



# Non-Timber Forest Products and Co-Management: A Case Study of Chunati Wildlife Sanctuary

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## *Abstract*

*Strategies to foster development based on the gathering, processing, sorting, collection period, and diversification of non-timber forest products (NTFPs) implicitly target households as principal beneficiaries. This paper suggests that the cultivation and domestication of NTFPs can play important roles in the co-management of protected areas. Chunati Wildlife Sanctuary (CWS) is a co-managed site where local communities are dispersed throughout the forest. This study focuses on four villages in CWS that derive a significant portion of their livelihoods from NTFPs collected in the sanctuary. It concludes that both research on the cultivation and domestication of NTFPs and co-management practices are needed to allow forest villagers to continue to live in CWS in a sustainable manner.*

## **Introduction**

Millions of people throughout the world make extensive use of biological products from the wild (Koziell and Saunders 2001, Lawes et al. 2004). These items, commonly termed non-timber forest products or NTFPs, are harvested for both subsistence and commercial use, either regularly or as a fallback during times of need. NTFPs are biological products and services, derived mainly from forests, deserts, grasslands, agroforests or farm forests, as well as marginal lands. They may be used to make different products for domestic use, or marketed through middlemen. They add to peoples' livelihood security, especially for rural dwellers, and may also have substantial cultural significance and value (Posey 1999; Cocks and Wiersum 2003).

Non-timber forest products include plants used for food, beverages, fodder, fuel,

medicine, fibers and biochemicals; animals, birds and fish used for food, fur and feathers; and other animal products such as honey, lac and silk (Wickens 1994). Shiva (1995a) has called non-timber forest products "potential pillars of sustainable forestry." They are now recognized as more important than timber, and are regarded as a more viable commercial option in forest management (Peters et al 1989; Anderson 1990; Anon. 1990; Chakravarthi 1990; Godoy and Bawa 1993; Blay 1996). Today's interest in NTFPs is based on the argument that in order to conserve the world's tropical forest we have to find new products and develop market systems for NTFPs, so that the forests will become too valuable to destroy (Byron and Ruiz-Perez 1996).

In developing countries, 80% of people use forest products for food and personal care (Anon, 2000). Rijsoort (2000) suggests that farmers cultivate NTFPs on their homesteads as a strategy for reducing the pressure on natural forest resources. Research reveals that NTFP cultivation can also have concrete ecological benefits. For example, it can encourage natural regeneration and mimic natural forest ecosystems in plantations and afforestation sites (Campbell, 1995). Rijsoort (2000) further suggests that food security means having access to sufficient food for a healthy and productive life in the right quantity and at the right time. NTFPs and trees contribute to household food security and family nutrition through a variety of mechanisms. Food NTFPs are often used as "snack foods" while working on the land or tending cattle, and they have a buffer function in times of scarcity. In a study from southwest Bengal, Malhotra et al. (1993) recorded 189 different NTFPs used by local people, of which 113 are derived from plant species and 76 from animal species. Of these 27 are used commercially, 39 are consumed as food, and 47 are used for medicinal purposes for both livestock and humans. In a study from South Africa, Shackleton and Shackleton (2004) found that NTFPs were used commonly by more than 85% of households as a source of mats, brooms, brushes, utensils, and edible fruits.

The sustainable production and conservation of forest products is influenced by a number of factors, largely socioeconomic and institutional in nature. Non-timber forest products are used for cultural, subsistence, recreational, and commercial purposes, and offer a wide range of opportunities for cultural maintenance and revival, support of forest biodiversity, as well as rural community economic development and stability (Cocksedge 2006). NTFP-based activities are often perceived as transitional, giving way to other enterprises and products as the economy improves (FAO 1995a). However, availability of NTFPs is not the only



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factor that determines their collection; different social and economic status is also an important contributing factor in determining what is collected and by whom. On the whole, tribal communities depend most on NTFPs for their livelihoods. Local communities also use NTFPs, but there are some significant differences between the two groups. For instance, only tribal groups eat fern leaves (dhekishak) and bamboo shoots as vegetables (Malhotra et al 1993). It is therefore important to acknowledge that NTFP collection and commercialization can make a positive contribution to the livelihoods of the poor, and can be incorporated into socio-economic development programs involving forest management.

Men and women also have differing roles in collecting NTFPs. In southwest Bengal, Malhotra et al. (1993) found that women constitute the major gatherers of forest products - particularly fuelwood and fodder and other items for domestic consumption, while a few elderly men usually collect medicinal plants. Some men gather dry leaves and fodder. Most women also take their children to the forest to collect tubers, brushwood and dry leaves. Studies show that NTFP-based activities can provide women with a greater sense of self-confidence and improved status within the household and the community (Marshall et al. 2006a).

