Impacts of Alternative Income-generating Activities on Livelihoods and Forest Dependence at Madhupur National Park in Bangladesh

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Abstract

Globally, forest degradation is a severe problem. In Bangladesh, forests have been degraded due to over-exploitation, changes in land use, encroachment, fire, uncontrolled and wasteful commercial logging, illegal felling, grazing, and the collection of fuelwood for a large population. People who live near forests are usually involved in agriculture, and they regularly rely on forest products (timber, fuelwood, bush foods, medicinal plants, etc.) for both their own subsistence purposes and for income generation. Recognizing this problem, in 2008 the Forest Department (FD) of the Government of Bangladesh and the United States Agency for International Development (USAID) started the Integrated Protected Area Co-management (IPAC) project in 17 protected areas (PAs) and one eco-park in Bangladesh with the aim of improving local people's livelihoods through greater access to and control over local forest resources.

Since 2009, IPAC has promoted alternative income-generating activities (AIGAs) as one means of improving the livelihoods of villagers living around Madhupur National Park (MNP), while also decreasing their reliance on forest resources. This paper examines whether AIGAs have improved village livelihoods and decreased the use of forest resources, by documenting and comparing the livelihood patterns of villagers involved in AIGAs sponsored by IPAC with those of villagers in communities that did not receive such IPAC support. I rely on data gathered through household surveys, focus group discussions, key informant interviews, and secondary sources such as an IPAC database based on an earlier socio-economic survey. In the 16 village conservation forums (VCFs) at MNP, the IPAC database reveals that, between September 2010 and May 2011, 450 of the 4,450 households from 16 VCFs each received about BDT 1,944 for various AIGAs, including turmeric growing, fisheries development, homestead gardens, and bamboo production. By providing these AIGAs and conducting awareness-building activities, the IPAC project has created alternative livelihood opportunities for poor people who otherwise would depend heavily on natural resources from the protected area. Thus, IPAC project activities appear to be contributing to the conservation of natural resources in and around Madhupur National Park.

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Introduction

Globally, deforestation and forest degradation are a severe problem. In Bangladesh, forests have been degraded due to over-exploitation, changes in land use, encroachment, fire, uncontrolled and wasteful commercial logging, illegal felling, grazing, and the collection of fuelwood to support the energy needs of a large population. For example, Madhupur Forest was a compact, densely forested area until the 1960s (Bhuiyan 1994), but in the last few decades it has shrunk substantially. Government statistics show that 18,000 hectares of forest remained in 1997 (BFD 1999; MoEF 1999), but a land-cover classification based on 2003 Landsat ETM+ images shows only about 2,000 hectares of forest left, mainly in the Madhupur Thana area.

One quarter of the world's people depend directly or indirectly on forests for their livelihoods (Uprety 2004). This is one cause of forest degradation. People who live near forests are usually involved in agriculture outside the forest, and they regularly rely on forest products (timber, fuelwood, bush foods, medicinal plants, etc.) for both their own subsistence purposes and for income generation. This high dependence of households on forests coupled with other socio-economic attributes like low levels of education, poverty, and small landholdings is associated with forest degradation.

A livelihood comprises the capabilities, assets, and activities required to earn a living. A livelihood is "sustainable" when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets, both now and in the future, while not undermining the natural resource base (Carney 1998). In 2008, the Forest Department (FD) of the Government of Bangladesh and the United States Agency for International Development (USAID) started the Integrated Protected Area Co-management (IPAC) project in 17 protected areas (PAs) and one eco-park in Bangladesh with the aim of improving local people's livelihoods through greater access to and control over local forest resources. IPAC has promoted alternative income-generating activities (AIGAs) as one means of improving village livelihoods while decreasing their reliance on forest resources.

This study aims to test the hypothesis that AIGAs improve village livelihoods and decrease the use of forest resources, by documenting and comparing the livelihood patterns of those villagers living in communities and involved in AIGAs sponsored by IPAC with those living in communities that did not receive IPAC support. The specific objectives of the study are to:

- Describe the basic socio-economic and demographic characteristics of households that participate in IPAC sponsored co-management activities and of those that do not;
- Assess whether IPAC AIGA grants have improved the livelihood conditions of community members; and

- Assess whether co-management practices have reduced forest dependence among IPAC village conservation forum members.

Background

Madhupur forest is situated 125 kilometers northwest of Dhaka on the Tangail-Mymensingh Road in Tangail District. Some portions of this forest were gazetted as a national park as early as 1962. Today Madhupur National Park (MNP) covers three upazilas (sub-districts): Madhupur Upazila in Tangail District, and Muktagacha and Fulbaria Upazilas in Mymensingh District. Major parts of the park are under the administrative control of the Tangail Forest Division. MNP, which is also known as Madhupur Garh, comprises an area of 18,440 hectares (45,565 acres), of which 1,022 hectares (2,525 acres) have been declared reserved forest, through gazette notification, and the remaining 43,039 acres are in the process of being designated as reserved forests. MNP is comprised of numerous administrative divisions, including four ranges, ten beats, and one nursery center (IPAC 2009).

