

**The Livelihood Dependency of Khasia Community on Betel
Leaf Cultivation at Lawachara National Park, Moulavibazar**

**A Dissertation
by
Sayeed Mahmud Riadh
ID 04262006**

**Submitted to the Development Studies Program, BRAC University
In partial fulfillment of the requirement for the degree of
Master of Development Studies**

October, 2008

**The Livelihood Dependency of Khasia Community on Betel
Leaf Cultivation at Lawachara National Park, Moulavibazar**


**A Dissertation
by
Sayeed Mahmud Riadh
ID 04262006**

Approved by:



Supervisor

**Professor Jefferson Fox, PhD.
Coordinator, Environmental Studies
East West Center, USA**



Director

**Dr. Syed M. Hashemi
BRAC Development Institute
BRAC University**

Table of Contents

	Acknowledgement	vi
	Abstract	vii
1.	Introduction	1
2.	Objective of the Study	3
3.	Background	6
	a. Khasia Community	6
	i. History and Origin	6
	ii. Culture and Livelihoods	7
	b. Betel leaf cultivation	10
	i. Betel vine	10
	ii. Seedling Preparation	11
	iii. Seedling Plantation	12
	iv. Maintenance of the planted seedlings	12
	v. Mulching	13
	vi. Diseases	13
	vii. Harvesting Procedure	13
	viii. Processing of Betel leaf	14
	ix. Marketing of Betel leaf	15
	c. Study area: Lawachara National Park	15
	i. Location and Topography	15
	ii. Legal status	17
	iii. Forest types	17
	iv. Flora and Fauna	17
	v. Settlements	18
	d. Forest Management System of Lawachara National Park	18
	i. Past management System	18
	ii. Present management System	20
	iii. <i>Nishorgo</i> interventions	21
4.	Methodology	22
5.	Results	23
	a. Demographic profiles of respondents	23
	b. Household capital of respondents	24

c.	Income profile of respondents	25
d.	Pattern of forest resource use	27
e.	Problem analysis in betel leaf cultivation	27
i.	Input Analysis	29
ii.	Market access	30
iii.	Soil Fertility loss: Soil rehabilitation programme	30
iv.	Diseases	31
f.	Social capital analysis	32
g.	Biodiversity in the betel leaf garden	32
i.	Tree species diversity in the <i>Jhum</i>	32
ii.	Wildlife available in the <i>Jhum</i>	33
6.	Discussion	34
7.	Conclusion and Recommendations	39
a.	Conclusion	39
b.	Recommendations	40
	References	42

List of Tables

Table 1:	Demographic characteristics of respondents	24
Table 2:	Household capital of respondents	25
Table 3:	Monthly consumption pattern of households (Taka)	26
Table 4:	Input analysis	29
Table 5:	Common tree species supporting betel vines	32

List of Figures

Figure 1:	Map of Lawachara National Park	16
Figure 2:	Monthly consumption pattern of households	26

Annexes

Annex 1:	Questionnaire	48
----------	---------------	----

Acronyms

BBS	Bangladesh Bureau of Statistics
CNRS	Center for Natural Resources Studies
DFO	Divisional Forest Officer
FD	Forest Department
FSP	Forestry Sector Project
HHs	Households
IUCN	International Union for Conservation of Nature
JFM	Joint Forest Management
KWS	Khasia Welfare Society
LHS	Land Holding Size
LNP	Lawachara National Parks
NACOM	Nature Conservation Management
NFA	National Forest Assessment
NSP	Nishorgo Support Project
NTFPs	Non Timber Forest Products
PA	Protected Area
RECOFTC	Regional Community Forestry Training Center for the Asia and Pacific
RF	Reserve Forest
SEHD	Society for Environment and Human Development
WC	Working Circle
WCFSD	World Commission on Forests and Sustainable Development.
WRI	World Research Institute

English-Bangla translations

Jhum	Betel leaf garden
Upazila	Lowest civil administrative unit in Bangladesh
Punji	Tribal village
Mantri	Tribal leader
Durbar	From the Iranian language, this is the name given to the tribal council of the Khasia communities

Acknowledgement

First, I would like to express my profound gratitude and considerable appreciation to Professor Jefferson Fox, East-West Centre, USA for his valuable guidance, comments, and constant encouragement which make it possible to complete this study.

I also wish to extend my heartfelt thanks and appreciation to Dr. Ferdous Zahan, Academic Co-ordinator of the MDS Programme for her valuable suggestions and guidance.

I am particularly indebted to the respondents of Khasia punji, who assisted my study with their valuable time and cooperation. My sincere thanks to Mr. Kodore, Khasia Mantri who provided me with valuable information. I would like to express my thanks to Mr. Modinul Ahsan, Assistant Conservator of Forest, Moulvibazaar, Wildlife Forest Division and Mr. Tariqul Islam of RDRS who provided me with useful information and documents related to my study. Both the villagers and village chiefs of Magurchara and Lawachara punji and other concerned agencies deserve appreciation for their kind cooperation in providing me with the relevant information needed for this study.

Similarly, I am thankful to all my colleagues at BRAC University and also thankful to my friend, Mr. Ruhul Mohaiman Chowdhury for his encouragement and patience. I would like to extend special thanks to Mr. Nasim Aziz of Nishorgo Programme and Nicola Banks Doctoral Associate at Brooks World Poverty Institute for her assistance in editing the English of the paper.

Finally, I am deeply indebted to my parents, wife and daughter who inspired and encouraged me to reach this stage. I am grateful for their patience and sacrifice while I completed this study.

Abstract

Declaration of an area as “protected” is known to threaten the livelihoods of forest dependent communities. In Bangladesh – as in most developing countries - the livelihoods of forest dwellers are largely dependant on forest resources, particularly non-timber forest products (NTFPs). It proves a challenge for management authorities to reconcile the need for the protection with the recognition of the livelihood dependencies of local communities.

In Lawachara National Park, Khasia communities are largely dependent on forest-based betel leaf cultivation. This study analyzes the livelihood dependency of Khasia communities on betel leaf cultivation in Lawachara National Park. This study utilized an in-depth questionnaire, focus group discussions, and a thorough literature review.

Irrespective of their socioeconomic status, this research shows that both richer and poorer households are highly dependent on betel leaf cultivation. This suggests that the education levels of the Khasia community in LNP has not yet reached a level that can provide them with alternative livelihood opportunities. Another significant finding of the research is that the gender distribution of betel leaf cultivation empowers women financially as well as socially. Input supports and market access were identified as major obstacles to betel leaf cultivation. Due to declining soil fertility, the Khasia community has had to use chemical fertilizers in their Jhum (betel gardens). Though traditionally mulching was used as a manure source, this shift has in turn created a demand for irrigation. Due to the increased cost of inputs, the profitability has declined. As a tribal community the Khasias are marginalized, implying insufficient market access and unfair prices. As a result, their dependency on the forest cannot be reduced by increased incomes. Since forest-based betel leaf cultivation offers a high potential for the generation of cash incomes for the Khasia communities living within park boundaries, the recently introduced co-management approach must properly address this issue.

Chapter 1

1. Introduction

Protected Area declaration is the one of the most common efforts for biodiversity conservation. The International Union for Conservation of Nature (IUCN) (1994) defines a Protected Area as: “an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means”. An estimated 10.8 percent¹ of the world’s land is declared as a Protected Area (WRI, 2008). Bangladesh has 1.442 million hectares of forest cover (NFA 2007). Only 0.5 percent of Bangladesh’s total land is declared as Protected Areas¹ (WRI, 2008).

Declaration as a Protected Area (PA) is not sufficient to prevent the steady loss of biodiversity in developing countries. A failure to integrate local communities into PA management is one cause, since they are largely dependent on these resources for their livelihoods. The livelihood dependency of local communities provides one of the main challenges for PA management. The management authorities face a trade off between livelihood dependency and biodiversity conservation. This trade-off arises since the livelihoods of local communities have recently been recognized as a human rights issue. In addition, biodiversity conservation is similarly important for sustainable forest resource management.

In general declaration as a PA imposes restrictions on the traditional resource use of local communities (McNeely, 1988; Gomez-Pompa & Kaus, 1992), thus rendering the livelihoods of local communities vulnerable. Tribal communities are the primary victims of this process, since their livelihoods are largely dependent on local forest resources.

Some 60 million people worldwide - indigenous and other communities living in and around forests - depend on forest resources for their subsistence (WCFSD, 1999). In India, 68 million people, belonging to 227 ethnic groups, and comprising of 573 tribal

¹ Includes IUCN categories I-V. Marine and littoral protected areas are excluded from these totals.

communities live within or near forest areas (Rai and Nath, 2003). Bangladesh is home to 27 tribal communities (Khaleque 1998), with their 1.2 million people (1991 Population Census), living mainly in or near forest areas.

The livelihoods of a quarter of the world's poor is directly or indirectly dependent on the forest (World Bank, 2000). Poverty is an important factor in the dependence of tribal communities on forest resources. Since the late 1980s, a number of studies have revealed that people living near forests and/or PAs depend on them as an important source of livelihoods (Fernandes et. al. 1988, Falconer & Arnold 1989, Cavendish 2000, Gunatilake 1996, Godoy and Bawa 1993, Reddy and Chakravarty 1999, Barham et. al. 1999, Bahuguna 2000 and Takasakyi et. al. 2001). These studies imply that the livelihood dependency of local communities should be a key focus of PA management. More specifically, integrating those dependencies, or finding ways to reduce those dependencies should be a key part of PA management (Gunatilake 1998, Hedge & Enters 2000).

In line with global experiences, the reliance of indigenous communities in Bangladesh on forest resources is extremely high. One of these indigenous communities is taken as point of reference for this study. This is the Khasia community, living in the northeastern regions of Bangladesh. In general, the livelihoods of the Khasia community mainly depends on betel leaf cultivation inside the hill forests. This is recognized by several studies as a sustainable hill cultivation practice (Chowdhury and Mahat, 1993 and Nath *et al.* 2003). Riadh (2007) identified betel leaf farming as the most vital source of cash income for Khasia communities living within the study area for this research, Lawachara National Park (LNP), Moulavibazar.

Shah and Sah (2004) identified several factors for the higher incidence of poverty in tribal regions. These include the low bargaining capacity, lack of proportional political representation, the poor quality of local governance, and their constrained access of tribal communities to forests, land, and water resources.

2. Objective of the Study

Local communities consider the PA declaration a threat to their livelihood. It is therefore a challenge for the management authority of PAs to address their livelihood dependency in the management of protected areas. This study focuses on identifying those factors that affect the livelihoods of local communities, namely the level and extent of dependency of the Khasia communities in Lawachara National Park (LNP). Such knowledge may help in the formulation of innovative management strategies of protected areas which will help to reduce this dependency. This study will analyse the available PA resources and constraints, as well as the stake of tribal communities and their vulnerability arising from the conventional management regime. Since Khasia communities are one of the major stakeholders in the collaborative management of the LNP, their dependency must be given utmost consideration for successful PA management.

The main objective of the study is to analyze the livelihood dependency of the Khasia community within Lawachara National Park on betel leaf cultivation. Some specific objectives are:

1. To identify the different factors which influence the livelihood of Khasia communities,
2. To identify the extent of their dependency on betel leaf cultivation,
3. To analyze the pattern of forest resource use of the Khasia community,
4. To identify different problems in betel leaf cultivation, in particular those associated with input support and access to market,
5. To analyze the social capital of Khasia communities.

