Poverty-Environment Nexus
An Investigation of Linkage and Policy Implications

Paper 74

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The present paper titled **Poverty-Environment Nexus: An Investigation of Linkage and Policy Implications** has been prepared under the CPD-UNDP collaboration programme on *Pro-Poor Macroeconomic Policies* which is aimed at developing pro-poor macroeconomic policies in the context of Bangladesh through research and dissemination. The research papers under the current programme attempt to examine the impact of various macroeconomic policies on poverty alleviation and to establish benchmarks for poverty reduction strategies. The outputs of the programme have been made available to all stakeholder groups including the government and policymakers, entrepreneurs and business leaders, and trade and development partners.

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ACRONYMS

ADB	Asian Development Bank
BCAS	Bangladesh Centre for Advanced Studies
BFRI	Bangladesh Forest Research Institute
DoE	Department of Environment
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
FD	Forestry Department
FSMP	Forestry Sector Master Plan
FSP	Forestry Sector Project
GO	Government Organisation
HDI	Human Development Index
JFM	Joint Forest Management
NGO	Non-government Organisation
PPRC	Power and Participation Research Center
SDNP	Sustainable Development Networking Programme
SEHD	Society for Environment and Human Development
UNDP	United Nations Development Programme
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VPC	Village Protection Committees
WRI	World Resources Institute

1. INTRODUCTION

There is a clear connection between environment and poverty and it can hardly be overemphasized. The more visible environmental problems are mostly seen in the case of exhaustive resources which are in constant danger of depletion from excessive use, particularly in a developing country such as Bangladesh. At the same time, loss of many environmental resources can indeed make some people destitute even when an economy is growing. Therefore, common and mutually interlinked issues of poverty eradication and environmental protection are the major concerns of many developing and developed countries. While everyone recognises the connection between environment and poverty, the nature of these relationships are very complex and site specific. In the absence of information, government and policymakers often adopt policies based on common knowledge and perceptions rather than based on rigorous studies. For example, it is often thought that (i) countries must tackle poverty before dealing with environmental issues, (ii) poor people do not care about the environment; they do not have the resources or know-how to invest in the environment or in "green" technologies, (iii) population growth automatically leads to environmental degradation; and (iv) governments can manage natural resources better than poor people can. These perceptions or ideas have proven to be myths rather than realities. More site-specific studies can reduce the gaps between common perception and reality and will help policymakers to take more appropriate policies.

This study is an attempt to understand the relationship between poverty and environment which focuses on Tangail Forest Division in Bangladesh. While the findings are preliminary and based on site visits, interviews, and a small questionnaire survey, the paper nevertheless highlights some important findings and must be followed up with a more elaborate survey to validate these findings as well as to draw policy recommendations. A general overview on poverty and deforestation is presented in Section 2 while Section 3 describes the different dimensions and linkages of environment and poverty. Section 4 attempts to provide a brief summary of available literature on poverty-environment nexus. Section 5 discusses the study area with a focus on general socio-economic condition and the nature of deforestation, particularly encroachment of forest areas. Section 6 presents the research methodology used for this study. Section 7 discusses the findings from secondary data as well as from the field survey conducted for this study. Section 8 presents some policy recommendations followed by a brief conclusion in Section 9. A discussion on further scope for research focusing on some of the limitations of the study is presented in Section 10.

2. POVERTY AND ENVIRONMENT

As mentioned earlier, the “poverty-environment nexus” has become a major issue in the recent literature on sustainable development. Because the existence of a "poverty-environment nexus" implies that one problem is a significant determinant of the other, some discussion of poverty and environmental degradation in question may be necessary.

2.1 Poverty

Poverty is a relative term and as such there is no consensus on how poverty should be defined. Poverty has been defined according to what is prioritised as a “need”. It is usually conceptualised as an economic or social condition, and has major implications for policy. A person is poor when his/her personal income or consumption is below a specified “poverty line” (Coudouel and Hentschel 2000). However, personal income can vary greatly from year to year, is only appropriate for wage earners, and has less relevance to the poor. Many poor people rely on their own production and informal sector activities, in which the concept of profit is unclear, rather than on a formal income (Glewwe and Van der Gaag 1988).

In the 1960s consumption of goods and services gained favour as a superior poverty indicator, as it presents a more stable indicator than income, over time. A bundle of goods deemed necessary for meeting basic needs are identified–consisting of food expenditure and modest expenditure on non-foods (Lipton and Ravallion 1993).

Despite subsequent broadening of the definition of poverty, consumption has remained the most widely used indicator (Baulch 1996). As the definition of poverty expanded with the concept of basic needs in the 1970s, qualitative indicators expanded to incorporate the satisfaction of those needs. These indicators incorporated aspects of ill-being, such as poor nutrition, shelter, clothing and access to health services. In the late 1970s, Amartya Sen introduced the concept of “capabilities” to replace the basic needs concept (Westendorff and Ghai 1993). The entitlement approach draws on Sen’s work, and leads to a definition of poverty that is concerned not only with material well-being, but also with opportunities–what people can or cannot do (capabilities) as well as what they are or are not doing (functions) (NRSP 2000). From this understanding of poverty, the United Nations Development Programme (UNDP) developed its Human Development Index (HDI) as an alternative to income/consumption measures of poverty. Three dimensions of human deprivation are captured in this index, which draws from measures of life expectancy, adult literacy and access to health services and safe water, as well as percentage of underweight under-five children.