Madhupur forest is the largest surviving forest of the plains. It initially covered an area of approximately 647.5 square kilometers (250 square miles), but deforestation has reduced it to less than half of its original area. The Koch and Mandi (also known as Garo) tribes historically lived in the area and extracted forest resources. Over time, this extraction caused deforestation as they sought to meet their livelihood needs. The forest and its inhabitants came under the Zamindari of the Rajah of Natore who dedicated the area to the god Gobinda as a *debottor* (endowed property) as per the British Zamindari system. Throughout the British period, the Mandi people cultivated higher lands under lease from the government and could legally register lowlands in their own name (secure and permanent tenure). The Mandi recorded their lowlands under the Indian Tenancy Act of 1878.

The government of Pakistan established a 202-hectare (500-acre) farm in Kakraid, under Madhupur Thana, and resettled displaced Bengali farmers on lands prescribed for the Mandi people in Aronkhola in 1962. Eviction notices were sent to the Mandi of Chunia village by the Divisional Forest Officer of Mymensingh in 1968 and 1969. Consequently, a community-based organization was formed to ensure the rights of tribal people in Madhupur. Pressure from this organization prevented the Mandi from being fully evicted. The association produced a 15-point petition demanding land, security, education, and the power and authority to determine their own development. The concerned authorities never answered this petition.

In 1971, the great Freedom Fighters used the surrounding sal (*Shorea robusta*) forests as base areas during the Liberation War. The Dhokla Guest House is renowned as the site of the drafting of the Wildlife Act of 1973. In 1973, the Father of the Nation, then Prime Minister Bangabandhu Shiekh Mujibur Rahman, stayed in this guesthouse for

three days. To protect the sal forests, he declared the Madhupur Sal Forest as a heritage area with great ecological importance.

In 1978, the Divisional Forest Officer and District Commissioner of Tangail issued additional eviction notices to 200 homesteads consisting of about 800 families. In order to create the national park, the Government of Bangladesh offered people BDT 1,000 and one acre of land per homestead as compensation for resettlement.

In 1980, the government ordered the Rasulpur Range Office to occupy 108 acres of Mandi land in Joynagacha, Bonderiacholla, and Kedjai. In May 1981, the Forest Department hired local thugs to try to occupy the land by force. After the proclamation of martial law in 1982, a martial law order was sent to the Union Chairman and the village government head to evict those "forcibly occupying government forest." In 1984, over 16,997.4 hectares (42,000 acres) in the Madhupur forest were classified as forestland, meaning land belonging to the state Forest Department, without consulting with the Mandi community.

In the 1980s, rubber trees were planted on 6,070.5 hectares (15,000 acres) in Madhupur forest. Private entrepreneurs took this opportunity to take over Mandi land without providing compensation. In January 1990, the government announced that 10,117.5 hectares (25,000 acres) of Madhupur forest were planted with rubber trees, with another 16,188 hectares (40,000 acres) to be developed with funding from the Asian Development Bank (ADB). As a result, many sal forests were destroyed, teak trees uprooted, and other plants and wildlife disturbed or destroyed. ADB later withdrew its funding due to huge pressure from human rights groups.

Today MNP is a popular tourist spot from November to February. Many visitors from different parts of Bangladesh come to visit and picnic there. Various tourist companies employ many people to provide services to tourists. About 57,000 people still live inside MNP. Of these, about 15,000 are classified as ethnic (Garo and Koch) and 42,000 as non-ethnic. These inhabitants are dependent on the park for their livelihood activities. Approximately 113 villages surround MNP with a combined population of 28,513 households consisting of 124,575 inhabitants, of which 63,678 are male and 60,897 are female (IPAC 2009).

Local community members depend on the MNP for their subsistence and businesses. Forest stakeholders in Madhupur include *moholder* (auctioneers); illegal tree fellers; collectors of various non-timber forest products, including fuelwood, honey, bamboo, cane, sungrass, fruits, and medicinal plants; and farmers who grow pineapples, bananas, papayas, lemons, and other crops in the forest. Many poor people who live in adjacent villages are entirely dependent on the forest for fuelwood and building materials, the collection of which often involves illegal tree felling. There are several mosques, Hindu temples, and churches located in the park. Nearly 15 non-governmental organizations (NGOs) are actively working in the park, many of which

are implementing micro-credit and other development programs. These NGO micro-credit programs usually focus on supporting activities for women. A government bank also operates in the park and makes micro-loans for income-generating activities, such as agricultural production and handicrafts, to assist in poverty reduction. IPAC has been operating a program through the Center for Natural Resources Studies (CNRS), a national non-governmental organization implementing IPAC activities at the village level. A few other development organizations (e.g. Society for Social Services, Grameen Bank, Habitat for Humanity, Young Men's Christian Association, World Vision) have also been working for livelihood support.

