some degree of uncertainty and trial-and-error. MACH took an adaptive approach to the design, implementation and management of the program — MACH set activities as needs became apparent (e.g., communications strategy, tree planting, pineapple contour cultivation to reduce soil erosion, pollution abatement, etc.). Rather than being tied to long term management plans, resource management plans are adapted, reviewed and approved on an annual basis according to new information and the previous year’s experiences. MACH’s adaptive management allows for learning by doing and openly discussing and solving challenges and constraints. As the Site Coordinator from Sherpur, Md. Ziaul Haque explained, “mistakes are learning experiences and are not considered wrong.”

MACH was a process based approach not a blueprint project

MACH's participatory approach works with all local stakeholders to understand problems and identify possible solutions. Participatory planning in different forms took place in each site. Initially, Participatory Community Planning workshops were used to work with the communities to identify problems and develop potential solutions. Then, the project made use of a systematic approach termed "Participatory Action Plan Development (PAPD)." One-day workshops were held separately with randomly selected participants of each of four stakeholder types (fishers, farmers, landless and women). These workshops included a problem census and ranking including a cause-effect analysis by the participants in each stakeholder group. Through a plenary with all groups, the main natural resource related problems were agreed upon. Next, the separate stakeholder groups identified and analyzed the feasibility of potential solutions including their likely impacts on stakeholders. Thus the main outcomes of the PAPD workshops were lists of ranked problems and then analyses of possible management and physical interventions to address these.



Participatory planning was a vital first step.

Co-management is the foundation of the MACH approach, which has been promoted in the belief that a shift from top-down management to sharing decisions and responsibility between resource users and government at the resource level would improve the quality of decisions and local compliance with management plans. Therefore, the intention of co-management is to empower fishers both as an end in itself and in the expectation of better management (Viswanathan et al. 2003). This requires major changes in institutions, organizations and attitudes.

MACH has taken a unique three-pronged community-based co-management system:

- Firstly, working with local communities and government to develop co-management institutions;
- Secondly, building the capacity of those institutions to manage themselves and to restore and protect wetland ecosystems comprising of water, fish, trees, and wildlife; and
- Thirdly, providing support to improve the livelihoods of poor people dependent on these wetlands.

Much emphasis has been placed on developing local institutions and supporting communities and local government in the planning and sustainable use of natural aquatic resources. MACH helped develop two interacting organizations: (a) community based organizations consisting of the users, whose responsibility is to manage specific wetland areas, and (b) local government committees that include officials, elected representatives and community based organization leaders to coordinate and guide the process.

Community organizations were developed for resource management (Resource Management Organizations, RMOs) and for livelihood development (Resource User Groups, RUGs). These groups were then linked to the government through the formation of Local Government Committees. Emphasis has been placed on making these institutions self reliant and self-sustaining, providing funds that they could manage, and establishing transparent procedures that make those taking decisions more widely accountable.

Local community organizations for resource management were formed over several years through steps involving community, project and local government

RMOs are voluntary bodies that are registered the government and have adopted best management practices in the river, beel and floodplain units of the wetlands surrounding their village. They also develop and enforce norms, practices and interventions that will sustain wetland productivity. Their formation followed a lengthy participatory planning process involving all types of local wetland users or stakeholders. Special emphasis was placed on the poor who are most dependent on wetlands, to ensure that they comprised a majority of the members and could have the strongest possible voice in these organizations.

RUGs are membership bodies limited to poor people who depend on the wetlands. The project has helped them access credit and training to increase their incomes while reducing fishing involvement. This has reduced their pressure on wetland resources and at the same time enhanced their incomes. To increase their sustainability, RUGs have been united into Federations of Resource Users (FRUGs). Sixty percent of the RMOs are people from RUGs to ensure the poor hold a majority in the general body of the RMOs.