The *World Development Report 2000/01* (World Bank 2000) claims "to broaden the notion of poverty to include vulnerability and risk and voicelessness and powerlessness." Although Chambers (1995) stresses that vulnerability is not the same as poverty; it is an important aspect as poor people are more vulnerable to shocks and stresses due to the lack of assets available to help them cope. Vulnerable people are those who "are more exposed to risks, shocks and stresses; and with the loss of physical assets and fewer and weaker social supports, they have fewer means to cope without damaging loss" (Chambers 1997).

Participatory approaches to poverty also challenge the conventional definitions, expounding the direct inclusion of the poor themselves in the process of defining poverty. It is argued that income/consumption poverty has assumed importance only because of its importance as a developed world state. According to Chambers (1995), when the poor are asked, income deprivation is quite low on their priority ranking, even less than self-respect and lack of domination. The participatory school asserts that the conventional understanding of poverty does not allow for its fundamental subjectivity. For the poor, poverty is a local, diverse and dynamic condition. While poverty relates to lack of physical necessities, assets and income, it is also more than this. Poverty is now seen as multidimensional, dynamic, complex, institutionally-embedded, and a gender-and location-specific phenomenon (World Bank 2000). The poor are not a homogeneous group, but experience poverty in different ways requiring a range of policy responses and measurements. In terms of the linkages between poverty and environment, these are inevitably complex and diverse, reflecting the diversity of poverty dimensions and experiences. The choice of the poverty indicator is thus dependent on the research context and goals, budget, duration and the specific need for comparative analyses.

2.2 Environment

The term environment is widely recognised as a broad term with many interpretations and definitions. The term "environment" may be used narrowly with reference to "green" issues concerned with nature such as pollution control, biodiversity and climate change; or more broadly, including issues such as drinking water and sanitation provision (often known as the "brown agenda"). Neefjes (2000) uses the term in a broad sense, referring to the environment as "a vehicle for analyzing and describing relationships between people and their surroundings, now and in the future."

Bucknall (2000) uses a broad definition of environment in his background paper to the World Bank's Environment Strategy and notes that environment generally refers to a natural resource base that provides sources and performs sink functions.

The broad interpretations of both poverty and environment mean that understanding the linkages between the two is particularly challenging. With respect to environment, this study focuses on deforestation and the linkage between poverty and degradation of forest resources.

2.3 Deforestation

The forests of Bangladesh are broadly classified into three categories based on the topographic conditions: (a) Hill forests; (b) Plain Sal forests, and (c) Mangrove Littoral forests. The hill forests contain most of the productive forest areas and plain Sal forests the least. In terms of forest land under forestry use, the Hill forests contribute 508,991 hectares (45.4 per cent), followed by the Littoral Mangrove Forests and Coastal Afforestation extending over 489,872 hectares (43.7 per cent), and Plain Sal Forest account for the rest 121,884 hectares (10.9 per cent) of the forest area.

The present paper on poverty-environment connection, the study focuses on deforestation to see what extent poverty contributes to deforestation. Area affected by deforestation in Bangladesh has not been surveyed or mapped and their exact sizes and locations were never conclusively determined (Forestry Master Plan 1992).

Statistics on Bangladesh forestry vary considerably from one source to another and rapid decline in forest cover is clearly visible. According to the Forestry Sector Master Plan (FSMP), the total land area covered by forest is 2.56 million hectares, which accounts for 17.8 per cent of the total land area of Bangladesh. Bangladesh Bureau of Statistics (BBS) reports that there are about 2.25 million hectares forest lands, which is about 14 per cent of the total land area. World Bank (1997) figures show that there are 1.47 million hectares forest area in Bangladesh which makes up 11 per cent of total land area. Whatever might be the spatial coverage of the forest, the striking reality is that much of the country's forest land is devoid of trees, and the actual tree cover is alarmingly less and disappearing rapidly. Some sources quote satellite surveys and note that forests are declining at a rate of nearly 70,000 hectares per year and Bangladesh has less than 0.02 hectares of forest land per person–one of the lowest forest-man ratios in the world. Annual deforestation rate in Bangladesh could be as high as 3 per cent, whereas the same in South Asia is about 0.6 per cent. Increased demand for forest products, partial implementation and lack of monitoring of various forest management plans, institutional constraints faced by the Forest Department (FD) due to shortage of manpower and resources, and encroachment into forest lands are among the root causes behind the continual decline of forest cover.