Co-management is defined as a "situation in which two or more social actors negotiate, define and guarantee amongst themselves for 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). IPAC has been implementing co-management activities in MNP since 2009 and provided support for AIGAs between September 2010 and May 2011. As of December 2011, 89 village conservation forums (VCFs), two people's forums (PFs), and two co-management councils (CMCs) had been formed under the Madhupur National Park. IPAC's management information database states that 450 of 4,450 households from 16 different VCFs had each received around BDT 1,944 per household for AIGAs in Madhupur for activities such as growing turmeric, developing fisheries, planting homestead gardens, and producing bamboo (Fox *et al.* 2011). After a preliminary visit to these villages and a reconnaissance survey, I chose two villages that received AIGAs from IPAC for my study-Gachabari and South Bhutia. These two villages are ideal for my study, because both IPAC and non-IPAC target households are available for interviewing.

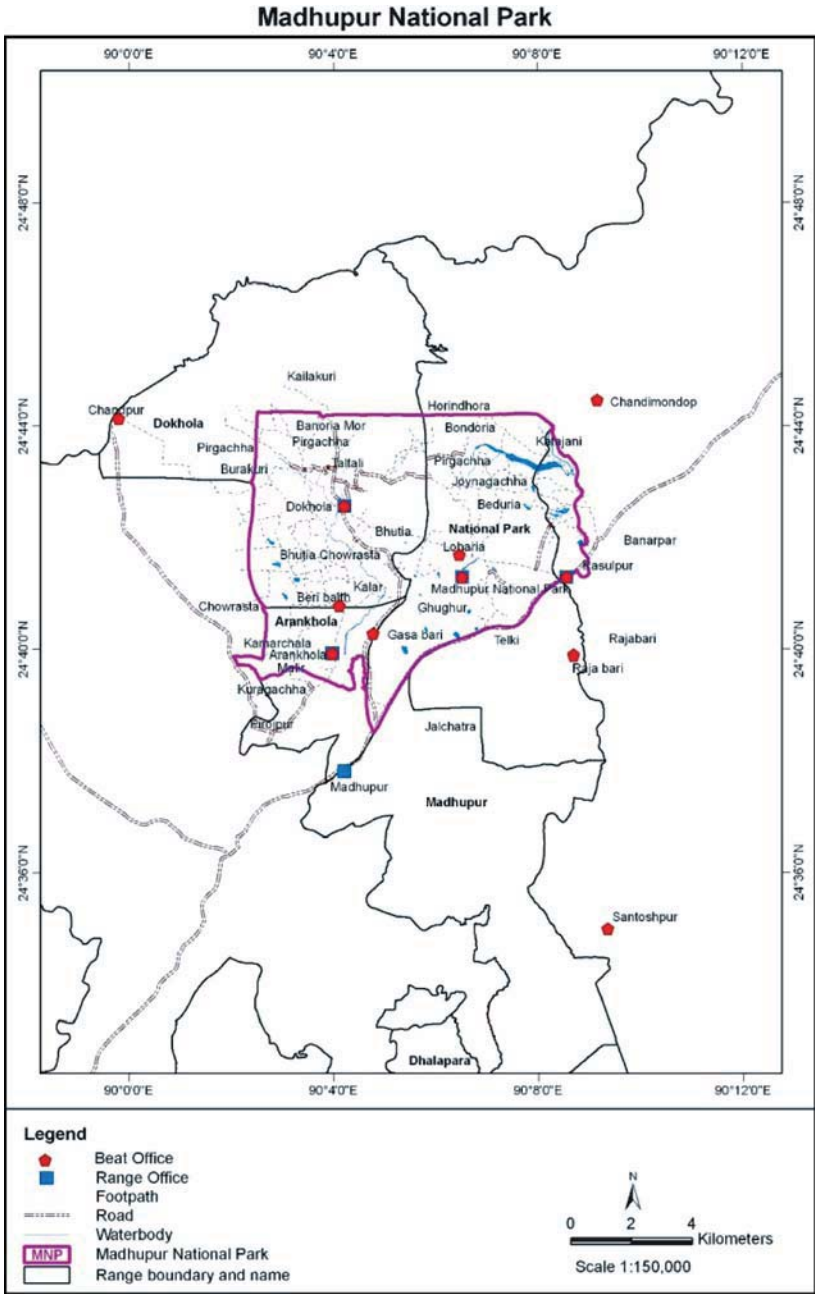

Figure 1: Location of the study area (Source Forest Department)

Methodology

This study was conducted using both primary and secondary data. I collected secondary data from various sources including IPAC, the Forest Department, the Center for Environmental and Geographical Information Services (CEGIS 2008), journals, and government and NGO reports and publications. Some demographic data were also collected from the Bangladesh Bureau of Statistics Handbook 2010 (BBS 2010).