As human populations increase, a natural extension of the process of collecting NTFPs and wood from a common resource is to move on to the domestication of these species, and for agricultural agencies to encourage on-farm cultivation, especially where forest-based collection by rural harvesters is perceived as an ecological threat. Previous field surveys have shown that three factors in particular may influence small-scale farmers' decisions about domesticating trees to produce marketable products: (1) market opportunities and constraints, (2) the properties of a given species relative to farmer needs, and (3) the role trees play in risk management (Miah, unpublished data).

## Background

### Study Objectives

This study focuses on four villages in Chunati Wildlife Sanctuary (CWS), Chittagong Division, Bangladesh. A total of 170 families inhabit these four villages. Household level data were collected to examine the various sources of income and the relative importance of income from NTFPs. The main goal of the study is to provide a detailed profile of the NTFPs collected in the four villages. The collected information is expected to contribute to general knowledge of the current forest use

practices and villager dependence on NTFPs. It will deepen the understanding of the economic and social value they provide to different sections of the community. The primary research objectives are as follows: (a) to identify the main NTFPs and aspects of NTFP extraction, processing and sorting of NTFPs originating from woody plants, herbs and shrubs; (b) to describe the division of labor in NTFP collection with regard to gender; (c) to identify the maximum collection period of NTFPs and latest month of collection; and (d) to assess the contribution of NTFPs to household income and the overall degree of household dependence on them.

### **Study Site**

The Chunati Wildlife Sanctuary is located at 21°40' N and 92° 07' E, about 70 km south of the city of Chittagong, on the west side of the Chittagong- Cox's Bazaar highway (Fig. 1). It was originally a part of Chittagong Forest Division and is now under the jurisdiction of Chittagong South Forest Division. The total area of the Wildlife Sanctuary, according to the government gazette notification, is about 7,764 hectares (Nishorgo Support Project 2005).

Typically, the rural households of Chunati Wildlife Sanctuary use several different non-timber forest products to meet their everyday needs. The villages cover 56.1 hectares of cultivable land (0.33 hectares per household), and depend solely on rain-fed agriculture. The local people cultivate paddy, wheat, peppers, turmeric, mustard and other vegetables. They also collect bamboo, cane, fuelwood, grass, fruits, ferns, mushrooms, medicinal plants, dry leaves, wild animals, and honey periodically from the forest of CWS. Different collectors - men, women and children - are involved in seasonal or regular collection. Harvesting of NTFPs is usually suspended during the monsoon when people are fully engaged in farm-based agricultural activities.