Local dependency should be properly accounted for in protected area management (Masozera and Alavalapati 2004). More specifically, the identification of factors that influence dependency and the formulation of innovative strategies that reduce dependency should become part of PA management (Gunatilake 1998, Hedge and Enters 2000). Masozera and Alavalapati (2004) found that forest dependency was influenced by factors such as education, age, gender, household size, land holding size, market access and agricultural income. While age, agricultural income and market access were found to have a negative relationship with forest dependency, household size was found to have a

positive relationship. Statistically significant relationships were not found with the level of education, land holding size or gender.

In Sri Lanka at the Sinharaja World Heritage Site, Senarate, *et al.* (2003) found that while the government's conservation program has restricted the access of local communities to non-timber forest products (NTFPs), commercial tea cultivation opens up the possibility of cash incomes. . In Lawachara National Park there are alternative options for income. Betel leaf cultivation has a high income-earning potential and has been shown as the main source of cash income for the Khasia communities who live there (Riadh 2007). Both studies reveal that alternative income-earning opportunities (like betel leaf cultivation in LNP) have substantially reduced dependency on forest resources, particularly on NTFPs.

Effective PA management requires an overview of resource use by the dependent communities. It is usually observed that poorer households gather more NTFPs to meet a wide range of domestic needs. In comparison, NTFPs play a marginal role in fulfilling the daily needs of rich households (Senarate, A. *et al.* 2003). In most tropical countries, NTFPs play a significant role in the livelihoods of a large section of the poor living inside or close to the forests (Arnold and Perez 2001). One study conducted in the Buxa Tiger Reserve of Northern West Bengal found that forest dwellers used NTFPs as food or as a dietary supplement, especially during the lean season (Das 2005).

Lawachara National Park has been used for many years by subsistence and small-scale woodcutters and NTFP harvesters. Those households living within the forest are solely dependent on forest resources to meet their entire demand for fuelwood and house-building materials (FSP 2000 and CNRS 2000). Collection of fuelwood to meet subsistence demand is found to be the most common of the park's resources. Bamboo is also harvested both for subsistence and for small-scale commercial uses (FSP 2000b). Riadh (2007) found that in LNP, for those that have no other income source than betel leaf cultivation - largely the middle and poor members of the Khasia community - their income is supplemented by the collection of fuelwood and wild vegetables for domestic consumption.

Addressing the livelihoods of forest dependent communities is a prerequisite to more effective forest management (Sunderlin *et al* 2005). This requires the identification and analysis of the problems related to the livelihoods of forest dependent communities. In spite of the benefits derived from betel leaf cultivation, some problems are created in terms of forest conservation and the livelihoods of the Khasia community. Nath *et. al* (2003) found problems in land tenure and product marketing. These as well as other problems must be studied and addressed accordingly for the proper management of LNP. For this reason, one of the research's specific objectives was to identify the problems associated with betel leaf cultivation as a way of securing the Khasia community's livelihoods.

In addition to natural, physical and financial capitals, social and human capitals are also building blocks to secure livelihoods (Unasyuva 2000). Carney (1998) defines social capital as:

“the set of social relationships on which people can draw to expand livelihood options. These include kinship, friendship, patron-client relations, reciprocal arrangements, membership of formal groups and membership of organizations that provide loans, grants and other forms of insurances.”

The livelihoods of local forest dwellers consist of the assets, capabilities and activities required to secure their living. As a major part of livelihood assets, social capitals create access to resources and strengthen the capabilities of the forest dwellers. An analysis of their social capital is therefore an integral part of any study of the livelihood dependency of Khasia communities.

Chapter 3

3. Background

a. Khasia Community

i. History and Origin

The Khasia community belongs to the Austri-Asiatic (Mon-Khmer) language family (Khaleque 1995; Maloney 1984; Grierson 1903). They are one of the matrilineal tribes in Bangladesh, in which a mother's property is inherited by her daughters (Khaleque 1995). They descended from the Khasia and Jaintia hills of Cherapunji and Shilong regions (Banglapedia, 2008). The Khasia is a major tribe in the northeastern Sylhet Division of Bangladesh, where they settled about 500 years ago (Das 1999). Presently, the Bangladesh Bureau of Statistics records the population of the Khasia community as 12,300 (BBS 1991). However, the Bangladesh Khasia Society estimate a higher population of around 30,000. The birth rate is very high among the Khasia (Banglapedia 2008).

Costa and Dutta (2007) reported 85 Khasia punjis (small tribal village) in Bangladesh, scattered among 11 upazilas in the northeastern part of the country. These upazilas are Srimongol, Komolganj, Rajnagar, Kulaura and Borolekha in Moulavibazar district; Jintiapur, Kanaighat and Gowainghat in Sylhet district; Cunarughat and Bahubal in Habigonj district; and Tahirpur in Sunamgonj district.

Today, the Khasis has various tribes. The Khasis of the Khasi Hills are known as *Khynriams* and the Khasis of Jaintia Hills are known as *Syntengs* (but they prefer to be called Pnars). These two groups are again divided into several tribes based on the location of the hills in which they live. The *Khynriam* group is further divided into three tribes namely the Bhois, the Wars and the Lyngams. The Bhois inhabit the Khaisa hills of the north, the Wars in the south and the Lyngams in the west and northwest areas. Within the *Syntengs* or *Pnar groups* are the *Wars*, the *Labangs*, the *Nangtun*, the *Khyrwangs* and the *Nangphylluts*. As the *Wars* are found in both *Khynriam* and *Pnar* groups, they are

known as the *War Jaintias* (or *War Pnars*) and *War Khyria* (or *War Khasis*) according to their location in Jaintia Hills or in Khasia Hills (Rymbai 1998).

ii. Culture and livelihood

The Khasis have been noted to share strong similarities with the Indo-Chinese people -

“The Khasi people are of the Indo-China race; they are short, very stout and muscular, with enormous calves and knees, rather narrow eyes and little beards, broad high cheekbones, flat noses and open nostrils. Their hair is gathered into a top-knot, and sometimes (they) shaved off the forehead and temples” (Hooker 1854, in Costa and Dutta 2007)

For their livelihoods, Khasia communities usually grow betel leaf alongside bananas, pineapples, oranges, cassia leaves (*dial*), and black pepper on their Jhums. Traditionally they hunted wild animals and eat bush meat. Rice, wild vegetables and dry fish are their staple food items. They also collect wild vegetables and fruits for their own consumption from neighboring forests (Banglapedia 2008).

The Khasi communities practice their own traditional religion. In the beginning, Khasi religion was Shamanistic, based on traditional beliefs and practices based on the spirit world. The Khasis believe in the immortality of the soul, that the soul only passes through the phase of temporary embodiment and that the earth is only its temporary abode. Shamanism was later reduced to divination, which became the most prominent feature of their religion. Gradually the Khasis have become converted to Christianity by various Christian Missionary groups and have been influenced by western education and thoughts spread by these missionaries (Costa and Dutta 2007).

The influence of Hinduism and Christianity is evident in the Khasia religion. Around one and a half centuries ago, Christian missionaries began to preach Christianity among Khasia communities. Presently, more than 80% of the Khasias are Christians. Their conversion to Christianity has changed their socioeconomic structure remarkably. Almost all the punjis have their own church, which is visited each Sunday for prayers. Moreover,

various issues regarding their punjis are discussed in church. As well as providing religious guidance, christian priests often arbitrate in disputes arising in the punjis. Most of the Khasias are Protestants. However, traditional customs remain practiced. For example, after death, a body is cremated and the ashes buried. During the funeral, the priest recites: "Good bye, good bye, you will chew betel leaf in the kingdom of God" (Banglapedia 2008).

Khasias are bilingual; speaking both in the Khasia language and in Bangla. They do not, however, have a written version of the Khasia language. There was once a written scripture, but it was destroyed by a calamity. The first Khasia version of some parts of the Bible was written in Bangla alphabets. The literate Khasias use Bangla alphabets to write the letters in Khasia language. Elsewhere, the Khasia language is documented in Roman alphabets. Though in Bangladesh Khasia language is not standardized, in Charapunji, India, their version of the language is standardized (Banglapedia 2008).

Khasia religious beliefs, culture, dress and manners have evolved considerably with the influence of modern developments in education, science, technology and culture. However, some indigenous traits still remain. Various rituals are performed throughout the year to pray for the fertility of their lands. These include *Khyakhang brata* (at the time of sowing seeds), *Pisthol*, *Pirdong* and *Khyaklam*. Marriage is treated as obligatory for Khasia men and considered as God's command. Celibacy is sinful and cursed in their culture. They love to dance and sing. In different social events like marriage, birth and death, dancing and singing are performed in chorus (Banglapedia 2008).

Unlike other communities in Bangladesh, in which the husband takes a new bride to his parents' home, one notable feature of the Khasia marriage is that the new husband moves with his wife to his parent-in-law's house. This is due to the matriarchal nature of Khasia communities. While the wife remains with her mother, all that household's income go to her mother as household head. Polygamy is not practiced in the Khasia community and Khasia men must take a wife from a different clan (Gordon 2004). If someone marries a

woman from his own tribe, he will be deprived from property, exiled from the village, and will be given no funeral after his death. (Banglapedia 2008)

Traditionally, Khasia girls select their bridegrooms. After consent from the bride, the guardians from both sides of the family organize the marriage. The priest recites religious verses and blesses the bridegroom and the gods are offered wine and dry fish. Palatable dishes and drinks are offered to the bridegroom's party. After marriage, a new cottage is built close to the bride's mother's house for the new couple. If a new couple lives independently in this manner, their income is treated exclusively as their own (Banglapedia 2008). A new cottage is not built for the youngest daughter of the family however, as she will inherit the maternal house and properties.

Khaisa women and men share responsibility for household activities and cultivation. In a Khasia family, strong trust exists between husband and wife, and disagreement is rare. Women are respected by men. Children are known by their maternal titles. All daughters, including the youngest, inherit a share of property but are unable to sell it. The youngest daughter is responsible for performing all the rituals and ceremonies in the family.

In the event of the untimely death of his wife, a husband can get married and move elsewhere. Otherwise, his children have a religious responsibility to look after him. Monogamy is customary among the Khasias. However, if her husband dies or is found to be sexually impotent, a wife can have more than one husband. A divorce can take place in any event of mistrust, hatred, dishonesty and impotency on the part of the husband. Prior to the divorce, one or both partners have to inform their desire to the Minister of the Punji and the people concerned with their marriage. A specific time period is provided to allow both parties to reconsider their intent to divorce. By the beating of drums in the Punji, the marriage is declared null and void. In most cases, the wife must pay fifty percent of the compensation if she initiates the process of divorce. If the husband initiates the divorce, he must pay only two pieces of cloth. After divorce, the children remain with their mother, and both husband and wife can marry again. Among the Khasia Punjis, the rules of marriage and matriarchal social customs are the same (Banglapedia 2008).

The leader of the Khasia community is called *Mantri*, and he is concerned about the social, traditional and religious issues within the community. A mantri is chosen by the villagers and is passed down to his son. Tenureship of a Mantri is not fixed, and he may remain Mantri as long as he desires (Ahsan, 2007).