Resource User Groups bring economic and social benefits to communities: *“this support has opened up a new window of opportunities for the members, especially women. Traditionally, women are confined within the four walls of their houses. Now with money in their hands they have become economically empowered and more confident. This too has brought changes within their homes — children are getting more food as well as more children in our locality are going to schools than before.”* Toyobul Islam, Imam and President of the Kalapur FRUG, Sreemangal

To link the local government with the community-based RMOs and FRUGs, MACH established Local Government Committees (LGCs). The LGCs bring together the leaders of the RMOs and FRUGs with the local Union Parishad chairmen¹ and local representatives of the Upazila government that belong to different governmental offices, such as the Department of Fisheries, Ministry of Land, or Department of Livestock. Together this committee coordinates activities, resolves problems, oversees improved wetland management, and makes co-management decisions. Local Government Committees are permanently mandated through government order and have been formed in each Upazila (sub-district), called Upazilla Fisheries Committees, UFCs.

Flexibility was vital: the approach to developing community organizations was different in each site according to social, environmental, and administrative factors

Unlike previous projects that ignored existing institutions, the MACH approach has formally recognized and linked community organizations and the local government. This is a way to overcome the limitations of each and build on the strengths of the other.

¹ The Local Elected Official. The Union Parishads or local councils, are a vital tier of government. The respective chairmen act as advisors to the RMOs and they have invited the RMOs to attend their council meetings to represent wetland interests in their areas. The Union Parishads have played an important role in resolving local conflicts and in endorsing new wetland management practices.

Results Achieved

MACH has addressed sustainable wetland resource management at the landscape level rather than just in individual rivers and lakes, working in three wetlands covering about 25,000 ha. Over 110 villages inhabited by over 184,000 people are directly involved in the project, while the total benefited population may exceed half a million. MACH has done this through:

- Mobilizing communities into registered organizations that are empowered to conserve resources;
- Helping communities make resource management maps and plans;
- Undertaking habitat restoration;
- Adopting conservation measures for sustainable harvesting; and
- Introducing alternative sources of income to reduce pressure on wetlands and enhance incomes.

“Enormous social change, really have empowered men and women; communities successfully link with nature and manage their resources and have viable livelihood options that are compatible with sustainable wetland resource management”

Azharul Mazumder, Environment Unit Leader, USAID-Bangladesh

The management actions implemented through this arrangement have already resulted in dramatic changes for the better in the environment and in people’s lives.

Wetland Habitat Rehabilitation

RMOs identified locations within their respective wetland management areas that were affected by siltation to the point that they dried out and could not support fish in the dry season. Re-excavating canals to improve flows and re-excavating beels (lakes or dry season water) to increase the depth to maintain water year round restored the wetland habitats. In total, about 46 hectares of beels were excavated and 30 km of canals were expanded to retain dry season water, 56 sanctuaries in 173 hectares of area were established and 605,000 trees were planted resulting in increased fish catches of 2-5 times over 1999 baselines of 58-171kg/ha, reaching 316-388 kg/ha across the entire wetland system of nearly 25,000 hectares in 2004-05, and increases in fish consumption of 45% over the same period which benefit the landless as much as large landowners. The improved habitat is also crucial for fish to survive the dry months and facilitates breeding and regeneration of aquatic plants and animals. RMOs and local government formed Project Implementation Committees to oversee contractors and in some cases employ the laborers required for earthworks. Though the total area excavated is modest compared with the total dry season water area, these deeper fish refuges and canal connections directly serve and link with the majority of the dry season water area in the three sites.

Wetland Sanctuaries

The single most important resource management intervention has been establishing 56 wetland sanctuaries at the three sites covering 427 acres (173 ha). These are areas ranging from less than one hectare to over 100 ha in size that retain water throughout the year and where the community has banned all fishing to allow fish to breed and repopulate the wider floodplain during the monsoon. While the sanctuaries are primarily for protecting fish with the aim of restoring and enhancing yields from the rest of the wetland system outside the sanctuaries, they also benefit aquatic life in general, including waterbirds and plants. This is particularly the case in the large permanent sanctuary established in

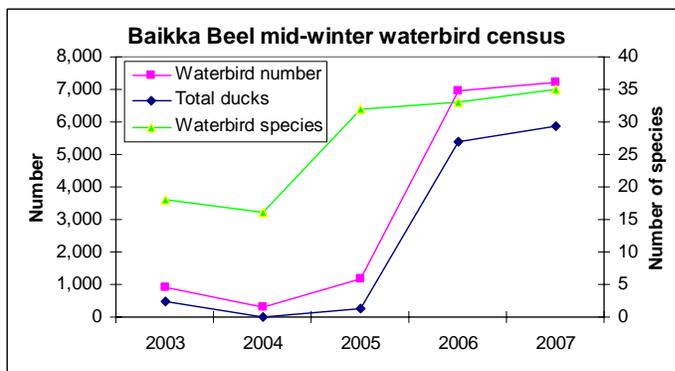


Permanent sanctuary in Baikka Beel, Hail Haor

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Hail Haor that within two years has attracted up to 7,000 wintering water birds where there were less than 100.