I began fieldwork by visiting Madhupur Upazila and consulting with the IPAC and CNRS staff members, community leaders, members of the local government, and other key informants. Next, I conducted a reconnaissance visit to gain a better understanding of the local livelihoods, socio-economic conditions, and IPAC project activities. IPAC began working here in June 2009 to advance co-management through various methods. Among other initiatives, the project has supported alternative income-generating activities with the goals of reducing peoples' dependence on Madhupur National Park and the surrounding forest, improving livelihoods, and changing attitudes towards resource management.

Prior to choosing the study sites, I made preliminary visits to villages in Madhupur Upazila and identified two suitable villages that were representative of the area (Gachabari and South Bhutia under Rasulpur Forest Range), both with a mix of ethnic/non-ethnic, IPAC/non-IPAC, and AIGA/non-AIGA inhabitants. For primary data collection, I drafted a questionnaire for gathering the necessary information from households that participated in IPAC-sponsored activities and from those that did not. I pre-tested this questionnaire by interviewing several community members and then modifying it and adding questions about the respondents' family size, age, sex, occupation, educational levels, livelihood options, income, expenditures, and housing conditions (Appendix).

Primary data were collected through field visits, direct observations, consultations with community leaders and residents, focus group discussions (FGDs), and informational discussions (e.g. at the tea stall, school field, celebrations). I conducted a detailed sample survey in the two selected villages, Gachabari and South Bhutia under Rasulpur Forest Range, located in Madhupur Upazila, Tangail District, and adjacent to Madhupur National Park (Figure 1). For the survey, I took a stratified random sample of 40 households: 20 households that participated in IPAC-sponsored activities and 20 households that did not. About half of the respondents were male and half were female, in both the IPAC and non-IPAC groups. I conducted semi-structured interviews among the households using a prepared questionnaire. I also conducted two FGD sessions, one in each of the target communities. I used both qualitative and quantitative methods to analyze the collected data, focusing on livelihoods, income, and other factors. See Table 1 for a list of the interviews and discussions.

I conducted the study from August 2011 to January 2012, with most of the primary data collection completed in January 2012. I visited IPAC, WorldFish, and CNRS for data collection and to set up appointments for interviews. I also interviewed three project staff from CNRS as key informants (one staff member from each village and one CNRS coordinator who also lived in the area). The key informants were chosen for their broad and in-depth knowledge about their area, as well as for their knowledge of the livelihoods of villagers. Discussions with key informants focused on past conditions in Madhupur National Park, and on the villagers' livelihood practices. Key informants also spoke about forest dependence and collaborative activities supported by the IPAC project.

In order to crosscheck interview data and gain an overall impression of each village, I used participatory research assessment tools like FGDs. I conducted two FGDs, one in each of the survey villages. In addition to the selected respondents, family members also participated in the FGDs. Using a checklist of topics, I asked participants about the situation at Madhupur National Park prior to the implementation of IPAC. With regard to AIGAs, I asked what types of AIGAs local people had engaged in, and whether or not they were sufficient to improve local livelihoods. I used a checklist of structured questions for the FGD (see Appendix), which corresponds to the topics covered in the individual interviews.

Table 1: Data collection methods matrix: household (HH) interviews, focus group discussions (FGDs), and key informant interviews (KIIs)

Data collection event	Gachabari		South Bhutia		Total
	IPAC members	Non-IPAC members	IPAC members	Non-IPAC members	
HH interviews	10	10	10	10	40
FGDs		1	1		2
KIIs with villagers	1	1	1	1	4
KIIs with CNRS field staff		1	1		2
KII with CNRS site coordinator			1		1
KII with DFO Tangail			1		1

At each stage of the survey the data were checked, edited, coded, and transferred to computers at the field site. Some data were collected in local units of measurement familiar to respondents, so these units were converted into standard international units during the data entry process. Data were processed and analyzed using Microsoft Excel. Preliminary data sheets were compared with the original coding sheets to verify the accuracy of data entry.

Results

Socio-economic and Demographic Characteristics of IPAC and Non-IPAC Households

I collected socio-economic information from the 40 household survey respondents, including both IPAC and non-IPAC beneficiaries, and I also observed infrastructure, such as roads, market facilities, and health facilities in these communities. Among the 40 respondents, the largest age class was 20–35 years old (n = 18, 45%), followed by 35–45 (n = 15, 37.5%,) 45–55 (n = 3, 7.5%), and 55 years and older (n = 4, 10%). Respondents included Christians (n = 18, 45%), Muslims (n = 20, 50%) and Hindus (n = 2, 5%). I found their housing and sanitation conditions to be relatively good, and to be supported by other donor-funded projects. The FD and some donor-funded NGOs have provided the majority of participants with improved cook stoves under the Nishorgo Support Project (NSP) effort to increase fuel efficiency and conserve forests. Good roads connect Madhupur with Dhaka, and the community has good market access, within a distance of four kilometers on a good road. A Christian missionary hospital also provides good health services in the area.

