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# Communities in conservation: protected area management and enhanced conservation in Bangladesh

Sharif Ahmed Mukul<sup>1</sup> and Shimona A. Quazi<sup>2</sup>

*In the last few decades, the natural resource base of most developing countries has decreased alarmingly because of enormous population pressure and extreme poverty. Bangladesh is no exception, having lost most of its forest in the last 30 years. The Government of Bangladesh (GoB) has adopted various approaches to conserve the country's remaining biodiversity, including protected areas (PAs). However, the creation of PAs alone has not produced positive conservation results as expected, due to a purely ecological focus that excluded the needs of local forest-dependent people. The introduction of community-based natural resource management (CBNRM) for nature conservation in PAs is relatively new for Bangladesh compared to other South Asian countries, but it seems to have effected significant changes. The GoB recently adopted CBNRM in five of its PAs as part of a pilot programme in collaborative management. This paper is a case study of the changing trends in PA management, people's livelihoods and attitudes in and around one of these pilot sites. We observed that some changes have already taken place in forest resource collection patterns and in the attitudes of people in the locality. People's income sources and dependency on protected forests have also noticeably shifted away from forest areas in the*

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<sup>1</sup> Department of Forestry, School of Agriculture and Mineral Sciences, Shahjalal University of Science and Technology, Sylhet 3114, Bangladesh. Corresponding author. E-mail: sharif\_a\_mukul@yahoo.com

<sup>2</sup> Department of Botany, University of Hawai'i, 3190 Maile Way, Honolulu HI 96822 USA. East-West Center, 1601 East-West Road, Honolulu, Hawaii 96848-1601 USA.

*last year. Although gradual, people's participation seems to be changing the direction of future forest conservation in Bangladesh. We conclude that bringing a larger number of people under various income-generating schemes, clearly defining the rights and responsibilities of the local people in PAs and ensuring more effective governance should be the next steps for the future of participatory management in the country.*

**Keywords: protected areas, co-management, livelihoods, alternative income generation, Bangladesh**

## Introduction

Forests cover almost 25 percent of the world's land area and are critical in meeting human needs for water, food, shelter, medicine, fuelwood, fodder and timber. They also provide a wide range of environmental services, including biodiversity conservation, watershed protection, soil protection and global climate change mitigation (Landell-Mills and Porras 2002). In spite of their value, forest and biodiversity losses have increased globally, at rates that are vastly higher than ever before (Kaimowitz and Angelsen 1998). Over the last 8 000 years, the world has lost about 50 percent of its forest cover, but most of this has occurred in the past 30 years (Bryant *et al.* 1997). Over 15 million hectares of natural forest are lost in the tropics every year, which is more than the area of Nepal or Arkansas (State) in the United States (FAO 2006). It is now widely perceived that the poorer populations of most developing countries, many of whom live in and around the world's remaining forests, are somehow responsible for deforestation and will be most affected by its consequences (Sunderlin *et al.* 2005; Koziell 2001).

The establishment of protected areas (PAs) is one of the key global actions that are being taken in the face of massive forest and biodiversity loss. For a long time they have been considered the most effective and widespread measure for conserving nature and natural resources *in situ*, and are regarded as the cornerstone of all national and regional conservation strategies (Mulongoy and Chape 2004; Lewis 1996). Globally, the number of PAs has been increasing significantly over the past few decades and presently there are more than 100 000 PA sites worldwide covering nearly 12 percent of the world's land surface (Scherr *et al.* 2004). However, simply setting aside PAs has not produced positive results as expected, due to their purely ecological focus and low recognition of traditional and indigenous people's customary forest rights and practices. Such omissions have led to misunderstandings between PA managers and local forest user communities, ultimately resulting in PAs that fail to meet their conservation goals (Borrini-Feyerabend 2002; Gadgil 1990).

As a response to this situation, several people-oriented approaches have been developed and widely promoted by various international conservation agencies over the last 20 years, under the broad banner of community-based natural resource management, or CBNRM (Fisher 2003; Jeanrenaud 2002). This approach has been further modified for different field contexts and may be referred to as co-management, collaborative management, participatory management, joint management, or adaptive management (see Colfer 2005; Fisher 2000; Kothari *et al.* 2000 for more information). Community-based conservation is a major emerging issue for conservation policy in Asia, yet it is not being addressed uniformly across the continent (A.T. Smith, personal communication, 2007).

As one of the most densely-populated countries in Asia, Bangladesh is an instructive microcosm of Asian conservation. The country was densely forested until the colonial period, with about 20 percent forest cover; even until 1980 it was home to about half the bird species and a quarter of all mammal species in South Asia (Poffenberger 2000). Currently, forest cover is estimated at 6 percent of the total land area and many species have become locally extinct. Although the beginnings of government conservation efforts can be traced to 1966, before Independence, few of the goals were actually met (FAO 2000). At present, Bangladesh has 18 PAs, which cover 1.67 percent of the total land area. These figures are among the lowest in the world (World Resources Institute 2007), yet many species of global value exist in these sites. At the same time, many of the rural poor are either forest dwellers or dependent on forests for subsistence (Sharma *et al.* in preparation; Roy and DeCosse 2006). Collaborative management is therefore a necessity for Bangladesh, not an option, if the country is to maintain its forests and biodiversity into the future.