Most sanctuaries have been established by the RMOs within water bodies where they hold fishing rights for 5-10 years and are part of the local management plans designed to restore fish catches. A few sanctuaries have been declared directly by the Ministry of Land, following proposals made by the projects, which incorporate larger areas of national importance for overall wetland habitat protection. These have been removed from the fisheries leasing system permanently.



New Waterfowl Sanctuary Established in Bangladesh

The Ministry of Land has designated Baikka Beel, a 100-hectare area of the Hail Haor wetland in Bangladesh, as a permanent waterfowl sanctuary. The MACH project has been instrumental in restoring this diverse and productive wetland that is now able to support the needs of local populations for fishing and collection of aquatic plants. The fish that are protected year round here repopulate the haor in the wet season, helping to increase fish catches. Bird populations that dwindled in the 1980s are recovering in both numbers and species diversity. By early 2007 111 bird species, including 55 waterbird species, had been recorded in the sanctuary, including four that are globally threatened. The future of these birds looks secure. Resource management organizations, with local government backing, have successfully foiled attempts by local elites to shoot ducks in the sanctuary.

Closed Season and Fishing Norms

Sanctuaries alone cannot restore wetland productivity. Developing local institutions –sets of rules and norms– which are widely accepted in the local communities and result in sustainable fish catches has been important. Each RMO along with the fishers has banned fishing for 2-3 months in the early monsoon when fish breed, allowing fish protected in the sanctuaries to safely repopulate the floodplain. Fishing restrictions are the other key set of rules. The RMOs have banned complete dewatering of those water bodies under their direct management, which means that even outside the sanctuaries more fish can survive over winter. RMOs advocate this practice to leaseholders in other water bodies within the sites. They have banned using fixed gears, particularly barriers (*pati bundhs* - mat made up of split bamboo) that completely close off channels so that fish can once again move between habitats at their needs. Similarly, they have worked to stop use of other harmful fishing practices including use of fine mesh seine nets, fishing that targeted shoals of juvenile catfish, fishing festivals where many people from outside the area were attracted to fish out a wetland, and current jals (monofilament nylon gill nets). The RMOs are also trying to restrict extraction of water for agriculture in the dry season to maintain sufficient water in the beels.

Re-introduction of Locally Lost or Threatened Fish Species

Restored wetland habitats and sustainable fishing practice allowed some fish species to recover, but others needed a helping hand. MACH supported the RMOs in re-stocking

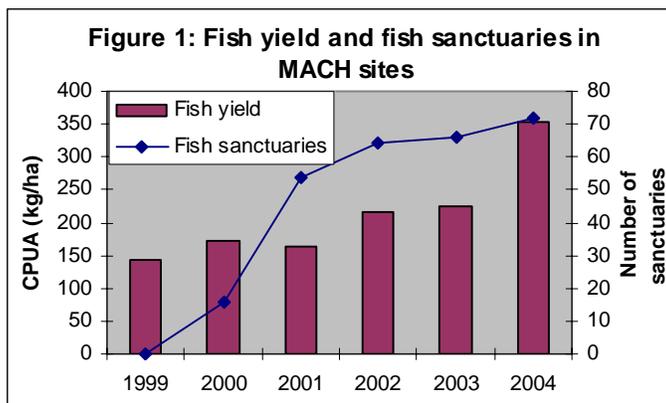
“Wetland productivity and biodiversity have been substantially enhanced and a good start has been made on extending project innovations to other areas, most notably through the Inland Capture Fisheries Strategy of the Department of Fisheries.”

External Project Evaluation Team, 2006

about 1.19 million fish (mostly juveniles) of 15 native species. The fishers reported them as having been present in the sites but project monitoring showed they had declined to negligible catches and were threatened with local extinction.