Informal institutions called *Durbar*² are found in Khasia communities. This is headed by the community mantri. Each household head is a member of the Durbar and must contribute to its funds. Responsible for the well being of the community, the Khasia mantri can call Durbar at any time he feels it necessary to discuss different issues with other senior member of the community. As their leader, the Mantri has a strong control over the other members of his community with respect to social, traditional and religious issues (Ahsan 2007).

3.b. Betel Leaf Cultivation

i. Betel Vine:

Betel leaf (*Piper betle L.*) is an important crop in Bangladesh, cultivated in Kustia, Khulna, Narail, Faridpur, Bagerhat, Barisal, Jessore, Rajshahi, Rangpur, Satkhira, Cox's Bazar and in greater Chittagong District, as well as in neighboring countries. It is a perennial dioecious climber that climbs up trees supported by its adventitious roots (Saha and Azam 2004, Nath *et al.* 2003). The betel vine is under the family of Piperaceae.. Betel leaf is popular among Bangladesh's people, and is usually chewed with slices of betel nut (*Areca catechu*) and lime. The leaf has a medicinal value and is widely used in social festivals for hospitality. It has a large market throughout the country, and is also exported to the Middle East, Britain, Pakistan and to some countries of Africa. (Pthmai, P. *et al.* 2006)

There are two types of betel vine based on topography, namely plain land betel leaf and hilly betel leaf. Hilly betel leaf is cultivated by the Khasia people using a different

² Durbar is an Iranian phrase, which refers to the Shah's noble court. Durbar is adopted in Indian context while the Parsian and Perso-Turcomen rulers administered in this region. It represents a feudal state council or a purely ceremonial gathering (Wikipedia, 2008).

cultivation technique. In greater Sylhet, Khasia communities cultivate betel leaf in about 108 Khasia Punjies (Pthmai, P. *et al.* 2006).

Betel leaf vine grows best in moist, tropical forest conditions with cool shade, high humidity and rich soil moisture (Bendre and Kumar 1980). Betel vine prefers well-drained clay and sandy clay soil. Khasia people cultivate the betel vine on the trees surrounding their punjies. The betel leaf garden is called Jhum by the Khasia people. The cultivation technique of the Khasia utilizes the surrounding trees to support the betel vines. Betel vine can be planted at the base of most types of trees, but trees with thick and soft bark are most suitable. Usually natural forests are selected for betel leaf cultivation where there are less trees. The Khasia allow naturally-germinated saplings, suitable for betel leaf cultivation, to grow. Betel vines are then planted on the base of selected trees when the saplings attain 10-15 ft in height. Natural forests under the Forest Department, the marginal lands of tea estates, and Government Khas lands are those areas mainly cultivated by the Khasia (Pthmai, P. *et al.* 2006).

ii. Seedling Preparation

But-Tang is the technique of seedling production, in which small cuttings are made from betel vines. Usually the cutting is selected from healthy vines that are three years or older. For seedling propagation, 2, 4 or 6-branched cuttings are used. Two-branch cuttings are used most extensively, while 4 to 6-branch cuttings are used for planting depending on the girth of supporting trees. For example, 2-branch cuttings are used for small girth trees, 4-branch cuttings are used for medium-girth and 6-branch cuttings are used for large-girth trees. Root and branches of the seedlings are given priority in the grading process. Four nodes should exist in two-branched seedlings. Accordingly, six nodes exist in 4-branched seedlings and eight-nodes exist in six-branched seedlings. The lengths of the seedlings are 1 ft (for two branched seedlings), 2 ft (four branched seedlings) and 2-4 ft (for six branched seedlings). Three leaves are kept on each branch. The leaf of the vine is harvested before planting, as the leaf gets rotten if it makes contact with the soil. Medium aged, soft, green and fresh vines are selected for making the cuttings. Softer and more juvenile vines are taken as seedlings. Watering is mandatory

after planting, otherwise seedlings may wilt shortly after planting. Cutting is done by a slanted cut above the node. Round shaped or injured cuttings are not used for planting. The knife used in the cutting process is called *Teri-but-tang* in Khasia language (*Teri* means knife, *But* is for 'cut' and *tang* for seedlings), and it is shaped to ensure that vines or branches of cuttings are not broken or twisted in the cutting process. It is preferable to plant the seedlings on the same day that the cuttings have been collected.. Otherwise, the cuttings must be kept in a cold and shady place (Pthmai, P. *et al.* 2006).

iii. Seedling Plantation

Betel vine planting is carried out from June to August. In preparation for planting, weeds and grasses are cleaned from the base of the supporting trees. Next, planting pits are made -these are 6 to 7 inches deep, 1 ft in length and 6 inch in width. When the seedling is planted, two nodes are buried under ground and one is kept above ground. The pit is filled with loose mud, but not compacted. The number of pits surrounding a supporting tree varies according to the number of branches in the cutting. For example, under a medium-sized supporting tree, a 4-branch-seedling is planted on two sides of the tree. For large supporting trees, 2 or 3 sides of the trees are planted with 6-branch cuttings. Water logging in the pit should be carefully avoided (Pthmai, P. *et al.* 2006).

iv. Maintenance of the planted seedlings

The seedlings do not require maintenance until their new shoots emerge. This usually takes 10 to 15 days to occur. For this period, the seedlings are kept free from weeds and grasses, so that the new shoots are not suppressed. If seedlings are found to creep along the ground rather than to climb their supporting trees, the vines are tied to the supporting trees. The next step is to debranch the supporting trees, called *Kolom kora* or *Khasi kora* by the Khasia people. Debranching is usually done after 2-3 weeks of planting, and ensures that the new vine gets sufficient light and air, so it can grow rapidly (Pthmai, P. *et al.* 2006).

v. Mulching

Debris from the debranching process are kept together at the base of the seedling. This debris gradually decomposes, providing nutrients to the seedlings. The weeds and grasses that were cleared from the supporting trees are also used as mulching materials. Mulching helps to keep the soil moisture and provides nutrient support to the newly-planted vines. This has been the traditional method used by the Khasias for nutrient support, but recently some betel leaf cultivators have switched to using fertilizers. Though fertilizer use helps to increase the vine yield, in the dry season a lack of mulching and watering can lead to the death of the seedlings. Most Khasia farmers avoid chemical fertilizer use so as to keep the soil nutrients intact. The usual life span of a betel vine is 15-20 years (Pthmai, P. *et al.* 2006).

vi. Diseases

There are two main diseases found in betel vine plantations, namely leaf-rot and root-rot. The latter is found to be more harmful to the plantations (Pthmai, P. *et al.* 2006). Leaf-rot is known locally as *utram*. Spots develop on the leaves of the plant in the early stages. Gradually the infected leaves start to dry and finally the whole vine is attacked and dies. This disease is more common during periods of high rainfall or high humidity. To prevent the disease from spreading, the Khasias uproot all infected vines, and keep the plot fallow for up to one year for replanting (Nath *et al.* 2003).

Root-rot is called *ukhlam* in Khasia language, and is believed to be a curse. In the early stages of this disease stem is attacked. Gradually all of the leaves turn a yellowish colour and vine dies within two days. This disease is highly infectious, and within a week the entire garden is infected and dies. If the spread of disease is limited to only half of the garden or Jhum, it is treated as good fortune. No cure for this disease has so far been found (Pthmai, P. *et al.* 2006).

vii. Harvesting Procedure

Betel leaves are usually harvested for the first time when they reach three years old. Plucking the betel leaves is a task for the male members of the Khasia families. Often

hired labourers from the neighbouring tea estate or villages are employed to assist in harvesting. Khasia people use a ladder called a *Lo-u*, made of single pole to harvest from a big tree. The season for harvesting betel leaves is from May – January.

Betel leaves can be plucked from each vine 4-times in a year . These four harvests are called; . *Hat lobor*, *Hat sumar* or *hut khra*, *Hat candid*; and *Hat Khia* or *long khong*.

- i. *Hat lobor*: . This period is from mid-May to June. In this harvest, new leaves have emerged and the leaves are small in size and soft. No more than 2 leaves are plucked from each branch. At this time, any damaged leaves are also plucked.
- ii. *Hat sumar* or *hut khra*: This plucking season is from the end of June to September. This is an important harvest that provides the highest yield. In addition to harvesting, maintenance of the vines are also done at this time.
- iii. *Hat candid*: This harvest starts in October and continues until mid-December. In this period, the leaves which are assumed to be dropped during dry seasons are collected.
- iv. *Hat Khia* or *long khong*: Over the period December to January, all the remaining leaves are plucked from the vines regardless of their size (Pthmai, P. *et al.* 2006).

viii. Processing of Betel leaf

After being harvested, betel leaves are brought from the Jhum in a basket to the yard of their homes. This basket is called *Khara Hat Ptha*. The harvested betel leaves are spread onto a polythene sheet or across banana leaves. Water is sprayed onto the leaves so that they look fresh. Leaves are collected into small bundles, each consisting of 144 leaves. These are known as *Kanta*. . Betel leaves are sold in a unit known as a *Kuri*, which consists of 20 *Kanta*. A tall herb called *Pla tara* (*Alpinia nigra*) is used to bind these small and large bundles. This herb is usually grown in the garden of the Khasias alongside bananas The task of processing the betel leaves are carried out by female family members (Pthmai, P. *et al.* 2006).

ix. Marketing of Betel leaf

Senior female members of the household usually handle the marketing of betel leaves. Previously, female Khasia carried betel leaves in a basket to the market. Now it is common for middlemen to come to the Punji and negotiate prices with the female members. The price of betel leaves depends on the particular harvest as well as supply. The best prices are offered between May-June and December-January, when the production and supply of betel leaves is the lowest. From June-September, the prices are lowest, even though leaf-sizes are big. This is because yields are highest during this season (Saha and Azam 2004).

c. Study area: Lawachara National Park (LNP)

The study was conducted at Lawachara National Park (LNP), a well-known protected area in Bangladesh. It has a number of unique natural resources in both flora and fauna. Moreover, the area's indigenous people have their own distinctive culture.

i. Location and Topography

The park is located in northeastern Bangladesh (Fig. 1). The park is a part of West Bhanugach Reserved Forest of Sylhet forest division. The park was established in 1996 with a total forest area of 1,205 ha (NACOM 2003). It lies in between 24°30'-24°32'N and 91°37'-91°39' E (Feeroz *et. al.* 1994).

The park's topography is undulating with slopes and hillocks. These are called *Tilla*, and are scattered throughout the forest, ranging from 10-15 meters in height. The Dholoi river flows on the east of the park, and the Manu river on the north. Numerous streams flow through the park. The park is bordered by tea gardens in the southeast, south and east sides, as well as by coffee plantations in the west side. The soils are brown, sandy clay loam of Pliocene origin (Hussain *et. al.* 1989).