Although Bangladesh has a long history of community involvement in forest management, beginning with *taungya* (agroforestry) systems in 1871, and various social forestry projects from the 1960s onwards, the concept of co-management in PAs is a novel approach (Zashimuddin 2004; Poffenberger 2000). In 2002, the Forest Department of Bangladesh began to develop a programme of forest co-management called the Nishorgo Support Project (NSP), which is partially funded and supported by USAID. The project covers five pilot sites that have been created out of existing reserve forests in the areas. All five sites are located in hilly areas, which are atypical of the otherwise flat deltaic landscape. Consequently these sites harbour unique flora and fauna, notably migratory birds and several endangered species of primates.

A key challenge for the NSP is addressing the prevailing misconceptions among local and indigenous forest communities and respective forest-governing authorities that so far have hindered effective forest conservation. Various initiatives have been taken at these sites to increase people's active involvement in PA management and conservation, ranging from awareness-raising activities to developing alternative means of livelihood. In this study, we collected qualitative and quantitative data to explore the changing trends in forest use, local livelihoods and people's attitudes towards co-management over a one-year period at one of the northeastern pilot sites. This work is an important initial step for assessing the progress of this new approach to conservation in Bangladesh.

## Background

### *The case study site*

Satchari National Park is one of three Nishorgo PAs situated in the northeastern hilly region of Bangladesh (Figure 1). The park is one of the newest PAs comprising about 243 hectares of forest carved out of the Raghunandan Hills Reserve Forest (RF) in the Satchari Range, situated nearly 130 kilometres northeast of Dhaka. Administratively the park is located in Chunarughat Upazila, an administrative subdistrict of Habiganj District. India borders the park to the south and other adjacent lands are under tea estates, rubber and agar (*Aquilaria*) plantations and paddy fields. The area was previously classified as moist evergreen forest, but the large-scale conversion of indigenous forest cover to plantations has resulted in just 200 hectares of natural forest (Choudhury *et al.* 2004); the rest is secondary (raised plantation) forest. The park is also one of

the last habitats in Bangladesh of the endangered primate, the hoolock gibbon (*Hoolock hoolock*) (NSP 2006).