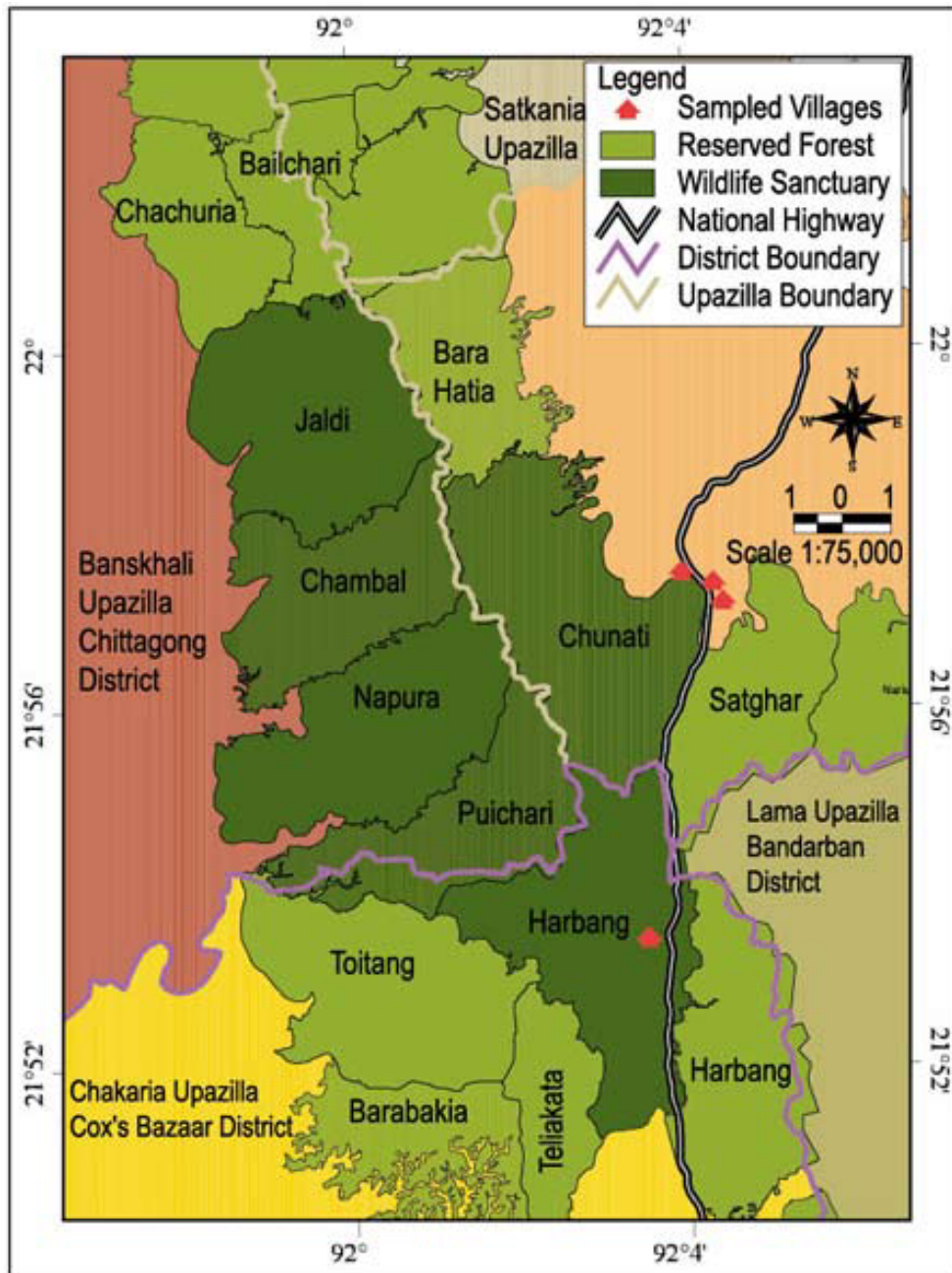


Figure 1: Map of Chunati Wildlife Sanctuary (Source: Nishorgo Support Project 2007)

## Methods

The study sites were situated in Chunati Beat and Harbang Beat, located 70 km and 78 km from Chittagong city, respectively. Beats are administrative units used by the forest administration. I selected four paras or small villages located in the two beats. Goyalmara village is located in Harbang Beat, while Nalbania, Teenghoria

and Bonopukur villages are in Chunati Beat. Field data were collected between February and June 2006 and analysis was conducted during July and August 2006. Data were gathered from a total of 24 households selected randomly from the four villages (14% overall sampling intensity). I conducted six household interviews in each village, but because population sizes vary over the villages, this method meant that some villages were more thoroughly sampled than others. There were 10 households in Teenghoria, 40 households in Nalbana, 50 in Bonopukur, and 70 in Goyalmara, which yielded sampling intensities of 60%, 15%, 12% and 9%, respectively.

I surveyed households on the basis of their agrarian holdings (small, medium and large), and also interviewed representative groups of seniors, women, and youth. I collected socioeconomic information from each sampled household (member) regarding family size, age, sex, literacy level, and secondary occupations, land holdings, primary off-farm income, total annual earnings, and collection (amounts and timings) and availability of NTFPs.

In addition, I conducted separate interviews with forest staff involved at the field level (forest guards and foresters), executive staff members (Range Forest Officers and Sub-Divisional Forest Officers), managerial officials (Assistant Conservator of Forest and Divisional Forest Officer at Chunati and Harbang beat office), and a local NGO official. This was done in order to learn about institutional perceptions and problems at the administrative level. Upon completion of the research, I conducted a feedback meeting in order to share the research findings with the villagers and to obtain their suggestions and comments.

Finally, vegetation surveys were carried out in 48 plots (two for each household) in order to determine the abundance of NTFP species collected in the study area. Plots measured 20m by 20m each. In each plot, I noted the number of species, number of individuals, parts used, collecting season, uses and economic value for each NTFP.

## Results and Discussion

### Socioeconomic Data

I surveyed all age groups, but the majority of respondents were in the lowest age classes, (20-29) and (30-39) (Fig. 2). They constitute the main work force in the villages. The oldest respondent lived in Bonopukur village and was 68 years old. The largest portion (33%) of household heads interviewed were educated to the 10th grade level, 29% to the 5th grade, and 25% had secondary and higher



secondary education, or HSC. Only 12.5% respondents had completed education above the HSC level.