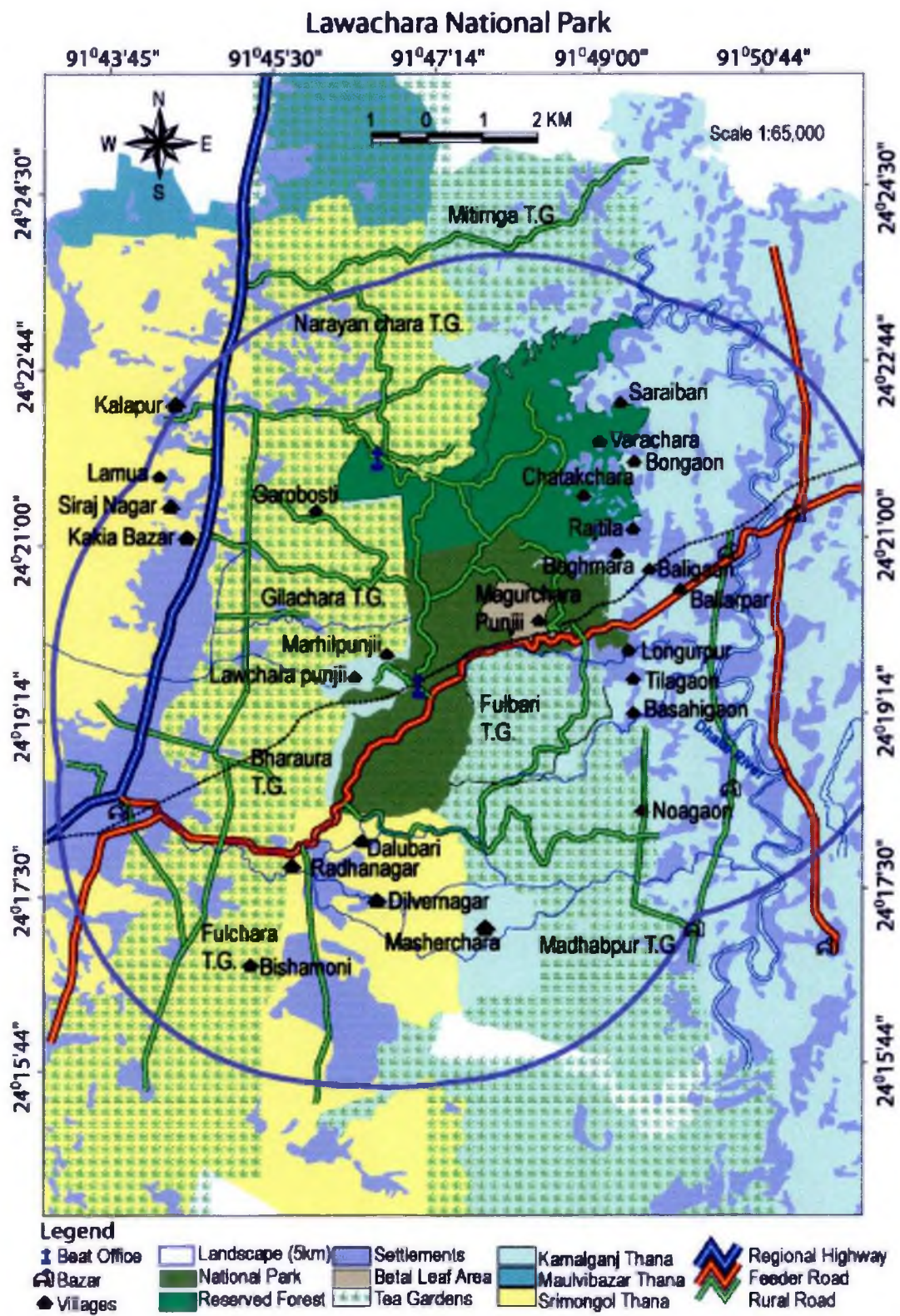


Figure 1: Map of Lawachara National Park (source: Nishorgo Support Project, 2007)

ii. Legal status

The park has been declared as a National Park under the provision of Article 23 (3) of the Bangladesh Wildlife (Preservation) Order, 1973 (President's Order No. 23 of 1973), and amended by the Wildlife (Preservation) (Amendment) Act, 1974 (Act XVII of 1974). This order prohibits any hunting, killing or capturing of wildlife or any disturbance to wildlife within the park and within a 1-mile radius of the park. The Act also prohibits the cutting down of trees, the gathering of forest products, the extraction of barks or any harm to the plants there. No part of the forest can be cleared for mining or for any other purposes such as cultivation. Fishing or the pollution of waterways in the park are also prohibited. The government may, however, allow such activities to a limited extent, when it is deemed necessary for the park's improvement and beautification, or for any scientific purpose.

iii. Forest Types

The forest types of Lawachara National Park does not fall under one recognized types, rather it is a combination of planted exotic species and mixed forest with a deciduous canopy and an evergreen understory (Ahsan 2000). The indigenous vegetation cover of mixed tropical evergreen forest originally supported the area (Alam 1988). However, because of the removal of almost all of the original forest cover, the forest has turned into a secondary one or altered substantially.

iv. Flora and Fauna

The park is renowned for its extensive variety of flora and fauna. Around 167 plant species and 276 animal species are found in the park (NACOM 2004). Two of the flagship species found in the park are the Hoollock gibbon and the capped langur (Nishorgo 2006). A summary of the plants and animals in the park is given below (FSP 2000a).

Plants	167 species
Amphibians	4 species
Reptiles	6 species
Birds	246 species
Mammals	20 species
Odonate insects	17 species

v. Settlements

Twelve villages can be found on the outskirts of the park, and 2 villages inside it (CNRS 2000). The park is home to several indigenous communities namely Khasia, Monipuri and Tripura. While the Khasia communities live inside the park, the other two communities live adjacent to it. The park provides livelihood opportunities for the Khasia (Nishorgo 2006). The community's settlement was established in the early 1940s, when the Forest Department (FD) deployed people for logging and plantation activities. There are two Khasia villages within the park, namely Magurchara Punji and Lawachara Punji. Magurchara punji is the largest village. It was established in 1950 and is inhabited by 42 households. Lawachara punji was established in 1940 and consists of 23 households (FSP 2000a; Chemonics 2000). An area of 1.2 ha was allotted to each tribal family by the Forest Department. These Khasia communities are engaged in betel leaf cultivation for their livelihood.

The 12 villages on the outskirts of the park are inhabited by Bengali migrants and a few Tripura families. The Bengali migrants are almost all Muslims whereas the tribal communities are primarily Christians and Hindus. It is reported that about 4000 – 4500 people are living as settlers (CNRS 2000). The park is most commonly used for the subsistence harvesting of fuelwood and bamboo (FSP 2000a).

3.d. Forest management System of Lawachara National Park (LNP)

i. Past management System

The Lawachara National Park was previously managed and administered by the Divisional Forest Officer (DFO) of Sylhet Forest Division. It is now managed by the Wildlife Conservation and Nature Management Division, Sylhet.

The forests of West Bhanugach Reserve Forest (RF) - a large part of which is now Lawachara National Park (LNP) - were declared as reserve forests in the early nineteenth century. The original reserve was comprised with eight compartments, demarcated on the basis of the catchment areas of existing streams (*chara*). The concept of watershed management was adopted as the management strategy for the reserve and the

management plan was subjected to unrestricted biotic interference along with controlled shifting cultivation, grazing and forest fires (NSP 2006).

The Forest Department (FD) previously issued permits for selling individual trees. During 1924-25, a purchase contract system was introduced based on a minimum guaranteed royalty, where any tree of 6ft girth and above could be felled. During 1930-31, marking of trees by FD officials prior to felling was introduced. In the following year a coupe (*mahal*) system of timber harvesting was introduced based on fee-cum-royalty. In designated areas and compartments of the reserved forests, bamboo harvesting was regulated to avoid the excessive extraction of immature bamboo clumps/culms and a four-year felling cycle was followed.

The first Working Scheme of Sylhet Forest Division was introduced over the period 1935-38, which prescribed plantations of Teak, Jarul, Gamar, Cham, Toon and Garjan in West Bhanugach RF. The first Working Plan was prepared for the period of 1938-47 whereby three working circles (WC) were recommended. These were Timber A and B WC, Firewood A and B WC and Bamboo WC. The Timber WC prescribed selection-cum-improvement silvicultural system in view of the hilly terrain. Two Working Schemes were then prepared for the period of 1950-54 and 1959-65 whereby selection-cum improvement and clear felling-cum-artificial regeneration methods were followed as silvicultural management. This eventually led the natural forests of RF to be clear felled and planted with Teak, Jarul and Garjan.

In a revised Working Plan for the forests of Sylhet Forest Division, Chowdhury (1963) recommended five Working Circles (WCs) for the period 1963-1983. In this Working Plan, selection-cum-improvement WCs were abolished, which was a very appropriate system of silvicultural management for the hill forests covered under the Park. The hill forests are characterized by high rainfall and a rich soil condition. For this, if the biotic pressure of the forests can be stopped, natural regeneration of the forests will be encouraged. On the other hand, the clear felling-cum-artificial regeneration WC was split into two WCs namely Short-rotation plantation WC and Long-rotation plantation WC.

The hill forests of the Lawachara National Park (LNP) were under the Long-rotation WC. Under this, long-rotation tree species such as Teak, Sal, Chapalish, Garjan and Jarul were planted after clear felling of the reserve by marking annual coupe. In Short-rotation WC, extensive plantation of short rotation species such as Malakana (*Paraserianthes falcataria*) were introduced in 1974 in order to ensure a regular supply of raw materials for the Sylhet Pulp and Paper Mill.

Until the declaration of the Lawachara National Park (LNP) in 1996, the Management Plans prepared by Balmforth and Howlader (1988-97) and Choudhury (1991-2001) were followed. These recommended the conversion of natural forests with raising plantations. They emphasized the need for industrial plantation with short rotation species such as Malakana (*Paraserianthes falcataria*) to ensure a regular supply of pulpwood materials for Sylhet Pulp and Paper Mill and other forest-based industries. Like other forest reserves in Sylhet Forest Division, West Bhanugach Reserve was also brought under similar management policies until the declaration of Lawachara National Park in 1996 (NSP 2006).

ii. Present management System:

Balmforth and Howlader (1988-97) and Chowdhury (1991/92-2000/01) provided Management Plans for Protected Areas under the Sylhet Forest Division, including the Lawachara National Park (LNP), containing four preservation-working circles. These prescriptions substantially reduced commercial felling in the Pas, but recommended wildlife management practices remained unchanged due to the lack of funds. As per recommendations, a separate management plan for Lawachara National Park (LNP) was prepared by Rosario (1997) under Forest Resources Management Project and subsequently by Salter and Alam (2001) under the Forestry Sector Project (FSP). These management plans were neither approved nor implemented however.

Under the forestry sector project, the management plan introduced a zoning system based on existing land use and forest cover with their respective management objectives. Such zoning provides a basic spatial framework for protecting the areas of highest conservation

value, for limiting the spatial extent of high impact activities, and for designating areas that provide benefits to local people (FSP 2000b).

iii. Nishorgo interventions

The Nishorgo support project (NSP) is a comprehensive effort to build a partnership between the Forest Department and key local and national stakeholders, in order to improve the management of Bangladesh's PAs. The Bangladesh Forest Department launched the Nishorgo support project (2004-2008) on a pilot basis, implementing collaborative management in 5 PAs sites including the Lawachara National Park (LNP). This project prepared a Collaborative Management Plan in order to: i) maintain ecological succession in constituent forests by providing effective protection against biotic interference, ii) develop and maintain natural forests as a natural habitat that favours wildlife, iii) conserve forest resources including the constituent biodiversity, and iv) establish co-management practices through stakeholders' consultations and active participation (Nishorgo 2006). IUCN defines co-management as:

Collaborative management or co-management is defined as a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources (Borrini-Feyerbund, IUCN: 2000)

Living and depending on Lawachara National Park for their livelihood, the Khasia community is involved in co-management of LNP as a major stakeholder.