Increase in Fish Catches, Consumption and Biodiversity

Project data shows that catch per hectare has increased by about 140% between 1999 and 2004. Fish yields increased by 2 to 5 times over baseline yields before intervention of 58-171 kg/ha, to 315-390 kg/ha in 2004-05 and re-established 8-10 threatened fish species. In addition several locally rare fish species have been restored. As all species are consumed and form a staple part of the diet, fish consumption has also increased. By 2004 fish consumption was on average 52% higher than before MACH started, at 17.5 kg/person/year in 2004, which compares with a national average that declined between 1995-96 and 2000 by 14% to 11.1 kg/person/year.



Tree Planting and Improved Watershed Management

Tree planting for habitat restoration and improvement has been one of the MACH project’s key interventions since its inception. Communities felt it was important to plant native trees to mitigate the past trend for loss of tree cover including swamp forest in the wetlands and riparian areas. The habitat restoration program envisaged mitigation of the degraded environment and micro-climate to benefit people and wildlife, and for soil and water conservation in the watersheds of the project wetlands. It also aimed to increase the national tree cover and generate financial returns for the country in general and for poor people in particular. Activities included contour planting of pineapple in the hills surrounding one site where siltation was raising the wetland bed by 5 cm per year. This has reduced runoff and erosion rates and at the same time permitted denser planting and improved soil fertility which increased farmer incomes. A total of 605,365 saplings of 56 species (48 native and 8 domesticated exotic) had been planted under the program by the end of 2005, 21% to restore swamp forest. Swamp forest will be preserved as a long-term investment in ecological restoration.

Contour cultivation of pineapples can increase profits by over 100% and reduces soil erosion which severely affects wetlands such as Hail Haor

Industrial Pollution Mitigation

One of the biggest industrial clusters in Bangladesh is located in Kaliakoir, north of Dhaka, where there are many textile and dyeing factories. During participatory planning processes, the communities which MACH has been working with in the Turag River floodplains reported that these industries use the surrounding wetlands, particularly Mokesh Beel and Ratanpur Khal that flows through the beel, as a disposal ground for untreated waste. They reported this resulted in poor catches of bad smelling fish. Regular monitoring results indicated that water in the beel and khal has biological and chemical oxygen demands respectively more than double and more than four times higher than the national acceptable standard. They also have seasonally high pH levels and sulfide concentrations averaging 50% above the national acceptable standard peaking at five times that level. The project has advised industries on setting up treatment plants and one new one has been established and four more are under construction. In spite of the efforts to mitigate industrial pollution, the pollution problem is worsening due to the increase in the number of textile-related factories in the area, rising from 20 to 80 in late 2005. This means that there is an immediate need to increase the rate of implementation of proposed pollution mitigation options if there is to be any reduction in pollution. Without this the efforts of the communities and MACH that have seen fish yields in the greater Turag-Bangshi area restored from about 60 kg/ha to about 300 kg/ha by 2004 are likely to be irreplaceably lost.

Community Organization/Resource Management Organizations

The key building block has been establishing 16 RMOs, each representing the whole user community of the management area. These are registered with the government, with approved constitutions and annual budgets. They have secured access for 10 years to certain water bodies where their elected executive councils, in consultation with the wider community, make management plans and set rules for wetland use. About 60% of the members are poor resource users, who through separate organizations receive training and credit. Out of 1,396 members, 53% come from RUGs, 21% are women, and 42% are fishers. To improve transparency and broaden participation in the RMOs different sub-committees have been formed in most RMOs, including audit, sanctuary management, and plantation sub-committees.

RMOs have adopted wise resource management measures such as creating fish sanctuaries, undertaking habitat restoration activities, and banning damaging practices like dewatering in dry season. Further, RMOs have followed good organization practices, like making and revising resource management maps and plans for their areas, following democratic principles by electing their office bearers, adhering to transparency and accountability through open meetings and audits, and ensuring that the poor get fair access to wetland resources.

