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INTEGRATED PROTECTED AREA CO-MANAGEMENT (IPAC)

IMPACT ASSESSMENT OF CO-MANAGEMENT ON PROTECTED AREA CONSERVATION IN BANGLADESH




April 22, 2012
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Cover Photo:
Bangladesh has developed effective co-management approaches in both forest and wetland ecosystems. Initially implemented at a pilot scale, Bangladesh is now working with the international donor community to bring co-management for PA conservation to scale. To implement this approach, co-managers engage local stakeholders through a participatory process that empowers them with a voice and well defined roles in decision making and provides sufficient economic incentives to engage their interests in successful natural resource management objectives.

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ACRONYMS

ACF	Assistant Conservator of Forests
ADP	Annual Development Plan
AIG	Alternative Income Generation
CDM	Clean Development Mechanism
CHT	Chittagong Hill Tracts
CMC	Co-Management Committees
CMO	Co-Management Organization
COP	Chief of Party
DC	Deputy Commissioner
DCOP	Deputy Chief of Party
DFO	Divisional Forest Officer
DoE	Department of Environment
DoF	Department of Fisheries
ECA	Ecologically Critical Area
ECNEC	Executive Committee for National Economic Council
EWC	East-West Center
FD	Forest Department
FRUG	Federation of Resource User Groups
FUG	Forest User's Groups
GIS	Geographic Information Systems
GoB	Government of Bangladesh
IPAC	Integrated Protected Area Co-management
IQC	Indefinite Quantity Contract
LOI	Leaders of Influence
M&E	Monitoring and Evaluation
MACH	Management of Aquatic Ecosystems through Community Husbandry
MoEF	Ministry of Environment and Forests
MoFL	Ministry of Fisheries and Livestock
MoL	Ministry of Land
NGOs	Non-Governmental Organizations
NRM	Natural Resources Management
NS	Nishorgo Shahayak
NSP	Nishorgo Support Project

PA	Protected Area
PMARA	Performance Monitoring and Applied Research Associate
PMP	Performance Monitoring Plan
PPP	Public Private Partnerships
REDD	Reducing Emissions from Deforestation and Forest Degradation
RIMS	Resource Information and Management System
RMO	Resource Management Organization
RUG	Resource User Group
SEALS	Sundarbans Environment and Livelihood Support Project
SMEs	Small and Medium Enterprises
SOW	Statement of Work
USAID	U.S. Agency for International Development
VC	Value Chain

FOREWORD

Bangladesh forests and wetlands over past decades have been declining and degrading under severe human pressure and poor governance, adversely impacting biodiversity, ecosystem services and food security. Conversely conservation and sustainable management of forests and wetlands can be and increasingly is one of the foundations of long term sustainable development in Bangladesh. Forests and wetlands remain the direct and indirect sources of livelihood and food security for millions of Bangladeshis and their conservation is a key component of adapting and mitigating the challenge of climate change. For example, wetlands directly support food security by providing fish accessible to poor people and provide flood storage, protected forests secure watersheds (safeguarding downstream soils and water supplies) and mitigate carbon emissions, and mangrove and coastal forests help absorb the force of cyclonic surges.

Co-management (collaborative management involving local resource users, government and other stakeholders) has been taken up in many countries to improve their governance of natural resources notably fisheries, water resources, and forests, including in Protected Areas (PAs). Although co-management can describe a broad range of arrangements, here it is considered to involve government, local communities and other relevant stakeholders sharing the rights, roles and responsibilities to conserve and sustainably manage forest and wetland Protected Areas. This involves empowering poorer local people in decision making processes for PAs, and government decentralizing and empowering its local managers to work in a transparent collaborative way with civil society. Ultimately co-management requires that government and local people develop and share and implement a common vision, in this case of sustainable PAs. Co-management can link different levels in the hierarchy of management, and most recently flexibility and cross-stakeholder learning processes in the form of adaptive management have received attention. Compared with top-down systems, co-management is seen as improving efficiency (by increasing local compliance with conservation rules set by and with the community), and improving equity (through active participation of the poor in decision making). It is also often linked with measures to diversify and sustain or enhance the livelihoods of the poor, particularly to compensate for reduced access to protected areas, although internationally the effectiveness of such measures is reported to be mixed.

The management and administration of forests and wetlands in Bangladesh has a long history of state control. In forests this has been based on a professional Forest Department controlling all access and uses of forests for over a century based on top-down enforcement. In wetlands this has been based on the land administration leasing out short term fishing rights to individuals or groups to generate revenue without concern for resource sustainability or fisher livelihoods. Changes started on a pilot basis in the 1990s. In forests this took the form of social forestry in degraded forests allocating use rights to individual or small groups of households to restore tree cover and share benefits. In fisheries this involved community-based co-management (with the emphasis more on communities) in individual water bodies, and there was similar devolution of small water management schemes to communities at about the same time.

With USAID support, co-management was extended to three large wetland systems with formalization of government-community links from 1999 onwards under the MACH project, and with this experience it was tested on a pilot basis in five forest PAs under the Nishorgo Support Project. Co-management has since 2008 been taken up as the general approach to management of forest PAs, with USAID support extending to 18 PAs.

This assessment compiles and analyses evidence on the impacts of co-management established in Hail Haor (since 2000), Lawachara National Park and Chunati Wildlife Sanctuary (since 2004) and Fashiakhali Wildlife Sanctuary (since 2009). These sites were purposively selected to represent differences in the duration of operation of co-management and in the ecosystems being protected. Outcomes for biodiversity, ecosystems and livelihoods are considered to result from the immediate outputs of changes in governance and institutions from the co-management approaches adopted and the wider social and environmental context. The evidence available indicates that there have been positive outcomes, unlike the general trend for continued degradation and loss of biodiversity, this degradation has been halted by co-management and instead biodiversity is being restored from improved protection and management under co-management. In

general the evidence suggests that there are more substantial impacts where co-management has been operating for longer. Compared with baseline information populations of those indicator species and groups that might be expected to respond relatively quickly to reduced human exploitation have increased (water birds and fish in wetlands, some under storey birds in forest, whereas canopy dependent birds have not yet, since it will take decades for lost forest cover to recover), and the changes are greater where co-management has operated for longer.

The main outcomes relate to biodiversity and are associated with the condition of the ecosystems and habitats in the PAs. The impacts on livelihoods are more complex. Livelihood impacts can arise in four ways: through direct exploitation of natural resources as part of co-management (such as fisheries), through non-consumptive use in the form of tourism and associated services for visitors, indirectly through ecosystem services that benefit local communities and wider society (such as watershed conservation), and through associated initiatives to enhance or diversify income earning and/or reduce costs for target households. Among these potential impacts the direct benefits from improved management of wetlands tend to be more immediate and more apparent than those from forests (fish populations recover relatively quickly and are a major source of livelihood and nutrition in Bangladesh, whereas non-timber forest products and ecosystem services are more dispersed and long term). On the other hand tourism in some forest PAs has shown a rapid increase and co-management has been associated with improved promotion and services for visitors, whereas fewer wetlands are as attractive for visitors. Hence the combination of institutional arrangements and data show a significant difference between forest and wetland PAs.

Inside formal forest PAs extractive use is illegal while only very limited areas of public forests surrounding these PAs have been made available for use by the communities now involved in conserving these PAs, severely limiting the scope for poor from these communities to earn an income directly from conservation services. One major opportunity relates to eco-tourism, which generates incomes for entrepreneurs and workers in transport and hospitality sectors (estimated to be in the order of US$ 1.2 million in 2011 for the most visited PA studied – Lawachara), and funds for community development through the CMOs, but this may come at a potential cost if the number of visitors and places they visit go beyond the capacity of PAs. Tourist visit rates have increased very rapidly in the most popular of the sites studied (Lawachara) and this currently threatens the primary aim of conserving forest habitat and wildlife. The other opportunity for direct livelihood gains linked with forest PAs is through social forestry in buffer areas, but so far the FD has released insignificant amounts of land for this and thus the full potential is yet to be reached.

By comparison wetland co-management aims at both conservation and restoring economic returns from fishing, and is shown to generate substantial direct livelihood benefits. These amounted to an additional value of fish caught in Hail Haor estimated to be worth US$ 4.2 million in 2010 alone compared with baseline conditions (or approximately Tk 14,400 (US$ 175) more per fishing household per year). By setting aside sanctuary areas, restoring wetland habitats, observing closed seasons, and minimizing harmful fishing practices, fishing communities can restore productivity on a sustainable basis – with fisheries at least as healthy after 11 years of co-management as they were after 5-6 years.

How far such changes can be attributed to co-management and the causal factors of context and co-management arrangements are the other key issues in this assessment. The institutions – rules and norms regarding natural resource use – are a key product of co-management and community participation. This is particularly the case in wetlands, such as Hail Haor where the CMOs set local access rules, sanctuaries and fishing gear restrictions; whereas in forest PAs most rules have been set under national frameworks. More generally co-management is about better governance of natural resources through more transparent and participatory decision making, based on creating spaces and capacity for the disempowered to have their voices heard in practical decisions that affect both conservation and their livelihoods. Changes in attitudes can be found – directly in communities to reduce harmful fishing practices or hunting, and also in cooperation between local stakeholders and government, which is at the core of co-management. Again this illustrates how the transformation is a process with fluctuations about a positive trend. Those who had the greatest say in the past are the stakeholders that remain threats to co-management. In wetlands the land administration, which ultimately sets the policy rules and constraints within which co-management is allowed or abandoned by government, has not demonstrated a long-term commitment to sustaining the nation's natural resources or the rights of the poor, and looks set to reverse successful co-management. In forests co-management has been formally adopted in PAs by the Forest Department, attitudes and acceptance among

staff in the field then follow, and it will take continued gradual achievements over time to build up trust. Overall a long term programmatic extension and expansion of co-management based on agreements between all the key government agencies and external development partners, that provides a flexible and locally adaptable framework for co-management is needed if the achievements to date are to sustain and be strengthened.

Hence co-management is achieving positive impacts and outcomes in terms of improved biodiversity conservation, enhanced livelihoods, and more transparent and empowering PA governance. But co-management cannot be treated as a time-bound project or a fixed model. It means a fundamental commitment to a long term paradigm shift of sharing responsibilities and decision making, and devolving decision making to local stakeholders – both government and communities. For this to succeed co-management at its best needs to be adaptive to differences in environment and social conditions between sites and to changes over time. This flexibility is difficult for government to accept when administration is used to prescribe fixed details of management arrangements, rather than setting a framework and principles and then allowing a process to evolve. Moreover this change in paradigm and approach takes time to have the desired outcome, particularly in forest PAs it can take many years to see the fruits from regenerating forests let alone the wildlife that depend on those fruits. To achieve this longer term programmatic support is needed to enable co-management to take root and become normal practice.

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1. INTRODUCTION

With a population of about 150 million Bangladesh has the highest population density of poor people in the world. Forest cover has fallen to 4-6% of surface area. Deforestation and conversion of wetlands damage the livelihoods of the very poor most as they depend to a significant extent on collection of plants, fuel wood and fish for consumption and sale. These losses also damage ecosystem services to the whole population. Yet traditional "management" of many forest areas has benefited local elites and business interests who are behind systematic theft of trees. Similarly the traditional leasing of fishing rights in water bodies has favored short term exploitation by moneyed individuals rather than long term sustainability and rights for poor fishers. These threats and losses to key ecosystems are associated with adverse impacts on biodiversity and with livelihood losses for many poor people who depend on natural resources. Some 17 percent of the total land mass of the country is designated as forest land (including state forest land of some 2.2 million ha, itself consisting of 1.3 million ha of natural forest and plantations under the jurisdiction of the Forest Department (FD), and 0.9 million ha of un-classed state forest administered by the Ministry of Lands) (Roy 2004). However, reliable up-to-date statistics on the changes in forest cover in Bangladesh are hard to come by. In 1992 UNEP found that 7% of the land area of Bangladesh had remaining natural forest cover (evergreen or mangrove) with 6% being degraded land under shifting cultivation, while a 2001 report on forestry in Bangladesh concluded that "forest cover has been reduced more than 50 percent since the 1970s" (Chemonics 2001).

Out of 106 globally threatened and near threatened species of mammal, bird, reptile and amphibian currently known to have occurred in Bangladesh, exactly 50% depend on forests (including saline water habitats within the Sundarbans), and 32% depend on evergreen forests. With over 7,000 km of embankments, many wetlands have changed from natural vegetation to rice cultivation in the past three decades, with surface water areas declining in the dry season and wetland connections blocked. More than 40% of the 260 freshwater fish species are considered threatened with national extinction (IUCN Bangladesh 2000) and may soon follow the path of other wetland fauna and flora. 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. Fish consumption fell by 11% between 1995 and 2000 (but by 38% for the poorest households), and it is estimated that inland capture fisheries catches fell by 38% between 1995 and 2002 (Muir 2003). Despite these challenges, the natural resources based on biodiversity in wetlands and forests remain the direct and indirect sources of livelihood security for millions of Bangladeshis. For example, with wise use and conservation wetlands directly support food security by providing fish and other aquatic resources accessible to poor people. Indirect examples of ecosystem services include the services of protected forests in securing watersheds to safeguard down slope soils and downstream water supplies. Protecting forests and wetlands is, moreover, an increasing priority in the context of global climate change: besides the well known contribution of forest cover to mitigating carbon emissions, mangrove forests help absorb the force of cyclonic surges, and freshwater wetlands provide vital flood storage and groundwater replenishment

Purpose and Structure of this Report

The aim of this study and report is to undertake an evidence based impact assessment of co-management of forest and wetland biodiversity in Bangladesh based on case studies. It attempts to answer two questions. Has the establishment of co-management improved the management of forests and wetlands, and in what ways and by what mechanisms? Why have any improvements or lack of improvements in forest and wetland management arisen? In particular it draws together evidence generated from three projects supported by USAID: Integrated Protected Area Co-management (IPAC) project, Nishorgo Support Project (NSP) and Management of Aquatic ecosystems through Community Husbandry (MACH) project.

2. PROTECTED AREA MANAGEMENT

Co-management Approach

In recent years there has been much work to develop existing and new local institutions as a means of empowering user communities and improving natural resource sustainability through community based management and co-management (Berkes 1989; Berkes and Folke 1998; Berkes et al. 1998; Ostrom 1990; Pomeroy and Rivera-Guieb 2006; Viswanathan et al. 2003). Community based management is locally based and emphasizes community capacity and participation, whereas co-management (as defined below) focuses more on partnerships and linkages between communities and other stakeholders, and can address hierarchies of management issues. However, co-management is unlikely to be a genuine partnership unless the capacity of typically disadvantaged community stakeholders to organize is strengthened enabling them to become equals with government (i.e. strengthening the community-based side of co-management).

Although closely related, there is debate over differences between co-management and community based management. Korten (1987) characterized community-based resource management by the following: a group of people with common interests, mechanisms for effective and equitable management of conflict, community control and management of productive resources, local systems or mechanisms for capture and use of available resources, broadly distributed participation in control of resources within the community, and local accountability in management. Community based management of natural resources has been widely promoted internationally. In fisheries it is expected to result in: greater security of access and cooperation resulting in enhanced sustainability of the resource, more equitable distribution of benefits, improved conflict resolution among fishers, enhancement of fishers' status in relation to other stakeholders, sharing of information between co-managers, and higher levels of voluntary compliance (Pinkerton 1989). However, in biodiversity conservation there have also been criticisms of both communities based and centralized management and arguments that coordination between organizations is costly and hence co-management could be inherently inefficient (Barrett et al. 2001). Several definitions of collaborative management or co-management have been made, for example:

- "The sharing of power and responsibility between the government and local resource users" (Berkes et al. 1991: 12).

- World Conservation Congress, Resolution 1.42: "a partnership in which government agencies, local communities and resource users, nongovernmental organizations and other stakeholders negotiate, as appropriate to each context, the authority and responsibility for the management of a specific area or set of resources" (IUCN 1996).

- "A situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources" (Borrini-Feyerabend et al. 2000: 1)

In general, co-management focuses on cooperation and sharing in management between government and local communities of resource users. Within this framework the diversity of the government or state sector has not always received sufficient attention – there are differences in priorities and interests between central and local government and between different government agencies. Co-management has been considered to be a logical approach to solving resource management problems by developing partnerships that are not only horizontal but also vertical between local and higher levels of governance, which is vital in complex systems. In addition co-management is not one prescribed arrangement between the relevant stakeholders, there is a continuum ranging from collaboration where government stakeholders dominate decisions and prescribe a minimal space for decision making by local resource users, to situations where government devolves a wide range of powers to local resource users who advise it of their actions. In this regard past models of social forestry in Bangladesh would be at one end of the co-management range (where local people receive some use rights but had to accept centralized choices of trees and their felling regime, and where coordinated representation and decision making among local people has little or no role). Management of waterbodies by

community based organizations (CBO) would be closer to the other end of the range (once the waterbody is reserved for a community the CBO is empowered to set local rules, but does this with advice from and/or informing Department of Fisheries).

Co-management is best considered as a process rather than a single defined system. This aligns with recent analysis that emphasizes how co-management is more effective when it is adaptive - "adaptive co-management", which emphasizes learning processes in a complex and uncertain context (both resources and social) (Armitage et al. 2009). Adaptive co-management implies that management actions, plans, and governance institutions will change as the co-managers jointly build shared visions and learn from their actions, which depends on social trust and explicit inclusion of learning processes.
Carlsson and Berkes (2005) argued that co-management is better than alternative management systems in six ways:

- Allocation of tasks,
- Exchange of resources,
- Linking different types and levels of organization,
- Reduction of transaction costs,
- Risk sharing,
- Conflict resolution mechanisms, power sharing.

In this study effectiveness of co-management is considered mainly in terms of points 3, 4 and 6; and also in terms of outcomes.