Chapter-4

Methodology

Two Khasia punjies were selected purposively for the research, namely Magurchara punji and Lawachara punji, to investigate the livelihood dependency of Khasia communities on betel leaf cultivation in Lawachara National Park (LNP). Both punjies are located within the Protected Area (PA). Within Magurchara punji, I sampled 50 percent of the households at random, with a total sample size of 21. Within Lawachara punji all 23 households were surveyed. In total, 44 households from two villages were surveyed.

Firstly I did community mapping. Then community profiles were prepared through focus group discussions. Lastly, household surveys allowed me to prepare household profiles. As well as from secondary sources, the community profile allowed me to classify households into two groups – richer and poorer – within each punji, according to their monthly incomes, housing pattern, homestead and agricultural land holdings. Household with a monthly income less than Tk.3000 and living in *katcha* housing (constructed with bamboo and roof with straw or corrugated iron) were classified as poorer, while those with a monthly income over Tk.3000 and with *pacca* (brick or concrete buildings) or semi-*pacca* housing (with corrugated iron roof) were classified as richer.

Household heads were interviewed using a semi-structured questionnaire. Prior to conducting the survey I visited the two punjies to inform the community about the research.

The household survey was translated into the local language and administered by a hired interpreter. This probed issues such as; the respondents' background, household assets, and their dependency on betel leaf cultivation. Information collected on household composition, age, education, land and livestock holdings, sources of family income, monthly income, market accessibility and livelihood seasonality were statistically analyzed.

Chapter-5

5. Results

5.a. Demographic Profiles of the Respondents:

The demographic characteristics of respondents are presented in Table 1 under the category of poorer and richer households.

As female household members were less willing to respond, the majority of respondents were male. This could in part be due to gender factors. As both myself and my interpreter were male, female spoken to – especially young women – were shy in interviews. Religious differences did not impact upon our dialogue. Although the Khasia are Christians, they respect and follow Muslim Pardha culture, given that the majority of nearby communities are Muslim.

The number of people per household was found to be 6.31 persons and 5.33 persons for richer and poorer households respectively. The average age of richer respondents interviewed was 48 years and poorer respondents interviewed were 41 years. In the case of richer respondents 88% are married, in comparison with 78% of respondents among poorer households. In terms of literacy, 6% of richer respondents are illiterate whereas 14% of poorer households are illiterate. Large differences were found in secondary school attainment - while 19 percent of richer respondents have studied to secondary level, only 5 percent of poorer respondents have reached this level. Regular school attendance is difficult given the distant location of the secondary school. Students must stay in town for their secondary-level education. Although this may be affordable for the richer households, it is beyond the financial capacity of the poorer ones. In both punjis, more than 80 percent of households were found to be Christian.

Table 1: Demographic characteristics of the respondents

Demographic Features	Khasia Community	
	Richer	Poorer
No. of HHs sampled	17	27
No. of People per HHs	6.31	5.33
Age of Respondents (years)	48.25	41.29
Male (%)	68.75	66.67
Female (%)	31.25	33.33
Married (%)	88.24	77.77
Single (%)	5.88	7.41
Widowed (%)	5.88	7.41
Separated (%)	0	7.41
Illiterate (%)	6.25	14.29
Can sign only (%)	50	61.9
Primary School (%)	18.75	14.29
Secondary School (%)	18.75	4.76
Higher Secondary and Above (%)	6.25	4.76
Christian (%)	81.25	95.24
Hindus (%)	6.25	4.76
Muslims (%)	12.5	0

5.b. Household capital of the respondents

The homestead size varies in 2.0, 3.0 and 4.0 decimals³ across the richer households, with the average size of their homestead being 3.19 decimals. Their Jhum (Betel leaf garden) size varies between 2.0, 2.5 and 3.0 acres, with an average size of 2.69 acres. Only 25 percent of households have poultry (with an average of 6.5 chickens), but they do not have any cattle. Around 69 percent of richer households have sanitary latrines and 56 percent of households have access to tube well water. Meanwhile, 44 percent of richer households drink water from the well.

³ A decimal is an unit of area in India and Bangladesh approximately equal to 1/100 acre (40.46 m²).

Table 2: Household capital of respondents

HHs Capital	Unit	Richer	Poorer
Homestead area	decimal	3.19	2.60
Jhum area	acre	2.69	2.53
Cattle	% HHs	0.00	10.00
Poultry	% HHs	25.00	15.00
Access to tubewell	% HHs	68.75	20.00
Access to Sanitary latrine	% HHs	56.25	60.00

Across poorer households, the homestead size varies between 1.5, 2.0 and 4.0 decimals, with an average homestead size of 2.6 decimals. The size of their Jhum area varies between 2.0, 2.5 and 3.0 acres, with an average Jhum size of 2.53 acres. Ten percent of poorer households have cattle (and an average of two cows). Fifteen percent of poorer households have poultry (with an average of 7 chickens). Forty percent of households are without a sanitary latrine. Twenty percent of poorer households drink water from a tube well, while 40 percent of households source their drinking water from a well.

5.c. Income profile

Betel leaf farming provides the only source of cash income for Khasia people. On average, richer households earn Tk. 5719 each month, while poorer households earn Tk. 2675 each month. I found that the size of the betel leaf gardens between the richer and poorer households are almost the same. Differences in income were found to be attributed to the higher yields from inputs such as labour, fertilizer and irrigation. Site quality was also observed to have significant impacts on betel leaf production.

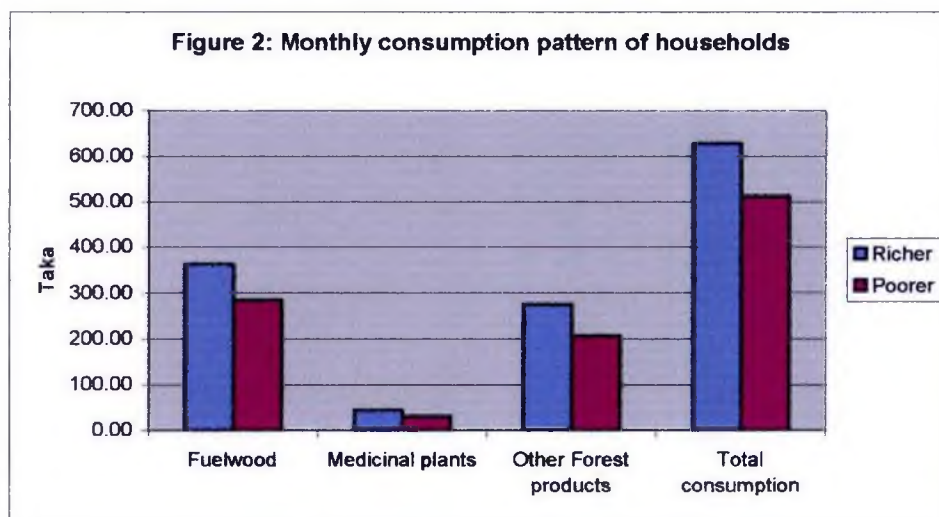
5.d. Pattern of forest resource use

Forest resources like timber, fuelwood, bamboo, wildlife, building materials (sand), honey, cane, fruits, vegetables, sun grass, tree bark and medicinal plants are available in Lawachara National Park. The Khasia community regularly collects cane, fuelwood and wild vegetables. Bamboo is also collected seasonally as per their requirements, as well as timber and sand occasionally. Respondents were asked to calculate the cash value of the

forest produce consumed by them, based on local market prices. On average, richer households collect forest produce worth Tk. 628.65 per month from the forests. Meanwhile, the poorer households collect only Tk.511.88 worth of forest produce each month. Forest produces are collected only for their own consumption; they have no interest in selling these to the markets.

Table 3: Monthly consumption pattern of households (Taka)

Consumption pattern	Richer	Poorer
Fuelwood	362.50	284.50
Medicinal plants	44.44	31.33
Other Forest products	275.00	207.08
Total consumption	628.65	511.88



Both richer and poorer households are fully dependent on forests for their consumption of fuelwood. On average, the richer consume 362.50 tk worth of fuel each month, in comparison with the poorer's consumption of Tk. 284.50/month.

The study reveals that 19 percent of richer households use medicinal plants, consuming an average of Tk 533 worth each year. Twenty percent of poorer households use medicinal plants from the forests, but consume only Tk 376 worth on average each year. However, it was also observed that few respondents could identify medicinal plants. In addition, few know the medicinal uses of plants.

Khasia communities also collect other forest products such as timber, bamboo, wildlife, building materials (sand), honey, cane, fruits, vegetables, sun grass and tree barks for their domestic consumption. Richer households were found to consume Tk. 275 worth of other forest products, compared to Tk 207 for the poorer households.

An analysis of the pattern of forest resource use revealed that both income groups collect fuelwood, medicinal plants and other forest products for their domestic consumption. The contribution of fuelwood and other forest products to total household economies were higher than that of medicinal plants.

Khasia communities believe that over-exploitation of forest resources may affect their future livelihoods. This belief is reflected in their subsistence nature of forest produce collection, whereby households only collect enough to meet their consumption needs. This is vital for the sustainable use of forest resources as well as the conservation of biodiversity within Protected Areas (PAs).

5.c. Problem analysis in betel leaf cultivation

i. Input Analysis

The major inputs of betel leaf cultivation are land, labour, fertilizer and irrigation. Respondents were asked to calculate the expenditure for these input supports. The study reveals that half of richer communities use chemical fertilizers worth Tk.11, 577 a year. Meanwhile, 42.86 percent poorer farmers spend on an average Tk 5,909/year on chemical fertilizers. Just over 31 percent of richer farmers use compost for their betel vines, costing Tk. 2,252 each year. Around 33 percent of poorer communities use compost worth Tk. 2,645 a year.

In general, the Khasia community depends on manure for improving soil fertility. Richer communities, however, use chemical fertilizer because they can afford it. Poorer communities cannot use chemical fertilizer due to their lower financial capacity. They are therefore more dependent on composts. In the cultivation of betel leaf, application of chemical fertilizers demands adequate irrigation. In some cases, the betel vines are located far away from the water sources and there is no scope for irrigation. In such cases, both economic categories are less likely to use chemical fertilizers.

Betel leaf cultivation by Khasia communities is not traditionally dependent on fertilizer. Usually forest lops and tops are collected from surrounding forests and used to mulch their betel vines and improve soil fertility. However, after the Nishorgo support Project (NSP) intervention in the LNP, the forest department has placed restrictions on the collection of forest debris, thus compelling them to use fertilizer. As well as reducing soil fertility, this also increases production costs. For poorer farmers, these restrictions can hamper their cultivation and make their livelihoods vulnerable.

Irrigation was traditionally used only in drought conditions. Application of fertilizers, however, compels cultivators to irrigate their betel vines, which is not possible in all cases. Khasia communities have observed through experience that betel leaves produced without using chemical fertilizers are more viable for longer periods.