Alternative and Enhanced Livelihoods for Poor Wetland Users

Realizing that a reduction in fishing is likely to be a critical part of reviving the wetland fisheries, MACH has identified and developed alternative income generating opportunities for existing and potential new fishers and others directly dependent on

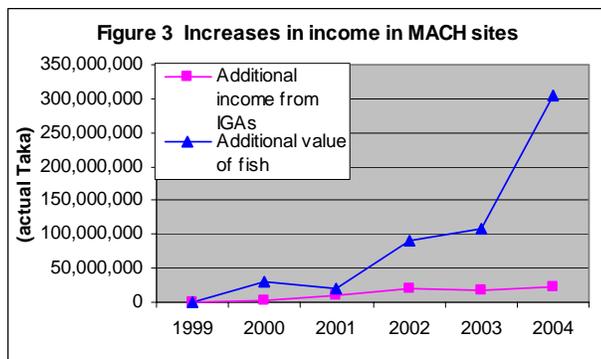
wetland resources, especially poorer resource users. Over 5,500 of the poorest wetland resource users have joined savings and credit RUGs. These consist of 15-30 men or women from poor households, generally those owning under 0.2 ha of land or less, laboring for part of the year, having a low education level, who



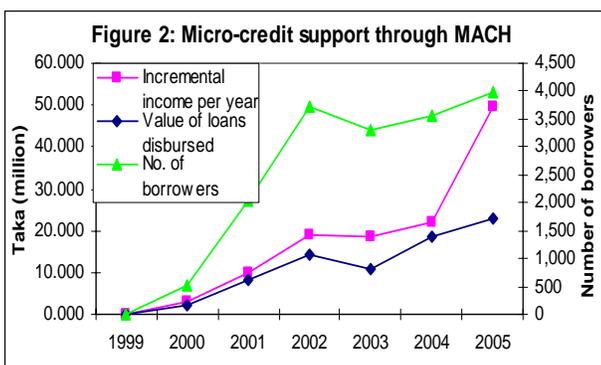
Poultry rearing has been one of the most profitable enterprises for RUG members

did not belong to any other NGO groups, and that made use of the wetlands covered by resource management activities. These households were mostly from villages close to the wetlands and generally were involved in fishing or collecting other aquatic resources for income or food.

Following normal NGO practice for credit and savings programs in Bangladesh, only one person per household could join a RUG. Membership is based on making regular personal savings in weekly group meetings. On the basis of savings the members could propose income generating activities for receiving loans from the project. The recipient members were also trained in business and enterprise skills that they then used their loans to establish. Typical enterprises include raising poultry and livestock, small shops, and



individual skilled work such as tailoring or operating a tree nursery. The loan repayment rate was on an average 89%. Initially they faced some problems due to lack of skills. Training on specific trade helped them to overcome the difficulties. Sometimes natural disaster slowed their success. Borrowers have on average reduced their fishing effort by 20-30%.



Reduction in fishing pressure, along with restoration and reintroduction measures, allowed for the wetlands fish stocks to be restored. Fishers in the MACH project sites gained US\$ 4.7 million in 2004 from higher catches associated with resource management improvements, as compared with baseline data from 1999. In addition, by 2005, those participating in training and credit activities earned an extra US\$ 0.8 million, mainly from new enterprises supported by the project, as compared with their pre-participation incomes (daily incomes rose from about US\$1 per day in 1999 to US\$1.34 per day in 2005). This primarily impacted the poor who are most dependent on aquatic resources. Over 85% of households in the project areas are involved in fishing, and all of those

supported with training and credit were low income households, and therefore the poor have benefited the most from the project impacts. By April 2005, 5,334 households had members belonging to the RUGs. Of the RUG members about 68% are men, about 75% own under 0.2 ha of land. By 2005, almost 4,000 families had an increased annual income of 65% over their previous incomes.

Enhanced Governance and Precedents

The leaders of these formal community-based organizations now sit along with local government officials and councilors in co-management committees that oversee wetland management. These co-management committees are in the process of being endowed with funds that will generate an annual return to be used for operations and small-scale wetland restoration. Similarly, the savings and credit groups are now federated into 13 legal entities – registered membership-based social welfare organizations with elected leaders who also sit on the co-management committees. By 2006 eight federations employed former NGO staff to help their operations and received revolving funds totaling about US\$ 0.22 million to sustain their programs after direct USAID support ends. Moreover in a landmark policy decision, the government has designated eight “national” sanctuaries permanently set aside to protect wetland biodiversity that are managed by the

community organizations. The government no longer auctions out fishing rights in these sanctuaries. The Department of Fisheries, through its national Inland Capture Fisheries Strategy, is in process of adopting these institutions and the sanctuary approach on a larger scale as part of a policy shift towards community based co-management.