Method and Approach of This Review

This review firstly gives an overview of how conservation and co-management have evolved in Bangladesh in general in forests and wetlands. This is followed by analysis of evidence (quantitative and qualitative) on the impacts and processes of co-management from four sites. The framework adopted in this paper is influenced by those used in similar assessments and by the institutional analysis framework (Ostrom 1994). Some assessments have focused on institutional factors such as tenure, leadership and compliance associated with the performance of community or co-management (Pomeroy and Berkes 1997; Pagdee et al. 2006), while others have emphasized environmental factors (Agrawal and Chhatre 2006), or considered measuring sets of ecological, socio-economic and institutional indicators. One limitation of a case based approach is that there is less scope to assess higher levels of change in policy and practice, although these are discussed in the next section. The framework adopted here can be summarized as:

Context (society, pressures, environment, local institutions)

Co-management

leads to and incorporates:

Outputs (governance, institutions, interactions, attitudes and practices)

these lead to:

Outcomes (ecosystem health, biodiversity, livelihoods, welfare)

The intermediate outputs of co-management initiatives comprise of the governance system and institutions that emerge as part of co-management including inclusiveness and equity in decision-making processes and rules. Co-management results in interaction outcomes such as changes in attitudes, practice, enhanced cooperation and reduced conflict among individuals and their communities as a whole, among government officials and their agencies, and between stakeholders.

Thereby it is expected to result in greater efficiency and effectiveness in PA management (compared with past traditional systems). The ultimate outcomes of this process are expected to be greater security and even restoration of: habitats and associated biodiversity, and of livelihoods of local people including an improved status for the disadvantaged. Information has been compiled from a range of sources including: reports of MACH, Nishorgo Support and IPAC projects; unpublished data from those projects; and key informant discussions with field based co-management stakeholders.

Evolution of Co-management in Bangladesh

One legacy of cumulated eras of feudal and colonial rule has been that natural resources (particularly forests and wetlands) continue to be administered in a top-down centralized manner and regarded primarily as sources of revenue by government even in present day Bangladesh. In this general context changing to co-management represents a major shift in practice and policy. It inevitably threatens a long established status quo where relatively small numbers of people (including public servants, the rich, and those with political connections) have enjoyed a disproportionate share of the benefits and decision making rights in forests and wetlands. Moreover short-term interests and the absence of longer-term use rights have exacerbated over-exploitation and degradation of natural resources. Co-management offers more transparent decision making that directly involves local communities, when this includes long term recognition of stakeholder roles, then returns based on sustainable uses and conservation can be expected.

In this section the history of co-management in wetlands is discussed before its evolution in forests, because co-management started first in Bangladesh in fisheries and wetlands, and this experience influenced its introduction and rapid take up in forest PAs. In forests it has been taken up as policy in formally protected areas, which represent about 2.5% of the total area of state forests under the FD. Co-management is being adapted to the unique context of the Sundarbans mangrove forests for all of the Reserved Forest lands there, and so it will cover a much larger part of all forests. Similarly in wetlands out of over 12,000 public waterbodies only perhaps 3% (but a higher percentage by area) came under co-management with communities through agreements with Ministry of Fisheries and Livestock during the 2000s, and the Ministry of Land retains a veto power over this.

Wetlands

During the early 1990s components of the Flood Action Plan process highlighted the value of open water (freshwater capture) fisheries that had been neglected in the past, identified shortcomings in their management, noted that relevant traditional community institutions had gradually been eroded, and that biodiversity and productivity had declined as wetlands were drained and water flows had been interrupted by embankments (Ali 1997; Halls 1998; Sultana and Thompson 1997). The most notable feature of fishery and wetland management from the 1950 State Acquisition and Tenancy Act up to the 1990s was the absence of management concern for the sustainability or value of fisheries and wetlands. The government had divided public wetlands into thousands of waterbodies or "*jalmohals*" in each of which short-term (three year) fishing rights were leased out by the Ministry of Land to the highest bidder, without involving specialist agencies for fisheries or environment.

Recognition of the failings of this system, and awareness of international initiatives towards community-based natural resource management, led to a number of donor supported projects involving NGOs and Department of Fisheries that established community-based fisheries management in individual waterbodies, including ox-bow lakes, *beels* and parts of rivers, in the early-mid-1990s. Center for Natural Resources Studies (CNRS) demonstrated that natural fishery productivity could recover when silted up channels between floodplain wetlands and main rivers are re-excavated (Rahman *et al.* 1999). Elsewhere NGOs had helped minority fishers to organize to manage fisheries with support from the Department of Fisheries, but access had only been assured for the fishers for three years (Thompson et al. 2003). These initial efforts were supported by the Ford Foundation, and built on long standing debate and rhetoric over poverty among traditional fishers and their lack of direct access rights to waterbodies in Bangladesh, growing international experience in community based approaches, failure of an experiment in individual licensing of fishers, NGO interest and pressure awakened by the Flood Action Plan process and burgeoning civil society with the establishment of democracy. Increased donor interest was complemented by mutual benefits between the Department of Fisheries (DoF) and fishing communities. Since neither DoF nor fishers had secure access or decision making roles in waterbodies administered by the Ministry of Land, if the DoF cooperated with donors, fishers and NGOs over co-management it could achieve a greater role in fisheries. In 2000 Ministry of Fisheries and Livestock negotiated a framework with Ministry of Land for *jalmohals* to be reserved for sustainable community based management for 10 years at a time, under this a series of Memoranda of Understanding were signed for in total around 300 waterbodies covered by projects supported by DANIDA, UK DFID, IFAD and USAID, as well as projects supported entirely by Government of Bangladesh.

Most of these initiatives worked in individual waterbodies. Larger open water systems presented unique obstacles to applying the same community based approach. The fishers traditionally using open water fisheries in Bangladesh were principally from the minority Hindu community, and were also among the poorest members of rural society. These poor and minority groups had little capacity to challenge the more powerful sections of society that could afford to lease waterbodies or that were encroaching on open waters for agriculture and aquaculture, and still less capacity to coordinate their actions over large wetland systems.

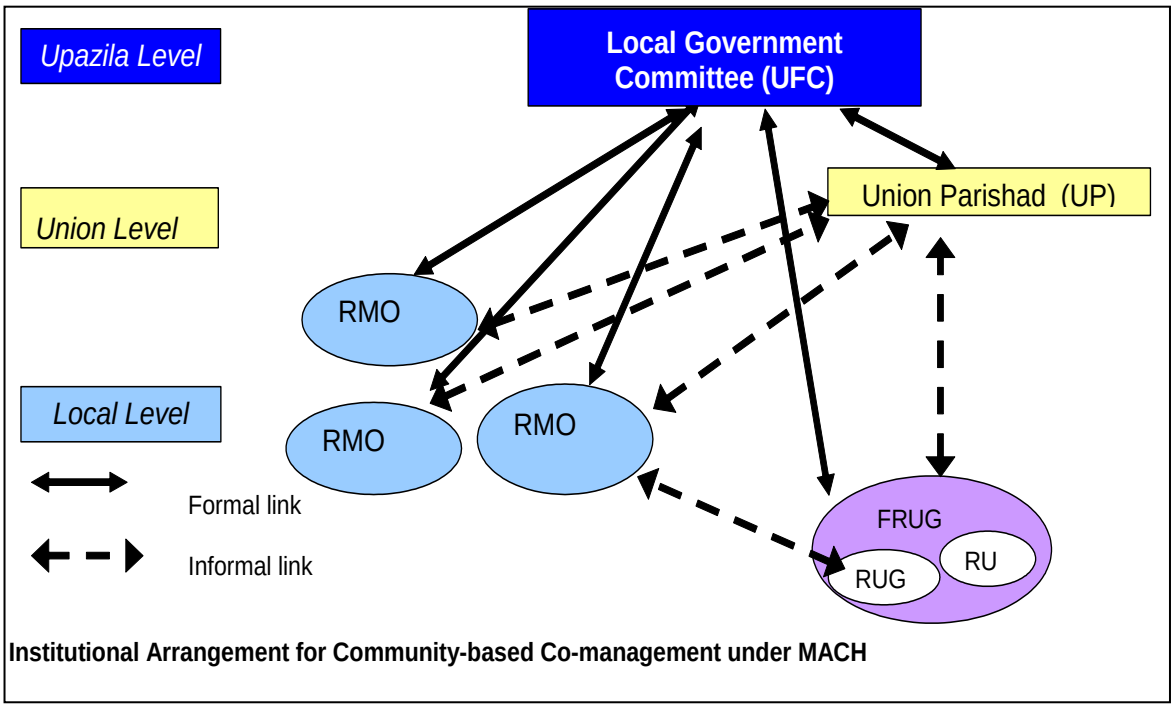


Fig. 1. Co-management Institutional Arrangement Left by MACH in Wetlands

USAID and the Government of Bangladesh from September 1998 to June 2008 (MACH 2007) aimed to ensure the sustainable productivity of all wetland resources – water, fish, plants and wildlife– over three large wetland ecosystems and thereby to help ensure food security and restore biodiversity.

MACH established what is best described as "Community based Co-management" in three large wetland systems, each comprising of multiple connected water bodies. The key components were establishing community organizations, embedding within them institutions for sustainable wise use of wetland resources, and formally linking them with the existing local government system. The Resource Management Organizations (RMOs) are community based organizations that manage specific waterbodies and comprise of fishers and other local people, with about 60% coming from the Resource User Groups (RUGs). RUGs comprise of poor people dependent on these wetlands, organized following a traditional NGO approach, but then federated into independent organizations at Union level. The RMOs were linked with their respective Union Parishads (UP, local councils) and their representatives attend UP meetings. Lastly MACH initially had "local government committees" in each working *Upazila* (sub-district) for coordination, and these were transformed into formal co-management bodies (Upazila Fisheries Committees) chaired by the Upazila Nirbahi Officer (administrative chief of the *Upazila*), meeting on a quarterly basis and comprising of *Upazila* officials, relevant UP chairmen, and the leaders of each RMO and FRUG in that *Upazila*. Once formed the RMOs acted, with project support, to restore wetland habitats and their productivity (re-excavating silted up water bodies, creating fish sanctuaries, setting limits on fishing, planting swamp forest). NGOs provided training and also revolving loan funds to improve the livelihoods of poor people dependent on these wetlands. The co-management evolved into the set of organizations and linkages represented in Fig. 1.

For longer term sustainability, MACH facilitated local government proposing and obtaining decisions directly from Ministry of Land to take a small number of water bodies permanently out of leasing to be kept as sanctuaries. Also before the MACH project ended, to sustain this system, revolving funds were handed over to federations of RUGs (FRUGs), RMOs held water body rights for ten years, and endowment funds were created by order of Ministry of Fisheries and Livestock under district administration oversight for each

concerned *upazila*. The interest from the endowment funds is available each year for the UFC to spend with about 20% for UFC functions and the majority forming a competitive grant fund which RMOs can bid for by proposing schemes for wetland conservation works. For the last 2-3 years of the project these local bodies followed these systems using project funds, to build capacity and gain practice in operating this system.

MACH generated a wide range of lessons summarised in several policy briefs, four of the key messages (adapted from Sultana 2007) were:

- 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.
- Wetland resource management depends on CBO performance and accountability. Meetings should be conducted among stakeholders of different social status so each group can express their problems and possible solutions. Participatory Action Plan Development can ensure poor people's opinions are reflected in resource management. It is a continual process to review progress, identify failures and their reasons, find solutions, and make improved plans.
- Establishing sanctuaries for conservation of fish brood stock during the dry season ensures long-term success of fisheries management by ensuring reproduction of a wide range of fish in the monsoon and by protecting other aquatic life. However, the decision to develop sanctuaries needs to be made by the CBOs.
- Well functioning linkages between community organizations and the local administration are essential. UP chairmen and *Upazila* administration may act as arbitrators when conflicts occur.

A separate co-management approach has developed in wetlands declared as Ecologically Critical Areas (ECAs). Under the Bangladesh Environmental Conservation Act 1995, ECAs can be declared in threatened or degraded ecosystems. In 1999 eight ECAs were declared (with four rivers added in 2009), with the exception of a buffer zone around the Sundarbans all are coastal or freshwater wetlands. In these areas DoE is the lead agency to attempt to establish co-management for conservation. Typically the ECAs, such as Hakaluki Haor, comprise a mix of public lands (waterbodies and other *khas* lands) and private lands. In ECAs where project funding was available the model adopted was to form Village Conservation Groups as local cooperatives, but these lack specific rights over defined wetland areas. While these groups do promote conservation, much of their activities were for alternative livelihood development along ecologically sustainable lines.

Conservation Management Plans were developed through participatory planning processes, with zoning a major aim of those plans. ECA committees were formed at each tier of government: the relevant Unions, *Upazilas*, Districts and nationally. While the aim was the necessary coordination among agencies and stakeholders, in reality any actions have been dependent on funding, and since DoE is a relatively weak agency with limited staffing and budgets, the system of many committees appears not to be sustaining or mainstreamed well into local decision making. So far the key requirement of setting and implementing in a transparent and efficient way strong planning and land use controls over ECAs following management plans and zoning has yet to be achieved.

Forests

Forest and biodiversity conservation in Bangladesh are rooted in cultural traditions and in pre and early post-colonial strategies of the Forest Department. The Charter of Indian Forests promulgated in 1855 recognized the importance of reserve forests and proposed an outline for forest conservation for South Asia (Negi 1994). Concerns for biodiversity assets in the country date back to colonial times. However, during the colonial era, timber extraction, and plantations, drove forestry operations, with the 1894 Forest Policy shifting focus to revenue earning and meeting local needs, and framing of formal government rules to that end. Based on the earlier Forest Policy, the 1927 Forest Act was passed, consolidating central government control over declared Reserve Forests and driving an expansion in plantation management activities. The 1955 Forest Policy reiterated the authority of the Department over forest lands, and re-asserted a silvicultural emphasis on maximizing total yield from the forests.

Recognizing the perilous situation of natural forests in the country, the Forest Department began some limited efforts in the 1960s to create forest Protected Areas from Reserve Forest lands. The largest increase in these declared Protected Areas (PAs) took place in the 1980s after independence. By 2003, Bangladesh had 19 formally declared Protected Areas, all in forests, covering 245,813 ha or 1.6% of the country's surface area. A Wildlife Act was enacted in 1974, at a time when blocks of forest still remained, but the Act allowed no formal role for local residents in PA management or benefits-sharing. Protection of these PAs was top-down, and with the intense population pressure around the PAs enforcement of conservation was inefficient and costly.

In 2003, other than sporadic patrolling and arresting of suspects of timber theft, the Forest Department had no strategy for managing the Protected Areas. A Wildlife "Circle" was created in the 1980s, suppressed, and then re-activated again in 2001, but the Circle is hamstrung by a lack of authority, staff and opportunity for professional advancement. Few of the PAs received matching investments in staff capacity, infrastructure, applied research, or conservation management. In effect, the PA network – although established to encourage protection – brought in many places a reverse impact. Without a budget for conservation practices and any training for conservation interventions, forest staff in the PA sites perceived the postings as places with fewer resources for forest management operations or less "real" work to do.

Meanwhile in the 1990s on public forest lands the Forest Department had been expanding social forestry, a model that gave individuals usufruct rights on small parcels of degraded forest land to plant trees. Social forestry has been participatory, but in a narrow sense: with management of the process directed by the Forest Department which selects the recipients. It had the positive impact of increasing tree cover in deforested areas (with some ecosystem service benefits such as reduced soil erosion), and bringing livelihood benefits to the direct participants (rights, resources and income). However, there was no clear conservation objective or requirement, and since the trees are mostly exotics they have very limited value for wildlife.

Narrow interpretation of the Forest Act 1927 limited community involvement within the Reserve Forest lands. In light of USAID's interest in supporting biodiversity conservation, and the restrictive options for participatory management in Reserve Forest lands, attention turned instead to those "double protected" lands within the Protected Area network covered under the Wildlife Act of 1974. These lands were ostensibly allocated for the conservation of biodiversity, but it was widely recognized even at the Forest Department that the PA forests were in extremely poor condition, with widespread illegal logging, the lack of any management interventions and minimal resource allocation from the Forest Department budget. Also, the forest PA network was extremely small as a proportion of total surface area of the country (only 1.6% in 2003 compared to 5% in India and nearly 10% in Sri Lanka). At the same time, USAID recognized that Government of Bangladesh policy documents had set ambitious goals for biodiversity conservation and participation on forest lands. The Forestry Sector Master Plan of 1994 in particular had called for an increase in biodiversity protected areas to 10% of all forest lands, and called also for participation of local communities in that process. However, little if any progress had been made toward these policy goals.

There was a global move towards more participatory management of PAs in the 1990s. Deardon et al. (2005) reviewed changes in PA management across 41 countries from 1992 to 2002. In 1992 governments were understood to be the "sole decision-making authority" in 42% but this fell to 12% in 2002. With the experience of the MACH project in developing co-management of wetlands, dialogue between Government of Bangladesh and USAID eventually led to the Nishorgo Support Project (NSP) during 2003 to 2008, which aimed to improve biodiversity conservation in the Protected Areas of Bangladesh through development and testing of a collaborative management and governance framework and supporting activities in five forest PAs. The NSP established and demonstrated a model for co-management in five PAs, and resulted in the adoption of co-management for all formal PAs by the Forest Department. The core of this approach was forming a Co-Management Council (and a smaller executive Co-Management Committee) for each forest range within these PAs. These bodies were co-opted and comprised of Union Parishad members and representatives of various stakeholder categories such as the poor, ethnic minorities, local elites, government agencies and NGOs, with the relevant FD officer the member-secretary (Fig. 2).