2.3.1 The Forest Act, 1927

The Forest Act, 1927 aims to consolidate the laws relating to forests, and duty leviable on timber and other forest produces. The law was mainly enacted to generate revenues from the forest products. The Act empowers the Government to declare portions of its forest as "Reserved" or "Protected" and by doing that it may take measures for in situ conservation of biodiversity. Any acts or omission detrimental to the natural resources of reserved and protected forests are prohibited and are punishable offences. Among there acts, the more serious ones include making fresh clearing of forest lands, removing timbers, setting fires, felling or otherwise damaging trees, clearing or breaking up any land for cultivation or any other purpose. The Act was amended in 2000 to provide provisions to establish social forestry involving local community participation in the management regime. Following the Act, a social forestry rules had been prepared by the Forest Department. It is feared that unless conservation guidelines including those concerning alternative livelihood are framed properly, the community might be moved more by the needs for overexploitation of forest resources.

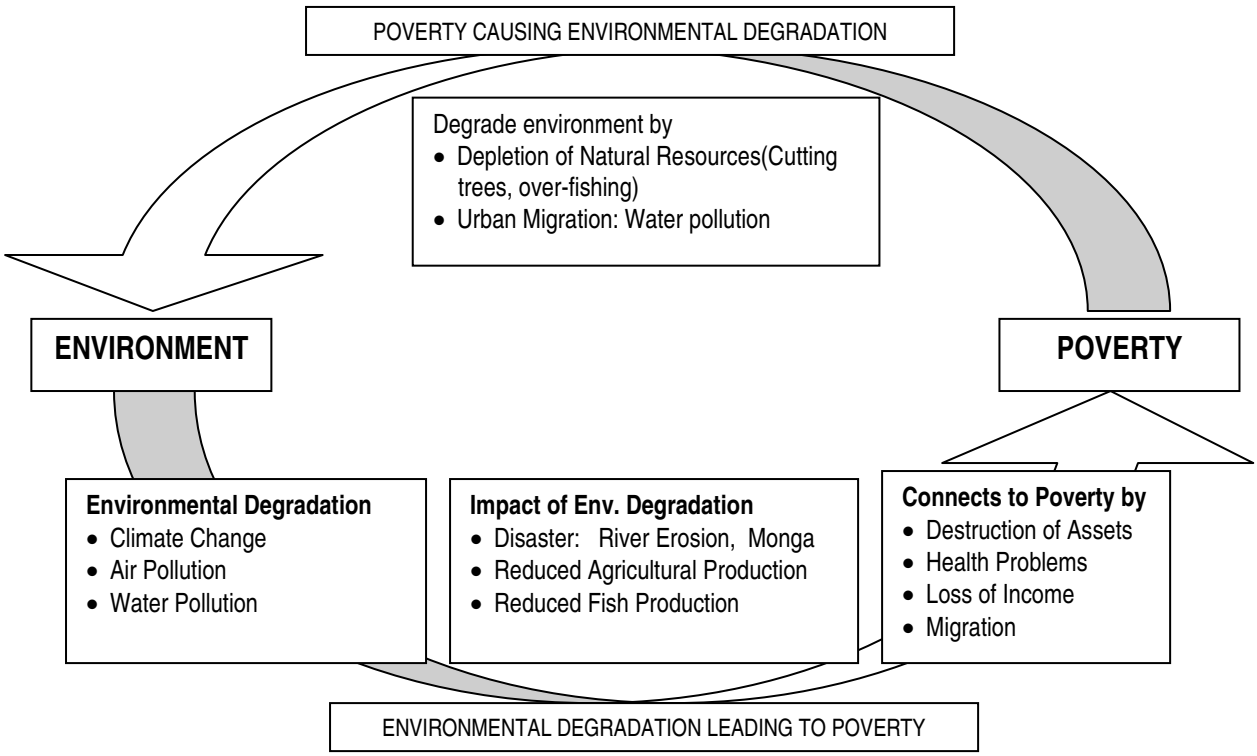
2.3.2 National Forest Policy, 1994

The Government of Bangladesh has already promulgated the National Forest Policy, 1994 and approved the Forestry Sector Master plan (1995-2015). Both the documents have emphasised on the afforestation programme in the country with coverage of 20 per cent and increase the protected areas by 10 per cent of the reserve forest land targeted in the Master plan by 2015 through the co-ordinated efforts of GO-NGOs and active participation of the people. One of the key objectives of the policy is to conserve soil and water resources and strengthen agriculture sector with the expansion of agro-forestry. The Forestry Master Plan incorporates various programmes for enhancing the involvement of rural population in forest sector activities. Its objectives include preserving existing values, conserving plants and animal variety and ensuring maximum benefits to local people.

3. LINKAGE BETWEEN POVERTY AND ENVIRONMENT

Poverty-environment nexus can be explained through two inter-linked processes, as shown in Figure 1. On the one hand, environmental degradation reinforces incidence of poverty by reducing the availability of natural resources and making the poor vulnerable to natural disasters. On other hand, poverty forces people to degrade the environment through overexploitation in absence of alternatives.

FIGURE 1: TWO DIMENSIONAL LINKAGES BETWEEN ENVIRONMENT AND POVERTY



Source: Authors' elaboration

Due to the increasing focus on the urgency of reducing poverty, and the broadening understanding of poverty, many international organisations are attempting to develop a better understanding of the linkages between poverty and the environment. There has been a move away from the simplistic approach of viewing poverty and environmental degradation as being "linked in a downward and mutually enforcing cycle" (Forsyth and Leach 1998), also referred to as the "poverty trap thesis"(Prakash 1997).