Betel leaf cultivation is a labour - intensive practice and family labour is not always sufficient for nurturing the betel vines. Labourers are often hired for cleaning and mulching the betel vines. In some cases, labourers are engaged in planting, plucking and processing as well. Male labour is paid Tk.40-50/day, while female labourers are paid Tk.30-40/day. Female hired labourers are usually engaged in processing activities. Some of the richer Khasia households have permanent labourers who support all of their farming activities. In addition to daily wages, permanent labourers also receive food. Labourers – who usually come from surrounding Bengali villages and tea estates – are usually paid on a weekly basis.

Table 4: Input analysis

Inputs	Poorer		Richer	
	%	Amount (Tk/year)	%	Amount (Tk/year)
Chemical Fertilizer	42.86	5,909	50	11,577
Irrigation	19.05	5,011	50	10,483
Compost	33.33	2,645	31.25	2,252
Hired Labour	95.24	230 man-days	100	328 man-days

Both richer and poorer households have similar-sized betel vines-gardens (Jhum), but their yields differ due to the variation in inputs applied. Unable to afford the adequate inputs such as labour, irrigation and fertilizer, the poorest households cannot maximize production from their Jhum. This leads to lower incomes and therefore prolongs the application of inadequate inputs in their production system. Thus, they remain poor. In addition, the production of betel leaf also depends on site quality.

ii. Market access

Female members of the family sort and pack the betel leaves after plucking. The betel leaves are usually sold to middlemen at their homesteads, with prices usually negotiated by female members of the family. The middlemen then sell them to the wholesale market (*aroth*). Since they lack access to the market themselves, the Khasia people are bound to sell their products to such middlemen. As a tribal community, they are socially marginalized. The household labour is fully engaged in the cultivation and packaging process as well as household activities. This leaves them little time to take betel leaves to the wholesale market themselves. Furthermore, trading in the wholesale market takes place in credit and as a marginalized community they feel insecure about selling their products in credit. A strong syndicate of middlemen and wholesalers is prevalent in the marketing process, restricting the access of the Khasia people to the wholesale market. Middlemen usually enjoy a 25-30% profit margin.

The study revealed that 56 percent of richer farmers and 30 percent of poorer farmers would be interested in selling their products directly to the wholesale markets. Meanwhile, 44 percent of richer and 70 percent of poorer households are not interested in selling their products directly to wholesale markets. This result indicates that poorer farmers are less interested in a self-marketing process. This is due to a number of causes. Firstly, with markets located far away from the Khasia punji, households do not have enough time for selling their products themselves. In addition, as a marginalized tribal community the Khasias lack the social power necessary for bargaining with Bengali wholesalers. Lastly, with wholesale transactions operating in credit, households fear the risk of losing their sale amount.

Given these circumstances, the Khasia communities are comfortable with the existing selling process from their homesteads through middlemen. They can bargain a little with the middlemen for better prices. Lacking a steady monetary income, sometimes households take cash advances from these middlemen for the purchase of fertilizers or hired labour. In such instances, those taking advances are bound to sell their betel leaves to the middlemen at a lower price fixed by the middlemen. In doing so they have little scope for bargaining with the middlemen.

iii. Soil Fertility loss: Soil rehabilitation programme

Though most Khaisa households wish to be reallocated to new forest patches for betel leaf cultivation, this is unfeasible from both a legal and scientific point of view. They are claiming for new land as the soil in most of their *Jhums* is in a degraded condition. NSP intervention that restricts them from collecting forest debris for mulching the betel vines has exacerbated this, as they are gradually becoming dependent on chemical fertilizers. For many, fertilizers are beyond their reach due to their high price. This means that their livelihoods are now quite vulnerable.

iv. Diseases:

Diseases are a major threat to betel leaf cultivation. Respondents reported that betel leaves are infected by two types of disease, leaf rot (Utram) and root rot (Ukhlam). Root rot (Ukhlam) is the more harmful of the two.

- i) **Leaf Rot:** In Khasia language this disease is known as Utram. It first appears as a spot on a leaf. This gradually affects all the leaves, which begin to dry out. Ultimately the whole vine becomes infected and dies. The disease is very infectious, and if immediate measures are not taken, surrounding vines also become infected. Respondents reported that this disease occurs during high rainfall and high humidity. Generally, Khasia people uproot the infected vines and bury them under the soil.

- ii) **Root Rot:** This disease is known as Ukhlam, and is considered a curse. If a tree is infected by this disease, the roots of the vine start to rot and then all the leaves gradually turn a yellowish colour and dry up within two days. Within a week, the whole garden becomes infected. If only half the garden becomes infected by the disease the household considers themselves fortunate. If a Jhum is infected by this disease, the household is very vulnerable. Khasia people do not know any prevention measures of this disease.

5.f. Social capital analysis:

As betel leaf cultivators, Khasia communities have no formal organization, though it was found that they are socially organized. All Khasia households are members of the 'Khasia Welfare Society (KWS)' which is registered under the Societies Act 1876. However, this organization cannot play a significant role in solving the problems of betel leaf cultivation. KWS tries to address the problems that they face as a tribal community, and provides financial support to poor households if they are in a distressed state.

Major decisions at the household level are usually discussed among family members. The opinion of all female members gets due respect in household decision-making. At the community level, decisions are taken after discussions among senior members of the community under the leadership of their Mantri (tribal head).

An informal institution is prevailed in the Khasia community name as Durbar committee. This is chaired by the Mantri, who has control over the social, traditional and religious

issues in the community. The Durbar committee is composed of the head of each household. Each household is supposed to contribute to the committee's fund.

The Khasia community generally believes that as a custodian of the LNP, the Forest Department's attitude towards betel leaf cultivation is supportive. However, the interventions of co-management under the Nishorgo program have not played any significant role in favour of betel leaf cultivation. Their expectation was that NSP intervention in the LNP might have helped them to address the problems they face regarding betel leaf cultivation.

5.g. Biodiversity in the betel leaf garden:

i. Tree species diversity in the Jhum

During the field study, I was accompanied by two Khasia's to visit their Jhums and identify the tree species that supported their betel vines. These were then cross-checked with the respondents' answers during the questionnaire survey. Each Jhum has an average of 10 different tree species that support betel vines. There are also a few more species found in the Jhum that do not support betel vines.

Table 5. Common tree species supporting betel vines:

SI No.	Local Name	Scientific Name
1	Jarul	<i>Lagerstroemia flosreginae</i>
2	Awal	<i>Vitex spp.</i>
3	Chapalish	<i>Artocarpus chaplasha</i>
4	Kalajam	<i>Syzygium cumini</i>
5	Rata	<i>Amoora wallichii</i>
6	Toon	<i>Cedrela toona</i>
7	Bonak	<i>Schima wallichii</i>
8	Simul	<i>Salmalia malabarica</i>
9	Kadam	<i>Anthocephalus chinensis</i>
10	Dumur	<i>Ficus racemosa</i>
11	Dhakijam	<i>Syzygium grandi</i>
12	Jam	<i>Eugenia spp</i>
13	Dewa	<i>Artocarpus lakoocha</i>

5.g.ii. Wildlife available in the Jhum (betel leaf garden):

During the household survey the Khasia people reported that their betel leaf gardens are home to different types of birds, snakes, wild pig, jackal, monkeys, barking deer, squirrel, wild boar and porcupines. This reveals that betel leaf gardens are supportive to biodiversity conservation in the LNP.

Chapter – 6

6. Discussion:

The results of the study reveal a complicated scenario of the livelihood dependency of Khasia communities in the LNP. Theoretically PA declaration does not allow any type of cultivation practices within the PA. In case of LNP, however, the Khasia communities were settled there prior to PA declaration to support FD's plantation programme. Simultaneously they were allocated land for their cultivation. Consequently, for many years, Khasia communities have practiced their traditional forest-based betel leaf cultivation to secure their livelihoods. The historical background of their livelihood dependency should be kept in mind. Many studies have found that the livelihood of Khasia communities is highly dependent on betel leaf cultivation (Riadh 2007, Nath *et al.* 2003 and Saha and Azam 2004). In 2005 Das also found a large number of people in the Buxa Tiger Reserve, India depended on NTFPs even after it was declared a PA. Mukul (2007) found that 27 percent of households in Satchari National Park, Bangladesh get their cash income from collecting, processing and selling NTFPs, even though Satchari has been declared a National Park.

The study analysed how different demographic factors influence the livelihoods of the Khasia community living inside the LNP. These factors included education, age, gender, household size and land holding size.

Theoretically the education of local communities is negatively co-related with the livelihood dependency on forest resources. Gunatilake (1998) found that the education level of a household is negatively related to their forest dependency. But Masozera and Alavalapati (2004) did not find any statistically significant relationship between education and livelihoods dependency. This study finds that irrespective of economic category, both richer and poorer households are highly dependent on betel leaf cultivation, though their education varies according to their economic category. In addition, it can be hypothesized that the education level of the Khasia community in LNP

has not yet reached a level which could provide them with alternative livelihood opportunities.

As betel leaf cultivation is a labour-intensive process, the age of household members is a vital issue. The average age of respondents was found to be 48 and 41 in richer and poorer households respectively, but their dependency on forest was reported the same. In Rwanda, a study by Masozera and Alavalapati (2004) found a negative relationship between age and forest dependency. This was due to the fact that forest-dependent activities were illegal there and young people were more willing to take those risks than older people. The situation in LNP is different though, both richer and poorer respondents reported the same level of dependency. Since the average age of richer respondents is higher than the poorer, richer households invested more in engaging labourers. Both age and higher incomes impact on the decision to provide physical work.

The gender distribution of labour is a prominent feature of betel leaf cultivation. Men are more involved in the labour-intensive tasks than women. As a matriarchal society, Khasia women play a vital role in household decision-making, and are also involved in the processing and marketing of their betel leaf product. Household income is also handled by women. Women in the Khaisa community are both economically and socially empowered, which could be a positive notion for biodiversity conservation in LNP.

The Household size (HHS) of the Khasia varies according to income category, but dependency on betel leaf cultivation is reported the same regardless. Richer and poorer households were found to have an average of 6 and 5 members respectively. Though betel leaf cultivation is a labour-intensive practice, both richer and poorer households are highly dependent it due to high unemployment and a lack of alternative opportunities. Masozera and Alavalapati (2004) found an average HHS of 5.74 in the Nyungwe forest reserve of Rwanda, implying a positive relationship between HHS and forest dependency. This suggests that large families tend to depend more on forest resources. Hedge & Enters (2000) found a similar relationship. Several studies found that families with more labour tend to extract more forest resources (Gunatilake 1998, Hedge & Enters

2000). In forest dependent communities, large families have a higher propensity to extract resources because they require more resources to meet their subsistence needs.

Households with more land are likely to earn more income, and therefore likely to be less dependent on forest resources. Thus, land holding size (LHS) is expected to have a negative relationship with forest dependency (Masozera and Alavalapati 2004). This study finds that richer households have an average homestead size of 3.19 decimals and 2.69 acres for the average size of their betel leaf garden. Poorer households have an average homestead size of 2.6 decimals and an average size of betel leaf garden of 2.53 acres. As betel leaf cultivation is an income opportunity that depends on land availability, this implies that richer households have more propensity for income generation.