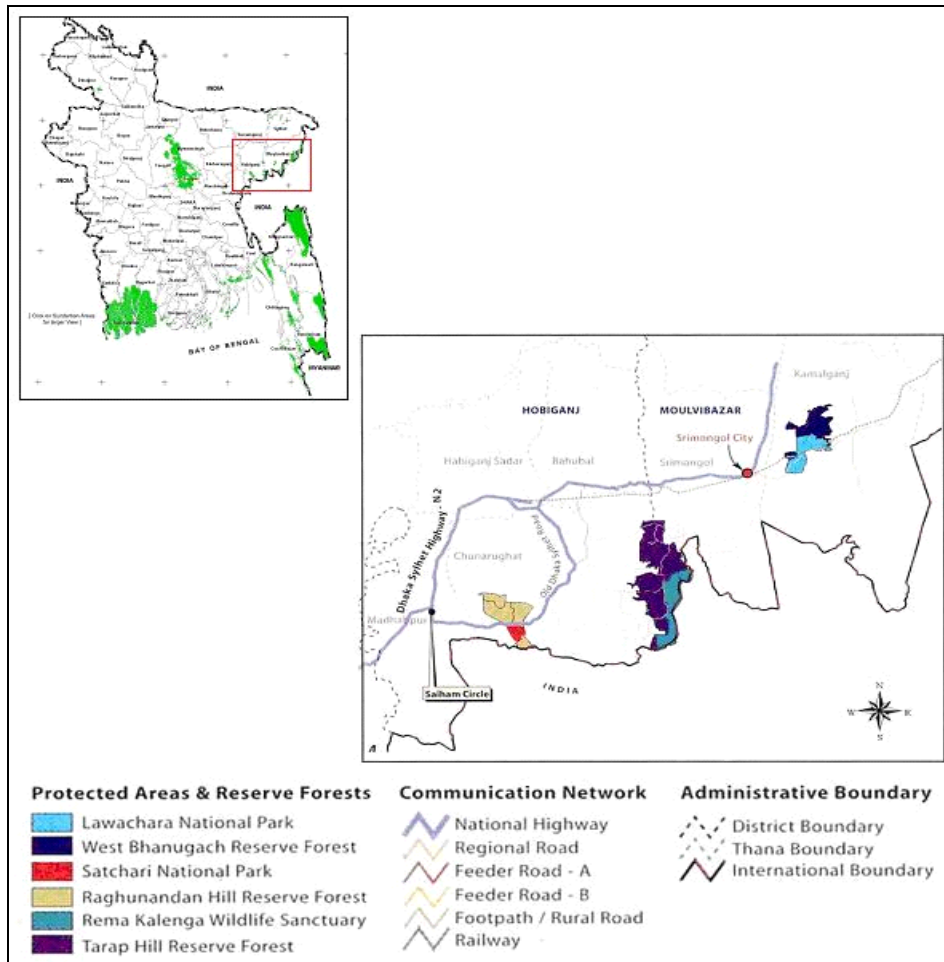


Figure 1. Northeastern protected areas of Bangladesh

### Selection of the villages

Local people have traditionally collected various resources from the national park and adjacent reserve forest in the Satchari area. A previous study by Mollah *et al.* (2004) identified 19 villages with varied degrees of dependency and interest in the national park. This included one village, Tiprapara, which is located within the national park and inhabited by people from the Tripura ethnic community. The other villages that have stakes with the national park are located about three to eight kilometres away. For the present study, we randomly selected four villages, one from each of the first four forest dependency categories as identified by Mollah *et al.* (2004), i.e. major, medium to major, medium, and medium to minor. The five villages classified as having

minor stakes in the forest were not considered. However, after field observation, we found that the rankings of two of the villages, Deorgach and Ratanpur, had changed. Accordingly we adjusted our categories from those of Mollah *et al.* (2004) (Table 1).

**Table 1. Study villages, location and sample size**

Village	Location	Pop. (HHs)	Sample size (n)	Forestpractices*	Forest Dependency
Tiprapara	Inside	22	n = 22	Collect fuelwood, house building materials, fruit and other NWFPs, cultivate lemon and produce	Major
Ratanpur	Outside	156	n = 16	Mainly involved with illegal tree felling and collecting fuelwood	Medium to major
Deorgach	Outside east	316	n = 32	Mainly collect fuelwood, some involved with illegal tree felling	Medium
Goachnagar	Outside west	328	n = 33	Mainly collect fuelwood, some involved with illegal tree felling	Medium to minor

\* As described by Mollah *et al.* (2004).

### **Data collection and field techniques**

The study was carried out from January 2006 to January 2007. We arranged focus group discussions (FGD) in each of our study villages to construct community maps and community profiles of the respective villages. Information gathered during the community mapping exercises was also checked and verified through field visits in the study villages. During the FGD we used local people's perceptions regarding their dependency on the forest to develop three preliminary forest dependency categories, i.e. completely or mostly dependent, moderately dependent and least dependent. We also used the group discussions to collect information regarding co-management incentives, efforts to enhance livelihoods and efforts to motivate people for co-management in the study villages.

We then conducted two sets of formal household surveys, one year apart, using semi-structured questionnaires in our four sample villages. In Tiprapara, we took a 100 percent sample (i.e. 22 respondents), because villagers are highly dependent on the park for their subsistence and income, and because the village is very small. In other study locations a 10 percent sample of households was taken from each of the three forest dependency categories using a stratified random sampling approach. During the study we interviewed 103 households with 597 members (49 percent female), out of a population of 818 households from the studied villages.

The household surveys used a semi-structured questionnaire to interview the heads of the selected households. Details about household demographic and educational status, income sources, forest-based income, products harvested from nearby forests, quantity of forest produce

harvested and livelihood patterns were collected and noted. Additional data on the household's overall views and perceived benefits from the existing forest management system and their expectations from the local forest governing authorities were also recorded. Respondents were free to express their views on all topics.

## **Discussion**

### ***General findings***

We used the data from the FGD to classify the households into three income categories. These were: extremely poor (monthly income below Tk2 000)<sup>3</sup>, medium to poor (income between Tk2 000 and Tk7 500 per month) and rich (monthly income is Tk7 500 or higher). Based on our income scale approximately 37 percent of households in the four sample villages were extremely poor, followed by medium to poor (32 percent) and rich (31 percent).

The literacy rate in the villages was about 54 percent. The primary occupations observed over all the study villages were agriculture, mainly paddy cultivation (37 percent), followed by non-wood forest product (NWFP) extraction (18 percent), timber poaching (18 percent), day labour (15 percent), small business (5 percent), government and non-government services (4 percent) and overseas employment (2 percent).

The scenario was different in Tiprapara, as it is located inside the park and there is no agricultural land, unlike the other villages. Villagers from Tiprapara worked mainly as day labourers (38.5 percent), followed by NWFP extractors (mainly for fuelwood, 32 percent). Forest patrolling is the main service done by Tiprapara residents (82 percent of respondents).

### ***Co-management activities aimed at improving livelihoods and community participation***

The Nishorgo Programme of the Forest Department is developing a range of options and incentives for the people of the area, aimed at regulating forest use. Different strategies have been used for the interior and exterior villages at Satchari National Park as their needs and limitations are dissimilar. Villages located inside national parks are particularly vulnerable to the changes that occur when a park is created, while exterior villages may be impacted in ways that are less visible or obvious, yet equally important for long-term management.