This circular relationship is now widely seen as too simplistic, ignoring the complex circumstances in which the poor find themselves (Ambler 1999, Scherr 2000). Prakash (1997) suggests that the causal roots of environmental degradation "lie in institutional and policy issues rather than in poverty itself." He goes on to conclude that "the relationship between poverty and environment is mediated by institutional, socioeconomic and cultural factors" (Prakash 1997).

The complexity of the relationships often contributes to inadequate understanding and policy responses. As noted by Markandya and Galarraga (1999), "it is important to recognize the paucity of information on the linkages between poverty and environmental policies." The concept of environmental entitlements is one approach to understanding the relationships between environment and poverty. The key issue raised by this approach

is that the links between environmental change and impoverishment are not direct, but are mediated by poor people's interactions with particular environments, structured by macro-level processes (Leach and Mearns 1991). Environmental entitlements refer to two main attributes: access to resources; and control over the use of those resources. The approach highlights the role of institutions in mediating relationships between people and environments (Leach, Mearns and Scoones 1997). Other approaches adopt similar views– that the relationships between poverty and environment are complex, and that there are many different types of relationship (positive and negative). There is wide recognition that poor people in developing countries, particularly in rural areas, rely on natural resources for their livelihoods. Improving access to and control over environmental resources by the poor should provide a mechanism for the reduction of poverty. The poor, whose life and livelihood choices are profoundly shaped by their physical surroundings, have a strong vested interest in protecting rather than destroying the environment, which is enhanced when they have some part in its management and use. Thus the reality is that the relationship between poverty and environment is complex and context-dependent, and simplistic models and unexamined assumptions often lead to inappropriate policy choices.

4. LITERATURE REVIEW

Numerous studies have showed that environmental damage can have particular significance for the poor. Recent participatory poverty assessments, conducted in 14 developing countries of Asia, Africa, and Latin America, reveal a common perception by the poor that environmental quality is an important determinant of their health, earning capacity, security, energy supplies and housing quality (Brocklesby and Hinshelwood 2001). Rural studies commonly suggest that poor people's economic dependence on natural resources makes them particularly vulnerable to environmental degradation (Ambler 1999, Cavendish 1999, Cavendish 2000, Kepe 1999, Reddy and Chakravarty 1999). Other studies have assessed the health damage suffered by poor households that are directly exposed to pollution of the air, water and land (Akbar and Lvovsky 2000, Bosch *et al*. 2001, Brooks and Sethi 1997, Mink 1993, Songsore and McGranahan 1993, Surjadi, 1993). In addition, environmental disasters and environment-related conflicts may have regressive impacts because the poor are least capable of coping with these disasters (Albla Betrand 1993, Myers and Kent 1995).

In some cases, poor households themselves may be the cause of environmental degradation. Poverty may induce the poor to deplete resources at rates that are incompatible with long-term sustainability (Holden 1996). In such cases, degraded resources can further reduce the income of the poor (Cleaver and Schreiber 1994,

Dasgupta and Maler 1994, Durning 1989, Ekbom and Bojo 1999, Mink 1993, Pearce and Warford 1993, Prakash 1997, World Bank 1992, World Commission on Environment and Development 1987). Rapid population growth, along with insufficient means to increase production, may induce overexploitation of fragile lands on steep hillsides, or invasion of areas that governments are attempting to protect for environmental reasons.

The existing literature also suggests that poverty-environment linkages may be affected by factors as diverse as economic policies, resource prices, local institutions, property rights, entitlements to natural resources, and gender relations (Ambler 1999, Arnold and Bird 1999, Barbier 2000, Dasgupta and Maler 1994, Dutt and Rao 1996, Ekbom and Bojo 1999, Eskeland and Kong 1998, Heath and Binswanger 1996, Leach and Mearns 1991). By implication, the relative strength of links between poverty and environment may be very context-specific (Chomitz 1999, Bucknall, Kraus and Pillai 2001, Ekbom and Bojo 1999).

5. STUDY AREA

Tangail was chosen as the study area for this study because of it's proximity to Dhaka and also because of its importance as an area with forest resources (see Figure 2 for the location). The Tangail Forest Division, which has the same boundaries as the Tangail district, lies between $24^0$48' and $25^0$58'N latitudes and $89^0$45' and $90^0$18'E longitudes. The total area of Tangail Division is 341,400 hectares of which the upland area is 112,835 hectare. Tangail Forest Division, like other parts of Bangladesh, belongs to the humid megathermal (MAT > 22^0C) with little or no water deficit in the root zone during a year. Temperature efficiency favours tree growth throughout the year. The population of Tangail division is approximately 3.5 million. The tribal population, representing 0.5 per cent of the total population, include the Garo, Mandai, and Koches who are settled in and around forests. Agriculture is the main source of income for 75 per cent of the total households. The remainder is engaged in small and medium business, trade and service. The informal sector is very active and there is a lot of petty trading in food products, grown mainly in private lands or homesteads.