In terms of primary household occupation, most respondents were farmers (33%) while approximately 28% were engaged in small businesses, 21% were day laborers, and (17%) were service holders (Fig. 3). Most houses were tin sheds (54%), while a few people lived in cement homes (4%). Housing is often used as an indicator of household wealth and as such could be linked to livelihood dependency on natural resources and subsistence (Fig. 4).

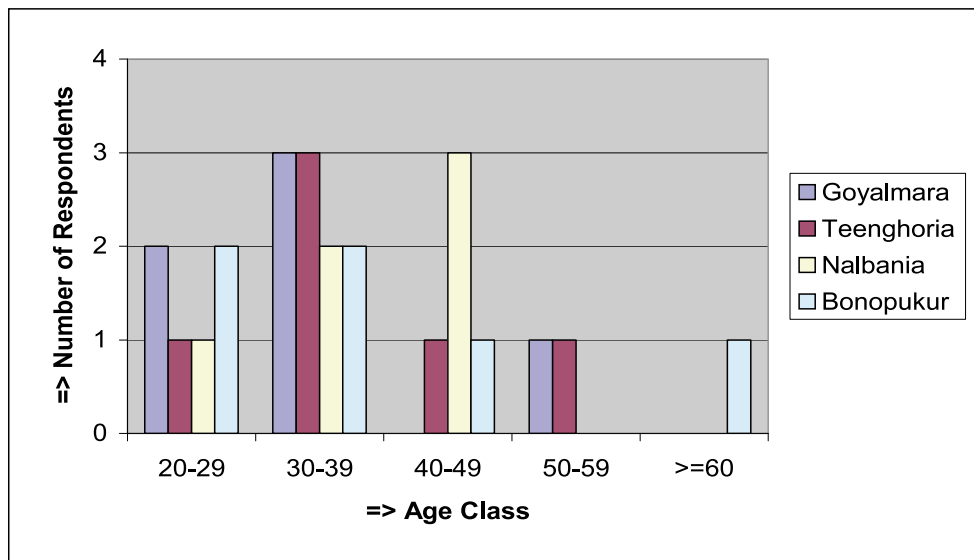


Figure 2: Age classes of surveyed villages

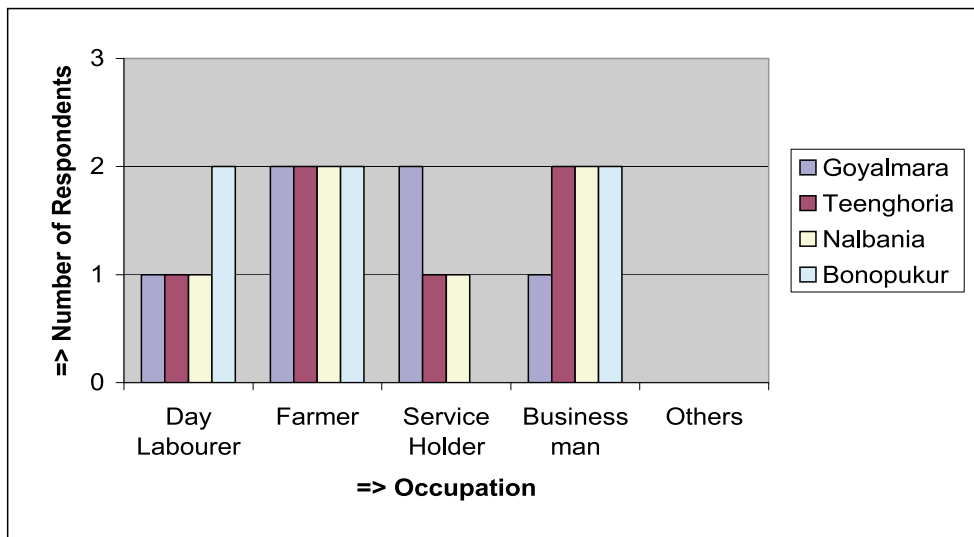
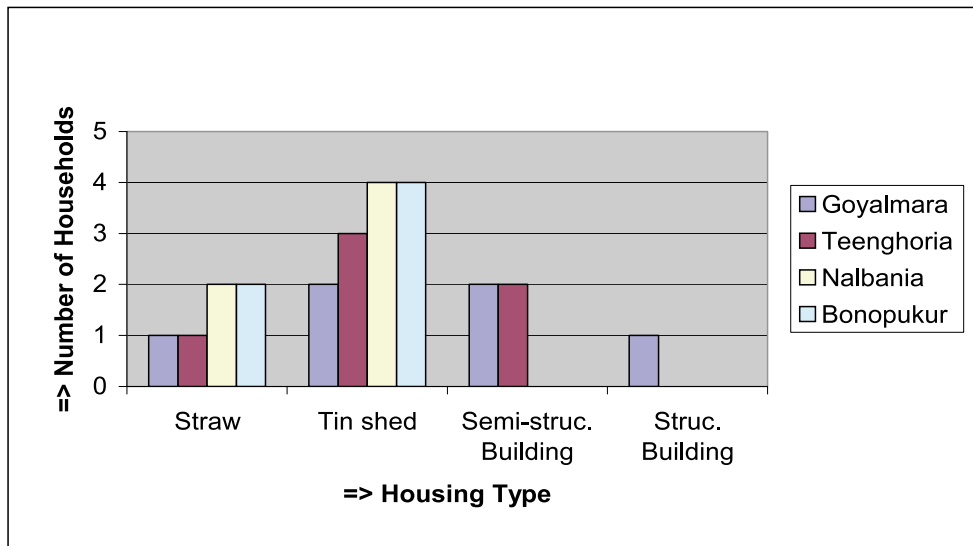