The ethnic Tripura community living inside the park has a long tradition of various forest practices, such as *jhum* or shifting cultivation, hunting and the collection of fuelwood and harvesting fruit and building materials from the forest. Because the declaration of the area as a PA reduced their access to many of these uses, the Forest Department granted the Tripura formal permission to cultivate lemon within a specific confined zone within the park. Additionally, since there are no alternate energy sources available for domestic use, the village has informal permission to collect fuelwood for their own consumption. The Forest Department has also recently allotted 0.5 hectare

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<sup>3</sup> Tk68.5 = US\$1.00 (September 2007).

of denuded forest land from the park buffer area to each Tripura household, as part of a long-term benefit-sharing agreement (J. Roy, personal communication, 2006).

Most of the Tripura villagers, who were formerly involved in illegal logging and fuelwood collection from the park, now work as members of the Forest Department’s forest patrolling team. Several teams from Tiprapara also work in rotations guarding the forest. Other alternative income-generating activities that are being promoted include ecotourism, livestock rearing and weaving traditional Tripura fabrics. Men and women both receive training and initial support for these ventures and are now contributing considerably to their family incomes.

In the other three study villages, such incentives were confined mainly to technical support and financial assistance. Some illegal loggers from these villages have been rehabilitated with training and loans for alternative income generation activities such as nursery raising, home gardening, aquaculture and cattle rearing. Nishorgo has also held tour guide training for educated youths in these villages. Five groups of women were assisted in raising funds on a cooperative basis to further invest the funds in small enterprise development (purchasing cattle etc.). Table 2 lists the NSP support activities made to date in the study villages.

**Table 2. Activities to improve local livelihoods and generate alternative income in the villages in and around Satchari National Park**

Village	Tiprapara	Ratanpur	Deorgach	Goachnagar
<b>Type of support</b>				
Cattle rearing/fattening	✓	✓	✓	✓
Ecoguide training	✓	-	✓	-
Fisheries	-	✓	✓	-
Forest patrolling team	✓	✓	-	-
Land (i.e. buffer area)	✓	-	-	-
Nursery raising	-	✓	✓	-
Piggeries	✓	-	-	-
Promotion of handicrafts	✓	-	-	-
Vegetable farming	-	✓	✓	✓

One of the problems in the application of these initiatives that was identified through the FGD is the uneven distribution of support within the villages. Although some villagers are happy with the initiatives undertaken to alter conventional forest practices, villagers who are not receiving livelihood training or support from the co-management authorities expressed their dissatisfaction, as the creation of the PA has restricted their forest use and affected their incomes.

The exclusion of local people from natural resource management is one of the main causes of unsustainable resource management. In Satchari National Park, Nishorgo has formed a co-management committee (CMC) with 19 representatives from various forest stakeholder groups. The objective of this committee is to allow local people to actively contribute to the management decisions of the park by sharing and expressing their views and interests at regular committee



meetings. Our FGD indicated that in most cases, villagers felt that they had enough access to the CMC, and that people are now increasingly consulted to take new decisions regarding park management. However, clearly there are still gaps and inequities in the new management system that prevent effective communication and resolution of problems affecting local stakeholders. These must be addressed in order for holistic PA management to succeed in the long run.

### ***Changing trends in forest use, forest dependency and forest-based income***

Traditionally, the people of the Satchari area have engaged in various types of resource collection. These include forest villagers, poor people from villages outside the park and tea estate labourers. We found that many households, particularly poor households in our study villages, rely partly or entirely on the national park and the surrounding reserve forest for fuelwood, timber, bamboo, fruit, medicinal plants and other NWFPs. Local people in the study area collected timber, fuelwood and 13 other NWFPs from the adjacent forests. In addition, day labourers from all of our study villages collect fuelwood on their off-days (mainly during agricultural off-periods).