In terms of the educational level, my data suggest that the largest group of respondents has no formal education, followed by those who completed primary school. The educational levels of respondents are shown in Table 2.

Table 2: Educational level of household survey respondents

Educational level	Number and percentage of respondents	
	IPAC households (n = 20)	Non-IPAC households (n = 20)
No studies	8 (40%)	7 (35%)
Completed primary school	6 (30%)	7 (35%)
Completed secondary school (SSC)	4 (20%)	3 (15%)
Education above SSC	2 (10%)	3 (15%)

In terms of occupations, the largest group of respondents are day laborers and people dependent on collecting forest products, followed by farmers. Table 3 shows the occupations of different respondents. A 2010 survey showed that 55 percent of households in this area were dependent on forest resources (Rokeya 2011). However, I found forest dependence to be approximately 30 percent in households that received AIGAs. My findings also show that non-IPAC participants are more involved in day labor and forestry work than IPAC participants. These data suggest that more IPAC participants may be involved in non-forestry related activities such as farming and small businesses.

Table 3: Current occupations of respondents

Major Occupation	Number and percentage of respondents	
	IPAC households	Non-IPAC households
Services (i.e. formal job in NGO, private firm, government)	2 (10%)	3 (15%)
Agriculture	5 (25%)	3 (15%)
Daily labor and forest resources	6 (30%)	9 (45%)
Van/Rickshaw puller	4 (20%)	3 (15%)
Small business	3 (15%)	2 (10%)

Average monthly incomes for both IPAC and non-IPAC households were normally distributed and the income levels of both groups were similar (Table 4). Major sources of income for both IPAC and non-IPAC households are presented in Table 5, along with the average contribution from each. The data show that non-IPAC participants depend more on day labor and forest income than IPAC households.

Table 4: Average current monthly income of respondents

Income ranges in BDT (and USD)*	Number and percent of respondents	
	IPAC households	Non-IPAC households
< 3,5000 (USD 41)	4 (20%)	3 (15%)
3,500–6,500 (USD 41–76)	9 (45%)	10 (50%)
6,500–9,500 (USD 76–112)	5 (25%)	6 (30%)
> 9,500 (USD 112)	2 (10%)	1 (5%)

*Note: 1 USD = BDT 85 (ONDA online currency conversion, February 10, 2012)

Table 5: Sources of household income and monthly averages for each

Major sources of income	Mean monthly income in BDT	
	IPAC participants	Non-IPAC participants
Services (i.e. formal job in NGO, private firm, government)	8,970	8,590
Agriculture	6,158	5,650
Daily labor and forest resources	4,050	5,460
Van/Rickshaw puller	7,490	7,250
Small business	10,345	9,567
Mean income in BDT	6,701	6,603

Eight NGOs work in the project area: World Vision Association for Social Advancement (ASA), Grameen Bank, Buro Tangil, Bangladesh Rural Advancement Committee (BRAC), CARITAS, PROSHIKA, and the Society for Social Services. These NGOs provide loans (usually for 6–12 months with weekly repayments at 10–15 percent interest) to beneficiaries to use for income-generating activities such as small businesses, fish cultivation, and poultry and livestock rearing. These NGOs

target mainly women participants. People also borrow money from their neighbors and relatives. The AIGA grants provided by IPAC are small in comparison with the amount of money available to villagers to borrow from other NGOs and informal sources.

Impact of IPAC AIGA Grants on the Livelihood Conditions of Community Members

IPAC has been implementing co-management activities in 10 villages in MNP since 2009 and has provided AIGA support between September 2010 and May 2011. In my study villages, 60 of the 450 village conservation forum member households received AIGA support for vegetable gardening (see Table 6). IPAC provided a one-day training on vegetable cultivation (see Figures 2 and 3) and gave participating households one-time input packages valued at BDT 1,944 per household. These included seeds and starts for different kinds of vegetables, such as turmeric and ginger. Beneficiaries cultivated these and other varieties of vegetables. Many participants invested their own resources in their gardens, in addition to their labor. These investments ranged up to BDT 42,455 with an average of BDT 10,624 per household.

Figure 2: Turmeric cultivation in Gachabari

Figure 3: A woman in her ginger garden, South Bhutia

Table 6: IPAC's AIGA support in different village conservation forums

Name of VCF	Number of HHs	Name of product	Number of beneficiaries	Land area (decimals) for AIGA cultivation	IPAC support (BDT)	Personal investment of beneficiaries (BDT)	Total investment (BDT)
South Bhutia	250	Turmeric	30	570	58,334	272,266	330,600
		Ginger	0	0	0	0	0
Gachabari	142	Turmeric	26	520	50,556	251,044	301,600
		Ginger	4	102	7,778	67,702	75,480
Total	392	2	60	1,192	116,668	330,668	447,336