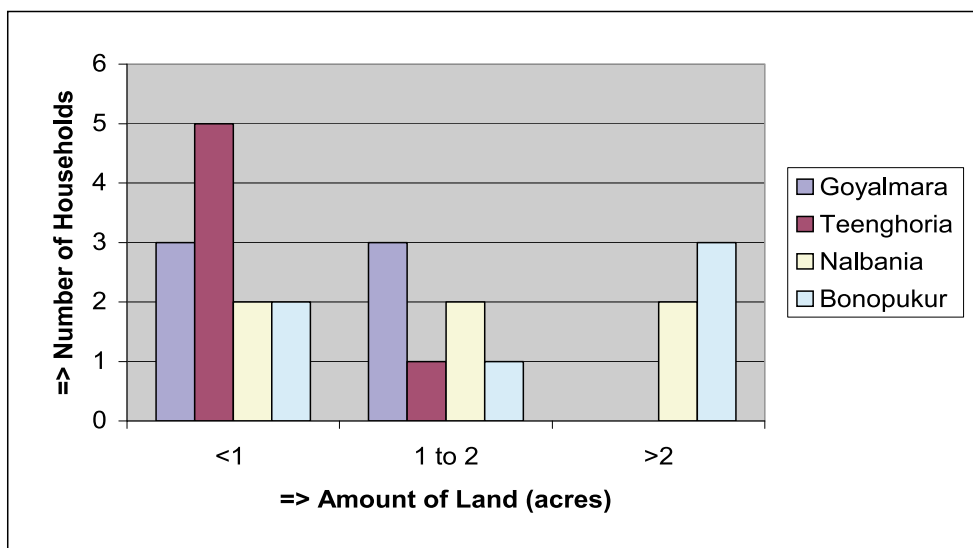
Figure 3: Occupation of Respondents in the Study Sites





**Figure 4: Housing Types of Respondents**

Land holding size can influence socioeconomic conditions and people's ability to practice sustainable forest management. The Bangladesh Bureau of Statistics (2005) officially denotes poor people as having up to 1 acre of land, lower middle class owning 1 to 2.49 acres of land, middle class own 2.5 to 4.99 acres of land, upper middle class own 5 to 7.49 acres of land, rich (upper class) owning 7.5 acre or more of land in rural areas. I classified households into 3 groups for interviews on the basis of land holdings (Figure 5). In this study, most respondents (50%) owned less than 1 acre of land, while only a few people in Nalbania and Bonopukur own more than 2 acres of land.



**Figure 5: Size of Household Landholdings**





### Use of NTFPs

The respondents use various NTFPs in their daily lives, which they pick from their household gardens and the surrounding forest lands. These products (and the percentage of households that use them) include deadwood for fuel (83%), herbs (75%), fruits (58%), dry leaves (54%), building poles (33%), vegetables (25%), mushrooms (17%), and honey (8%) (Figure 6).

About 40% of NTFPs collected by the villagers were used for medicinal purposes, including the leaves from 24 different plant species. Villagers used over 29% of all species for food (Figure 7). They also used leaves of various species (35%) for assorted purposes, and fruits of various plants (16%). The most commonly collected NTFPs are listed in Table 1. Households in all the villages I studied, except Teenghoria, also collect mushrooms from the forest.