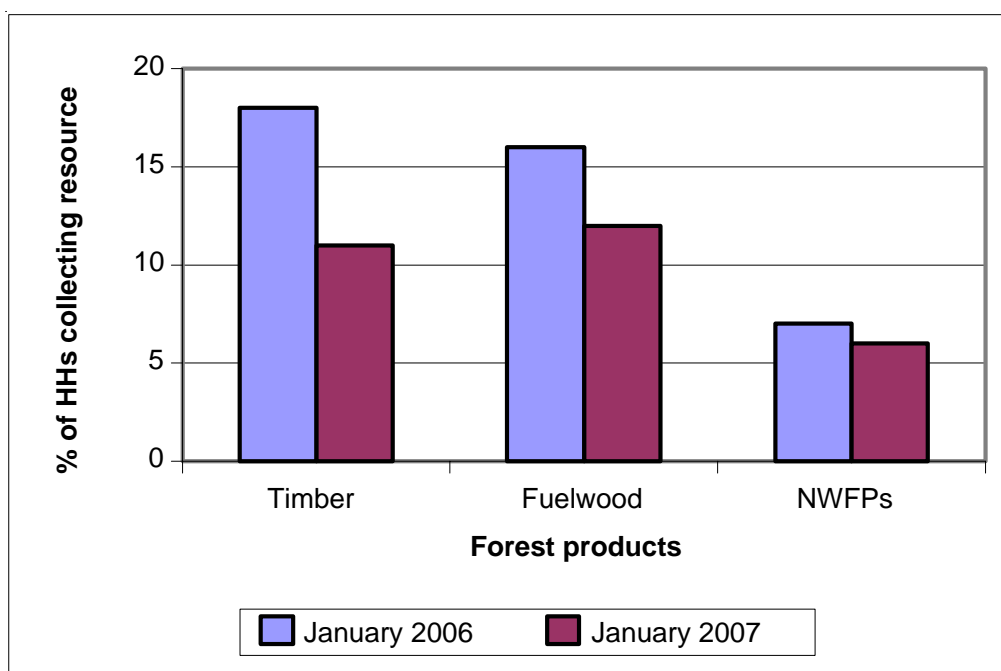
In our quantitative analysis of the new management system at Satchari National Park, we considered changing trends in the collection of *forest products*, changes in local *forest dependency* levels and changes in respondents' *income sources*. In our comparisons we analysed the data in terms of three main forest products: timber, fuelwood and NWFPs. Because findings for most NWFPs were very variable across the four sample villages, they were not considered individually in this analysis. However, fuelwood was considered as a separate forest product even though it is an NWFP, due to its high significance in local livelihoods. The results suggest that people's involvement in forest product collection decreased over the study period. We also found a shift in people's dependency away from the forest, most of which was occurring in Tiprapara and Ratanpur, but was less apparent in Deorgach and Goachnagar. The extent of people's incomes based on forest resources also made a noticeable shift towards non-forest sources. The findings are described in more detail hereunder.

***Forest use and forest products:*** All households from the village inside the park, Tiprapara, collect fuelwood from the forest for both domestic consumption and sale, but only 60 percent of respondents from Ratanpur, 55 percent of those from Deorgach and 56 percent of Goachnagar respondents reported collecting fuelwood from the park for sale or own use in 2006. In contrast, illegal timber was harvested, only for sale, and almost exclusively by villagers from outside the park — Ratanpur, Goachnagar and Deorgach (Table 3).

**Table 3. Numbers of respondents from the four study villages collecting forest products from Satchari National Park for sale in 2006 and 2007**

Village (n=)	Timber			Fuelwood			NWFPs		
	Jan 2006	Jan 2007	% change	Jan 2006	Jan 2007	% change	Jan 2006	Jan 2007	% change
Tiprapara (22)	1	0	-5	6	2	-18	1	0	-5
Ratanpur (16)	8	3	-31	5	4	-6	4	3	-6
Deorgach (32)	6	7	3	3	4	3	2	3	3
Goachnagar (33)	4	1	-9	2	2	0	0	0	0
<b>Total</b>	<b>19</b>	<b>11</b>	<b>-8</b>	<b>16</b>	<b>12</b>	<b>-4</b>	<b>7</b>	<b>6</b>	<b>-1</b>

In terms of forest products extracted solely for sale, the overall number of respondents extracting forest resources decreased during the study period (Figure 2). In January 2006, around 18 percent of respondents were involved in timber poaching from the nearby forest, which declined to around 11 percent in January 2007. Overall household involvement in collecting fuelwood and other NWFPs also declined considerably.



**Figure 2. Overall change in the collection of forest products between January 2006 and January 2007**

Percent reduction in forest resource extraction was uniformly greater for the two villages with higher forest dependence, Ratanpur and Tiprapara (Table 3). Both these villages reported lower levels of resource extraction in 2007, with Ratanpur showing the greatest reduction occurring in terms of timber felling: Fifty percent of the Ratanpur respondents had previously claimed to fell trees in 2006 and less than 25 percent said they felled trees in 2007. In terms of fuelwood collection, Tiprapara reported the most reduction over the study period. In the two villages that were classified as less dependent, where forest extraction was low to begin with, there was no considerable change. Goachnagar showed a reduction in tree felling, no change in NWFP collection levels and an increase in fuelwood collection from about 6 percent of surveyed households in 2006 to 9 percent in 2007 (i.e. one household). However, in Deorgach, extraction showed a very slight increase in household involvement in timber poaching and NWFP collection, from 19 to 22 percent for timber and from 6 to 10 percent for NWFPs. These changes represent one additional household in each case. This may be less of a concern for NWFP extraction because the levels are low, however in terms of timber felling this may warrant further investigation. Deorgach and Goachnagar have both been identified as villages with many illegal tree fellers and there are several sawmills and fuelwood traders in Deorgach (Mollah *et al.* 2004).