Co-Management Council Structure	Co-Management Committee Structure
1 Upazila Nirbahi Officer (UNO) - Chairperson 1 Assistant Conservator of Forest or Range Officer – Member-Secretary 9 Representatives from the organized poor 13 Chairmen and members from relevant Union Parishads and *Pourashava* (closest wards to PA, at least 1 woman) 9 Representatives of poor resource users 6 Representative from resource owners (brickfields, sawmills etc) 3 Representatives from ethnic minorities 2 Representatives from local youth 6-8 Representatives from local elite 1 representative of other major stakeholders 1 Representative from law enforcing agencies 4-6 Representatives from other Government agencies 2-4 Representatives from local NGOs Relevant Member of Parliament to act as Advisor Maximum 55 members, including 10 women. Term of those not officials or elected, 4 years.	1 Assistant Conservator of Forest or Range Officer - Member-Secretary 3-4 Representatives from local government (UP) (1 woman) 2-3 Representatives from civil society 2 Representatives from resource user groups 1 Representative from local youth 2 Representatives of resource owner group 2 Representatives from ethnic minorities 1 Representative of law enforcing agencies 2 Representatives from other Government agencies 1 Representative from NGOs Upazila Nirbahi Officer (UNO) - Adviser President and Vice-President to be elected by Committee members from among their membership. Term of office 2 years except for Member-Secretary and law enforcement agency representative

Fig. 2 GoB Approved Co-Management Council and Committee Structure

Apart from the major change of bringing local stakeholders into the decision making process with FD for PAs, this also represented an attempt to decentralize decision making for PAs, and to build capacity among the FD and stakeholders. During NSP formal management plans for each PA were developed through participatory processes, but with a strong involvement of project experts, and approved by FD, with a focus on eco-restoration and developing tourism. A patchwork of support and facilitation for local poor people to reduce forest use and enhance their livelihoods was developed. Greater emphasis was placed on reducing deforestation, and former forest users were mobilized to guard PAs as Community Patrol Groups.

A wide range of practical lessons and recommendations for forest PA co-management were drawn (see Box 1). It was clear that more time and resources were needed not only to sustain co-management in these five PAs, but to help FD take up the approach across its growing PA network. Consequently USAID designed the Integrated Protected Area Co-management (IPAC) project (being implemented between 2008 and 2013) to build on the successful MACH wetland and NSP forest pilots and expand co-management, with the ultimate objective that Bangladesh establish a national network of integrated forest and wetland PAs conserved through co-management. Hence IPAC has taken up the NSP recommendations and is scaling up co-management to the majority of forest PAs (except for some coastal and hill tract PAs), it also provides limited support for the already well established co-management institutions in former MACH sites, and adds value to co-management in some ECAs. This has been conceptualized as a broad "Nishorgo Network" of PAs that will improve coordination and sharing among diverse co-managed conservation sites in Bangladesh, and will promote eco-tourism, local participation in PA decision making and conservation practices.

Significant steps in this process have been the approval of sharing income from visitor entrance fees in forest PAs between the government treasury and CMOs, and reformulating the forest CMO system to strengthen representation of the poor. The latter has been based on forming in each village identified as having made use of a forest PA a Village Conservation Forum (VCF), and for each PA a People's Forum comprising of representatives of the VCFs. The CMO then comprises of FD officers, other government officials, UP members, local elites, and members of the People's Forum, other local people, and also representatives of the Community Patrol Groups. Fig. 3 gives a simplified view of this governance framework in forest PAs.

Contrasting Policy Issues

In early 2012 it is useful to complete this review of context and recent history with some observations on differences in context and in institutionalization of co-management between wetlands/fisheries and forests. In both forests and fisheries a relatively small percentage of public lands so far came under co-management.

Co-managed forests form a distinct sub-set with a legal definition – forest PAs – and the one agency responsible for them (the Forest Department) has committed to co-management arrangements that are reinforced by the authorization given by Ministry of Finance to share entry fees with communities through co-management bodies. There is a reasonable expectation that these arrangements will continue, although they are not enshrined in legislation. Changes have to some extent been simpler since only one agency (FD) was involved, and all are derived from USAID support. This framework offers a long-term future for co-management in forest PAs. The nature of this co-management is inevitably more dominated by that government agency (since the FD held all powers it is gradually reducing those, whereas DoF never held significant powers over waterbodies), and how the process of sharing decision making develops and its impacts are an unfolding story.

In fisheries and wetlands an initial framework was developed by Government of Bangladesh, with little input from USAID, that enabled community based co-management but was time-bound. In 20011-12 the Ministry of Land has not renewed reserved access for CBOs for another 10 years, despite having declared a revised *Jalmohal* policy in 2009 that on paper would encourage this. Co-managed water bodies have no distinct status from any others, apart from being covered by inter-ministerial MOUs. Conservation and fisher livelihood objectives were included in the Ministry of Land's *Jalmohal* policy, but that ministry is not following them and is encouraging local influential to take *Jalmohals* from community organizations, without any longer-term conservation measures (just as has been the case in the majority of *Jalmohals*). A number of these community organizations have used the courts to temporarily halt this process. Although the Ministry of Land has questioned its commitment to the MACH-supported innovation of permanent sanctuaries so far it has not abandoned this.

For forest PAs government commitment to co-management depends on practice within FD. For fisheries and wetlands it depends on politics and power negotiations where Ministry of Land dominates and does not subscribe to long term sustainability.

Box 1: Recommendations from NSP for improving Forest Protected Area (PA) Management

The Authority and Roles of Co-Management Organizations (CMO)

1. Clarify and Further Codify Complementary Roles of the CMO and the Forest Department, Especially for Enforcement
2. The CMO Need to Play More Active and Leading Role in Coordinating Inputs and Resolving Conflicts Across the PA Landscape
3. Allow for a Greater Degree of Site-Specific Governing Solutions within the Co-Management Regulatory Framework
4. Assist in Creation of National Organization to Support PA Co-Managers
5. CMO Need to Prepare their Own Business Plans and Sustainability Plans
6. Secure Direct Financing for Community Patrol Group (CPG)

Capturing Economic Value from Forest Department Lands

7. Simplify Entry Fee-Sharing Process, Adjust Entry Fee Levels, and Allow Cross-Financing
8. Understand and Address the Political Economy Behind PA Entry Fee Auctions
9. Expand CMO-Led and Financed Social Forestry in Buffer Areas
10. Allow Participatory Enrichment and Re-vegetation Plantations in PA "Core Zones" as Part of Ecosystem Restoration
11. Consider Allowing CMO – and Community Patrol Groups (CPGs) in Particular – to Benefit Directly and Monetarily from Success in Halting Illegal Felling
12. Continue Exploring Means of Expanding Carbon Financing Projects
13. Prepare a Legal Framework Formally Allowing CMO to Benefit from Tourism-Related Economic Opportunities on PA Lands
14. Set a New Vision and Policy for Revenue Capture and Sharing from PA Lands

Institutional Changes within the Forest Department

15. Recognize and Accept Co-Management Organizations as the Principal PA Management Partner of the FD
16. Educate and Re-Orient Staff about the Department's Primary Role as Service Provider Rather than Revenue Generator
17. Create a "Protected Areas and Biodiversity Management" Wing at Forest Department
18. Develop Capacity Development and Training Program for PA Managers Across All Levels of the FD
19. Establish and Maintain Common Standards Across All PA through Centralized FD Skills and Leadership
20. Explore New Modalities for Obtaining Feedback from the Public for PA Decisions and Plans
21. Meet 2004 Forest Policy Targets for new PAs totaling 152,000 hectares, and do so through Declaration of PA within Larger Multiple Use Reserve Forests

Supporting Issues and Approaches

22. Facilitate, Finance, and Encourage a Private Foundation Dedicated Primarily to the Protected Area System
23. Co-Management Organizations Should Target the "Marginalized" Rather than the "Poor"
24. The FD and Researchers Need to Develop Knowledge Management Priorities and Strategies for the PA System
25. Extend Efforts to Develop a Unified and Widely Recognized "Brand" for a National Network of Protected Areas

Source: DeCosse *et al.* (in press)

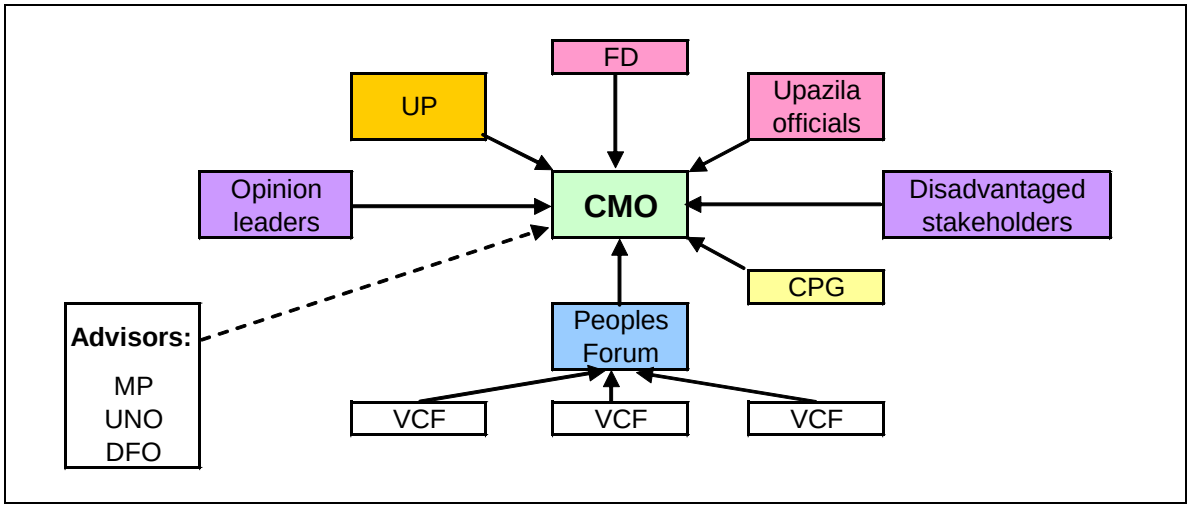


Fig. 3 Simplified Compositions of Revised Co-management Bodies for Forest PAs

Co-management has currently been adopted in 25 forest and wetland PAs across Bangladesh, in forest PAs following the above framework (Fig. 3), and in wetland PAs following the framework from MACH (Fig. 1) and in ECAs the DOE guidelines.

Background on the Focus Sites

Selection of Focus Sites

For this report detailed evidence has been compiled from four representative co-managed PAs, where as far as possible information on the full range of possible impacts was available. These comprise of one wetland system and three forest PAs. They were purposively selected from among the 18 forest PAs and 6 wetland systems where IPAC actively supports co-management (shown in Fig. 4). The following criteria were considered:

- Preference for sites where co-management has been longer established so there is a greater likelihood of detecting outcomes, but with at least one site brought under co-management during the early stages of IPAC project to represent adjustments and learning in the process of establishing co-management.
- To cover at least one of the wetland systems where MACH introduced co-management.
- Preference for sites where more data was already available from published and unpublished sources, and which were relatively easier to visit to collect additional data and qualitative evidence.
- To represent some of the diversity in co-management challenges found among the relevant sites in Bangladesh.

The sites selected to best meet these criteria were: in the north-east Lawachara NP (forest PA with co-management since NSP with relatively more information) and Hail Haor (wetland, with co-management since MACH, good information and nearby to Lawachara), and in the south-east Chunati WS (forest PA with co-management since NSP) and Fashiakhali WS (forest PA with co-management introduced under IPAC.

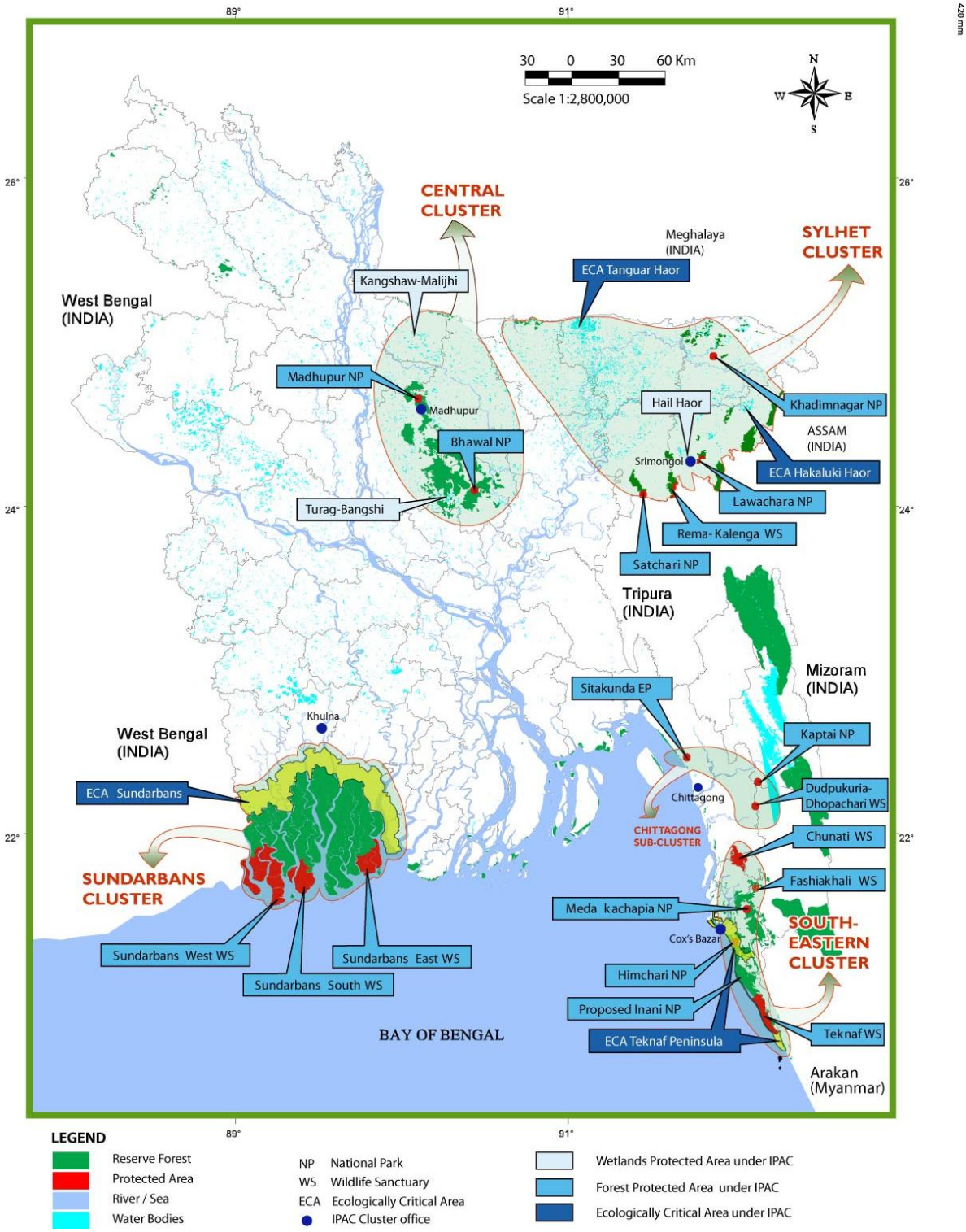


Fig. 4. Locations of Protected Areas with Co-management supported through USAID

Lawachara National Park

This PA was established in 1996 and covers 1,250 ha in Moulvi Bazar District, where one Co-Management Council and Committee were established through NSP in September 2005. About a third of the area comprises old plantations from the 1920s and 1930s that retain a high diversity of native forest trees and are mixed with small patches of original forest. This is contiguous with production plantations in 1,390 ha of West Bhanugach Reserve Forest. Lawachara was originally part of much more extensive forests that were cleared for tea estates and cultivation in the 19th century. It is probably one of the best known PAs in Bangladesh in terms of biodiversity. In addition to an exceptional 249 species of birds recorded within the PA, it is notable for spectacular blooms of arboreal orchids in the early wet season, and a rich mammal fauna including seven primate species.

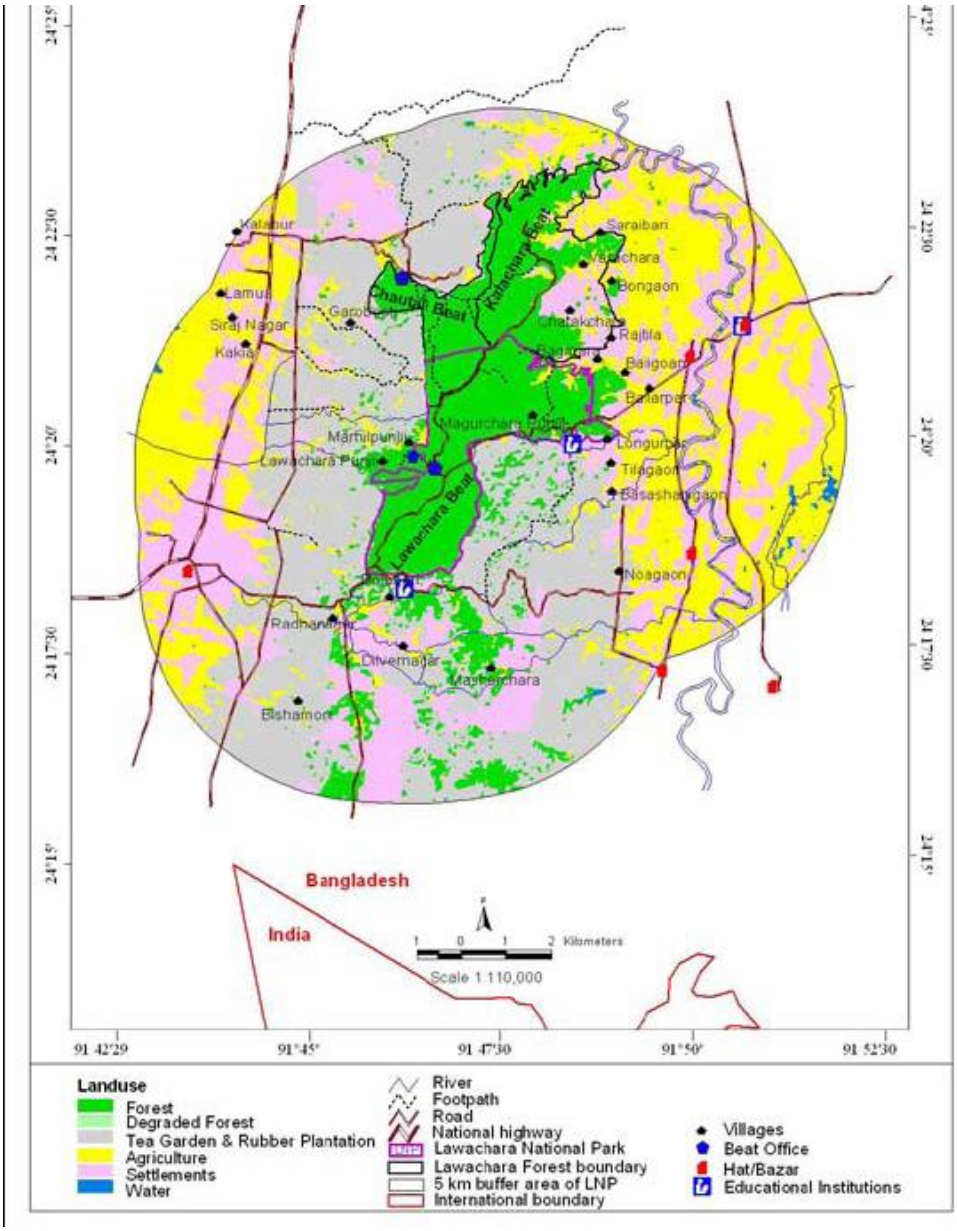


Fig. 5. Lawachara National Park Showing the Surrounding Villages and Landscape

Two forest villages, Lawachara and Magurchara, inhabited by 63 households of the *Khasia* ethnic minority and established in the 1940s and 1950s are located inside the PA where they cultivate betel leaves in 130 ha. A further 16 villages are located within 5 km of the PA boundary; many are inhabited by migrants who moved here in the 1950s, with also a *Tipra* ethnic minority village abutting the PA to the south. Over 2,200 households (over two-thirds considered poor) inhabit these villages, and most make use of the PA to obtain firewood, timber, fruits and food including occasional hunting. However, in these uses they are joined by

many of the workers from six tea estates that border the PA as well as the poor living around Srimangal and Komolganj towns. The PA and communities and landscape around it are shown in Fig. 5.