Lessons Learned

MACH has key learned lessons that can offer guidance to others trying to replicate the model.

Co-Management, Networking and Governance

Co-management involves sharing responsibilities between key stakeholders and commonly involves devolving a greater share of management responsibilities from government to empower local communities. Local government plays a powerful role in all development work at the grassroots level. However, often projects do not strengthen linkages with local government. MACH made linkages between the RMOs and the Union Parishads and the officers of line agencies who form the Upazila administration to ensure synergies and to formalize the status of the RMOs. This included having RMO management plans endorsed by Department of Fisheries officers, encouraging relevant Union Parishads to invite RMOs to observe and report in their meetings, and encouraging knowledge-sharing between RMOs. Building trust, understanding and an effective working relationship between local government (local government committees) and community resource management organizations takes time to develop.

Based on the experience of MACH, it is unlikely that government agencies alone will be able to facilitate the type of community based organizations that seem to be effective in improving wetland management. Local government involvement is essential and establishing Upazila level committees, as MACH has done, will be vital, but RMOs or their equivalent (community-based organizations) need support to develop before they can sit on such committees or take on resource management responsibilities; this initial support generally will need to come from NGOs skilled in social mobilization and with support from government or donor funds..

Building Community Resource Management Institutions

Evidence showed that establishing sanctuaries for conservation of brood stock during the dry season created the basis for long-term success of fisheries management in an area by ensuring reproduction of fish and other aquatic life. However, the decision to develop sanctuaries must be made by community based organisations (CBOs) in order to achieve sustainability. The development of CBOs for wetland management has empowered and recognized local bodies to take responsibility for decisions and actions to restore and sustain wetland uses and productivity. The key building block to the MACH approach for sustainable wetland management was establishing RMOs. The RMOs have worked to protect water bodies and to address problems identified by the communities, which have involved setting rules and limits on use, and restoring wetland habitat including tree planting.

Key message:

Communities have complex structures. Community wide organizations can benefit from the influence of local elites as champions of conservation and the poor, but their motivation needs to be understood. They may take control of resources to the detriment of the poor unless time is taken to establish practices for good governance that limit elite dominance in RMOs and in expropriating the resource.

Empowering and enabling the poor

Wetlands harbor multiple resources and multiple stakeholder groups use these resources for income and for subsistence. The MACH approach involves the whole community neighboring the wetlands, including rich and poor, influentials and subordinates. In some cases local elites dominated the process and took a leadership role. It sometimes became difficult to ensure the poor were heard and to ensure their rights to access and decision-making. Without a concerted effort to build institutions that empower the poor, the majority of people (who are poor) do not have bargaining power and do not understand their rights. MACH addressed this through general awareness raising events such as popular theatre, ensuring participation in Union Parishad and local government committees and by helping the poor to form Resource User Groups that had capacity building programs and have their representatives included in the RMOs.

Pro-poor resource management – access to fishing.

Prior to MACH Hail Haor, fishing rights in leased *jalmohals* were sold to investors and middlemen, now Dumuria RMO has awarded fishing rights directly within their area to 35 members of the fishing community.

Also, poor resource users needed to be a majority in RMOs to ensure decisions did not favor the wealthy: by 2005 about 60% of the members were poor resource users. Special efforts to develop the capacity of poorer participants were needed so they could hold key positions in RMOs. The poor must be aware of their rights and need leadership training to play a role in local institutions. Further, constitutional arrangements (secret ballots, eligibility for different posts, roles of leaders, term limits) governing the operation of the RMOs promote pro-poor participation. Alternative income generating activities allowed

poor fishers to increase income during times when fishing is closed. MACH reduced fishing pressure by almost 2,500 person hours/day of fishing time to allow the resource to recover.