**Forest dependency:** We derived three categories of household forest dependency (as opposed to overall village dependency) using a combination of local people's perceptions regarding their dependency on the forest obtained during the FGD, together with a calculated dependency value. To determine a household's level of forest dependency, we considered the contribution of the forest to the household's annual cash income — i.e. the direct cash derived from the sale of forest products and the cash value of products consumed from the forest, which a household could otherwise have purchased from the market. According to levels of forest-based income, the categories were: Tk154 000 or more per year corresponding to high forest dependence, Tk54 000 to Tk24 000 yearly for moderate dependence and below Tk24 000 per year for least dependence.

We found that overall people's dependency on forest products varies with their socio-economic condition, i.e. people with higher incomes rely on forests less than those from poor households (Figure 3).

Table 4 shows the change in forest dependency of the households in the four study villages between 2006 and 2007. The changes were most striking for the most forest-dependent village, Tiprapara. In one year, the percentage of people in the most dependent group dropped from 67 percent (15 persons) to 18 percent (four persons), mostly moving into the moderately dependent class. In Ratanpur, the village with medium to major forest dependency, the percentage change from the most dependent group to the moderately dependent group also showed reduced forest dependency, but at a lower magnitude (6 percent). The less forest-dependent villages, Deorgach and Goachnagar, showed negligible changes: A small number of people moved from moderate forest dependence to either higher or lower levels of dependence. The reason for this pattern is primarily because Nishorgo has put the most effort into changing people's forest-use levels in those villages with the highest dependency levels. However, the fact that Tiprapara is a very small, easily accessible village may affect the rate at which co-management can effect changes, as well as the actual calculated values.

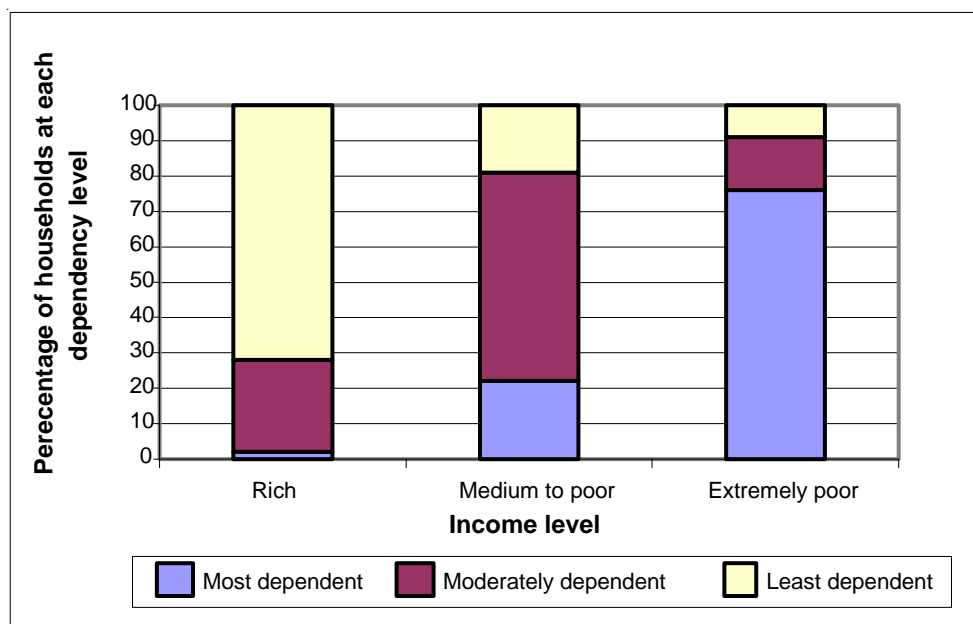


Figure 3. Variation of forest dependency according to income level

Table 4. Percentages of respondents in each household forest dependency class for the four study villages in 2006 and 2007

Village	Most dependent %		Moderately dependent %		Least dependent %	
	2006	2007	2006	2007	2006	2007
Tiprapara	67	18	17	59	16	23
Ratanpur	22	16	29	31	49	53
Deorgach	11	12	12	9	77	79
Goachnagar	8	9	13	11	79	80

**Forest-based incomes and local livelihoods:** We found an overall shift away from forest resources in local people’s income patterns over the study period, for all four villages. We classed local people’s income into two types, forest-based income and non-forest-based income. Forest-based income was further classified into three categories, namely illegal income from timber, income from fuelwood and income from NWFPs. All other forms of income were considered and calculated as non-forest income, including income from business, agriculture, services and income-generating activities facilitated by Nishorgo. Figure 4 illustrates the overall change across the four villages in various income sources from 2006 to 2007. Non-forest income over all four villages increased from 68 to 77 percent during the study period. The reason for this shift can be attributed largely to increased opportunities for people to work in non-forest sectors, including alternative income generation (AIG) activities under the co-management project. For example, information on illegal income from timber extraction was provided by former illegal loggers

who had recently stopped logging and moved to other occupations such as nursery raising and forest patrolling. This is further discussed hereunder.