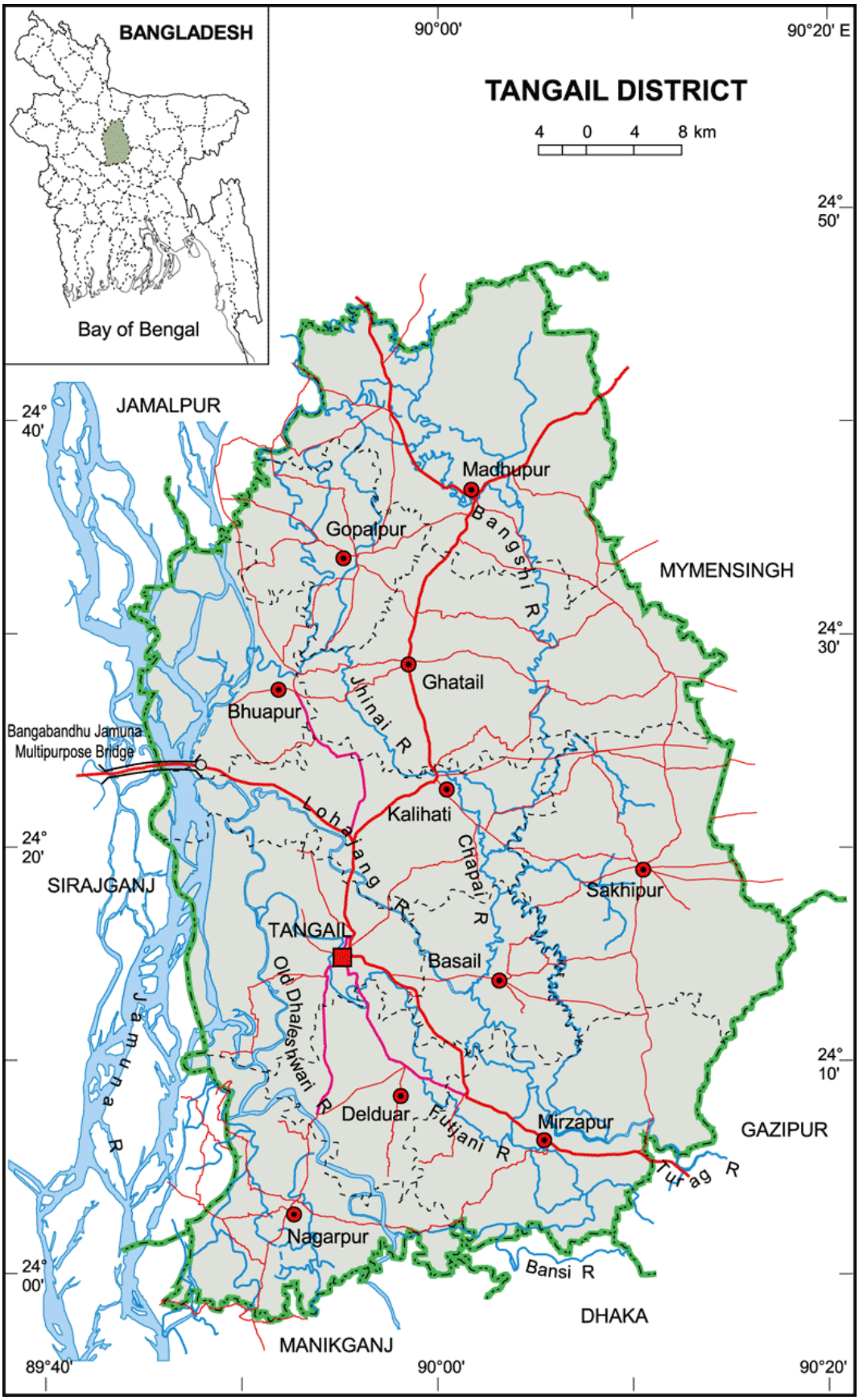


Figure 2: Location of Tangail District and Forest Ranges
Source: http://banglapedia.search.com.bd/Maps/MT_0043.GIF

5.1 Poverty

According to the current study, the average monthly income of the households for Tangail was Tk. 2,850. The focus of the survey was poor villagers who live next to forest areas, so such low average income was not unexpected. Along with the national trend, the overall poverty level or rate seems to be declining, but the number of poor people may be increasing. All the poverty indicators used in the survey questionnaire show that people's well being are gradually improving with the exception of food availability. The decrease in food availability with decrease in the quantity of taking less than two meals per day might indicate that the supply of food from the surrounding environment has decreased, but people are meeting their food demand from the market sources. Poverty indicators are discussed in more details in Section 8.

5.2 Forest Resources and Issues

The natural forests of the Tangail Forest Division are isolated *sal* forests, intermixed with a network of habitations and depressions which are intensively cultivated, mainly with paddy. The degradation of forests has continued due mainly to illicit felling, encroachments, grazing, and forest fires. Although woodlot and agroforestry systems of fast growing species have been established in blanks and depleted *sal* forests, no significant programme for the development of natural forests exists currently. Encroachments and land ownership complications are serious due mainly to lack of forest settlement operations and a high density of surrounding population practicing agriculture.