In 2011 24 out of the 65 members of the Co-Management Council were poor (owning under 0.5 acres or 0.2 ha of land), and 15 were women, membership includes representatives of *Tipra, Khasia* and *Monipuri* ethnic minority groups living around the park. Although women and ethnic minorities are actively involved in the decision making processes of the CMO, issues addressing the needs of the poor tend to be limited to identifying beneficiaries for support to develop alternative incomes. The Arannayk Foundation has provided funds for a revolving loan fund operated by the CMO, and the CMO also operates a welfare fund to support community patrol group members when they are attacked by hunters or illicit loggers during their duty. The Co-Management Committee is the executive body of the council and met in nine out of the scheduled 12 months in 2010-11 with an average 70% attendance of members, while the council met only once in the year. The latest change in office bearers took place through a show of hands in April 2011, and the last revision to the management plan for the NP was made in July 2010.

Chunati Wildlife Sanctuary

This PA was established in 1986 and covers 7,764 ha in Chittagong and Cox's Bazaar Districts, southeast Bangladesh where two Co-Management Councils and Committees were established through NSP in August 2005 (Chunoti range) and August 2006 (Jaldi range). About a quarter of the area is under rice cultivation, and only about 1% is reported to be remnant native forest. The vast majority of the PA comprises of secondary growth, scrub and extensive areas of sun grass, including some areas where plantations of exotic trees were attempted. Until the mid 1980s, when the PA was declared, much of this area still comprised of evergreen forests, but there was extensive logging and encroachment since that time. This accelerated when settlers moved into the area after the 1991 cyclone. By 2003 it was probably the most degraded PA in Bangladesh in terms of habitat and biodiversity. About half of the many villages and neighborhoods (*paras*) using the PA are located within the PA.

While it is clear that many people live within the PA boundary, the actual number is uncertain with estimates of 15,000 people living within the PA, or of 7,800 households (over 40,000 people) living in or adjacent to the PA and heavily dependent on it. Over 60% of these households are considered to be very poor, most make use of the PA to collect bamboo, firewood and sun grass, but they also collect fruits and hunt. Many households adjacent to the PA are involved in betel leaf cultivation and this has encroached into the PA. However, a major use is for rice cultivation and some households have documents indicating that they were given rights to land in the PA as part of settlement of landless people by the district administration. The PA and communities and landscape around it are shown in Fig. 6.

In 2011 26 out of the 64 members of the Chunati Co-Management Council and 30 out of 60 members of the Jaldia CMC were poor (owning under 0.5 acres or 0.2 ha of land), and 22-23% were women. Although women participate in meetings where decisions are made, issues addressing the needs of the poor tend to be limited to identifying beneficiaries for support to develop alternative incomes. Neither CMO operates a revolving loan fund or any welfare fund to support poor members facing hardship or injury when protecting the PA. Under each council is a Co-Management Committee and these met in nine and eight months out of 12 in 2010-11 with an average about 60% attendance of members, both use rented offices. Jaldi council met twice and Chunati council met once in the year. The latest changes in office bearers took place through a show of hands in July-August 2010, and the last revision to the management plans for the WS were made in December 2011. Non-FD stakeholders are not involved in coordination of management of the entire PA, which is in the hands of the FD.

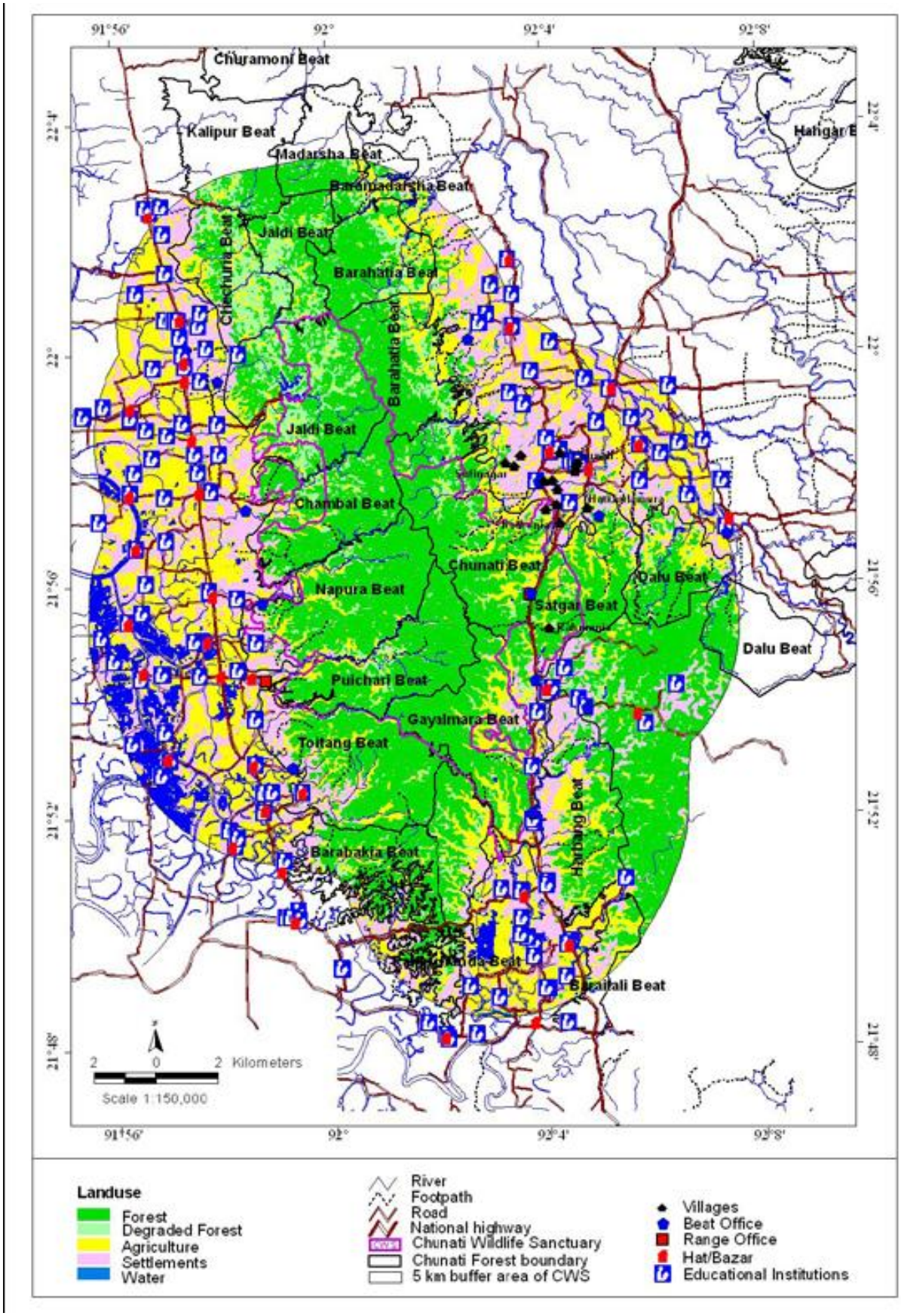


Fig. 6. Chunati Wildlife Sanctuary Showing the Surrounding Villages and Landscape of Fashiakhali Wildlife Sanctuary

Fasihakhali Wildlife Sanctuary

This PA was established in 2007 and covers 1,302 ha in Cox's Bazar District, southeast Bangladesh, where one Co-Management Council and Committee were established by IPAC in December 2009. The area comprises mostly of plantations of Garjan (*Diperocarpus* sp.) and exotic trees, and degraded grass covered hills, much of the original larger native trees were lost to forestry activities in the 1970s-80s and to illegal felling in the 1990s-2000s prior to establishment of the PA. Although there were two forest villages established here in the 1950s by the Forest Department, in the last two decades not only has the population of those villages expanded rapidly, but *Rohingya* immigrants have swelled the population. There are now 16 villages within the PA inhabited by about 5,500 households and 33,000 people, with another 25,000 people estimated to live nearby and make use of the PA. The main human uses of the PA are for collecting fuel wood, sun grasses and bamboo, and the considerable human encroachment has squeezed the significant elephant population of the PA into a small part of the area. The PA and communities and landscape around it are shown in Fig. 7.

In 2011 30 out of the 65 members of the Co-Management Council were poor (owning under 0.5 acres or 0.2 ha of land), and 14 were women. Although there is a *Marma* ethnic minority village in a corner of the forest they so far have had no real say in decision making. Committee discussions relating to the poor have focused on Community Patrol Group orientation and identifying beneficiaries for support to develop alternative incomes. The CMO does not operate a revolving loan fund or any welfare fund to support poor members facing hardship or injury when protecting the PA. The Co-Management Committee is the executive body of the council and met in all 12 of the scheduled months in 2010-11 with an average 64% attendance of members, but despite being formed in December 2009 the council did not meet during 2010. There has been no change in office bearers since CMO formation in November 2009, and the management plan for the WS was developed in November 2010.

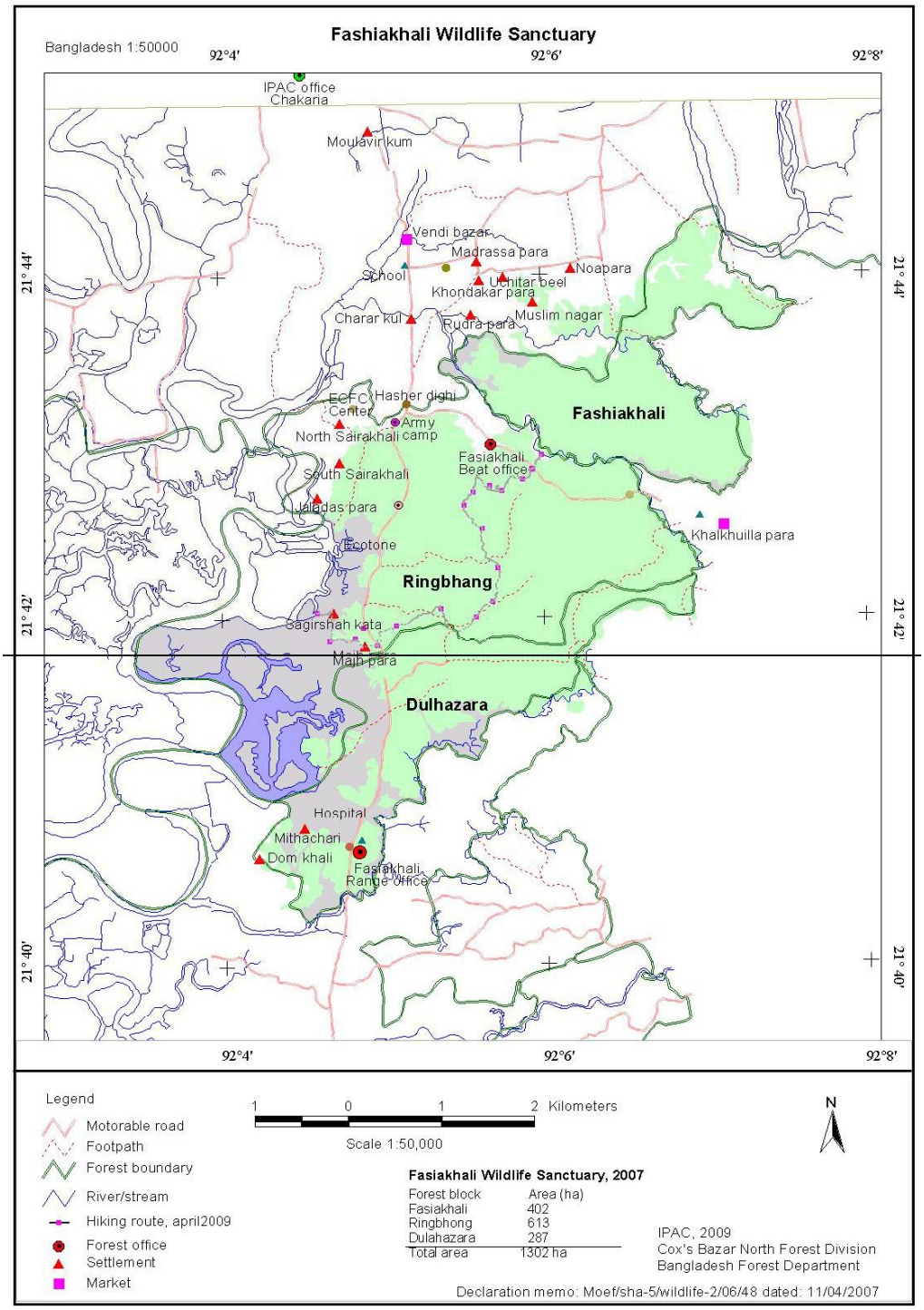


Fig. 7. Fashiakhali Wildlife Sanctuary Showing Nearby Villages

Hail Haor

This wetland in Moulvi Bazar District, northeast Bangladesh is fed by 59 streams from low hills to the east and west, which are covered by a chain of tea gardens and natural forest blocks. The river *Gopla* flows through the wetland from south to north, downstream flood control dykes and a sluice gate now limit its connection with the *Kushiyara* and *Manu* Rivers. The *haor* floods during the rainy season (May-October) when it extends to cover over 13,000 ha, but at the peak of the dry season (March) reduces to around 3,000 ha of water in over 100 separate waterbodies or *beels*. Private land exposed as the water level recedes is converted to rice fields. In Hail Haor the co-management arrangements comprise of:

- Eight RMOs representing the local population using each part of the wetland. The RMOs incorporate all types of local stakeholders – fishers, farmers, landless, local opinion leaders, men and

women. They protect, manage and restore productivity of their area of wetland and ensure fair access for local poor fishers. The areas influenced by each RMO are shown in Fig. 8.

- Five Federations of Resource User Groups (FRUGs) comprising only of poor men and women who previously made use of these wetlands. They operate savings and credit funds for their members. Members received skills training to diversify their livelihoods so that they became less dependent on fishing and could comply with restrictions on wetland use set by the RMOs without suffering economic hardship.

- Five existing Union Parishads (UPs, local councils, the lowest tier of government in Bangladesh each covering several villages) are involved. The RMOs are now invited to their respective UP meetings.

- Co-management was formalized through *Upazila* (sub-district) level committees (one in each of two *Upazilas* covering the *haor)* where Government officials at *Upazila* level, UP chairmen, RMO presidents, and FRUG presidents sit each quarter to coordinate and oversee wetland management.

The status of wetland and the co-management arrangements are therefore considerably different from forest PAs. One notable feature here has been that the Ministry of Land set aside in 2003 a key wetland area of about 100 ha (Baikka Beel) to be a permanent sanctuary which is managed by one of the RMOs for the benefit of wetland conservation and all *haor* users. This is the largest community managed sanctuary in the country. Within 2-4 years of protection from exploitation, some excavation, and replanting of swamp forest, this sanctuary has proved effective in conserving fish to repopulate the whole *haor* and to restore other wildlife, notably waterbirds.

