

Chapter 9

Community-Based Wetland Comanagement in Bangladesh

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To find new solutions to problems resulting from top-down approaches to resource conservation and sustainability, community-based comanagement recognizes that local communities should have direct control over the management, utilization, and benefits of local resources to value and use them in a sustainable manner. Developing successful community-based comanagement that enables entire wetland ecosystems while also ensuring productive fisheries and the needs of resource users is a major challenge. This case study brings together the importance of adaptive management, successful leadership, multidisciplinary approaches, and lessons drawn from more than eight years of experience to support community-based comanagement. The Management of Aquatic Ecosystems through Community Husbandry (MACH) project in Bangladesh used a holistic integrated approach and enabled the achievement of sustainable and environmentally sound development.

Background and 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, more than half of the country can be termed as wetlands that are a source of food and income for about 70 million rural households.

In Bangladesh about 4 million hectares of land are inundated with water every year in the monsoon (rainy) season, and more than 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 habitat for more than 260 fish species (Rahman 1989), 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 (Flood Action Plan 16 1995), and about 60% of animal protein consumption comes from fish (Bangladesh Bureau of Statistics 1999). See figure 1. 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 overfishing 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 them and recover the land 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 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 has caused locally severe pollution that kills breeding fish populations during the dry season; and loss of tree cover and poor hillside cultivation practices in watersheds have caused high rates of siltation in rivers and loss of floodplain wetlands.
- More and more people fish destructively using fine mesh nets to have high catch levels; loss of juvenile fish severely affects fish regeneration cycles.

As the dry season progresses, water in even the deeper parts of wetlands becomes shallow, giving fish few places to shelter. Even worse, the water that remains is sometimes pumped out so that all 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, resulting in declines of fish stocks. Similarly, populations of other aquatic flora and fauna, including waterfowl, are declining due to habitat degradation.

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% annually, presumably through high fishing pressure, fisheries now appear to be in crisis, with catch numbers *falling* by 5% annually. Despite changes in national policies that call for an end to drainage of remaining wetlands (Ministry of Water Resources 1999), wetlands continue to be encroached with no sign of abatement. 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 1998, the United States Agency for International Development (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 it 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 involved only 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 ended, the fisheries management system reverted to the previous situation, and elite in the area captured fish for their own benefit.



Figure 1. 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.



Figure 2. Participatory planning was a vital first step in understanding problems and identifying possible solutions.

MACH benefited from these earlier examples by designing a project that integrates management activities into the fabric of the local community and the local government. First, MACH considered all users of the wetlands, including the poor rural fishers and the elite, who could strengthen the community-based organizations (CBOs) as champions for best management practices. Second, MACH engaged resource users and governmental 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 food security, biodiversity, and sustainable productivity over an entire wetland ecosystem. 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 northeast
- Turag-Bangshi floodplain, a typical river-floodplain system close to Dhaka in central Bangladesh
- Kangsha-Malijhee basin, a flash-flood prone system in Sherpur bordering the hills of India

Project Objectives and 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 multidisciplinary, multisectoral, participatory, and community-based management approach to address declining fisheries and environmental degradation of wetlands in Bangladesh. Rather than focus solely on fisheries management, MACH sought to increase the sustainable productivity of all floodplain resources, including fish, plants, and wildlife, over an entire floodplain ecosystem, 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, preferably where there is the scope to protect sufficiently large areas to act as cores 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 comanagement built on past experience by avoiding a top-down, Department of Fisheries–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

MACH is a process-based approach, not a blueprint project.

Adaptive management is based on a flexible framework that allows programs to change their behavior as situations change and merit different approaches and activities. Because 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). 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 Mohammad Ziaul Haque, the site coordinator from Sherpur, explained: "Mistakes are learning experiences and are not considered wrong."

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 identify problems and develop potential solutions (see figure 2). Then the project used 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, 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 identified. Next, the separate stakeholder groups agreed on and analyzed the feasibility of potential solutions, including their likely effects on stakeholders. Thus the main outcomes of the PAPD workshops were lists of ranked problems, then analyses of possible management and physical interventions to address these.