TABLE 1: FOREST AREA UNDER TANGAIL FOREST DEPARTMENT

Name of the Upazila	Reserve Forest (in acre)	Proposed Reserve Forest (in acre)	Reserve Forest Noticed Under Section 4 and 6 (in acre)	Total Forest Area (in acre)
Madhupur	2,526.14	36,313.80	6,725.24	45,565.18
Ghatail	7251.01	6,201.99	8,402.48	21,855.47
Kalihati	191.02	-	468.27	659.29
Shamipur	38,232.28	1,632.33	7,355.99	47,220.60
Mirjapur	7,275.93	59.66	240.77	7,576.36
Total	55,476.38	44,207.78	23,192.745	122,876.90

Source: Forest Department, Tangail, 2007.

5.2.1 Forest Department and Related Institutions

Tangail Forest Division under Central Circle encompasses 9 Forest Ranges: Madhupur National Park, Dhokla, Madhupur, Aronkhola, Dhalapara, Tangail Sadar, Baheratali,

Hateya, and Bastail. Like other forest departments, Tangail Forest Department faces the same problem.

- Insufficient budget and late disbursements;
- Under-staffing and no recruitment;
- Lack of vehicles, computers and other materials;
- Lack of training, work planning and monitoring of activities, and
- Lack of reorientation and commitment to project objectives.

Under an appropriate contractual agreement with the FD, there are some selected NGO's which are working in the area. The NGO's are involved with raising awareness of local communities, organising the participants into groups and mobilising the groups for the planning and implementation of field activities.

5.2.2 Land Encroachment

Resource users in Tangail are mainly encroachers (more than 24,000 households in 1990). According to 1999 data, nearly half of the total forest land in Tangail has been encroached. Most of the encroachers came to these areas about 40 or 50 years ago. In Madhupur National Park Range, some Garo families had been living on these forest lands for more than 100 years. Of the 24,359 hectares encroached forest land, 8,434 hectare have been recovered so far and converted into woodlot and agroforestry plantations (Table 2). Landless and marginal farmers are illegal tenants, share-cropping in the encroached land of rich farmers. Others are engaged in petty business. Among resource users, almost 100 per cent depend on the forest for fuel, 30 per cent for fodder, 50 per cent for pole, and 20 per cent for timber (Forestry Sector Project 2003-2004).

TABLE 2: ENCROACHED FOREST LAND IN TANGAIL

(In hectare)

Thana	Total Forest Land	Encroached Forest Land	No. of Encroacher Households	Recovered for Woodlot and Agroforestry
Madhupur	18,447	8,590	8,201	1,811
Ghatail	8,848	5,471	4,649	2,218
Sakhipur	19,118	8,333	10,259	3,925
Kalihati	267	137	112	-
Mirzapur	3,067	1,828	1,103	483
Total	49,747	24,359	24,324	8,437

Source: Forest Department, 1999.

TABLE 3: RANGE-WISE FOREST AREA ENCROACHMENT UNDER TANGAIL FOREST DEPARTMENT

Sl. No.	Name of the Range	Forest Area (in Acre)	Encroached Area (As of Feb. 2005)
1	Dhalapara	25,670.25	14,445.96
2	Hatra	16,880.68	10,333.81
3	Boheratali	21,943.59	5,406.06
4	Bastali	14,089.98	7,241.26
5	Madhupur	5,895.29	3,648.91
6	Arunkhola	4,820.17	118
7	Dokhla	18,503.60	10,994.57
8	National Park	15,073.34	6,076.93
	Total	122,876.90	58,265.50

Source: Forest Department, 2007.

5.2.3 Social Infrastructure: Education, Health, Water and Sanitation

The literacy rate in Tangail district is 23 per cent, which is differentiated between men and women as 28.5 per cent and 17.5 per cent respectively. The educational institutions include 32 colleges, 563 secondary schools, 1,876 primary schools, and 153 madrashas (Islamic schools). Health services include 1 district hospital and 4 non-government hospitals, 10 Thana health complexes, 59 rural health centers and 2 out-patient facilities. The low rate of literacy, poor health and limited sanitation facilities indicate the extent of basic needs yet to be met in order to begin poverty alleviation.

5.2.4 Ethnic Minorities Issues

Garos, Mandais and Koches from the ethnic minorities of Tangail with a population of 14,000 (about 0.5 per cent of the division's total population) are the inhabitants of the Madhupur, Madhupur National Park, Dokhala and Aronkhola Ranges. The Garos were originally from "Sangsarik" religion and believed in many Gods. In recent years, they have converted to Christianity. Some are already third generation Christians. Mandais and Koches are mostly Hindus. By tradition Garo women hold the land title and men live in their wife's home after marriage. This is to avoid the fragmentation and the transfer of property to other clans. Garos have a high literacy rate and the ratio of female education is higher than that of males. In the past, the ethnic minority population depended on forests and shifting cultivation for their subsistence, but now they face problems in maintaining themselves on forest land due to the degradation of forest lands, encroachment by Bengali settlers and new government policies. Many have sold land to the new settlers and migrated to nearby towns in search of employment. Although ethnic women are formal land owners, previous Department programmes ignored women as participants. As a result, most new land titles went to male settlers and benefit-sharing

agreements were made exclusively with men. This went against the preservation of the cultural pattern and customs of the ethnic communities. Along with the degradation and encroachment of the forest came the deterioration of living conditions, the loss of resilience and the threat to the cultural heritage of traditional tribal forest dwellers.