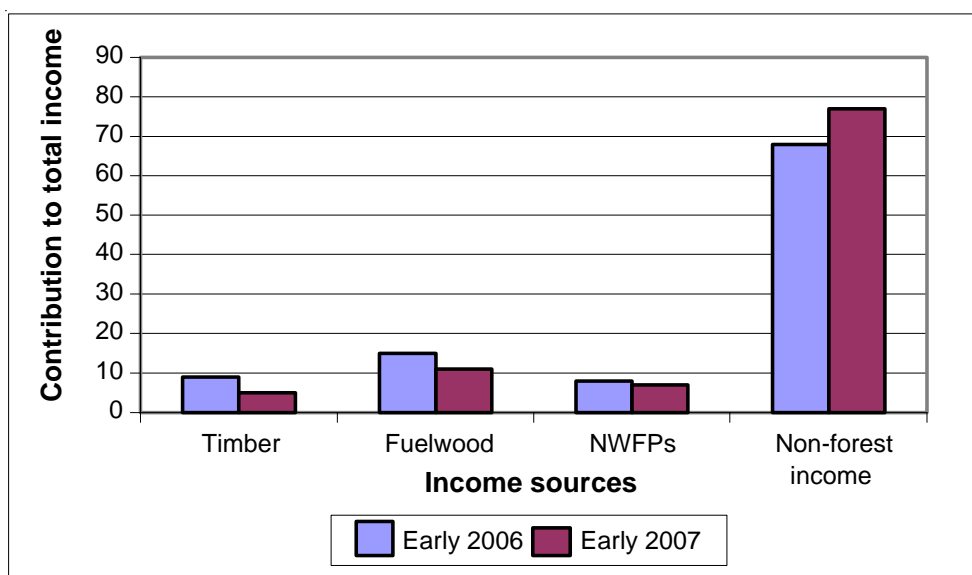


Figure 4. Shift in income sources between January 2006 and January 2007

### ***Changes in people's attitudes and responses towards co-management***

Although access to the support schemes under Nishorgo for people in the Satchari area is still very limited, the preliminary results of these efforts are encouraging. It is important to have an understanding of people's perceptions of the project, as well as their motivation for participating, in order to better anticipate the future needs of the local people that the project should address. The FGD revealed an overall positive view of co-management; according to a local person from Ratanpur interviewed in January 2007, people in the four villages are considerably less involved in practices such as illegal logging, fuelwood collection and NWFP harvesting in the forest compared to previous years.

During the study we also met several former illegal poachers who now contribute to the betterment of their society by participating in environmental restoration activities such as tree planting (Box 1). Nishorgo and other NGOs have worked to create AIG opportunities among primary forest stakeholders in Satchari and their dependency on the forest for livelihoods is decreasing. A greater understanding of the necessity of forest conservation to their own survival and to secure their future generations, combined with a viable means of earning a living, has motivated some people to change their minds as well as their occupations. For some of the local poor who were previously forest "destroyers", co-management also offers a chance to improve their social status, as they can now contribute to forest protection in spite of their past activities. A former illegal logger of Tiprapara explained this view in January 2007: "Nishorgo recruited us as forest protectors instead of as illegal loggers, which has made our lives more secure. We are more respectable in society than we were before."

Abul, age 25, is from Ratanpur and used to work as an unskilled illegal logger. In January 2006, he took Nishorgo training on nursery raising and also received raw materials from Nishorgo to develop his own nursery. His yearly profit from the nursery is now more than Tk50 000 per year. He and his family now work at the nursery and he has an agreement with the Forest Department to supply seedlings for their annual plantation programme. He is now a role model for the youth of the Satchari area.

**Box 1. Shafiqul Islam Abul: from tree cutter to tree grower**



*Abul stands proudly in his nursery with a new outlook.*

Abul, age 25, is from Ratanpur and used to work as an unskilled illegal logger. In January 2006, he took Nishorgo training on nursery raising and also received raw materials from Nishorgo to develop his own nursery. His yearly profit from the nursery is now more than Tk50 000 per year. He and his family now work at the nursery and he has an agreement with the Forest Department to supply seedlings for their annual plantation programme. He is now a role model for the youth of the Satchari area.

## Conclusion

The purpose of community-based PA management in Bangladesh is to reduce and reverse the country's rapid decrease in forest cover, by providing or creating alternatives to deforestation for the local forest-dependent people. Ensuring livelihood security for local stakeholders is critical to forest conservation; therefore, the creation of alternative income sources to shift local stakeholders' income away from the forests is a specific objective of the Nishorgo Project. In our study we assessed the degree to which opportunities for people to change their forest practices, people's perceptions and attitudes towards collaborative management and their livelihood patterns have been affected by the new management system.