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 Kalapur FRUG, Sreemangal)

Comanagement 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 among resource users and government at the resource level will improve the quality of decisions and local compliance with management plans. Therefore, the intention of comanagement 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 three-pronged community-based comanagement approach:

- working with local communities and government to develop comanagement institutions
- building the capacity of those institutions to manage themselves and to restore and protect wetland ecosystems comprising water, fish, trees, and wildlife
- 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: community-based groups consisting of the users whose responsibility is to manage specific wetland areas; and local government committees that include officials, elected representatives, and CBO leaders to coordinate and guide the process.

Local community organizations for resource management were formed over several years through steps involving community, project, and local government. 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 local 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 hold those making decisions more widely accountable.

RMOs are voluntary bodies that are registered with the government and have adopted best management practices in the river, *beel*, and floodplain units of the wetlands surrounding their villages. 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 and stakeholders. Special emphasis was placed on the poor who are most dependent on wetlands, ensuring that they made up 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 with access to 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 user groups (FRUGs). To ensure that the poor hold a majority in the general body of the RMOs, 60% of the RMOs are people from RUGs.

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

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 elected Union Parishad chairmen and local representatives of the *upazila* (subdistrict) government that belong to different governmental offices, such as the Department of Fisheries, Ministry of Land, or Department of Livestock. (Note 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.) Together this committee coordinates activities, resolves problems, oversees improved wetland management, and makes comanagement decisions. Local government committees are permanently mandated through government order and have been formed in each *upazila*, called *upazila* fisheries committees.

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.

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 hectares. More than 110 villages inhabited by more than 184,000 people are directly involved in the project, while the total benefited population may exceed half a million. MACH has done this by

- 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 improve livelihoods.

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

Enormous social change really has 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)

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. Accomplishments include the following:

- 46 hectares of *beels* were excavated, and 30 kilometers of canals were expanded to retain dry-season water
- 56 sanctuaries in 173 hectares of area were established
- 605,000 trees were planted

These actions resulted in increased fish catches of two to five times over 1999 baselines of 58–171 kg per hectare, reaching 316–388 kg per hectare across the entire wetland system of nearly 25,000 hectares in 2004–2005. Increases in fish consumption of 45% over the same period benefited 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 173 hectares (427 acres) of wetlands (see figure 3). These are areas that range from less than 1 hectare to more than 100 hectares in size and retain water through 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 water birds and plants. This is particularly the case in the large permanent sanctuary established in Hail Haor that within two years has attracted up to 7,000 wintering water birds where there were previously fewer than 100.

Most sanctuaries have been established by the RMOs within water bodies where they hold fishing rights for 5 to 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 propos-



Figure 3. The Ministry of Land has designated Baikka Beel, a 100-hectare area of the Hail Haor wetland in Bangladesh, as a permanent waterfowl sanctuary.



Figure 4. Resource management organizations along with fishers have banned fishing in the early monsoon when fish breed, allowing fish to repopulate the floodplain.

als 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.

The MACH project has been instrumental in restoring the diverse and productive Hail Haor wetland so it is now able to support the needs of local populations for fishing and a 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 water bird 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—that 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 two to three 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 the winter. RMOs advocate this practice to leaseholders in other water bodies within the sites. They have banned using fixed gears, particularly barriers such as *pati bundhs*—mats made of split bamboo—that close off channels, so that fish can once again move between habitats. 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*.

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)

Reintroduction 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 restocking about 1.19 million fish (mostly juveniles) of 15 native species. Before restocking, 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. See figure 4.

Increase in Fish Catches, Consumption, and Biodiversity

From the mid-1990s to 2000, national annual fish consumption declined by 14% to about 11 kg per person. By 2004, annual fish consumption was 17.5 kg per person, on average 52% higher

than before MACH started. Project data shows that catch per hectare has increased by about 140% between 1999 and 2004 (see figure 5):

- Fish yields increased by two to five times over baseline yields of 58–171 kg per hectare, to 315–390 kg per hectare in 2004–2005.
- Eight to 10 threatened fish species were reestablished.
- Several locally rare fish species have been restored.