Participants had good production, although some farmers' yields were hampered by heavy rainfall in September 2011. All of the IPAC participants benefited financially from their investments. Recently, in February 2012, participants began harvesting their turmeric and stockpiling it for further value-added processing in their homes (see Figure 4). Some farmers store their products for sale at a later date when prices are higher. Some participants sold some of their products to meet their emergency family expenses, as they have no other options to get money immediately. The minimum and maximum cash income received from selling these products ranged from BDT 300 to 5,000 (see Table 7), with an average of BDT 1,270. Almost 50 percent of the beneficiaries received less than BDT 1,000. In 2012, the market price of turmeric fell drastically. One of the AIGA beneficiaries told me on February 4, 2012 that fresh turmeric was then being sold at BDT 300 to 350 per one *maund* (40 kilograms) compared to BDT 1,200 to 1,500 the previous year, while boiled and dried turmeric was being sold at BDT 1,200 to BDT 1,500 compared to BDT 10,000 to 12,000 per 40 kilograms the previous year. He stated that, if the market price of turmeric had remained at last year's levels, then incomes would have been eight to ten times greater. Table 6 shows the mean cash income that households have earned from their AIGA-supported home gardens to date.

Figure 4: Freshly harvested turmeric, Gachabari

Table 7: Cash income received from AIGA vegetable gardens as of January 2012

Income range (BDT)	Number and percentage of respondents
< 1,000	3 (30%)
1,000–2,000	5 (50%)
2,000–5,000	2 (20%)

IPAC maintains a database of the 450 participants it supports in Madhupur forest. In Table 8, I compare land holdings and investments for turmeric for my 10 sample households with the IPAC database for 348 households. The IPAC database shows that a total area of 5,812 decimals (23.52 hectares) is utilized for turmeric by the 348 beneficiaries who cultivated this crop. In the IPAC database, the minimum and maximum land holdings were four decimals (161.9 m^2) and 120 decimals (4,856 m^2), respectively, with an average of 16.7 decimals (675.8 m^2) per beneficiary. My survey results found minimum and maximum land sizes of four and 60 decimals (161.9 m^2 and 2,428.5 m^2, respectively) with an average size of 24.5 decimals (991.5 m^2). In both databases, 50 percent or more of beneficiaries had less than 10 decimals (404.7 m^2) of land. Furthermore, the IPAC database shows that a total of BDT 3,370,960 was invested in turmeric cultivation in Madhupur in 2011. This figure includes both IPAC's AIGA support (BDT 1,944 per person) and the beneficiaries' own contributions. IPAC's contribution was BDT 676,669, or 20 percent of the total investment. This investment produced an estimated 232.5 metric tons of turmeric. In 2010 and 2011, Bangladesh faced a serious turmeric shortage. During 2011, the retail prices of fresh turmeric ranged from between BDT 330 to BDT 350 per kilogram, and powdered turmeric prices varied from between BDT 450 to BDT 460 per kilogram (Haroon 2011).

Table 8: Land area and self-investment for turmeric cultivation under AIGA grants

Land cultivated under IPAC grant (decimals)	Land size distribution used for turmeric cultivation				Investment range in BDT	
	# of responses	% of IPAC members	# HH from IPAC data-base	% HH from IPAC data-base	My survey data	IPAC database
< 10	5	50%	195	56%	< 3,855	< 3,855
10–20	2	20%	58	17%	3,855–6,755	3,855–9,655
20–30	1	10%	49	14%	6,755–11,395	9,655–14,455
30–40	1	10%	19	5%	11,395–13,340	14,455–20,095
40–50	0	0%	11	3%	-	20,095–27,055
> 50	1	10%	16	5%	32,855–44,440	27,855–67,655
Total	10	100%	348	100%		

IPAC members receive various types of training and earn extra money from AIGA activities, which in turn helps them to improve their livelihoods. One of the six components of IPAC is to create AIGA opportunities for local people who are dependent on forest resources. By bettering socio-economic conditions and improving people's ability to practice sustainable forest management, AIGA opportunities seek to facilitate the conservation of forests. My data suggest that, while IPAC activities

have been gradually improving the livelihoods of IPAC members, the AIGA grants given by IPAC, in equal amounts for all AIGA options (turmeric, ginger, fish, vegetable) (BDT 1,944 = USD 23), were not sufficient for the target beneficiaries. In fact, in total they invested four to five times the amount of money they received from IPAC to cultivate their land.

Impact of Co-management Practices on Forest Dependence among IPAC VCF Members

I learned from the FGDs that households who participated in IPAC activities claim to collect fewer forest resources than non-IPAC households. Previously, community people used to extract various foods such as *bon kachu* (wild taro), *bon alu* (wild potato), and *bon misticumra* (wild pumpkin) from the forest. Today, most people grow these vegetables in their gardens or buy them in the market. Other people used to collect forest products for sale, including fuelwood, bamboo, cane, and honey. Although previously many of the IPAC households that I surveyed were heavily dependent on forest-based resources, they have been compelled to convert their livelihoods to non-forest-based income-generation activities.