Participation of women

Despite setting quotas for women's participation in RMOs, it is difficult to make the organizations accessible and relevant to women and to overcome cultural biases. Women do not fish and are not considered to have first hand experience in managing the resource, yet their livelihood is affected by the resource. However, MACH set and successfully achieved women's participation through decisions made by each of the organizations. By the end of 2005 seven RMOs had general bodies with 25% women or more. About two-thirds of the women in RMOs were also RUG members. There were 36% women among the RUG members and 35% of Executive Committee members. USAID's 2006 External Project Evaluation Team stated, "An outstanding achievement of the project has been the empowerment of women. The project has operated in conservative rural areas, where women have traditionally had few rights and little power over their lives or livelihoods. By insisting that a proportion of positions in RMOs and FRUGs be filled by women, and by setting up RUGs for women, the project has forced the pace of social change. At several sites, the team encountered women members who were willing to speak forthrightly about their concerns and their role in the project – even interrupting the men."

Women are now earning income, so are more valued in the home; as evidenced by two quotes from women in the Pakuria FRUG, 2006: "My husband was an angry man, but now because of my earnings he is more calm, quiet and our home life is better." "I was poor, but now earn money. Because of this my husband allows me to leave the home and move around the community, when before I was not allowed. Now we make decisions jointly."

Best practices to ensure good governance

Participatory Action Plan Development (PAPD) workshops were facilitated by the project to identify problems and develop a consensus on potential solutions involving all groups of the communities, including the poor. These should be repeated as local management evolves: the initial PAPDs may not have involved all the appropriate villages and areas covered by subsequent RMOs. Based on a general consensus and overall plan, developing and updating detailed resource management plans must be an ongoing process, not a one-time event. Plans should be reviewed, activities evaluated and communicated to the wider community annually in line with the wetland resource leasing (Bangla) year. Further, leaders of the organizations need to be reminded to listen to resource users and inform them of major decisions, and resource users should understand what they should expect from their leaders.

Sustainability through institutional capacity building

Project designs from the outset should place a major emphasis on institutional sustainability. The formal recognition of RMOs as independent organizations is essential for their survival. Sound financial management is a requirement for sustainability and RMO representatives need to be trained in record keeping and financial management. The RMO needs to be able to prepare annual budgets that fit its resource management plans, raise funds in fair ways (such as fishing fees), and account for this to the members and wider community of users (fishers). Independent audit subcommittees can further strengthen transparency and good financial management practices. Thus projects should regularly assess the strength of community institutions and provide training to address the gaps. RMOs need to be trained on how they can interact effectively with local leaders and the local government.

Sustainability after donor-funds end

A small fund used after the project ends to support the operation of founded committees and programs to improve the resource base can enhance sustainability. Generally, after a project ends, without continued resources, the activities and institutions gradually weaken or disappear and the benefits dwindle. After consultations with the community groups and all levels of government from local to national, MACH established an endowment fund under government control, but with the co-management committees responsible for decisions on the use of the annual interest income. In this arrangement, the principal can never be touched but the accrued interest is used to carry on co-management functions including meetings and especially for small grants to RMOs for restoring wetland habitats. Additionally, MACH established a revolving loan fund which consists of 40 million Taka, roughly USD\$570,000, that goes to the FRUG to provide credit for alternative income generating activities to keep continued support for small enterprises that relieve pressure on the fisheries. The FRUGs are responsible for managing the savings of their members, providing credit to them and implementing IGAs by their own staff with oversight provided by co-management committees. Interest earned from the revolving loan fund is to be used for bearing expenses against employees, meetings and other activities.

Effectiveness in Resource Management

To ensure sustainable management of wetland resources, RMOs adopted regulations covering their wetland resource areas. Over time, each RMO has agreed upon a set of rules or norms regarding fishing within the areas it directly controls or influences. All 16 RMOs adopted four or more management rules that delineate fishing times, means of harvesting and plans for physical interventions. Through these rules, exploitation of fishery resources is limited and the resource is replenished.

Success Factors

Donor projects face a multitude of challenges in design and implementation. The following are key success factors learned from the MACH program.

Vision: MACH took on wetland landscape management encompassing the entire watershed in a holistic manner by incorporating a multifaceted, multidisciplinary, multi-sectoral approach to include: participatory natural resource management for sustainable utilization and biodiversity conservation, income generation, alternative income generating activities, local capacity building, and institutional strengthening working with all the stakeholders, from local community fishermen, businesses, the poor and elite, local government, district government, to national-level ministries.