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

Tree Planting and Improved Watershed Management

Tree planting for habitat restoration and improvement has been one of the MACH project's key interventions. 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 envisioned mitigation of the degraded environment and microclimate 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. Contour cultivation of pineapples can more than double profits and reduce soil erosion, which severely affects wetlands such as Hail Haor. Activities included contour planting of pineapple in the hills surrounding one site where siltation was raising the wetland bed by 5 cm annually. 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 eight 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.

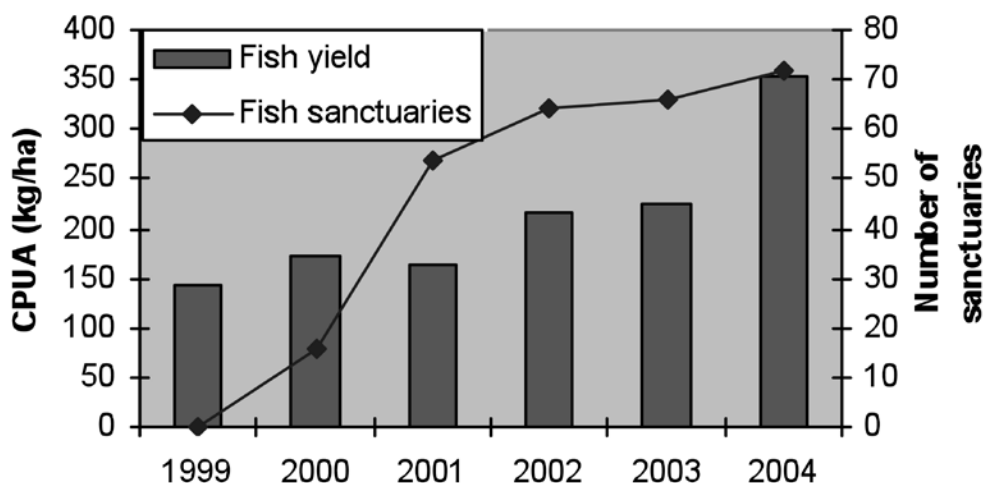


Figure 5. Fish yield and fish sanctuaries in Management of Aquatic Ecosystems through Community Husbandry sites.

Industrial Pollution Mitigation

One of the biggest industrial clusters in Bangladesh is in Kaliakoir, north of Dhaka, where there are many textile and dyeing factories. During participatory planning processes, the communities with which MACH has been working 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 that 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. A new one has been established, and four more are under construction. In spite of efforts to mitigate industrial pollution, the problem is worsening due to the increased number of textile-related factories in the area, quadrupling from 20 to 80 in late 2005. Thus, there is an immediate need to increase the rate of implementation of proposed 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 per hectare to about 300 kg per hectare by 2004 are likely to be irreplaceably lost.

Community Organization and Resource Management Organizations

The key building block has been establishing 16 RMOs, each representing the whole user community of the management area. The RMOs 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 resource user members are poor, receiving training and credit through separate organizations. Of 1,396 members, 53% come from RUGs, 21% are women, and 42% are fishers. To improve transparency and broaden participation in the RMOs, subcommittees have been formed in most RMOs, including audit, sanctuary management, and plantation subcommittees.

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 the Poor Who Use Wetlands

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 users. More than 5,500 of the poorest wetland-resource users have joined savings and credit RUGs. These consist of 15 to 30 men or women from poor households, generally those owning 0.2 hectare of land or less, laboring for part of the year, having a low education level, not belonging to any other nongovernmental organization (NGO) groups, and making use of the wet-

lands covered by resource management activities. These households were mostly from villages near 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 skills they could apply when they used their loans to establish businesses. Typical enterprises include raising poultry and livestock, operating small shops, and individual skilled work such as tailoring or operating a tree nursery (see figure 6). The loan repayment rate averaged 89%. Initially, loan recipients 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 reduced their fishing by 20% to 30% on average.

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 \$4.7 million in 2004 from higher catches associated with resource management improvements, compared with baseline data from 1999. In addition, by 2005, those participating in training and credit activities earned an extra \$800,000, mainly from new enterprises supported by the project, compared with their pre-participation incomes (daily incomes rose from about \$1 per day in 1999 to \$1.34 in 2005). This primarily affected the poor who are most dependent on aquatic resources. Over 85%



Figure 6. Raising poultry has been one of the most profitable enterprises for resource user group members.