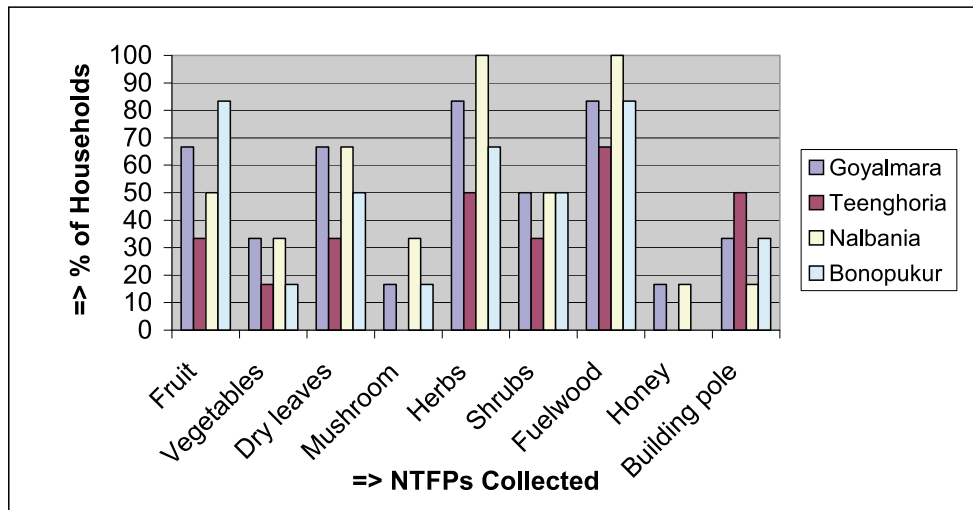


Figure 6: Percentage of Households Collecting Different Types of NTFPs

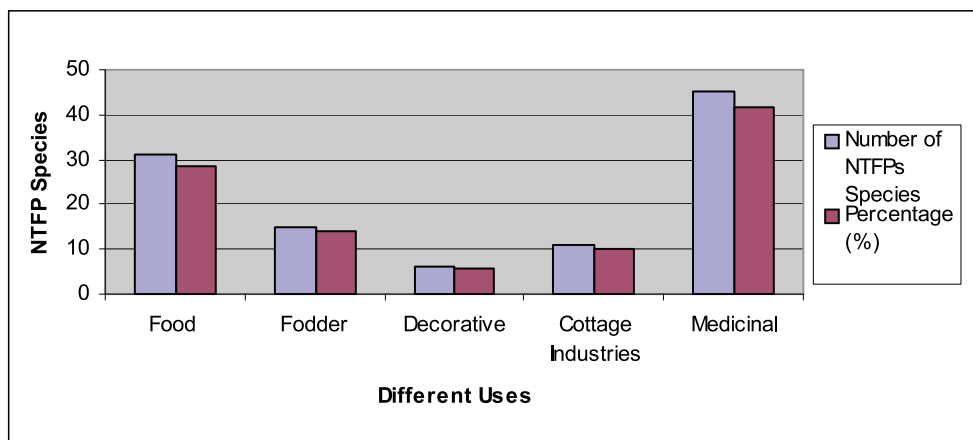
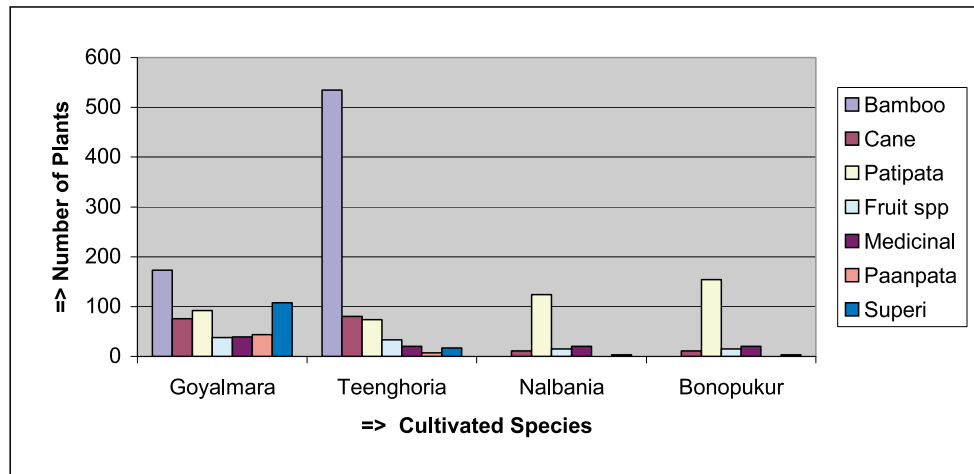