Participatory methodology was utilized to address local issues, needs and desires. MACH first went to communities developing the program through participatory planning with local communities identifying problems and solutions. MACH included the elite as well as the poor, thus avoiding elite capture. The participatory approach enables transparency and accountability.

Adaptive design, implementation and management set activities as the needs became apparent. For example, wetland resource management plans are adapted, reviewed and approved on an annual basis according to new information and the previous year's experiences. Other examples include, designing and implementing a public communications and awareness strategy, tree planting to reduce erosion, pineapple contour cultivation to reduce soil erosion, and adding a pollution abatement component to the project. Adaptive management allows for learning by doing and openly discussing and solving challenges and constraints.

Great leadership and management: from upper management to local site managers. Upper management continually energizes local staff to achieve outstanding results. MACH's project manager has vast local knowledge of the conditions and constraints facing the program and deep cultural insight and understanding stemming from 25 years of experience in Bangladesh, with a thorough technical understanding of wetlands and fisheries in Bangladesh and globally. Donor projects often fail or succeed due to the leadership, getting the right leader is a key success factor. Additionally, MACH has good coordination of the project work at all levels, resulting in knowledge building among staff and leveraging of activities.

Local champions — MACH has many unsung heroes that have enabled the program to succeed. Local people and leaders who have embraced the MACH approach by experimenting with and promoting the approach. These champions have led the way in their communities through showing others how co-management and alternative income-generating activities work to improve the wetland resources while reducing poverty. Through their example, others followed, and the successes were wide-spread.

Effecting behavior change is challenging. Due to the adaptive nature of the program, MACH was able to add a Communications and Outreach Strategy for environmental awareness behavior change. Through community theater, local announcements and other key culturally relevant strategies, MACH was able to effect significant behavior change for wetland conservation and biodiversity enhancement.

Sustainability is often difficult to achieve once donor funds end and there are no longer resources to continue work needed. To ensure wetland co-management continued MACH 1) worked with the Government of Bangladesh to create an endowment fund, and 2) established a revolving loan fund.

Institutional strengthening is a key enabling factor to achieve meaningful lasting results. For MACH, institutional strengthening was key for local accountability and transparency through backward and forward linkages (checks and balances).

Main Challenges

The combination of establishing community based organizations (CBOs) such as the RMOs and co-management institutions, along with extensive habitat restoration makes for a costly and time consuming program. This is a major challenge to scaling up. MACH provides a solid framework, but there are quality control challenges to scaling up and replication.

Ensuring that the CBOs formed adopt, and continue to practice, after project support ends, good governance, transparency, equity, and participatory decision making are challenges. For this creation of a sense of ownership of the organization by all of the members including the back-bench members is an issue for their sustainability.

Long term government commitment supported by policy is a challenge in two regards. The extent that Upazila Fisheries Committees, and in particular the concerned government officials, are sincere and transparent in their activities is vital for the sustainability of both the co-management system and the CBOs. Secondly, wetland resource management is dependent on use rights to waterbodies being held by the CBOs and those rights being used to follow environmentally sustainable practices. There is a provision for extension of these long term use rights provided the management performance is satisfactory, but this has yet to be demonstrated by the administration and remains a future challenge for the CBOs.

Conclusion

Management of natural resources, in this case wetlands, is complex and fraught with many risks. Success is dependent on the local user organizations ability to retain control and keep up certain conservation and best management practices and then for the positive results from this to be felt by those communities living around the resources and sharing the benefits. It is important for these resource managers to have support from the local administration and government and the elite and elected public servants. This local government support is essential for best management to be continued and for the resource to remain in the hands of the people that rely on it for their livelihoods. It is also important that all members of the community understand the need for this improved management to support the users in their effort to sometimes restore and then sustainably manage the natural capital which is their wetland. This management approach could be applied more widely to improve and sustain wetlands throughout Bangladesh and the region.

For donor-funded projects to be successful, the design, implementation and management of the program needs to be adaptive, locally tailored, culturally relevant, technically sound, have the participation of the

local communities in the design and implementation, and must have strong capable leadership and management. MACH has been able to achieve biodiversity conservation while using it as an entry to poverty reduction and good governance.

Finally, the MACH project components now have a rich body of experience and an excellent database, which should be made available to practitioners and researchers in the natural sciences. To access this database: www.machban.org

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