The focus group discussions also revealed that IPAC households have become more concerned about conservation issues and the protection of the national park due to participation in different types of awareness-raising programs, trainings, and meetings. The changing attitudes about the importance of forest conversation among IPAC households could have had some influence on their choice of professions, although other factors like the availability of credit and grants for AIGAs are likely as influential, if not more so.

Conclusions

In term of the benefits received from AIGAs, half of the participants I interviewed received grants to cultivate turmeric and ginger on their land. I found that these AIGA grants improved local livelihoods and increased household incomes to a limited extent. However, these AIGAs also resulted in other benefits. For instance, they provided a means of mobilizing people's participation and increasing agricultural production. A number of the participants who received AIGA grants for vegetable farming also invested in small businesses such as bicycle vans (rickshaw-vans). Based on these results, I conclude that the livelihoods of VCF members can be improved through the provision of appropriate AIGAs. Overall, however, only a small portion of VCF members received AIGA grants and training, and non-recipients continued to pursue less sustainable livelihoods. The majority of the people I interviewed that did not participate in any IPAC activities showed a higher dependence of forest resources than the people who did participate (see Table 3).

Community people who did not receive AIGA grants are eager to participate in IPAC co-management activities, especially the training that accompanies AIGA grants, because of the benefits others have received. These people have observed the monetary benefits that participants receive from selling the products of their improved vegetable cultivation practices. My results suggest that IPAC's AIGA grants have successfully improved the livelihoods of participants. The study's findings also provide some support for the hypothesis that recipients of AIGA grants have become less economically dependent on forest resources than non-recipients, as evidenced by their higher involvement in non-forest-based livelihoods in general, and by their higher participation in and income from sustainable agriculture, turmeric cultivation in particular.

I also learned from the FGDs that AIGA recipients found the training in vegetable cultivation to be useful; they met with and developed links to the upazila sub-assistant agriculture officer and private suppliers. Beneficiaries acknowledged that many of them would cultivate vegetables without IPAC assistance, but IPAC support allowed them to cultivate larger plots. Many beneficiaries invested their own resources on top of the AIGA grant for cultivating turmeric, ginger, and taro.

Discussions with beneficiaries (mainly the poor) also revealed that they consumed the vegetables they produced and distributed them to neighbors and relatives as well. This distribution helped them to strengthen social ties and relationships. Furthermore, if they did not grow vegetables they would have to buy them from the market. Although they would not purchase as great a quantity as they grow, they would have to earn money for these purchases. According to them, they would collect forest resources from Madhupur Forest for the money. Hence, these AIGA grants have implications for forest resource dependence.

Overall, people living in the area seem to lack the skills for successfully undertaking alternative income-generating activities. Skill development training provided by the NGOs is limited and confined to traditional areas of income generation. Local people, particularly tribal people, have skills in handicrafts like making bamboo baskets and weaving mats. However, I fully agree with community members that training in other areas such as food processing and marketing; medicinal plant production and marketing; cattle, poultry, and dairy farming; and pineapple and banana cultivation would be useful. With sufficient training and capital support (grants or loans), these activities could play a vital role in income generation for some local people and also help to lessen their dependence on forests. In the interviews, community people requested hands-on vocational training, including tailoring, beauty parlor training for women, and motor mechanics and carpentry for men.

By providing AIGAs and conducting awareness-building activities, the IPAC project has created alternative livelihood opportunities for poor people who otherwise would depend heavily on natural resources from the protected area. As a result, IPAC project

activities appear to be contributing to the conservation of natural resources in and around Madhupur National Park. The small AIGA grants that IPAC provides for vegetable cultivation have also contributed to increased recognition and acceptance of IPAC and its activities in these communities. This additional benefit may play an important role in enhancing conservation of this important protected ecosystem.

Recommendations

Based on my research findings, I would suggest the following measures to reduce forest dependence, improve local livelihoods, and promote positive forest conditions in Madhupur National Park:

- IPAC should continue to support vegetable cultivation in the project area where feasible and as resources permit.
- Poor households and forest users (resource collectors) should get priority as AIGA beneficiaries.
- Areas that are not currently used for vegetable cultivation, but have the potential to be, should be given priority for growing high-value vegetables like ginger and turmeric.
- Only a small percentage of households in each VCF receive AIGA grants or loans; there needs to be more investment to support additional VCF members.
- AIGA funds should be changed to a revolving fund, as in a micro-credit program, to promote the long-term financial viability of the program.

In summary, this study reveals that alternative income-generating activities can have an effect on livelihoods and forest dependence at Madhupur National Park in Bangladesh. The benefits of co-management of natural resources can be enhanced through support for sustainable livelihoods by providing AIGAs to resource user groups. In-depth, long-term studies are urgently needed to explore area-specific AIGA options for sustaining livelihood. The study results may contribute to project and policy formulation by decision makers.