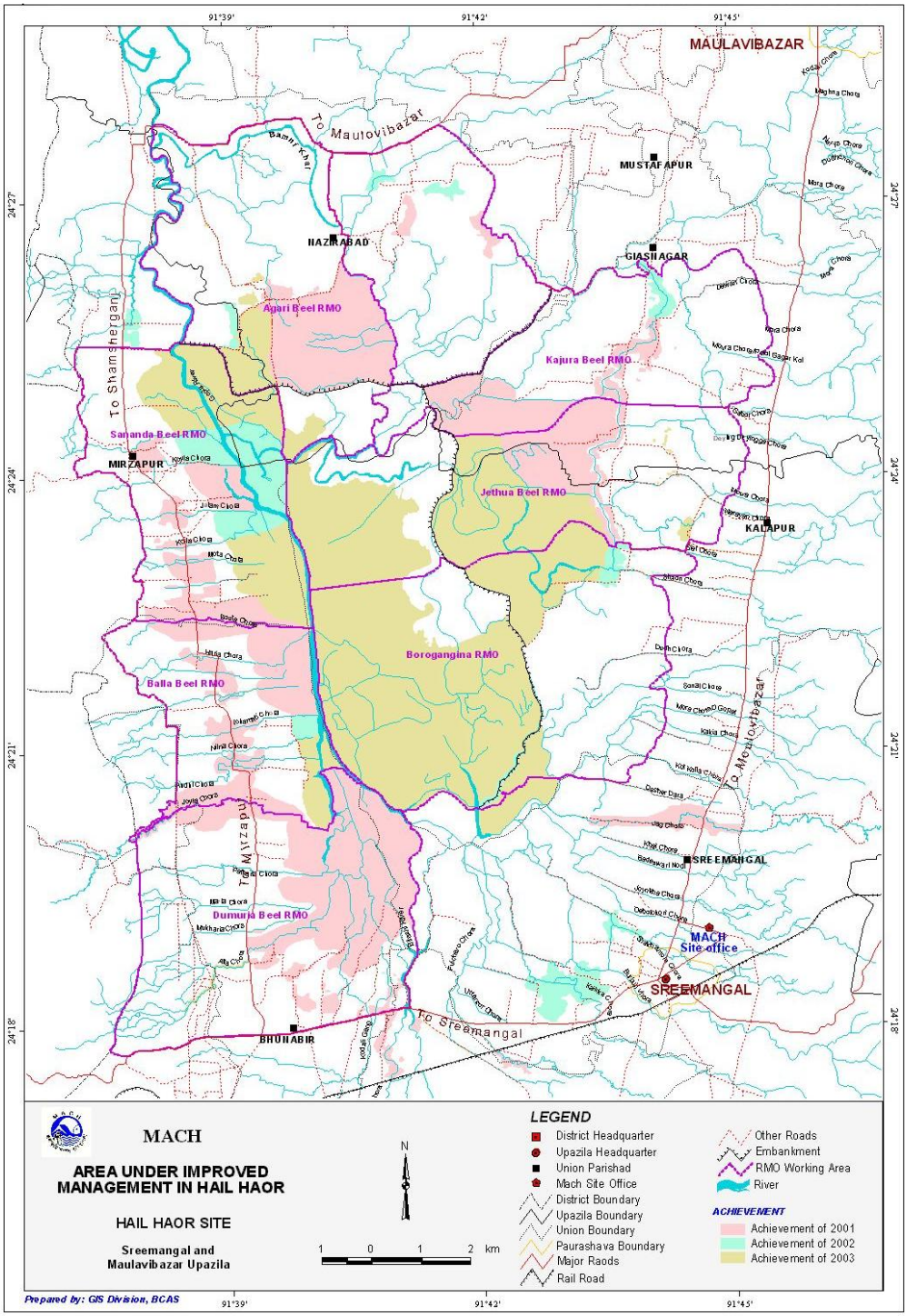


Fig. 8. Hail Haor Showing the Intended Influence Areas of the Eight RMOs Established There

In the following sections evidence on the impacts of co-management is presented and discussed by theme, illustrated for these PAs, and in some cases summarizing information compiled in April 2011 from 35 co-management bodies active in 15 of the PAs/sites covered by IPAC. An obvious and intended implication of the selection of sites is that the changes reported arise from different durations of co-management: the baseline in the wetland site where MACH initiated co-management is from 1999-2000, in the two older forest PAs supported under NSP the baseline is from about 2004, and in the one newer forest PA co-management only started in 2009.

3. OUTCOMES FOR BIODIVERSITY CONSERVATION AND ECOSYSTEM SERVICES

Biodiversity Indicators

As noted in the introduction (context) the recent general trend for forest and wetland ecosystems has been one of continued degradation and losses in Bangladesh, and this negative trend would likely have continued in the PAs without co-management. Instead the evidence presented here indicates that biodiversity conditions are restoring (improving) in the studied forest and wetland PAs under co-management compared with initial degraded and diminished levels, although the extent of recovery depends on the period of time of enhanced protection, and the speed of recovery depends on the regenerative capacity of different types of vegetation and faunal groups.

Ultimately if co-management of PAs is effective and efficient, it should result in reduced degradation of ecosystems and even recovery of degraded habitat, and this in turn will result in maintenance or recovery of biodiversity. Measuring changes in habitat is complex, and although some evidence is available (see below), more information has been collected on indicator species as measures of biodiversity change. In forest PAs the population densities based on encounter rates of selected indicator bird species have been monitored by experienced bird watchers along a number of representative transects in PAs. In wetlands fish catches of actual fishers have been monitored in representative areas around the year to determine fish species diversity and overall catches, and mid-winter counts of waterbirds give a measure of population and diversity trends.

The evidence summarized below clearly indicates that ecosystem condition and biodiversity have improved within three or more years of starting co-management and associated improvements in protection and restoration of habitats, at least for those components of ecosystems that have the capacity to respond in this time frame – forest undergrowth and wetland vegetation and fisheries.

Forest Birds

Monitoring of populations of purposively selected bird species chosen because they depend on different strata of forest has been used to assess the consequences of any changes in forest habitat that might be associated with co-management. Although populations of forest dependent birds are clearly higher in Lawachara compared with Chunati (where tree cover was much less), Figs. 9 and 10 indicate increases in populations of two species that mostly use the ground and undergrowth of forest – Red Jungle fowl *Gallus gallus* and Puff-throated Babbler *Pellorneum ruficeps*. The lack of changes in this period for other indicator species which are not ground/undergrowth dependent is consistent with other strata of forest vegetation taking longer to recover.

Changes between the 2005 baseline and 2008 have been standardized as percentage changes and averaged for three guilds of birds monitored: ground and understory, middle level and canopy preferring species. This shows clear evidence of a substantial (45-50%) increase in population of ground and understory species (Fig. 11) which is consistent with the recovery of undergrowth and reduced human disturbance possible during four years. No matter how effective forest protection might be under co-management it would take longer than this for larger trees to grow and hence little change in mid-storey bird populations (White-crested Laughingthrush *Garrulax leucolophus*, Greater Racket-tailed Drongo *Dicrurus paradiseus*, Red-headed Trogon *Harpactes erythrocephalus* and White-rumped Shama *Copsychus malabaricus*) could be expected. Chunati already had very few large trees and only one of two canopy indicator species was present so little change could be expected. However, Lawachara had large trees and the 10% decline in canopy dependent species (Fig. 11) suggests that there was loss or disturbance to nesting holes, and/or some continued loss of larger trees to illegal felling.

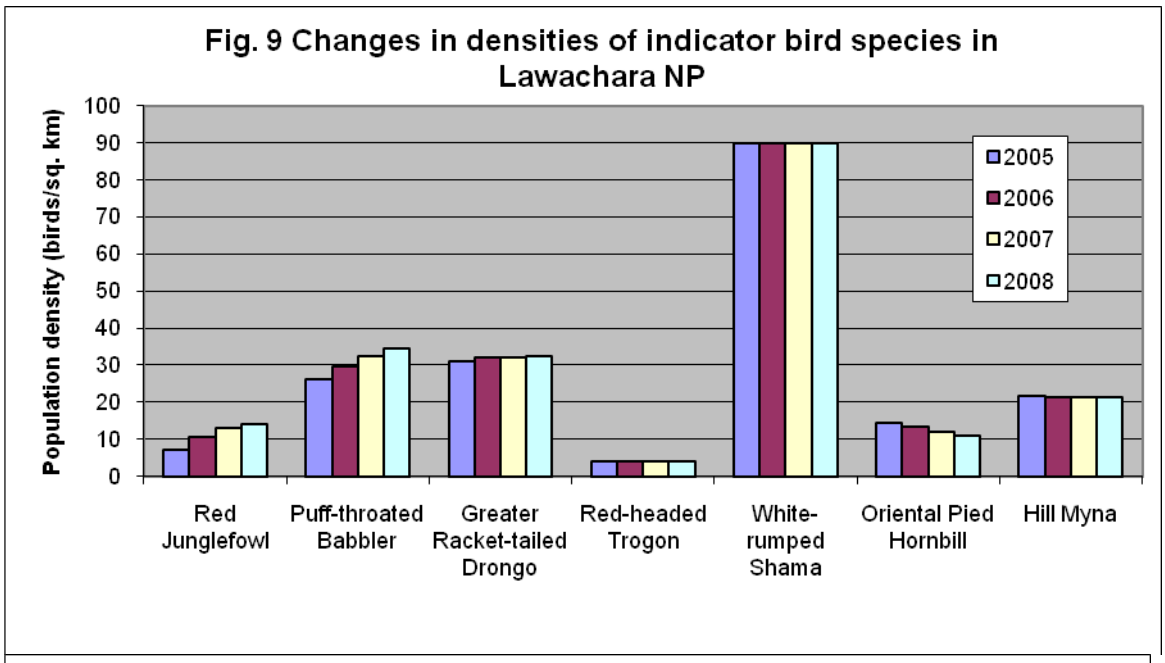


Fig. 9 Changes in densities of indicator bird species in Lawachara NP
Population density (birds/sq. km)
100
90
80
70
60
50
40
30
20
10
0
2005
2006
2007
2008
Red Junglefowl
Puff-throated Babbler
Greater Racket-tailed Drongo
Red-headed Trogon
White-rumped Shama
Oriental Pied Hornbill
Hill Myna

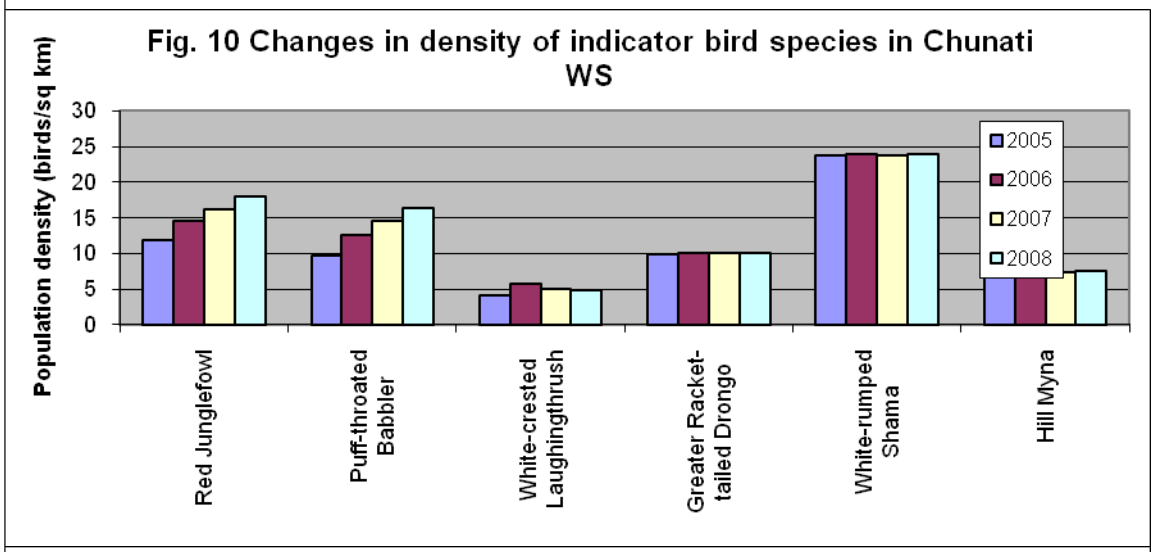


Fig. 10 Changes in density of indicator bird species in Chunati WS
Population density (birds/sq km)
30
25
20
15
10
5
0
2005
2006
2007
2008
Red Junglefowl
Puff-throated Babbler
White-crested Laughingthrush
Greater Racket-tailed Drongo
White-rumped Shama
Hill Myna

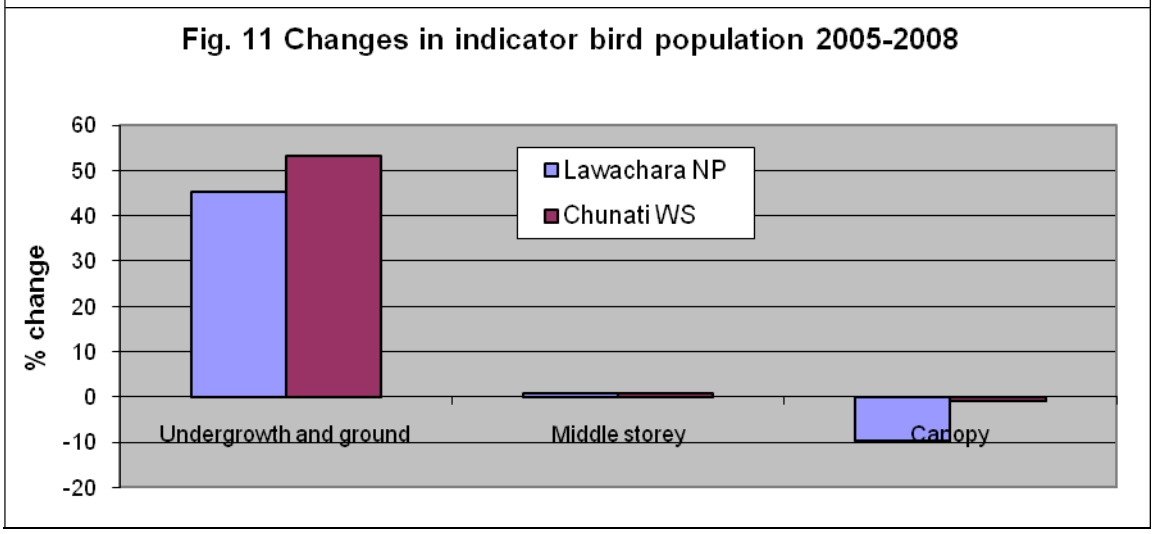


Fig. 11 Changes in indicator bird population 2005-2008
% change
60
50
40
30
20
10
0
-10
-20
Lawachara NP
Chunati WS
Undergrowth and ground
Middle storey
Canopy

Wetland: Waterbirds

Since 2004 Baikka Beel, a modest 100 ha within about 12,000 ha of Hail Haor, has been set aside as a wetland sanctuary by the Government of Bangladesh, up to 2008 with support of MACH project. Throughout this time, and continuing, it has been managed and protected by the local community in the form of Baragangina Resource Management Organization. As of December 2011, 162 bird species have been recorded in just this 100 hectare protected area, compared with 91 species by August 2006. Conservation measures in the whole *haor*, and especially in this important sanctuary, not only protect fish stocks but also the diverse wildlife and wetland landscape.

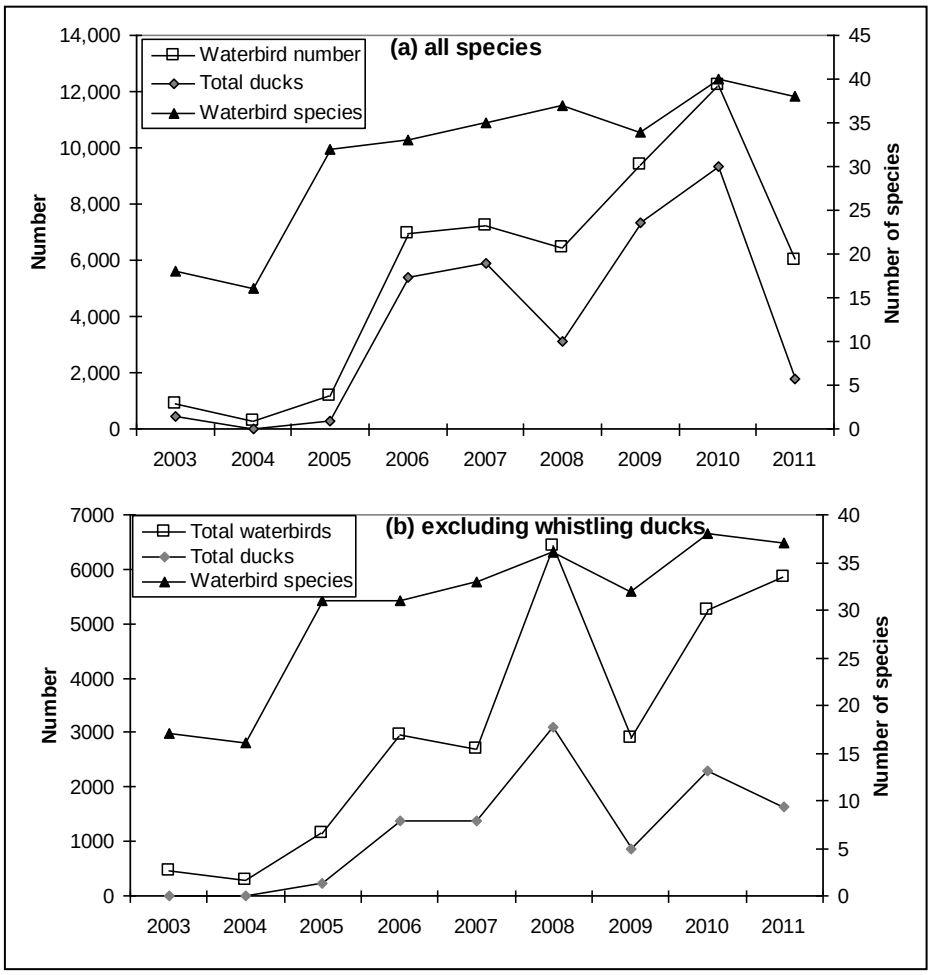


Fig. 12. Baikka Beel Mid-winter Water Bird Census. Counts were conducted each year in January or early February as part of the Asian Waterbird Census (AWC). (a) All waterbird species as defined by Wetlands International and following AWC methods. (b) Excludes two species of whistling ducks which usually are present in large flocks but in some years moved to other parts of Hail Haor.

Waterbird numbers and diversity increased rapidly with protection through co-management. The mid-winter waterbird census shows an increase from about 300 waterbirds of 16 species in January 2004 to a peak of 12,250 water birds of 40 species in January 2010 (Fig. 12a). The apparent drop in 2011 is because the usual large flocks of whistling-ducks were absent (Fig. 12b), some had moved to nearby areas to feed. Numbers of locally resident birds have increased, for example Purple Swamphen *Porphyrio porphyrio* numbers rose from 30 to over 1,000. Globally threatened species also returned: up to 12 Pallas's Fish Eagle *Haliaeetus leucoryphus* (Vulnerable) now spend the winter here.

Planting of 48,000 swamp forest trees by RMOs, including along one side of Baikka Beel sanctuary and protecting associated marshy vegetation of "*dhol kolmi*" *Ipomoea carnea fistulosa* has restored an important wetland habitat for migratory passerines. In December 2011 the little known Large-billed Reed Warbler *Acrocephalus orinus* was recorded here, the first undoubted record in South Asia for 78 years. Overall 147 species of bird had been recorded in Hail Haor up to February 2000, but by December 2011 65 species had been added, most in the Baikka Beel sanctuary, (pers. obs.; Thompson *et al.* 1993; Thompson and Johnson 2003; Thompson unpublished data).