We believe that our study accurately represents the overall co-management situation in Satchari National Park. We found small but definite positive changes in PA management, local people's attitudes and responses to co-management and forest resource collection patterns in the area, even within the short period of our assessment. People's income sources and dependency on protected forests have noticeably shifted away from forest areas in the last year. On the whole, satisfaction and morale are high, there are some exemplary success stories and local people are increasingly consulted in decisions regarding park management. People's participation appears to be gradually improving the prospects for forest conservation in Bangladesh.

However, we also uncovered some inequities in the current implementation of co-management that may become problematic if left unattended. The uneven distribution of AIG support, both within and across villages, was voiced as a problem by villagers in group discussions. Benefits are not always equitably or rationally distributed within the same village and rural producers

need improved market access to sell their products. Other recent studies in Satchari and other Nishorgo sites indicate that AIG opportunities are sometimes inappropriately matched to the recipient, e.g. poultry-rearing assistance to inexperienced individuals (Subhani unpublished data; Karim unpublished data). Such irregularities can undermine conservation efforts by wasting limited resources and reducing people's confidence in a project. Similarly, a study to assess local people's attitudes towards conservation and tourism in the Sariska Tiger Reserve in India found that because of limited AIG opportunities and motivation in the villages outside the reserves, villagers experienced few benefits from tourism (Sekhar 2003). Similar observations were made by Malla (2000) in Nepal.

Our quantitative data on forest use weakly support the claim that AIG support is unequal across different villages: Although the most forest-dependent villages have reduced forest resource extraction considerably, resource extraction is increasing (albeit very slightly) in the less-forest dependent villages. Illegal forest extraction is extremely difficult to track, but our discussions with reformed ex-loggers suggest that a possible explanation for this is that the less-dependent villages receive less AIG assistance from the co-management programme. This warrants further examination of the villages surrounding Satchari National Park, especially as only a few of these villages are treated as having high (major or medium-major) interests in the forest. Out of the 14 villages round the park with forest interests not classified as "minor", ten villages were classified in lower-dependency categories in the Mollah *et al.* report (2004).

The risk of focusing AIG support and other conservation initiatives too heavily on a small number of high-interest groups is that the long-term forest impact of a much larger number of moderately forest-dependent groups may be underestimated. Adaptive management calls for regular monitoring and evaluation so that tasks can be administered and implemented on a flexible schedule based on appropriate responses to a given situation, rather than a pre-set plan. As the highest risk groups demonstrate the desired outcomes and management of the more obvious impacts improves, it will be time to work more closely with the other "less-dependent" stakeholders. Villages known to harbour illegal loggers, or those located closer to sawmills and wood traders should receive special attention in this regard, as the creation of the park has undoubtedly affected people's earnings.

Another critical long-term issue for park management in Bangladesh that we identified in this study is governance. A historically long and widespread pattern of corruption and abuse at various levels of forest management has been one of the main barriers to establishing co-management at all five pilot sites. However, co-management is an opportunity for the Forest Department and local stakeholders to open up channels of communication that were previously non-existent. Our study highlighted that progress is being made in this area, yet both local people in PAs and local authorities are still unclear as to their rights and responsibilities with respect to park management. Addressing this gap by empowering the stakeholders is the key for more effective governance in participatory management.

The long-term sustainability of co-management in Satchari National Park ultimately depends on poverty reduction through broader, more equitable and appropriate distribution of AIG programmes to local people. This in turn requires that the governance mechanisms of park co-management must also be more clearly defined and made more efficient. Given the time and financial constraints of the pilot project, as well as the fact that co-management is still in its infancy in Bangladesh, we recognize that the level of investment required in order to do this may

not be available at this stage. However, these are critical issues for the long-term success of this and other community-based forest management projects in the country. Particularly because Nishorgo is a short-term donor-funded programme to initiate co-management at the pilot sites, sustainable sources of financing must also be secured in order to maintain the actual co-management systems into the future. Building stronger collaborations with local NGOs, administrators and institutions with overlapping objectives, as well as with the private sector, may also provide more cost-effective means to address shared long-term aims of co-management, conservation and socio-economic improvement.

**Box 2. Some Nishorgo initiatives for socio-economic uplift in Satchari area**

- Provide training on nursery raising, fisheries, home gardening, livestock and poultry rearing; provide initial support in terms of start-up supplies (e.g. for nurseries, seedling bags, seeds, fertilizer; for livestock rearing, animals and feed).
- Rehabilitate former illegal poachers by involving them in forest patrolling.
- Form co-management committees with representatives from the local elite, different forest user groups, local women, etc.
- Train local educated youth as ecotour guides for emerging ecotourism prospects.
- Arrange field tours to other PAs with exemplary management regimes.
- Create awareness through billboards, stage shows, cultural programmes, group discussions, essay and art competitions at the school level, student hikes, etc.

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