Acknowledgements

This study was carried out through the Applied Research Fellowship Program under the joint sponsorship of the East-West Center and the Integrated Protected Area Co-management project, with assistance from the WorldFish and funding from the US Agency for International Development. I would like to thank the IPAC project for providing me with this research opportunity as an Institutional Research Fellow from

a non-governmental development organization. I am indebted to program officials for their cordial help and support. I would like to express my gratefulness to Dr. Jefferson Fox (principal course coordinator from the East-West Center), and to Mr. Stephen Brennan and Mr. Bryan R. Bushley (East-West Center facilitators) for their tireless support and valuable remarks.

I also warmly thank Dr. M.G. Mustafa (Senior Fisheries Coordinator and Biophysical Advisor of the WorldFish) for his overall guidance, assistance with logistics arrangements, disbursement of funds for field study, and technical assistance throughout the six-month research program. I am grateful to all program officials, especially to Mr. Subodh Kr. Biswas, Mr. Rahul, Mr. Ranjit, Mr. Probin Chisim, and Ms. Shwapana Chisim of CNRS/IPAC for their cordial help and support for this study. I am also thankful to Ashit Ranjan Pal, DFO of Tangail, for his support. Finally, I wish to express my deep appreciation to my wife, Protima Rani Das, for her moral support and allowing me to conduct fieldwork on holidays. This study was made possible through the enthusiastic support of all those mentioned above.

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Appendix

Checklist of questions for focus group discussions

Demographic profile

1. What are major occupations of the people of the locality? Please rank them.
2. Are there many illiterate people in the locality? Do many people go to High school, college, and universities? Please rank them and indicate on the form.
3. Do you think that the occupations of people in the locality have changed over the past 30-50 years?

Socio-economic activities / livelihood strategies

1. What are the major income-generating activities of the local people? Please rank them according to their importance.
2. Are there many people who have no land?
3. Are there many people in the locality who have no work/job?
4. Please indicate how the availability of work changes with seasons.
5. What do the local people do when there is less or no work for them to do?
6. Do many people in the locality take loan from a bank, NGO or other organization? Please mention the reasons for taking loans.
7. Do the local people get income-generation training from any organizations?

Resource exploitation

1. What are the various resources that are collected from the forest and who collects what? Please indicate on the form.
2. For which resources is their collection likely to pose a threat to their availability in the future?
3. Please indicate how the exploitation of different resources varies with different seasons.
4. Which animals and plants are collected more and which are collected less?
5. When is there a scarcity of fuelwood in the locality? Please indicate how it varies with season (seasonal calendar).
6. Do the local people collect medicinal plants from the forest? Are they available nowadays?

Others

1. What are the major NGOs operating in the locality? Please indicate their activities on the form.
2. What are the major challenges for the conservation of forest resources?

Checklist of questions for key informant interviews

Stakeholders Assessment

1. What are the organizations/institutions that carry out any type of work in the forest?

2. From which villages do people come to the forest to collect resources?
3. Which villages are more involved and which are less involved?
4. What are the different categories/groups of people who go to collect various resources from the forest?
5. Are there any people who do not use the forest resources directly, but have linkages with resource exploitation and development of the forest?
6. Are there any other people who could be important for the conservation of the forest and its resources?

Resources and resource status

1. Which plants and animals have disappeared from the forest in the recent past?
2. Which plants and animals in the forest have been declining very rapidly?
3. What are the causes for the decline of various animals and plants?

Resource exploitation and dependency on forest

1. What are the various resources that are collected from the forest? Which are collected more and which are collected less?
2. What are the reasons for the collection of these resources?
3. Which category/group of resource users are dependent on the collection of these resources?
4. What proportion of local HHs benefit from the forest?
5. For which resources is their collection likely to pose a threat to their availability in the future?
6. Do people collect and use medicinal plants from the forest?

Demographic profile

1. How many households are living in this community/*thana*? How many adults?
2. What are the major occupations of the local people?
3. What proportion of local people are illiterate and what proportion of people have studied up to school, colleges and above?
4. How have the occupations of people in the locality changed over the past 30-50 years?

Socio-economic activities/livelihood strategies

1. What are the major income-generating activities of the local people?
2. What proportions of local people are very poor (have food shortage), poor, middle class and rich?
3. Are there many unemployed in the locality? What proportion of the local population?
4. In which season(s) is there a scarcity of work in the locality?
5. From which sources do local people take credit?
6. What are the different organizations that offer credit in the locality?

7. Do many people in the locality take loans from a bank, NGOs or other organizations?
8. Do the local people have skills that can be utilized for undertaking alternative income-generating activities?
9. Is there any work/economic opportunity that requires special skills that the local people don't have?

Others

1. What are the major threats to the forest habitat and its resources
2. What are the major challenges for the conservation of biodiversity and the restoration of habitat?