Wetland: Fish Diversity and Catches

The main outcome expected from wetland co-management has been restoration of wetland habitat and limits on fishing effort that result in an overall increase in fish catches. Most fisheries in Bangladesh are over-exploited, dry season refuges for fish are severely limited or completely drained out each year, and many connections between rivers and *beels* are blocked or interrupted by sluice gates affecting natural migrations.

The key actions noted earlier by the RMOs are establishing fish sanctuaries, observing closed seasons when most fish spawn, ending dewatering, and re-excavation of silted up waterbodies, complemented by some releases of locally scarce species and swamp forest planting.

Detailed monitoring of fish catches indicates that there has been some increase in the number of species caught each year, and that diversity has increased (catches after two years of improved management are less dominated by a few species (Table 1). During 1999-2006 32 fish species considered to be nationally threatened were recorded in Hail Haor, and 24 nationally threatened fish species were recorded in the sample catch in 2010 in Hail Haor.

Table 1. Fish Diversity in Hail Haor

Year	No of species	Diversity index*
1999-00 (baseline)	71	2.801
2000-01 (impact 1)	71	2.969
2001-02 (impact 2)	69	3.419
2002-03 (impact 3)	76	3.405
2003-04 (impact 4)	67	3.357
2004-05 (impact 5)	81	3.599
2005-06 (impact 6)	75	3.428
2010 (impact-11)	81	3.599

Years defined as: April to March, except for 2010 (February 2010 to January 2011).

* Shannon-Wiener diversity index (H') calculated using the weight of each species recorded in the sample of fishers' catches and defined as:

$$H = -\sum_{i=1}^{s} pi \log_e p$$

Where,

H: index of diversity

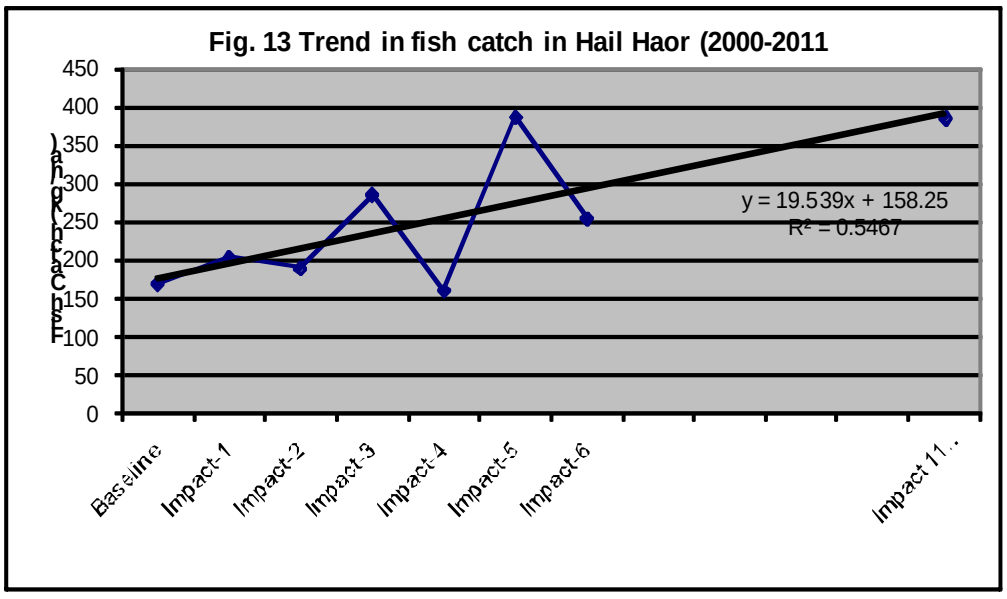
s: number of species observed

pi: proportion of individuals in the i^{th} species.

Data derived from monitoring fishers' effort and catches in seven study areas (total of 1,174 ha) every 10 days throughout the study period; except for 2010 (six study areas monitored every 7 days).

Sources: MACH (2007); IPAC (2011)

Unlike forest PAs, in co-managed wetlands local people involved in co-management directly benefit from restored biodiversity and productivity. Fish catches have more than doubled in Hail Haor as a whole (not just those parts managed by RMOs) in ten years from 171 kg/ha in 1999 to an average of 322 kg/ha in the last two years of MACH data and to 387 kg/ha in 2010 (Fig. 13). The 2010 catch per unit area is close to the maximum considered sustainable for a healthy floodplain wetland ecosystem. Based on a wet season water area of 12,490 ha for which the monitored areas are representative, the incremental production of fish in 2010 amounts to 2,697 tons in Hail Haor.



Habitat Indicators

Assessing changes in habitat such as vegetation is complex, which is why ultimate indicator groups (birds and fish) have been considered. However, qualitatively the stakeholders in co-management reported during assessments in April 2011 that habitat was improving. For example in Lawachara NP since 2008 the CMO considers that forest condition has improved in about 30% of the PA, and likewise improvements were reported in under half the area of Chunati and Faishkhali. Thus forest recovery is considered by local people to be substantial but localized within PAs. More detailed evidence on loss of trees or recovery of vegetation is limited.

Lawachara NP is surrounded by 22 villages that bring enormous pressure on its forests. The Park was initially divided into four patrolling sectors based on consultations with the members of existing Forest User Groups (40 groups with a membership of 536 households). In addition to these community patrol groups (CPGs) established around 2004, an extra all women group was formed in 2007. Local divisions and conflicts within and between communities have affected functioning of this system at different times, but the CPGs are still functioning. Despite initial problems, Fig 14 indicates a substantial reduction in the number of trees recorded in FD registers as having been felled (illicitly) within Lawachara once co-management and community patrol groups became effective. Nevertheless there has still been a loss of 300-400 sizeable trees a year, and as noted in Fig. 11 above regarding indicator birds this can have a long term impact o the forest canopy.

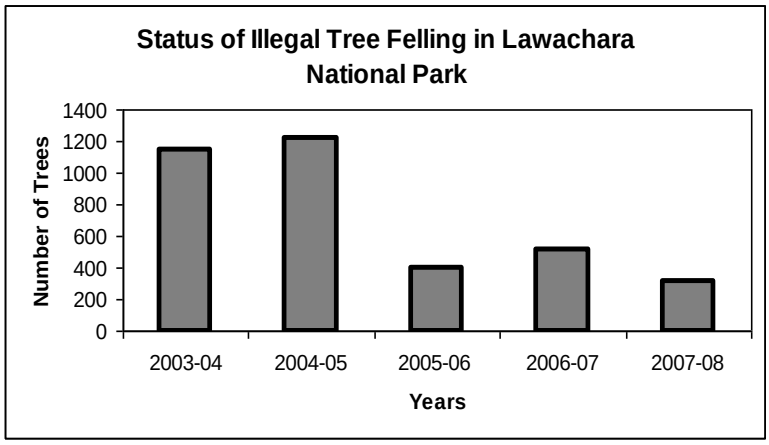


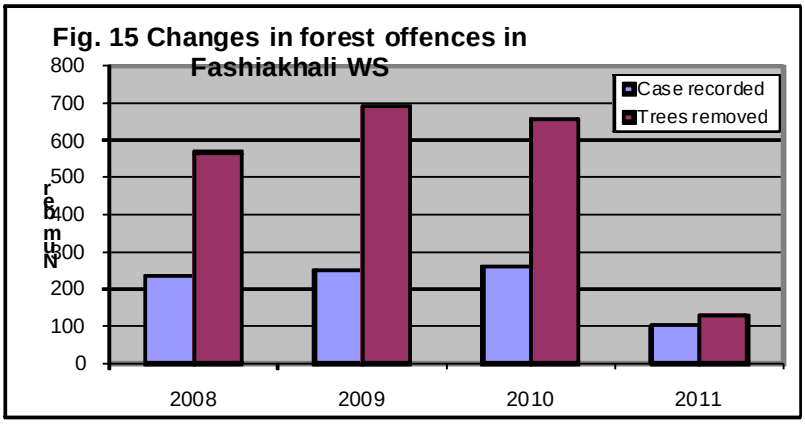
Fig 14. Illegal Tree Felling in Lawachara NP

Similarly in Fashiakhali WS there has been a dramatic reduction in both the number of tree felling offences recorded in the PA by the FD in 2011 (Fig. 15). Co-management started here in late 2009 and appeared to have little impact on deforestation in 2010, but in 2011 the officially recorded loss of trees was reduced to 20% of the level in the three previous years once CPGs and joint patrols became active. There are two factors at play here; there is a positive impact from joint patrols and CPGs in reducing actual logging. But in addition, with co-management FD has taken a less conflictual approach to addressing the problem and prefers where it can to use local mediation and institutions such as village courts (*salish*) to take action against offenders rather than the formal legal cases logged in its offence registers and used in compiling Fig. 15. This new approach to dealing with logging is fully in keeping with co-management and the development through collaboration in new and existing institutions of social pressures against deforestation, but appears to resulting under-recording of loss of trees.

Social, Institutional and Governance Impacts

Key aspects of co-management institutions are the rules and norms established regarding exploitation of natural resources and regarding decision making processes. Locally determined rules and norms are set within a wider regulatory, policy and governance framework. In part this has been discussed in the general context, but key points in Bangladesh are:

- Regulatory – there are already national level laws and rules covering forests, wildlife, fisheries and wetlands



which determine some of the framework for local rules under co-management. Where there is some flexibility to set local rules within the spirit if not definition of those national regulations compliance and enforcement may be higher. For example, national rules on minimum allowable catch sizes for some fish species are unenforceable while locally designated sanctuaries (no-fishing zones) can be enforced by communities and achieve the same intended impact.

- Policy – in forests co-management has been adopted as policy by the one government agency (Forest Department) controlling them, but in wetlands while both Department of Fisheries and Department of Environment have adopted co-management in some key sites this is seriously constrained by lack of support from the land administration system.

- Governance – political patronage and rent seeking are commonplace at various tiers in Bangladesh and set norms that inevitably influence past management and current co-management at PA level. On the other hand where co-management brings together all key stakeholders in decision making, this creates greater transparency and is expected to result in more equitable outcomes. This also represents a challenge to existing power relations, so that a level of constructive conflict may be desirable when establishing co-management. These changes are apparent in the forest PAs, where both FD staff and CPG members regarded their involvement as a check on past abuses resulting in loss of trees by the other party, and where there are inevitably tensions associated with this change. This is a positive aspect of "conflict" or challenges between co-managers in forests. In wetlands the opposite exists: DoF and fishers have largely shared interests, but both lack power to resist changes in policy implementation dictated by Ministry of Land.

Natural Resource Rules and Compliance

For co-management to be effective there needs to be an agreed management plan and set of resource related rules governing access and resource exploitation that are locally agreed and accepted by the community stakeholders, i.e. that goes beyond general top-down laws and rules regarding issues such as illegal logging or fishing practices. All of the CMOs have developed management plans for their areas. In the case of wetlands these relatively simple plans are recorded in the resolution books of the RMOs, and are reviewed and revised annually by them with advice from DOF (except for the wetland sanctuary in Baikka Beel where the plan was approved by the *upazila* fisheries committee and has yet to be reviewed). In Hail Haor wetland the common rules and norms of the CMOs are observing one or more fish sanctuaries (no-fishing zones), a ban on "harmful" fishing gear, a ban on dewatering, and fees for fishing.

In the forest PAs the initial management plans were more elaborate and indicative rather than practical sets of targets and actions, and required approval by FD centrally, which took away significant parts of decision making from the field level, while having the main plan in English made it inaccessible for many co-management stakeholders. In the case of Lawachara NP the initial plan of 2006 was, at IPAC's instigation, reviewed and revised by the CMO in 2010 (for example adding plans for use of income from visitor fees). This revised plan is in Bangla and is more clearly owned by the CMO since the FD agreed that higher level approval would not be needed for updating management plans, so it has been approved by the CMO including relevant FD staff, who shared the final draft with the DFO for comments. That forest PA management plans are not reviewed or revised annually in part reflects the longer time needed for management actions and their impacts in forests compared with wetlands and fisheries (trees take longer to grow and then for dependent fauna to recover compared with aquatic plants and fish populations, as already discussed in the previous analysis of outcomes).

Moreover the CMOs also prepare annual development plans for interventions that they plan each year. Nevertheless, infrequent review and revision of plans is, compared with annual reviews, less likely to develop capacity among co-managers to critically assess their management plans and practices, draw their own lessons, take decentralized responsibility, and respond promptly to changes in threats and opportunities. In practice in all the forest PAs the typical rules in place are reported to be: no cutting of trees, no hunting, no fires, and limits on collection of non-timber forest products (NTFP) for use.

The level of compliance with these rules in 2010-11 was similar in all of the sites considered – there was a moderate level of rule breaking reported in all three forest PAs, and in five out of eight RMO areas of Hail

Haor (two others had little or no rule breaking but one had serious problems). However, there are differences in the resolution of these problems. In almost all of the wetland cases the CMO could take actions itself to enforce its rules, including taking written commitments in meetings from the rule breakers to change their ways, imposing fines on offenders, or even to cancel their membership; and it was reported that in almost all cases the issues had been resolved in the last year. This ability to set and enforce graduated sanctions is a key characteristic of effective community based co-management (Ostrom 1990).

However, in the forest PAs it was reported that some actions were taken, but that this failed to overcome rule breaking – in forests while community participants can actively help in trying to reduce illicit logging, ultimately enforcement against apprehended loggers depends on lengthy and convoluted legal proceedings. The Forest PA co-managers have relatively easy access to formal legal forums through the FD. But even where a CMO is recognized by local communities as having authority in its management area, it needs to call on higher levels of sanctions and legitimacy in some cases – Agari RMO in Hail Haor had taken up legal cases against rule breakers, but they obtained bail and then continued to fish against the rules.

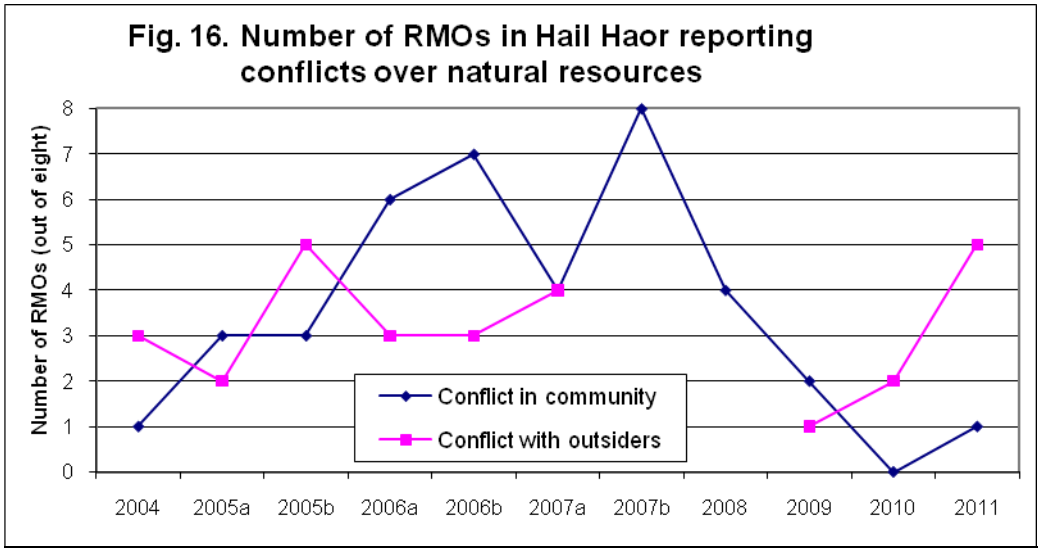
Cooperation and Conflict

Co-management is expected to reduce conflicts and improve cooperation by bringing together a range of stakeholders in decision making, and this is considered to be one of the main advantages of co-management (Carlson and Berkes 2005). In this model, effective co-management bodies play a significant role in conflict resolution/mediation/avoidance. Potential measures of this are the numbers of conflicts reported and the outcomes, and the extent of government support for communities in addressing conflicts and outcomes of such support. Importantly the concerned government agencies in these co-managed sites are not reported to have come into conflict with community partners in co-management in the last year or so.

In all of these co-managed sites there were no reports of conflicts over natural resource management within the participating communities in 2010-11, which indicates locally good support for management systems and decisions by the CMOs. The two exceptions were Agari RMO in Hail Haor where some members and non-members were encouraging non-compliance with the management plan and Dumuria RMO at the end of 2011. In the latter case there was a difference of opinion between two halves of the executive committee over a decision to sell fishing rights (a normal part of RMO management systems) to an area close to their sanctuary, but RMO members still believed that this could be resolved without recourse to any legal process. Moreover the situation is more complex for forest PAs – while no conflicts within communities were reported over this, in practice Community Patrol Groups come into conflict with fellow villagers where the latter engage in PA exploitation. There was no clear pattern regarding conflicts with outsiders in 2010-11: in Lawachara and Fashiakali none were reported (although in practice intrusions by people to cut trees and fuel wood are still regular occurrences, at least in Lawachara where groups of people cutting firewood were encountered in December 2011). In Chunati only one out of three such conflicts was resolved. In Hail Haor despite co-management being longer established five out of eight RMOs experienced outsiders breaking rules or coming into conflict with the RMO, and in two cases the problem was not resolved.

Although where co-management is longer established it might over time be expected to enhance cooperation and reduce conflicts, it is difficult to reach a clear conclusion on this. Some data on the extent of rule breaking and local conflicts over resource management is available for the Hail Haor RMOs for the period 2004 to 2011 (Fig. 16), this indicates that at least in wetlands some level of rule breaking (usually using fishing gears or methods that are restricted) is an ever present issue such that even though compliance is generally good it is very rare for rule breaking to be completely absent. A similar pattern also exists in the forest PAs where despite joint patrolling and extensive awareness raising a reduced level of illegal logging and firewood cutting persists.