The pattern of forest resource use by local communities is an important issue for biodiversity conservation in protected areas. An analysis of the pattern of forest resource use revealed that both income groups collect fuelwood, medicinal plants and other forest products for their domestic consumption. Since no forest products are collected by the Khasia community for commercial purposes, it can be said that the extraction pattern of forest resources by the Khasia community is relatively sustainable.

Khasia communities believe that over-exploitation of forest resources may affect their future livelihoods. This belief is reflected in the nature of their forest produce collection, which is used only to meet household consumption. This is vital for the sustainable use of forest resources as well as biodiversity conservation of the PAs.

The major problems facing betel leaf cultivation in LNP by Khasia communities are inputs support, access to market and diseases. This study focused on problems related to input support and access to market. Betel leaf cultivation requires labour, fertilizer and irrigation as inputs support. Betel leaf is a labour-intensive cultivation practice, and often family labour is not sufficient for cultivation. Many households thus depend on hired labour. Poorer households are not capable of paying hired labourers. This highly affects

the yield of their betel garden. As a result, poorer households get less income from betel leaf farming.

Fertilizers are not traditionally used in Khasia jhums. However, due to a reducing trend in soil fertility, Khasia communities are more inclined to use fertilizer to increase land productivity. Chemical fertilizer use requires simultaneous irrigation support. Financial restrictions and the remoteness of many Jhums mean that it is not possible to provide irrigation in all Jhums. Richer communities are more financially capable to provide fertilizers, irrigation and buy hired labour, helping to increase the productivity and income from their betel vines. Poorer households cannot afford these inputs for their betel vines, and therefore receive lower incomes. The allocation of sites for betel leaf cultivation is dependent on the community's power structure, meaning that the Jhums belonging to richer households are located in more suitable sites for betel leaf cultivation.

Diseases in betel leaf farms pose a serious threat to livelihoods. Two diseases are identified namely leaf rot (Utram) and root rot (Ukhlam). Root rot is the more harmful of the two. It is considered to be a curse, and infected vines are uprooted to prevent the spread of disease. Where the Jhum of a poorer household is infected, it largely threatens his livelihood. No scientific research has yet been conducted on these diseases. Scientific research is recommended to identify curative as well as preventive measures for these diseases.

Like other NTFP-based income opportunities, market access is a major problem for betel leaf cultivation. The study therefore tries to identify major issues surrounding the marketing of betel leaves. Middlemen were found to play a significant role in betel leaf marketing. They collect betel leaves from the punji and sell them on to wholesalers. They usually make a 25 to 30 percent profit margin. This shows that the benefits of high market prices go to the middlemen rather than the farmers, which corresponds with other studies (Saha and Azam 2004; Nath et al 2003) Khasia communities are bound to sell their products to middlemen for a number of reasons. They lack sufficient time to market the products in the wholesale market themselves, as markets are located far away from

the Khasia punji. In addition, they are socially marginalized which restricts their bargaining ability with Bengali wholesalers. The fact that wholesale markets operate in credit enhances their insecurity. Lastly, the Khasia community has been unable to develop a cooperative marketing process of their own. Furthermore, sometimes poorer households are forced to take credit support from the middlemen which restrict their bargaining capacity and reduces the price they receive from their betel leaves. Insufficient market access prevents Khasia communities from receiving a fair price for their betel leaves.

Although Khasias are marginalized they are found to be socially organized. A good kinship exists among Khasia communities. During distressed conditions such as health and financial crises, relatives and neighbours provide support. All Khaisa households were found to be members of Khaisa Welfare Society (KWS), which is legally registered under the Societies Registration Act. The KWS usually looks after the well-being of households, providing financial support to distressed families. The Mantri plays a vital role in the social life of the community. Major decisions are taken by the Mantri in consultation with elderly members of the community. Given their Christian beliefs, the Church and the priest also play a vital role in the social lives of the Khasia community. The Mantri also plays a supportive role in any conflicts within and between his community and neighbouring communities. As a socially powerful and financially solvent leader of the tribal community he exercises a lot of power in the community as well as in neighbouring communities. As a tribal community, the Khasia were not found to be politically empowered, and none were involved with a political party or ideology. The chief of the community, however, maintains a good relationship with the local administrative and political power structure.

Chapter – 7

7. Conclusion and recommendation:

7.a. Conclusion

Forests have the potential to support the livelihoods of local tribal communities. About 350 million of the world's poorest people are dependent on forests for their subsistence and survival. Around 60 million of these forest dependent people are indigenous and other forest-dwelling communities (WCFSD 1999). In 1995 Lynch and Talbott approximated that 275 million people in India are dependent on forest resources, while in total 500 million people living in and around the forests of India depend on NTFPs as a vital component for their subsistence (World Resources Institute, 1990). NTFPs have the potential to generate a cash income for forest dwellers. In Nepal, Maharjan (1996) found that forest-based ginger and cardamom cultivation and resin tapping provides local communities with a large portion of their income. Campbell *et al.* (1996) identified a similar potential for NTFPs in the Joint Forest Management (JFM) of India. In India NTFP-based activities generate employment for 1.6 million people (Gupta 1994) In Bangladesh, about 300,000 people depend on NTFPs for their employment (Basit 1995).

As a conservation strategy, protected area declarations are considered to be a threat to the livelihoods of local forest-dependent communities. Reconciling this trade-off between biodiversity conservation and the livelihoods of local communities has been attempted using different management strategies such as collaborative management, joint forest management, community-based natural resources management. These management strategies give priority to the livelihoods of local communities. This is an important step because without the involvement of local communities in PA management, trends in biodiversity loss could not be stopped. Understanding the livelihood dependency of local communities needs to precede the development of a successful management strategy. Lawachara forests were declared as a PA to conserve their biodiversity. However, the steady loss of biodiversity cannot be reduced by this declaration, because the rights and livelihood dependency of the local communities were ignored in past management strategies. In recognition of this pitfall, in 2004 the management authority introduced a

system of co-management in LNP, which recognized the dependence of local communities' on the national park. The Khasias are the only community living within the park boundary and practicing forest-based betel leaf cultivation for their livelihood support. This study critically analyzes the dependency of the Khasia community on betel leaf cultivation in the park.

Understanding the dependency of Khasia community on betel leaf cultivation in LNP is critical for developing effective management strategies for PAs. The Khasia community in LNP are highly dependent on betel leaf cultivation irrespective of their economic category. Problems associated with input support, market access and diseases were found to prevent the Khasia from increasing their incomes. Their socially marginalized condition also makes their livelihood more dependent on forests. These findings suggest that protected area management strategies must award primary consideration to the livelihood dependency of local communities. Since the Khasia community extract forest resources only for household consumption purposes, this implies sustainable use of forest resources. Khasia communities believe that over-exploitation of forest resources will affect their future livelihoods.

These findings suggest that instead of posing a threat to biodiversity conservation, betel leaf cultivation can be seen as supportive of PA management. This is because it provides livelihood support for Khasia communities without posing any large threat to biodiversity conservation.

7.b. Recommendation:

As the livelihoods of the Khasia community in LNP are highly dependent on betel leaf cultivation, the management strategy for LNP should recognize this livelihood dependency. Betel leaf cultivation has the potential to generate improved incomes for the Khasia community if existing cultivation practices are supported by the authorities. The profitability of the Khasia communities will be improved if they are provided with input support and market access. Scientific research into the causes and remedy of diseases will also help their livelihoods stability. Co-management policies for LNP should consider

these possibilities. The development of human capacity can be another way to reduce pressure on natural resources and to ensure sustainable livelihoods. These findings suggest that understanding the potentiality of NTFPs to generate cash income for local communities should be incorporated into the formulation of co-management policies for all protected areas.

References:

- Ahsan, M. F. 1995. **Human impact on forests of Bangladesh: a preliminary case study**. International Wildlife Management Congress: 368-372.
- Ahsan, M. M. 2007. Perceptions of Tourism by Indigenous Communities living in and adjoining Lawachara National Park, in Fox, J., Bushley, B. R., Dutt, S. and Quazi, S.A.(eds.), **Making Conservation Work: Linking Rural Livelihood and Protected Area Management in Bangladesh**. East-West Center and Nishorgo Program of Bangladesh Forest Department, Dhaka. pp. 131-148.
- Alam, M. K. and M. Mohiuddin. 1995. Conservation of Tree Diversity through betel leaf (Piper betel) based Agroforestry in Sylhet. **Bangladesh Journal of Forest Science** 24 (2): 49-53.
- Arnold, J. E. M. and M. R. Pérez. 2001. Can non –timber forest products match tropical conservation and development objectives? **Ecological Economics** 39 (3): 437-447
- BBS. 1991. **Population Census** by Bangladesh Bureau of Statistics. Government of the People's Republic of Bangladesh.
- Banglapedia. 2008. **"The Khasia"** [online August 25, 2008] URL:http://banglapedia.search.com.bd/HT/K_0215.htm
- Basit, M.A. 1995. Non-Wood Forest Products from the Mangrove Forests of Bangladesh. In P.B. Durst and A. Bishop (eds.) **Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest products in Asia and the Pacific**. Proceedings of a Regional Expert Consultation held in Bangkok, 28 November to 2 December 1994. FAO/RAP, Bangkok. pp. 193-200.
- Bendre, A. and A. Kumar. 1980. **Economic Botany** Rastogi Publication , Meerut ,India
- Borrini-Feyerbund, IUCN: 2000.
- Campbell, Jeffrey Y., R. N. Chattopadhyay and Chandreyee Das. 1996. Income Generation Through Joint Forest management in India: A Case Study of the participatory Forest Management project in Nayagram, West Bengal. pp 93-119 in Michael Victor (ed) **Income Generation Through Community Forestry: Proceedings of an International Seminar held in Bangkok, Thailand 18-20 October 1995**. Bangkok: RECOFTC.

- Chemonics (Chemonics International). 2000. **Biodiversity Sustainable Forestry IQC (BIOFOR) Strengthening The Arannyk Foundation. Site Selection Inventory and Monitoring Report.** USAID-Bangladesh, Dhaka
- Coad, L., A. Campbell, S. Clark, K. Bolt, D. Roe, L. Miles. 2008. **Protecting the future: Carbon, forests, protected areas and local livelihoods.** Revised May 2008. UNEP World Conservation Monitoring Centre, Cambridge, U.K.
- CNRS (Center for Natural Resources Studies). 2000. **Lawachara, Tropical Forest of Bangladesh. Rapid Rural Appraisal (RRA) Findings,** October 1, 2000.
- Chowdhury, M. K. and T.B.S. Mahat. 1993. 'Agroforestry in farming systems of Bangladesh', in **Agroforestry-farming Systems Linkages in Bangladesh,** BARC-Winrock International, Agroforestry and Participatory Forestry Research and Training Support Program, Dhaka, pp. 1-19.
- Das, B. K. 2005. Role of NTFPs Among Forest Villagers in a Protected Area of West Bengal, **Journal of Human Ecology,** 18(2): 129-136
- Das, L. N. CSC. 1999. **Srimanol Dharmapallir Itikatha** (in Bengali). Luxmibazar, Dhaka: Suprakash printers.
- Ellis, Frank. 2000. **Rural Livelihoods and Diversity in Developing Countries.** Oxford: Oxford University Press.
- Feeroz, M. M., M. A. Islam and M. M. Kabir. 1994. Food and feeding behavior of hoolock gibbon (*Hylobates hoolock*), capped langur (*Presbytis pileata*) and pigtailed macaque (*Macaca nemestrina*) of Lawachara. **Bangladesh Journal of Zoology.** 22(2): 123-132.
- FSP (Forestry Sector Project). 2000a. **First Five Year Management Plan for Lawachara National Park. Vol. 2: Background and support material.** Forest Department, Ministry of Environment and Forests, Dhaka.
- FSP. 2000b. **First Five Year Management Plan for Lawachara National Park. Vol. 1: Management Plan,** Forest Department, Ministry of Environment and Forests, Dhaka.
- Gomez-Pompa, A. and A. Kaus. 1992. Taming the wilderness myth. **Bioscience** 42: 271-279.