5.3 Participatory Forestry

Over the last two decades there has been a gradual shift in the forest management approach adopted by the Forest Department i.e., from its traditional custodian role to a more participatory approach. Accordingly, the provision of people's participation in protecting the natural forest and afforesting the degraded and encroached forest land with benefit sharing mechanism has been developed and people's participation has been ensured.

The ADB funded Community Forestry Project, implemented in Tangail (along with six other districts) from 1981 to 1987, paved the foundation of Participatory forestry in Bangladesh. Following this other ADB funded projects, namely 'Thana afforestation and nursery development project', 'Green Belt project', were implemented and now 'Forestry sector project' is being implemented throughout the country.

6. RESEARCH METHODOLOGY

The research methodology involved a combination of secondary data, interviews, and a comprehensive survey. As a first step, secondary data were gathered from multiple sources to have a general idea about the linkage between poverty and deforestation. The sources that were consulted include Bangladesh Forest Department in Agargaon, Arannyak Foundation, Bangladesh Department of Environment (DoE) Website, USAID – Nishorgo Project, Power and Participation Research Center (PPRC), Society for Environment and Human Development (SEHD), Bangladesh Centre for Advanced Studies (BCAS), Sustainable Development Networking Programme (SDNP), World Resources Institute website (WRI), and Bangladesh Forest Research Institute (BFRI). The information gathered from secondary sources helped to have a better understanding about the subject matter and were not used directly to establish a relationship between poverty and environment.

To complement and validate some of the secondary data gathered from various sources, the authors of this study interviewed some key government officials and subject matter experts. They include District Forest Officers and staff at Tangail Forest Department, high ranking police officers in Tangail, and some free lance consultants who have worked on many projects on this topic.

Finally, as part of a survey, 160 random households were interviewed based on a prepared questionnaire. Questions that were asked relate to poverty and forest resource use in the area and the full questionnaire can be found in the appendix.

6.1 Survey

A primary survey was conducted in all eight forest ranges of Tangail district to examine the poverty-deforestation relationship. A total of 160 households were interviewed, about 20 from each forest range (see Table 4). Targeted respondents were poor households who live adjacent to forest areas in Tangail. Questions included in the survey ranged from general information to specific questions. For the detailed questionnaire, see Appendix A.

TABLE 4: FOREST RANGE AND NUMBER OF RESPONDENTS

Range	No. of Respondents
Bashtola	23
Bohetola	17
Dhokla	16
Dholapara	20
Hoteya	20
Modhupur	19
National Park	21
Oronkhola	20

7. FINDINGS OF THE STUDY

7.1 Interviews

Some of the comments or opinions that came out of the discussion with government officials and local residents are as follows:

- Most forest areas in Tangail are protected by reserve or participatory forestry mechanism. This implies that in these forests the opportunity for poor people to cut trees is not that high.
- In general, forest resources are under pressure more from encroachment rather than from poverty. Encroachers are becoming participators because once settled they can hardly be evicted due to humanitarian and legal complexity.
- Getting the encroached land back becomes time consuming and sometimes impossible for the forest department due to complicated legal framework, as FD does not have the judiciary power to settle such disputes. They had to go through the long administrative and judiciary procedures.

- While participatory forestry seems to have some success, more investigation is needed about its role in poverty alleviation and potential negative environmental impacts. Questions are being raised about the impact of non-indigenous plants which are planted and encouraged by the Forest Department for quick profit sharing between the government and local participants.
- Because there are many stakeholders in the study area, different stakeholders have different opinions on the poverty-environment linkage.
- People are very supportive of participatory forestry and they feel that they are economically better off than before.
- Most agreed that poverty-environment nexus is complex and the nature of the linkage may change over time. Policies must be based on long-term comprehensive studies and local participation.
- Interviewees commented that timber is not something which you can carry in your pocket. Its removal involves felling, taking out of the forest and then trucking out to an appropriate place. All these activities involve a number of people and cannot be done without being noticed by the forest department staff. Resource extraction, particularly timber, is carried out by very powerful people who are affluent; wood, bamboo, cane are extracted mostly by poor people, primarily to sell in the market to meet their basic needs.
- A large number of community people have court cases against them filed by the local forest department officials. Such act has not only made community people hostile but also forced these people to get involved in illegal felling to meet case expenses.

7.2 Findings from the Survey Questionnaire

7.2.1 State of Poverty

The following socio-economic information was gathered based on the responses from the survey questionnaire.

I. Demographic Characteristics

The average age of the respondents surveyed was 46 years. Average family size of the households was 6 persons (male: 2.4 persons; female: 2.2 persons; children: 1.3 persons). The average monthly income of the surveyed households was Tk. 2,850.

II. Asset Ownership

The majority of the respondents reported that they were landowners. Eighty per cent of the respondents said they own land and 20 per cent said they do not own any land (see Figure 3). Most of the respondents have been settled in the area for a long period of time.