The series of data from Hail Haor also indicates that conflicts both within the concerned communities and with outsiders have continued, but there has been some reduction in the number of CMOs facing such conflicts since 2007. In part this reflects drawn out legal processes – legal cases brought by outsiders against RMOs or by RMOs against those encroaching on managed wetlands dragged on for several years in the courts, but it may also mean that over time co-management has helped to resolve some conflicts and that acceptance of RMO management systems and rules grew. A resurgence of pressure from outsiders in 2011 reflects the latent interest of better off people to capture the benefits that fishers have enjoyed from improved management.



Co-management is expected to strengthen cooperation between government agencies, local government and local communities, particularly in addressing local problems such as these conflicts. In Hail Haor half of the CMOs reported receiving help from Department of Fisheries whenever requested, and the other four CMOs in most cases, and they reported that generally this helped to reduce conflicts and improve compliance. Similarly Union Parishad interventions at the request of the RMOs were helpful, but in six out of eight RMOs this resulted in only a temporary easing of conflicts. Not only are wetland resource conflicts more effectively resolved, but RMOs such as Balla report that they are now recognized within their communities to the extent that their committee members are called in to mediate and resolve non-wetland disputes as well as disputes between villages over fishing grounds when before such issues would have needed to involve the Union Parishad to reach an acceptable solution.

There is, however, one exception to this pattern, Baragangina RMO which manages Baikka Beel sanctuary has over time strengthened its profile, recognition and contacts with government through the high profile of the sanctuary and frequent visits by senior officials to the extent that its office bearers can now easily communicate directly with officials such as the Deputy Commissioner. As a consequence it increasingly looks towards formal enforcement of the sanctuary against the ever-present threat of poaching, when in the past it was more likely to seek local community resolution of conflicts and sanctions on poachers through for example *salish* (traditional village courts) and the Union Parishad. Recourse to formal higher authorities is important in legitimizing the CMOs, but over reliance on this raises a risk of weakening the strength of community participation and support for co-management.

In the forest PAs, the CMOs reported that Union Parishads gave support some of the time when requested (more often in Lawachara) but that this had little impact. Community participants in co-management in Lawachara report improved cooperation between FD and communities such as Community Patrol Groups (CPGs). Initially there was a high level of conflict and mistrust regarding CPGs, and this required interventions from the Union Parishads, but over time it is reported that there are fewer influential people working against co-management.

Moreover the adoption of joint patrols combining CPGs and FD staff appears to have overcome some of this mistrust. CPG members see this as a system of checks and balances – with the CPG not only addressing illegal logging but also as they express keeping a check on the FD to prevent it playing a role in deforestation. Likewise, the FD is well aware that some CPG members were in the past active loggers. Differences between co-management stakeholders do still arise, and the CMO is acting as a forum to mediate these. However, it would appear that some issues arise from attempts by the FD to micro-manage or dominate its fellow co-managers and in such cases negotiation is directly addressed between FD and those stakeholders, for example in Lawachara NP it was reported that one CPG had arranged for two of its poorer members to work regularly at the ticket counter in return for a small daily wage, but the FD wanted this work to be rotated which the CPG argued would not give anyone a regular income.

Decision Making, Participation and Equity

Issues and measures of more participatory and equitable decision making through co-management include the way that leaders are chosen within CMOs; and the role of the poor and disadvantaged in taking decisions, including women and ethnic minority groups; and the extent that those decisions taken and management actions give fair outcomes for these stakeholders. Some fundamental differences exist between wetland and forest co-management approaches.

The wetland RMOs are community organizations without any officials or local government members, on average 61% of members of eight Hail Haor RMOs are poor (own under 0.5 acres (0.2 ha) of land) (range 40%-80%), and in all but one their office bearers were elected through secret ballot (all have at least one poor office bearer). To make co-management functional there is a higher tier of the *upazila* fisheries committee chaired by the Upazila Nirbahi Officer (chief administrator of the sub-district) where the leaders of each RMO sit with the concerned UP chairmen and *upazila* level officials to coordinate management, monitor progress and resolve any problems.

The CMOs in forest PAs started as co-management bodies where officers of FD, *upazila* administration, Union Parishad, and representatives of different stakeholders with interests in a forest PA meet. Even so, in Lawachara 37% of CMO members are poor (own under 0.5 acres or 0.2 ha of land), in Chunati 41% and 50% of two CMOs' members are poor, and in Fashiakhali 46% of CMO members are poor. The revised co-management arrangements introduced in the forest PAs were shown in Fig. 3. Although Village Conservation Forums (VCF) and People's Forums have been established, these are at best about two years old. At present, although intended to represent the inhabitants of their village, the VCFs are more groupings of people whose main interest and benefit has been from income generating activities. The members stress the forum as a conduit to accessing livelihood support whether from IPAC or from other bodies such as Arannayk Foundation. Nevertheless VCF members do report that they discuss issues to be taken up in the CMO with their representative in monthly meetings, and also receive feedback from their representative after CMO meetings. The issues VCFs engage in relate more to welfare of their members (proposing people for livelihood support, obtaining support for members facing personal crises – such as grants for members) but also than issues related to forest PA conservation.

At this stage the People's Forum as a body for coordinating local communities (VCFs) in their interactions with government in management of forest PAs requires strengthening to be active. Some VCF-VCF interaction in the forums is reported, and also through direct personal contacts, providing an informal information exchange. In Lawachara NP so far the People's Forum has yet to act as a combined voice or lobby in co-management. The community CMO leaders and also FD members of forest CMOs did not directly refer to a role of VCFs or People's Forum in the co-management process. These two additional tiers of community organization have the potential to strengthen community participation in co-management, as they are new it will take more time to develop this capacity and for them to be recognized and used by villagers, and they will need a focus for their collective action.

This second point is an important difference from the RMO-UFC relationship in wetlands such as Hail Haor, where the community organizations have defined wetland areas that they manage and benefit from. In the forest PAs so far CPGs do have defined areas to patrol and clearly are directly involved with FD in co-management. Comparable responsibilities for VCFs are yet to develop; these could be within Forest PAs, or in buffer forest lands allocated for village use, or in collective action for villagers. The latter may arise through climate change adaptation planning undertaken by VCF members, it is unclear if the outcomes reflect consensus among all inhabitants of a village and address services, needs, and vulnerabilities of the whole village community.

In the forest PAs decision making within the CMOs tends to involve a relatively small number of active leaders, differences also arise between FD and other CMO leaders. FD officials who are used to an authoritative role in forest management are only gradually accepting the principle of sharing decision making with community members. In this regard there is an important difference between wetlands and forests, in forest co-management the FD has to share some of its all-embracing powers with community co-managers, but in wetlands the Department of Fisheries never had those powers, since fishing rights are allocated by the Ministry of Land. Co-management in Hail Haor and other wetlands gave DoF a role by aligning with fishing

communities and negotiating that *jalmohals* be reserved through it for ten years to come under sustainable management by RMOs.

Unfortunately this also means that the Ministry of Land has never bought into community based co-management as a general policy. With allocation of fishing rights a traditional dimension of local political patronage and power and the term of existing access agreements ending, the Ministry of Land is now actively seeking to end co-management of wetlands and restore its power at the cost of conservation of the nation's natural wealth, disempowering the poor who have invested in conservation when the rich did not, and bringing insecurity to their livelihoods.

The role of disadvantaged groups is also important. There has been a project led emphasis on involving women as well as men in co-management, and on ethnic minorities where they are present. There are no ethnic minorities involved in fishing in Hail Haor. But although many involved fishers are from the Hindu minority, the RMO leaders are Muslim. Whereas in Lawachara CMO *Tipra, Khasia* and *Monipuri* ethnic minorities who live next to the PA and traditionally use it are active in the CMO. In Fashiakhali the *Marma* community living in part of the forest is not represented in the CMO, and in Chunati refugee encroachers are not considered a minority to be represented in co-management. As all of these minorities often are more directly dependent on the PAs for their livelihoods than other nearby communities, there remains a need to ensure that they play a more active role in decision making and/or that their interests are assured.

The role of women in CMOs needs time and effort to develop. In all three forest PAs about 22% of CMO members are women, and while they regularly attend meetings and are involved in discussions there are no specific attempts to address issues or concerns that women might face. In Chunati and Fashiakhali as a consequence there is no reported impact from co-management benefiting women (other than direct supports to households that involve women such as those engaged in bamboo handicrafts and homestead gardening).

In Lawachara, which had earlier livelihood support investments, the training and input support received by some women acts as an incentive to involvement in forest conservation. The situation is similar in wetland CMOs of Hail Haor – on average 26% of members are women, with a lower percentage in the executive committees. However, not only are women involved in income generating activities supported by the parallel Federations of Resource User Groups, but with more productive wetland resources all stakeholders including women have a direct interest in sustainable management of the wetland. Empowerment is more than economic, and it is notable in Hail Haor, where communities are conservative, that women in the early stages of co-management played little role in RMOs, but by now several female committee members have gained confidence to take on jobs for example with NGOs or in community clinics.

Attitudes

It was expected that adoption of co-management and extensive project support for government agencies and communities to establish co-management would result in changes in attitudes and behavior of the co-managers. Even in a longer established co-managed forest PA such as Lawachara NP the output is so far mixed. Among the CMO community members' awareness of the need to conserve forest has undoubtedly increased, including among poor ex-forest users such as Community Patrol Group members, and they also report they have enhanced their status within the community by working with Forest Department and being recognized as having a role in PA management.

In terms of putting attitudes and knowledge into practice, the impacts have been more modest – CMOs such as that for Lawachara NP rely on a small number of active members to drive the process, and it is reported that creating space for wider participation through sub-committees has not been successful (although in future the VCFs and People's Forum may enable broader-based participation in co-management). In addition, equivalent changes among field-based Forest Department (FD) staff are the exception rather than the rule – the perception of community stakeholders is that there has been a small positive change in FD attitudes at the local level.

This is consistent with views expressed from within FD. While co-management has been accepted at senior management levels, in the field support for the approach is gaining ground but commitment to this approach is mixed and varies among staff depending on experience. Thus co-management is gradually bringing FD into more inclusive relations with a wider range of local stakeholders.

The members of RMOs managing parts of Hail Haor report that not only has their knowledge of wetland issues and management improved, but that they have strong links among one another, and have a stronger profile and respect within the community. RMOs have also built up over a decade considerable recognition and legitimacy as local institutions. This extends to increased acceptance and respect from Department of Fisheries. With regular turnover of officers at *Upazila* level the knowledge base to learn about co-management arrangements of Hail Haor lies with the RMOs who are trusted to coordinate and prioritize between one another management plans such as use of the annual income from the endowment fund for endorsement by DoF.

Efficiency and Costs of Management System

In theory, and in the long term, co-management is expected to be more efficient than top-down traditional systems of managing PAs by generating local ownership of management plans and higher levels of compliance, and in some cases community protection and management may be seen as replacing paid guards. On the other hand establishing effective and self-sustaining community organizations and CMOs requires considerable skilled resources to help poor and disparate stakeholders' mobilization and cooperate; and to facilitate cooperation, understanding and trust building between community and government stakeholders for the initial years as the co-management system is developed.

In Hail Haor this followed a fully phased process: an initial five year first phase of MACH with a high level of project staffing to facilitate CMO development and wetland management interventions, a four year phasing out period with gradually reducing project staff levels and increasing independence developed among CMOs. Consistent with this phasing out of project support is the observation that the RMO committee members, for example in Dumuria RMO, report that they spend more time on RMO activities now than they did during the time of MACH project because then project staff spent time helping them, for example to organize meetings. However, the concept of co-management as imposing transaction costs on CMO participants in terms of time spent on co-management may not be a valid one. The view from CMO members, such as those of Balla RMO is that they do not count the time spent for RMO activities and meetings because over time they have become an extended family of RMO members and find wider values from their social interactions and co-management – the RMO has become a platform and identity for their lives and role in wider society.

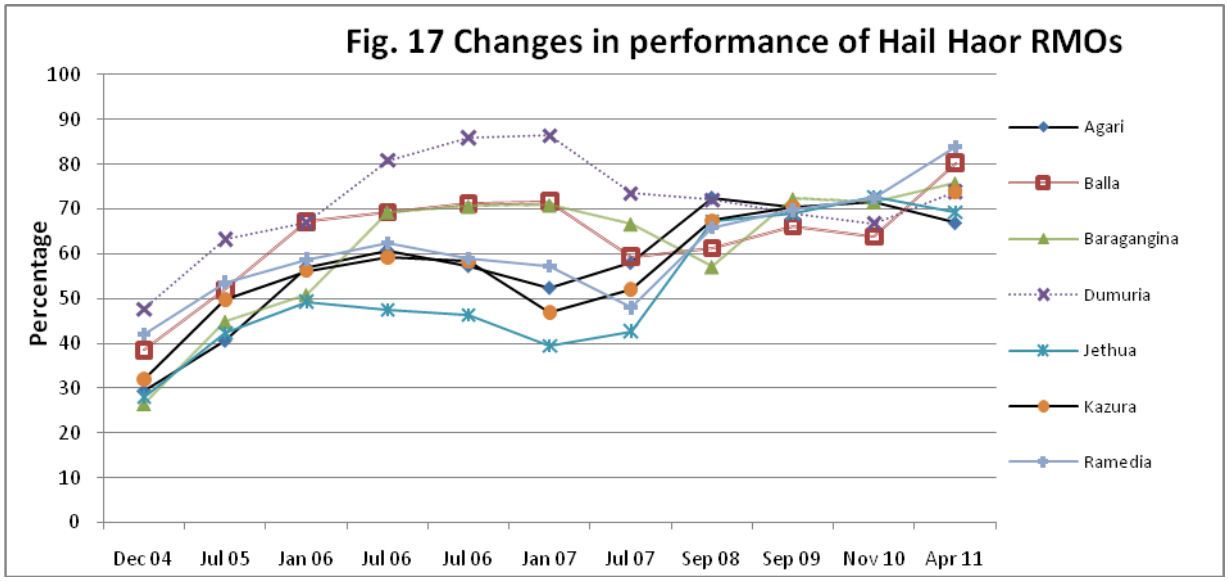
In the forest PAs staff levels have reportedly been falling in recent years with the transfer of PAs to the Wildlife Division. This is a coincidence arising from resource constraints rather than a planned reduction in the expectation that co-management requires fewer FD staff as other co-managers will take on some of their role and compliance might improve. In Lawachara NP FD staff levels are reported in 2011 to be just over a third of earlier levels with presumably commensurate reductions in government costs in real terms, while FD staff would like more resources and staff. The experience reported by community co-managers indicates that greater efficiency has been achieved through co-management, with community time and inputs adding considerable value to those from the government in improving conservation. However, the prompt release of revenue generated from visitors by the government to Lawachara CMO; its allocation for conservation, tourism facilities and community development; and lack of transparency in government resources provided for PA management remain issues that if not resolved may reduce the interest of communities in co-management. While there is project support with external funding and NGO facilitation, there is inevitably a tendency for these inputs to have a higher profile and supplant long term resources from government and other stakeholders.

Overview on Governance

The co-management institutional arrangements have evolved and to some extent are adaptive. Committees and arrangement for co-management have changed based on experience although such changes have depended on decisions from higher levels, and local management plans have changed based on review. There are differences in the arrangements between wetland and forest PAs associated mainly with the administrative framework in the two environments and the scope for community direct benefit from the natural resource base.

But the arrangements have also changed over time in two ways: lessons have been incorporated in revisions to the structure of committees and ways that stakeholders organize and interact (for example the changes in forest PA CMO structures and representation of community stakeholders), and secondly the extent of external facilitation and support to co-management. Co-management is taking root but is a transformational

process, not a simple physical construction. In the forest PAs co-management remains at a relatively early stage and time-series information on governance and institutional performance is limited. In Hail Haor, there is evidence from a series of formal structured assessments of the RMOs conducted at roughly six or 12 month intervals since late 2004. Full details are available in a number of reports, but combining sources of data and taking the overall summaries, these are considered to give a robust semi-quantitative measure of the performance of these RMOs. This indicates a general strengthening in performance (Fig. 17). Although in the period that MACH support was phased out some RMOs experienced some problems, those weaknesses have since 2007 gradually been overcome and the RMOs have consolidated to achieve greater similarity in their abilities and achievements.



Note: This is based on assessments made by MACH up to 2007 (with a simplification of the system in July 2006 hence two assessments at that time), by Flood Hazard Research Centre in 2008-10 using a further adjusted system, and by IPAC in 2011 (with further adjustments). In each case RMO committee, general members and other stakeholders were interviewed, and RMO records reviewed. Scorecard systems organized around the same seven themes (resource management, involvement of poor, involvement of women, organization functioning, governance and leadership, financial management, linkages with government) were used, with many of the data items (a mix of quantitative and qualitative) the same in all assessments. Scores were standardized to the percentage of the maximum possible for each theme and then averaged. Full details are given in various project reports.

4. SOCIO-ECONOMIC AND LIVELIHOODS IMPACTS

Economic Impacts

Integrated conservation and development or livelihood approaches spread since the 1980s as a response to the failure of traditional top-down protection based biodiversity conservation to address the needs of local poor people. As such these approaches have been closely linked with co-management. However, despite a number of reported successes reviewed by Hughes and Flintan (2001), they are not without criticisms, for example that communities are treated as homogeneous without in depth understanding of livelihood needs (Toillier et al. 2011), and that there is no association between receipt of livelihood diversification support and attitudes towards conservation (Gubi et al. 2008), there are also issues that alternative livelihoods delink local people from their interests in conservation areas. Hughes and Flintan (2001) reviewed a number of failures as well as successes and noted that integrated conservation – development projects many assumptions during their project implementations, each of which may prove true or not:

- Diversified local livelihood options will reduce human pressures on biodiversity, leading to improved conservation.
- Local people and their livelihood practices comprise the most important threat to the biodiversity resources of the area in question.
- Integrated Conservation Development Projects offer sustainable alternatives to traditional approaches of protected areas management.

Although there are thus arguments for separating community based co-management and livelihood support, given the high level of poverty and dependence on natural resources in Bangladesh development of co-management has also incorporated actions to not only empower poorer stakeholders but also enhance their incomes. However, economic development has been a subsidiary aim – in MACH it was separated from wetland management by supporting revolving funds and training through a separate NGO, in Nishorgo and IPAC relatively modest resources have been available for training and asset transfers.