- Gunatilake, H. 1998. The Role of Rural Development in Protecting Tropical Rainforests: Evidence from Sri Lanka. **Journal of Environmental Management** 53: 273-292.
- Gupta, B.N. 1994. India. In P.B. Durst, W. Ulrich and M. Kashio (eds.) **Non Wood Forest Products in Asia**. RAPA Publication 1994/28. RAP/FAO, Bangkok. pp. 19-48.
- Gurdon, P.R.T. 2004. **"The Khasi"** [Online August 24 2008] URL: http://www.gutenberg.org/catalog/world/readfile?fk_files=75825
- Hedge, R. and T. Enters. 2000. Forest products and household economy: A case study from Mudumalai Wildlife Sanctuary, Southern India. **Environmental Conservation** 27 (3):250-259
- Hussain, M. K., Q. N. Islam, S. A. Islam, M. A. Tarafdar, M. Zashimuddin, A. Ahmed. 1989. **Assistance to the Second Agricultural Project – Bangladesh, Status report on the activities of the Silvicultural Research Division**, BFRI, Chittagong. FO:DP/BGD/83/101, Working Paper No. 6.
- IUCN. 1994. **Guide to the Conservation on Biological Diversity**. IUCN, Gland, Switzerland and Cambridge, UK.
- Khaleque, K. 1998. **Ethnic communities of Bangladesh: Bangladesh land forest and forest people**, Society for Environment and Human Development (SEHD), Dhaka. pp. 1-26.
- Lynch, Owen J. and Kirk Talbott. 1995. **Balancing Acts: Community-Based Forest Management and National Law in Asia and the Pacific**. World Resources Institute.
- Maharjan, M. R. 1996. Income Generation Through Community Forestry: Case Studies from the Koshi Hills of Nepal. Pp 81-92 in Michael Victor (ed) **Income Generation Through Community Forestry: Proceedings of an International Seminar held in Bangkok, Thailand 18-20 October 1995**. Bangkok: RECOFTC.
- McNeely, J.A. 1988. **Economics and biological diversity: developing and using economic incentives for conserving biological resources**. IUCN Publications, Gland, Switzerland.
- Masozera, M. K. and Janaki R. R. Alavalapati. 2004. Forest dependency and its implication for protected area management; a case study from the Nyungwe

Forest Scandinavian. **Journal of Forest Science** Vol.19, Issue .Suppl. 4, August 2004 pp 85-92

- Mukul, S.A. 2007. **Bridging Livelihoods and Forest Conservation in Protected Areas: Exploring the role and scope of non-timber forest products. Field experience from Satchari National Park, Habiganj, Bangladesh.** A dissertation paper submitted for the partial fulfillment of B.Sc. (Honors) in Forestry, Department of Forestry, School of Agriculture and Mineral Sciences, Shahjalal University of Science and Technology, Sylhet, Bangladesh.
- NACOM (Nature Conservation Management). 2003. **Secondary Data Collection for Pilot Protected Areas: Lawachara National Park.** Co-Management of Tropical Forest Resources of Bangladesh. USAID-Bangladesh, Ministry of Environment and Forest, GoB.
- Nath, T.K., I. Makoto, M. J Islam and M. A. Kabir. 2003. 'The Khasia tribe of northeastern Bangladesh: their socio-economic status, hill farming practices and impacts on forest conservation', **Forests, Trees and Livelihoods**, 13: 297-311.
- Naughton-Treves, L., M. Holland and K. Brandon. 2005. The Role of Protected Areas in Conserving Biodiversity and Sustaining Local Livelihoods. **Annual Review of Environment and Resources**, vol. 30, pp 219-252.
- Nguyen, T.Q. 2006. "Forest Devolution in Dak Lak, Vietnam: Improving Forest Management or Livelihoods of the poors?", in Mahanty,S.,Fox,J.,Nurse,M.,Stephan,P.and McLees,L.(eds) **Hanging in the Balance: Equity in Community Based Natural Resource Management in Asia**
- Nishorgo. 2006. **Management Plan for Lawachara National Park** (Draft). Vol. 1 and 2. Nishorgo Support Project: Dhaka, Bangladesh
- NFA. 2007. **National Forest and Tree Resources Assessment 2005-2007**, Bangladesh
- Pthmai, P., R. Haider, M. Mohiuddin, M. J. Uddin and M. K. Alam. 2006. "**Khasia Pan Chash Padhati**" Bangladesh Forest Research Institute, Chittagong, Bangladesh.

Rai, R. and V. Nath. 2003. 'The Role of Ethnic and Indigenous People of India and their Culture in the Conservation of Biodiversity' **Paper submitted to the xii World Forestry Congress, 2003, QuebecCity, Canada.** [online September, 2008]

URL: <http://www.fao.org/DOCREP/ARTICLE/WFC/XII/0186-A1.HTM>

Riadh, S. M. 2007. Assessing the Role of Non-Timber Forest Products in the Livelihoods of Communities Living Inside and Outside of Lawachara National Park, Sylhet, Bangladesh. in Fox, J., Bushley, B. R., Dutt, S. and Quazi, S. A. (eds.), **Making Conservation Work: Linking Rural Livelihood and Protected Area Management in Bangladesh.** East-West Center and Nishorgo Program of Bangladesh Forest Department, Dhaka. pp. 36-49.

Rosario, E. A. 1997. **The Conservation Management Plan of the Protected Areas other than those in the Sundarban in Bangladesh.** Forest Resource Management Project, Forest Department, Bangladesh.

Rymbai, Tokin Roy R. 1998. Evolution of Modern *Khasi* Society, in J. N. (ed) **The Khasi Canvas, Meghalaya.**

Saha, N. and M. Atiqul Azam. 2004. The Indigenous Hill-farming System of Khasia Tribes in Moulvibazar District of Bangladesh: Status and Impacts, **Small-scale Forest Economics, Management and Policy**, 3(2): pp273-281

Senarate, A., P. Abeygunawardena and W. Jayatilake. 2003. Changing role of non-timber forest products (NTFP) in rural household economy: The case of Sinharaja world heritage site in Sri Lanka, **Environmental Management** Vol.32, No.5, pp-559-571

Sunderlin, W. D., A. Angelsen, B. Belcher, P. Burgers, R. Nasi, L. Santoso, and S. Wunder. 2005. Livelihoods, Forests, and Conservation in Developing Countries: An Overview. **World Development** Vol.33, No.9, pp1383-1402.

WCFS, 1999. **Our Forests, Our Future, World Commission on Forests and Sustainable Development.**

Wikipedia. 2008. **Durbar (court).** [online October 2008] [http://en.wikipedia.org/wiki](http://en.wikipedia.org/wiki/Durbar_(court))

[/Durbar \(court\)](http://en.wikipedia.org/wiki/Durbar_(court))

- World Bank. 2000. **World Bank Reviews Global Forest Strategies**. News Release No. 2000/193/S. [online September 2008] <http://wbi0018.worldbank.org/news/pressrelease.nsf>
- World Resources Institute. 1990. The World Bank in the forest sector: a global policy paper. **Wasteland News**, 8(2): 6-12.
- World Resource Institute. 2008. **Earth Trends: The Environmental information Portal** [online August 2008] <http://earthtrends.wri.org/text/biodiversity-protected/country-profile-14.html>.

Annex I

Respondent ID:

QUESTIONNAIRE FOR HOUSEHOLD SURVEY

A. Household Information

1.Name:	2.Sex: Male/Female
3. House hold head: Male and Female	4. Ethnicity: Bengali/ Khasia / Tripura
5. Age... years.	6.Marital status:
7.Family members: 5.Son:	8.Daughter: 7.Dependent:
9.Religion:	10.Housing Pattern: Katcha/Semi-pacca /Pacca
11. Do you have any disable member in your family?	

B. Human Capital

Education:
12. Respondent: can sign only/primary/secondary/higher secondary /graduate Year of Schooling: years
13. Spouse: can sign only/primary/secondary/higher secondary /graduate Year of Schooling: years
14.i. Did you get any IGA training? yes / no
If yes, please specify.....
14.ii. Did your spouse get any IGA training? yes / no
If yes, please specify.....

C. Natural Capital

15. Homestead area:
16. Do you have agricultural land? Yes/no
17. If yes, what is your land size?
18. Cattle: cow....., goat..... 22. Poultry: chicken....., duck.....
19. Do you depend on forest? Yes/no
20. If yes, level of dependency :high/medium/low
21. What do burn for cooking?
22. Source of fuel:
23. If you have to buy it from market, what would be it's price? TK.....

24. What are the forest products available in this forest?
25. Which forest products do you collect?
26. What do you collect for own consumption:
27. If you have to buy it from market what would be it's market price? TK.....
28. Forest products collect for selling in the market..... TK.
29. Which members of the household are involved in collecting forest products?
30. When do you collect it? (time of day/month/seasons)
40. Do you use medicinal plants for medical treatment? Yes/no; if yes, specify
41. Source of medicinal plants :homestead/forest/others
42. If you have to buy it from market what would be its price? Tk.....

D. Physical Capital

43. Do you have sanitary latrine? Yes/No	44. Do you have tube-well? Yes/No
45. What is the source of drinking water? Tube-well/ Well/Others	
46. Where is your nearest market place? How far is it from your homestead?	
47. Do you have market access for your products? If not, why?	
48. Where is your nearest hospital? How far is it from your homestead?	

E. Financial Capital

49. What is your main source of income?	
50. Others source of income:	
51. Monthly income: income from forests agricultural income return to wealth wedge income	TK.....
52. Do you have any loan? Yes/no;	
if yes what is the source? NGO/Govt. Institution/others	
53. Do you feel that you need credit support? Yes/no	

F. Social Capital

54. Do you involve with any organization? yes / no; if yes, specify.....
55. How do your involvement of the organization benefit you livelihood?
56. Your suggestions for better forest management which can help to support your livelihood.....

G. Vulnerability Contexts

57. What seasonal patterns are there in food supply, income, expenditure, residence, etc.?	
58. What crises has the household faced in the past (health crises, natural disasters, crop failures, civil unrest, legal problems, indebtedness, etc.) and how did it deal with them?	
59. What longer-term changes have taken place in the household's natural, economic and social environment and how has it dealt with these changes?	

H. Policies, Institutions and Processes

60. What organizations, institutions and associations (societies, cooperatives, political parties, etc.) do household members participate in and what role do they play in them?	
61. How are decisions reached within these organizations, institutions and associations?	
62. Who makes decisions about the use of natural and physical resources in the community anyhow are those decisions reached (what are the centers of decision-making)?	
63. What laws, rules and regulations affect the household?	