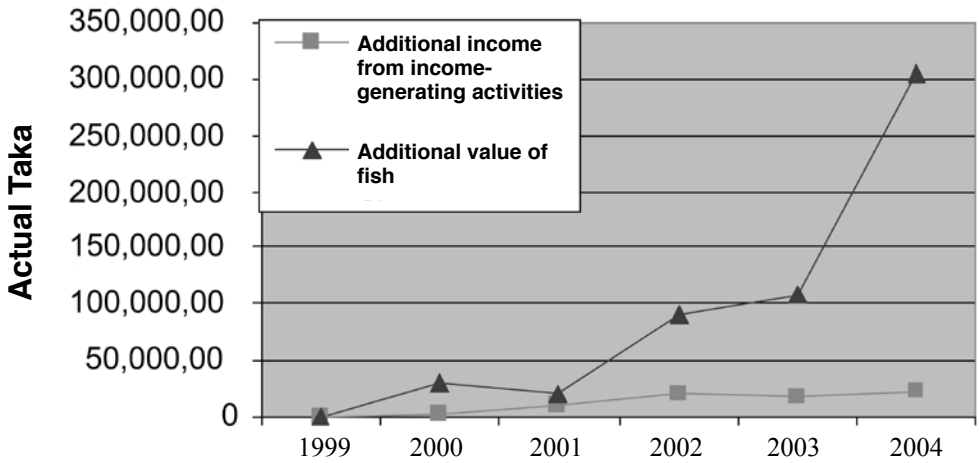


Figure 7. Increases in income in Management of Aquatic Ecosystems through Community Husbandry sites.

of households in the project areas are involved in fishing, and all of those supported with training and credit were low-income households; therefore, the poor have benefited the most from the project. By April 2005, 5,334 households had members belonging to the RUGs. Of the RUG members about 68% are men, and about 75% owning less than 0.2 hectare of land. By 2005, almost 4,000 families had increased annual income by 65% due to increased fish catches and new income-generating enterprises. See figures 7 and 8.

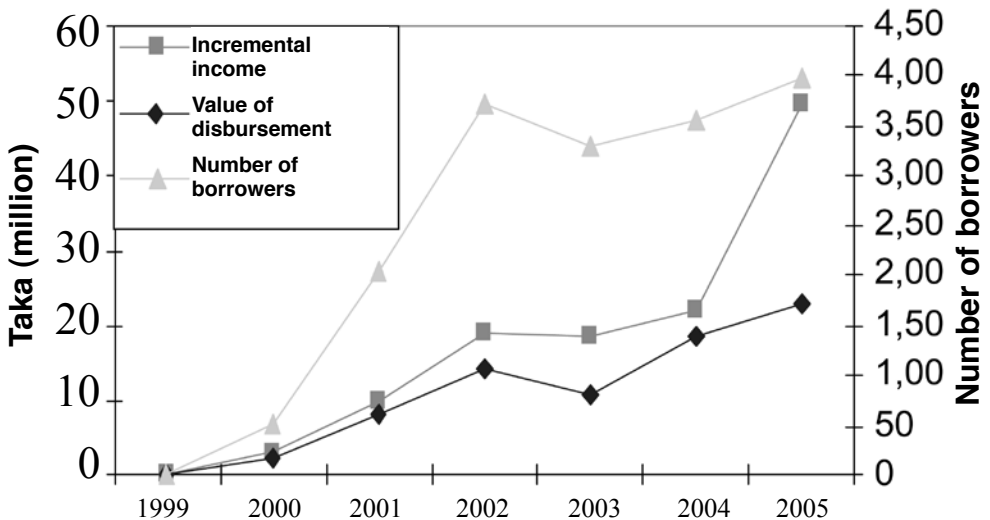


Figure 8. Micro-credit support.