Figure 7: Use of NTFP Species

**Table 1: Common NTFP Species Collected at the Study Site**

<b>Bengali name</b>	<b>Latin name</b>
Paniyala	<i>Calophyllum inophyllum</i>
Kanthal	<i>Artocarpus heterophyllus</i>
Borta	<i>Artocarpus lakoocha</i>
Bael	<i>Aegle marmelos</i>
Lutki	<i>Melastoma melabotheticum</i>
Jonglikola	<i>Musa sapientum</i>
Jongliboroi	<i>Zizyphus rugosa</i>
Tentul	<i>Tamarindus indica</i>
Kalojam	<i>Syzygium cuminii</i>
Bon Kochu	<i>Diplazium esculentum</i>
Thankuni	<i>Centella asiatica</i>
Chhoi	<i>Piper chaba</i>
Dhenkishaak	<i>Colocasia esculenta (Linn.) Schott</i>
Bamboo	<i>Melocanna baccifera and Bambusa tulda</i>
Cane	<i>Calamus viminalis and Calamus tenuis</i>
Jonglilebu	<i>Citrus aurantifolia</i>
Bon alu	<i>Dioscorea bulbifera</i>
Tokma	<i>Hyptis suaveolens</i>
Kolmishak	<i>Ipomoea aquatica</i>
Totola	<i>Oroxylum indica</i>
Odal	<i>Sterculia villosa</i>
Lali	<i>Amoora wallichii</i>
Chilauni	<i>Schima wallichii</i>
Fuljharu	<i>Thysanolenia latifolia</i>
Bonpata	<i>Paederia foetida</i>
Nayantara	<i>Vinca rosea Linn.</i>
Arjun	<i>Terminalia arjuna Linn.</i>
Lemon grass	<i>Cymbopogon citratus DC. Stapf.</i>
Sungrass	<i>Imperata arundinaria</i>

All the selected NTFP species were cultivated in the home gardens (Fig. 8). These included bamboo (41% of individuals planted in the sample plots), cane (10%), mat palms or patipata (26%), fruit species (6%), medicinal plants (6%), betel leaves or paanpata (3%), and areca nuts or superi (8%). Poorer people used small timber and thatch for household construction and roofing, respectively; leaf litter and leaves, medicinal herbs; as well as edible roots and tubers, mushrooms, flowers and fruits as substitutes for staple foods, especially during lean seasons. Women in particular are quite dependent on NTFPs for self-support and income. Of the household members that collect NTFPs, 62% were women, compared with the approximately 17% that were children and 21% that were men. Thus, nearly three times more women than men are involved in NTFP collection.



**Figure 8: Different NTFPs Cultivated in Study Areas**

The total annual income for a household was calculated as: the sum of annual agricultural farm income, income from other on farm sources including NTFPs and animal products, earnings from primary and secondary occupations i.e. off-farm wage income, and income from NTFP gathered from the forests.

The average income per year from NTFP sales varied from village to village. Average income level from NTFPs sales ranged from Tk 2,700 to Tk 7,425 per year, and the daily average incomes from NTFPs varied from Tk 20 to Tk 50 per day, during the collection season of 3 to 7 months. Villagers collecting NTFPs from the forests sell directly to markets. These sales differ from family to family on the basis of the products collected, family needs, and other factors. Villagers collected NTFP year-round except for 2 to 3 months; actual timing of collection would vary according to monsoon and winter seasons, but collection time is mostly from November to May each year (Table 2).

Non-timber forest products are a significant contribution to the income and welfare of study households. Respondents suggested that local NTFP collection helps them meet important household needs and sources of income such as leaves and medicinal herbs, food for livestock, fruits, fuelwood and honey; while also supporting the production of secondary goods like processed or prepared food (animal and vegetable), baskets and other crafts. Table 2 also shows that NTFP collection makes a significant contribution to household income.

### **Relative Contribution of NTFPs to Annual Family Income**

From the household survey, I learned that agriculture, NTFP collection, secondary occupations and others (remittances, wage labor, livestock, and small businesses)

are the main sources of annual family income. About 12% of the annual income of villagers in Bonopukur comes from the collection and sale of NTFPs, compared with 7% in Nalbania, 6% in Goyalmara, and 4% in Teenghoria (Table 3).