While detailed quantification of the level of dependence on natural resources from the PAs and wider landscape is lacking, there are fundamental differences between wetlands (where co-management has aimed to enhance sustainable returns from "PA" systems) and forests (where co-management has aimed to strengthen protection of PAs and deflect pressure to non-consumptive uses and to alternatives in landscape). Thus conservation and restoration of wetlands offers direct and rapidly generated economic benefits for local people – particularly through fish catches. Whereas forest PAs in themselves are intended to only generate non-extractive benefits (such as from ecotourism), in the long term they provide ecosystem services that benefit a wider population of indirect beneficiaries such as the stabilization of water flows and supplies that forest cover provides to the wider downstream areas of the catchment. There is, however, scope for the wider forest land estate around forest PAs to provide direct use benefits to local communities through social forestry, which is discussed below, which has the potential to serve a dual purpose in buffer areas adjacent to forest PAs but has so far only been taken up to a limited extent in these areas.

With an average reported sale value of fish for fishers of Tk 110 per kg in Hail Haor in 2010 the incremental fish catch in 2010 compared with baseline conditions represented an additional value of fish produced in Hail Haor for that year of about Tk 296 million or US$ 4.2 million in 2010 prices. There are estimated to be at least 39,000 households living in the villages immediately around Hail Haor in 2010 (the population of 172,000 people in 1999/2000 is estimated to have increased to just under 200,000 in 2010 based on the national population growth rate), and an estimated 50% of households catching fish as a component of their livelihood strategies, this averages to an additional income of about Tk 14,400 per household (Tk 3,000 per person in fishing households) in 2010 more than they would have earned from fishing had production levels

been at their baseline (pre-co-management) level.[1] These economic benefits reach fishers directly, and indirectly reach all households in the area since the market supply of a diversity of valued fish has risen. Consequently data from MACH (2006a) showed statistically significant increases in fish consumption with improved management for random samples of poorer and better off households, and this translates into improved nutrition. Moreover there is general agreement among all RMOs and community members that the poor have benefited as more fish and aquatic resources are available now.

Similar direct use impacts cannot be expected in the forest PAs, but tourism provides a different set of economic benefits (see also the following section on tourism). Lawachara NP provides the best documented case of these economic impacts, as visitor numbers are well documented and have increased more than in other PAs – to over 100,000 in 2011. Growth in visitor numbers is attributable to increased interest in nature, publicity and facilities in the combination of PA attractions (Lawachara and Hail Haor) as well as other attractions such as tea gardens, as a consequence there has been a rapid increase in the number of hotels and guest houses in the area reaching 19 in early 2012 (Sinha et al. 2012). A survey of visitors to Lawachara in 2008 found that 63% came as organized groups (mainly picnic parties) spending on average almost Tk 1,200 per person, while about 17% of visitors stayed overnight in the area, overall expenditure per person on transport, food, accommodation, etc. for all surveyed visitors averaged Tk 972 per person associated with visiting the NP (IUCN 2008).

While that survey does not give a clear estimate of per person expenditure (since children were not respondents), it suggests that about 30% of visitors may be children. If that is correct, then using the 2011 visitor number based on ticket sales and adjusting 2008 visitor spending in line with inflation suggests that visitor spending associated with Lawachara NP was about Tk 87 million (US$ 1.2 million) in 2011 (out of this perhaps a third or more goes directly into the local economy while the remainder is on longer distance transport, and perhaps without co-management related facilities and publicity visitor numbers would have doubled rather than quadrupled). Hence expenditure by visitors (over and above any visitor fees) can be substantial, and co-management has contributed to these benefits by attracting increased visitor numbers. Further investigation is needed to update and verify these estimates and to determine the employment generated.

In addition income generating activities (IGAs) have been promoted among some of the poor around all of these PAs (and in discussions were clearly valued by poorer stakeholders engaged in co-management processes), but this is as an incentive and catalyst to comply with conservation measures and not a direct result of conservation and co-management. Typically women involved in co-management refer to income generating activities as one of their main benefits. Impacts attributable to PA conservation are more difficult to identify, but qualitatively in Chunati and Fashiakhali it was reported that co-management had improved access of the poor to natural resources (presumably non-timber products), that IGAs were breaking even, but that there was no change in the economic condition of the poor. This contrast with Lawachara where access of the poor to forest resources has worsened as the CMO has been working to curb illicit felling with some success, and the poor are only able to unofficially collect some non-timber forest products for their household use without coming into conflict with the co-managers.

Social Forestry

As a medium term source of income and incentive for conserving trees, social forestry on public lands adjacent to PAs has considerable potential to complement PA co-management. This is particularly critical for forest PAs since the community members who have engaged in collecting fuel wood, non-timber products, and felling trees largely lose those income sources from inside the PAs if co-management results in effective conservation. To the extent that there are public lands, including Reserve Forest lands, nearby that have poor tree cover, a win-win solution is available based on Bangladesh's successful existing framework for social forestry. Target households receive rights to grow trees and use their products on designated areas of land. However, this tends to be a based on limited individual or small group use rights rather than a commons institution. There is also an issue of how far to be prescriptive in ensuring that native trees that

[1] Although the aim of this report is not to estimate benefit-cost ratios for the respective projects or co-management in general, the MACH completion report did include such an estimate based on actual project costs and actual returns up to 2006 and continued benefits up to 2022 for all three wetland systems where it worked, and estimated an internal rate of return of 56% against a total cost of US$ 12.76 (MACH 2007).

complement PA conservation are grown when faster growing exotics can give a better economic return. Moreover, public lands are limited so at best this can only partially compensate for incomes lost by stopping extraction from PAs.

For example, MACH supported planting of 650,000 trees as social forestry by small groups and RMOs, of which 159,000 were for swamp forest restoration (owned by RMOs and not to be felled) and the remainder are for the dual purpose of income generation and habitat creation (although only 237,000 were surviving at the project end). Only 50 acres (20 ha) of forest land have been allocated for social forestry under co-management among all of the forest PAs supported by IPAC. This compares with a potential area of several thousand ha of forest lands around the PAs, for example within Fashiakhali WS 73% (957 ha) in 2009 was shrubs and fallow land rather than forest based on satellite imagery, while within Chunati WS 89% (7,474 ha) in 2006 was grassland or barren. Moreover in addition there are reserve forest lands adjacent to PAs, such as close to 1,500 ha around Lawachara NP, parts of which would be suitable for social forestry, as well as other public lands. This indicates there is a considerable opportunity for expansion of a modified version of social forestry around PAs that would create greater livelihood benefits. This will need to be conditional on commitments by participants not to hunt or otherwise extract from core PAs.

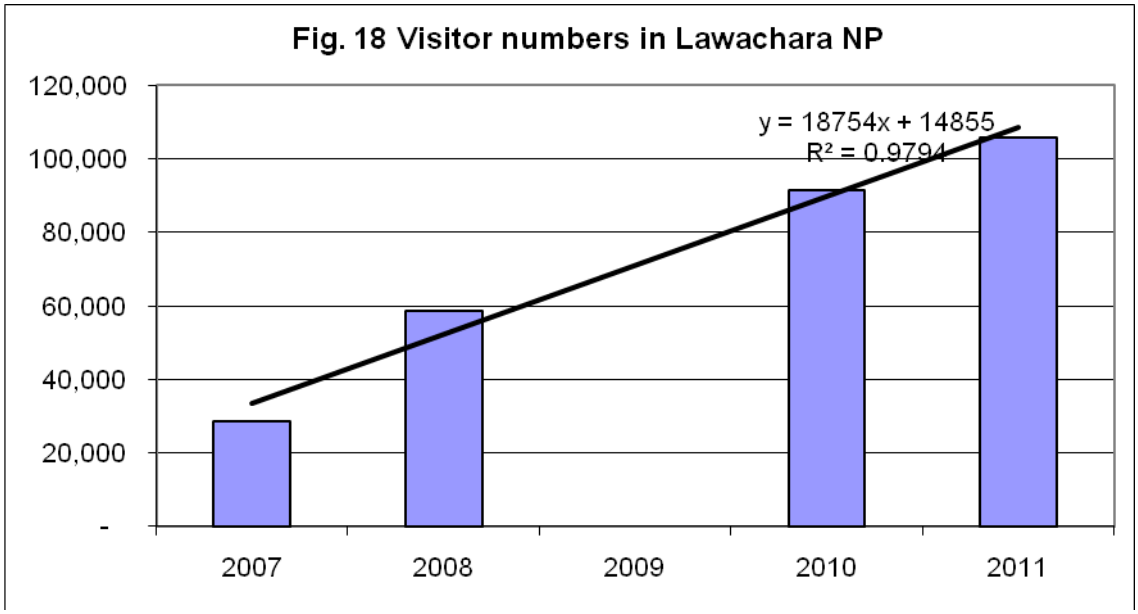
Tourism

Given that most extractive use of forest PAs is illegal, development of tourism has been a major component of co-management there. This has four dimensions:

- as a direct source of income for some former poor forest users who obtain work supporting or supplying tourists for example as guides, or by making handicrafts for sale to visitors;
- indirect local economic growth and incomes for those in the wider service sector who gain increased customers (notably hotels, restaurants, transport sector);
- visitor fees which are now shared with the local communities through agreement with the government, and can be used for local community development works; and
- wider support for co-management generated through visitors with implications for policy support of conservation and locally through increased recognition of the value of conservation generated by interacting with visitors.

The potential role of tourism in co-management differs greatly between individual PAs and their characteristics. If it is well managed then eco-tourism has great potential to generate economic benefits for communities that are partners in co-management, and to act as an added stimulus to recognition of the value of protecting such areas. But visitor pressure can also threaten the biodiversity value of such sites if numbers are too high or affect sensitive species or ecosystems. In the case of forest PAs, tourism is one of the main ways in which the protected area can generate any economic benefits for the surrounding poor people who bear the immediate demands of protection, through expenditure on services and goods, and through sharing of visitor entrance fees with the CMOs and their community initiatives. Moreover, expanding nature based tourism in and around PAs, provided this does not compromise biodiversity conservation objectives, serves a larger goal of changing attitudes and behavior towards PAs and biodiversity conservation among the general public of Bangladesh. This is a vital aspect of involving wider civil society by recognizing the value of ecosystems and PAs, understanding the changes involved in co-management, and generating interest in maintaining and enhancing this system.

Lawachara NP provides the strongest example of tourism impacts from co-management and improved facilities and awareness of eco-tourism potential. Being one of several attractions around the popular and easily accessible tourism destination of Srimangal town, the numbers of visitors quadrupled between 2007 and 2010-2011 (Fig. 18). This growth was despite entrance fees being introduced from November 2009 onwards. Thus visitor fees generated almost Tk 2 million (US$ 300,000) in the first year they were charged. Half of this is earmarked for use by the CMO for a mix of community development and enhancing protection. If this revenue share is released in time it makes at least Tk 1 million available each year for the CMO to use for community development and as incentives for community protection of the forest. Whether the costs of maintaining visitor facilities are to be covered from tourism revenue, or regular government fund allocations backed by the increasing revenue earned by government, or a mix of sources, is not yet clear. High levels of visitors has raised the issue of how to manage those visitors so that the ecological value of the PA is not adversely affected, and one approach is to develop new visitor facilities away from the core areas for biodiversity.



In other protected areas visitor numbers so far are much lower, although record keeping is also less comprehensive. In Chunati WS it is rare to have more than 100 paying visitors in a month as the area lacks sufficient forest growth to make it more attractive, and the PA is less publicized and accessible. In Hail Haor actual visitor numbers are difficult to estimate as there is open access for visitors to most of this large wetland, with no way of recording numbers in most of the *haors*. In Baikka Beel sanctuary there are visitor facilities, visitor fees are collected and used entirely by the CMO, and there is the attraction of large numbers of easily seen water birds, yet the number of visitors probably averages little more than 2,500 during the peak four months of the dry season. Fortunately in wetlands co-management is much less dependent on tourism as a component of incentives for local communities because sanctuaries play a major role in ensuring healthy fish populations and result in higher fish catches outside the sanctuaries.

Conclusions

So far as has been possible, evidence has been compiled that allows comparisons to be made between baseline conditions before the introduction of co-management and indicators during co-management. The sites covered in this assessment were purposively selected to represent differences in the duration of operation of co-management and in the ecosystems being protected. The evidence available indicates that there have been positive outcomes in terms of restoration of biodiversity from improved protection and management. In general the evidence not surprisingly suggests that there are more substantial impacts where co-management has been operating for longer. Compared with baseline information populations of those indicator species and groups that might be expected to respond relatively quickly to reduced human exploitation have increased (waterbirds and fish in wetlands, understory birds in forest, whereas canopy dependent birds have not since it will take decades for lost forest cover to recover), and the changes are greater where co-management has operated for longer. Hence co-management cannot be treated as a time-bound project; it means a fundamental commitment to a long term paradigm shift of sharing responsibilities and decision making. This change takes time to have the desired outcome, and particularly in forest PAs it can take many years to see the fruits from regenerating trees.

While the main outcomes relate to biodiversity and are associated with the condition of the ecosystems and habitats in the PAs, the impacts on livelihoods are more complex. Livelihood impacts can arise through direct exploitation of natural resources as part of co-management, through tourism and associated services, and through associated initiatives to enhance or diversify income earning and/or reduce costs for target households. In this regard the combination of institutional arrangements and data show a significant difference between forest and wetland PAs. Inside formal forest PAs extractive use is illegal while only very limited areas of public forests surrounding these PAs have been made available for use by the communities now involved in conserving these PAs, severely limiting the scope for poor from these communities to earn an income directly from conservation services.

The one main opportunity relates to tourism, which offers individual incomes for entrepreneurs and workers particularly in the hospitality and transport sectors, and funds for community development through the CMOs, and the expenditure of visitors can be substantial (estimated to be worth about US$ 1.2 million in 2011 for Lawachara NP). Tourist visit rates have increased very rapidly in the most popular of the sites studied (Lawachara), but this now threatens the primary aim of conserving forest habitat and wildlife and requires co-managers to develop new plans and measures to manage visitors. Visitors are fewer in wetlands, but there co-management offers opportunities that are not available in forest PAs as it aims at both conservation and restoring economic returns. This is shown to generate substantial direct livelihood benefits. These amounted to an additional value of fish caught in Hail Haor estimated to be worth US$ 4.2 million in 2010 alone compared with baseline conditions (or approximately Tk 14,400 more per fishing household per year). By setting aside sanctuary areas, restoring wetland habitats, observing closed seasons, and minimizing harmful fishing practices, fishing communities can restore productivity on a sustainable basis – with fisheries at least as healthy after 11 years of co-management as they were after 5-6 years.

How far such changes can be attributed to co-management and the causal factors of context and co-management arrangements are the other key issues in this assessment. The institutions – rules and norms regarding natural resource use – are a key product of co-management and community participation. This is particularly the case in wetlands, such as Hail Haor where the CMOs set local access rules, sanctuaries and fishing gear restrictions. In forest PAs management plans have been prepared in consultation with local stakeholders, and most of the rules have been set under national laws. Despite these differences compliance was found to be similar in the sites – with moderate levels of rule breaking. The link to co-management in forests has been largely through CMCs, Public Forums, VCFs, and joint patrols where FD staff and community groups share responsibilities.

One question that can only be partially answered is what would have been the situation now for biodiversity, habitat condition, community-state interactions, social capital of natural resource users, and livelihoods with no co-management in these sites? If past trends are anything to go by then the impacts of co-management have been greater than would appear from comparison with baselines, as overexploitation of wetlands and forests would undoubtedly have continued. And this would likely have led to higher levels of conflict among resource users and between them and government agencies than were experienced at the outset of establishing different PA co-management institutions.

Overall these cases indicate that strong participation of local communities in co-management is not just in theory beneficial compared with traditional top-down management but also is improving conservation of some of the small areas of key habitats that remain in Bangladesh along with their biodiversity. This is a transformational process that takes time and should not be seen as static. Associated with co-management has been an increased emphasis on conservation of biodiversity, when compared with past harmful practices in forest PAs (such as clearing of natural habitat and exotic plantations) and with short term sale by the government of fishing rights without concern for sustainability or who benefits from wetlands.

A few recommendations arising from this study are:

- Co-management requires a long term commitment from government at policy and field levels, with appropriate resources allocated to support the capacity of community participants, recognition of their role, and buy in from relevant government stakeholders.

- The projective nature of development in Bangladesh means that co-management may not sustain without some form of continued project support for co-management, which can be phased down to a low but long term level. This might best be in the form of longer duration programmatic support involving Government of Bangladesh, development partners and NGOs.

- So long as co-managed sites remain islands distinct from the norms of forest management and especially fishery/wetland administration, there is a risk that good practices will be downplayed by government and vulnerable to external threats from those seeking short term gains at the expense of biodiversity. Expanding the areas under co-management will help this to become the norm rather than the exception, but this needs to be supported by policy shifts that have taken place within FD but are yet to taken by Ministry of Land.

- The co-management arrangements developed are adaptive processes, and ought to be tailored and adapted to the nature of wetlands and forests, and different bio-physical and social situations. This calls for frameworks, regular reviews and learning processes at local and higher levels, and higher levels of capacity and vision among government staff working in the field in co-management than presently exist. This will also involve a fundamental change in government to adopt a more flexible framework for co-management that sets out clear principles but within that framework encourages local innovation and learning to cope with threats, ensure that co-management institutions perform better, and ensure biodiversity conservation outcomes are achieved.

- The attempt in forest PAs under IPAC to build a hierarchy of local bodies involved in co-management offers promise, and will require more time and efforts to enable VCFs and People's Forums to be relevant forces in collective action for the benefit of communities (villages) as a whole. This will require significant activities such as devolution of responsibilities and use rights for public lands/waters or climate change adaptation measures as community services can be taken up. The main reason why wetland RMOs have strengthened and gained wider social roles over time is that they have proven to be capable forums for taking and implementing decisions about wetlands and fisheries that bring tangible benefits to the wider communities they serve. Similar use rights and/or services need to be developed for forest communities.

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