Enhanced Governance and Precedents

The leaders of these formal CBOs now sit with local government officials and councilors in committees that oversee wetland management. These comanagement 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 comanagement committees. By 2006, eight federations employed former NGO staff to help their operations and received revolving funds totaling about \$220,000 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 and managed by the community organizations. The government no longer auctions off fishing rights in these sanctuaries. The Department of Fisheries, through its national Inland Capture Fisheries Strategy, is in the process of adopting these institutions and the sanctuary approach on a larger scale as part of a policy shift toward community-based comanagement.

Lessons Learned

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

Comanagement, Networking, and Governance

Comanagement involves sharing responsibilities among key stakeholders and commonly involves delegating 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, projects often do not strengthen linkages with local government. MACH made linkages among the RMOs, 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 among local government committees and community resource management organizations takes time.

Based on the experience of MACH, it is unlikely that government agencies alone will be able to facilitate the type of CBOs 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 (CBOs) 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.

Communities have complex structures. Communitywide 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.

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 CBOs 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; this has involved setting rules and limits on use, and restoring wetland habitat, including tree planting.

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 at all levels neighboring the wetlands, including rich and poor, influential and subordinate community members. In some cases, local elites dominated the process and took a leadership role. It sometimes became difficult to ensure that 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 theater, ensuring participation in Union Parishad and local government committees, and by helping the poor to form RUGs that have capacity-building programs and include their representatives in the RMOs.

Also, resource users who are poor needed to be a majority in RMOs to ensure that decisions did not favor the wealthy: By 2005, about 60% of the resource-user members were poor. 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 per 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 firsthand experience in managing the resource, yet their livelihood is affected by it. 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 in which at least 25% of members were women. About two-thirds of the women in RMOs were also RUG members. Women accounted for 36% of RUG members and 35% of the executive committee.

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 liveli-

hoods. 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

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 strategy, 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 evaluate 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, without continued resources after a project ends, the activities and institutions gradually weaken or disappear, and the benefits dwindle. After consultations with community groups and all levels of government from local to national, MACH established an endowment fund under government control, but with the comanagement 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 comanagement functions including meetings and especially for small grants to RMOs for restor-

ing wetland habitats. MACH also established a revolving loan fund worth roughly \$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 income-generating activities by their own staff with oversight provided by comanagement committees. Interest earned from the revolving loan fund is to be used for financing employees, meetings, and other activities.

Effectiveness in Resource Management

To ensure sustainable management of wetland resources, RMOs adopted regulations covering their wetland areas. Over time, each RMO has agreed on 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 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, multisectoral approach. This includes 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, and district government to national-level ministries.

Participatory Methodology

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

Adaptive design, implementation, and management set activities as the needs became apparent. For example, wetland resource management plans are adapted, reviewed, and approved annually 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

Great leadership and management are important, 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. Because donor projects often fail or succeed due to the leadership, getting the right leader is a key success factor. MACH also 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 who have enabled the program to succeed. Local people and leaders have embraced the MACH approach by experimenting with and promoting it. These champions have led the way in their communities by showing others how comanagement and alternative income-generating activities work to improve wetland resources while reducing poverty. Others followed their example, and the successes were widespread.

Effecting Behavior Change

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

Sustainability is often difficult to achieve once donor funds end and there are no longer resources to continue the work needed. To ensure that wetland comanagement continued, MACH worked with the government of Bangladesh to create an endowment fund and established a revolving loan fund.

Institutional Strengthening

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 CBOs such as the RMOs and comanagement 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.

Among challenges are ensuring that the CBOs adopt and continue to practice good governance, transparency, equity, and participatory decision making. Creating a sense of ownership

of the organization by all of the members, including the back-bench members, is an issue for its sustainability.

Long-term government commitment supported by policy is a challenge in two regards. The extent that *upazila* fisheries committees, particularly the concerned government officials, are sincere and transparent in their activities is vital for the sustainability of both the comanagement system and the CBOs. Second, wetland resource management is dependent on use rights to water bodies 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.

Conclusions

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, 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 who 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 that is their wetland. This management approach could be applied more widely to improve and sustain wetlands across Bangladesh and the region.

For donor-funded projects to be successful, their design, implementation, and management need to be adaptive, locally tailored, culturally relevant, technically sound, have the participation of the local communities in the design and implementation, and 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.

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