**Table 2: Distribution of Income from Sale of NTFPs in Some Forest Villages of CWS**

Village	Months per year that NTFPs are collected (Maximum)	Average range of income per family per day (Tk) from NTFP sales	Average yearly income (Tk) from NTFP sales	Major types of NTFPs collected
Goyalmara	3-6	15-30	2700	Fruits, vegetables, dry leaves, mushrooms, herbs, shrubs, fuelwood, honey, building poles
Teenghoria	2-4	17.5-35	2100	Fruits, vegetables, dry leaves, herbs, shrubs, fuelwood, building poles
Nalbania	5-7	18.75-26.25	3937	Fruits, vegetables, dry leaves, mushrooms, herbs, shrubs, fuelwood, honey, building poles
Bonopukur	5-6	41.25-49.50	7425	Fruits, vegetables, dry leaves, mushroom, herbs, shrubs, fuelwood, building poles

**Table 3: Relative Contribution of NTFPs to Annual Income of Sampled Families of CWS**

Villages	Number of family members	Mean family income (Tk) per year	Relative contribution on annual income			
			Agriculture %	NTFPs %	Other occupation %	Others %
Goyalmara	31	59460	37	6	45	13
Teenghoria	27	76188	42	4	39	15
Nalbania	40	53208	39	7	41	13
Bonopukur	28	64768	48	12	32	8

### Dynamics of NTFP Collection at Various Levels

The amount of NTFPs collected is somewhat dependent on demand in the market created by external agents (i.e. secondary traders) in Amirabad, Lohagara, and Chittagong. Secondary traders place their orders on various NTFPs to primary traders who operate within Chunati Wildlife Sanctuary. For these orders, they usually advance a lump sum to the primary traders. Next, on the basis of orders of various items, primary traders involve local people of their regions for collection of various NTFPs. Local villagers who actually collect the NTFPs get a minimum price for their goods. Usually primary traders sell NTFPs to secondary traders with minimum profits from the price given to village collectors. The secondary traders sell the NTFPs at a price three to four times higher than that of primary traders. Collection of NTFPs increases during the lean season, and the primary traders often



give advance payments during festival and crisis periods to collectors. Some collectors reported that they have little knowledge about channels of NTFP markets. However, some primary traders in Chunar Wildlife Sanctuary have tried to sell their goods directly to exporters at Amirabad and Chittagong, but failed due to the huge minimum cash requirements for transactions, delays in payments, and reduction of market value of NTFPs by agents. Secondary traders, on the other hand, typically do not face these problems as they are based in the cities and already have well-established connections and agreements with the exporters.

### **People's Perceptions About NTFP Collection**

In general, the people surveyed believed that NTFP collection will increase with time in CWS if they are managed sustainably. This requires monitoring operations and alternative income generating sources for villagers living in and around CWS. Forest villagers believed that NTFPs provide an important source of income for sustaining their daily needs. Villagers report that their agricultural yields are under continuous threat from elephants, wild boars, monkeys and illegal fellers. Villagers felt that NTFP collection has decreased in some areas of the Sanctuary, due to dwindling resources in forests, and the resulting increased protection, and reduction in demand from secondary traders.

## **Conclusion**

NTFP use and cultivation under co-management practices have been implemented in forests that were traditionally open to local communities as common pool natural resources for their livelihoods. Changes in biophysical or socioeconomic conditions have often been stated as the leading cause of forest management failure (Chauvin 1976, Dawkins and Philip 1998).

Livelihood costs of households could be significantly higher if the forests were guarded-either by the local community or by government foresters. Local communities have a built-in capacity to control harvesting as well as effectively monitor illegal felling through local arrangements, so overall livelihood costs will be lower under community management for the same level of control. Moreover, co-management approaches are particularly suitable for CWS because local communities are dispersed throughout the sanctuary. These people practice cultivation and depend on forests for their livelihood needs. An underlying assumption is that communities will conserve and protect forest resources if they receive tangible benefits from sustainable utilization of forests (RECOFTC, 1995).

On the other hand, proper understanding of the levels of social relations in community-based resource management has important welfare implications, especially for the livelihood security of poorer households, as they should not be made worse off from institutional changes in resource management. Though this study could not compare the transaction costs of resource management under different property regimes (state, co-management, community and private management), further research on comparison of transaction costs associated with different forms of property regimes may help to develop a more generalized theory of transaction costs and their significance in managing the local commons. While this assumption still needs to be tested, currently local people appear to have limited rights to forests, despite the recognized importance of NTFPs for income generation and food security (Lynch 1995). There is a pressing need to facilitate specific interventions that enable forest resources to play a greater role in livelihoods through improved local forest governance. Forests can only contribute to poverty reduction when poor people have secure long-term rights to their resources, coupled with the capability to defend them against more powerful actors. The potential contribution of forests to poverty reduction is the subject of some debate. Overcoming these barriers is crucial in achieving progress toward sustainable forest management and making forest resources work optimally toward alleviating poverty, leveraging local and national socioeconomic development, and avoiding the long-term degradation of important forest-based goods and services specially NTFPs.

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