The average period of settlement is 47 years. Twenty-eight per cent of the respondents

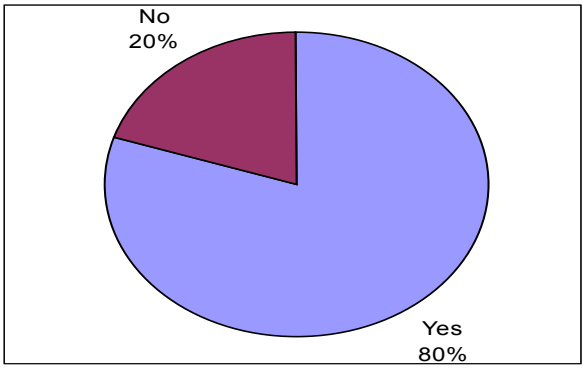


Figure 3: Land Ownership

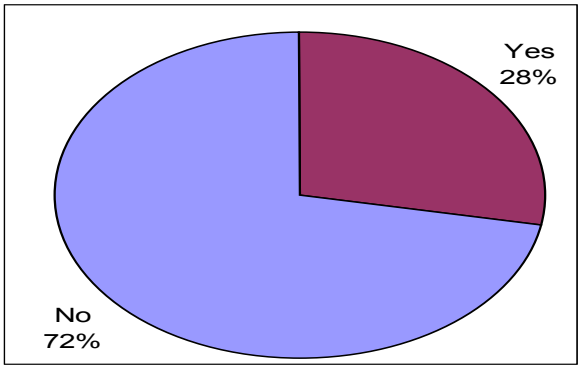


Figure 4: Litigation for Eviction

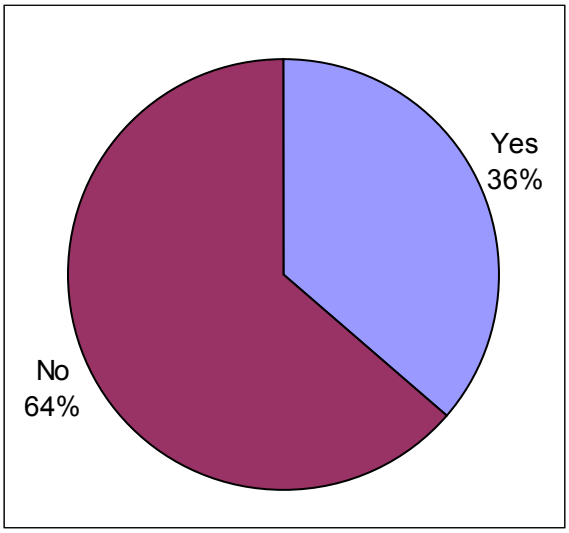


Figure 5: Eviction Pressure

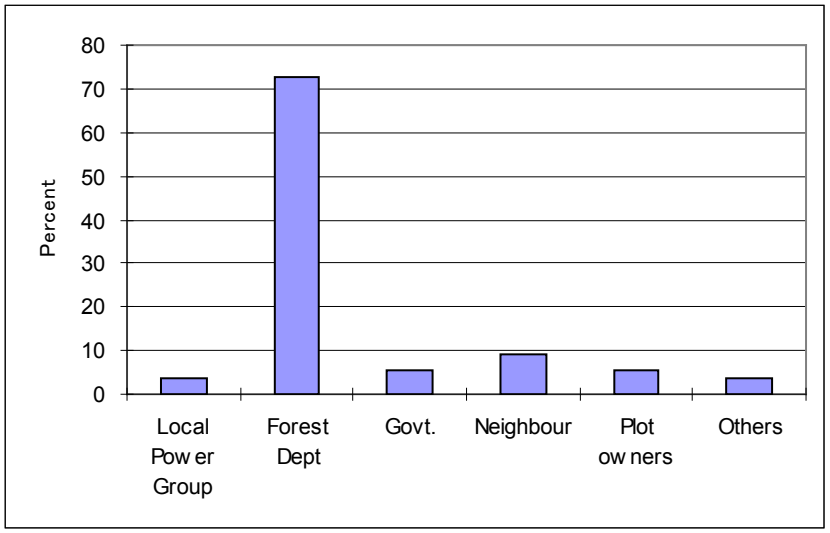


Figure 6: Eviction Pressure by

were facing the pressure of eviction through litigation (see Figure 4).

III. Eviction Pressure

A considerable number of respondents (36 per cent) reported that they are facing eviction pressure (see Figure 5). Interestingly, most of these eviction pressures (73 per cent) are coming from the forest department, as commented by the respondents (see Figure 6). This might be due to either of the two reasons: either the respondents claiming to be the owner of the lands which actually they do not own, or the forest department is creating illegal pressure to evict them.

IV. Food Consumption

Eighty-two per cent of the respondents said that foods are cooked twice in a day, about 16 per cent reported that food is cooked three times a day and only 2 per cent said that they cook food only once a day (see Figure 7). Regarding the number of meals eaten per day,

77 per cent commented that they eat three times a day, 23 per cent eat twice a day while nobody reported to having meals only once a day (see Figure 8).

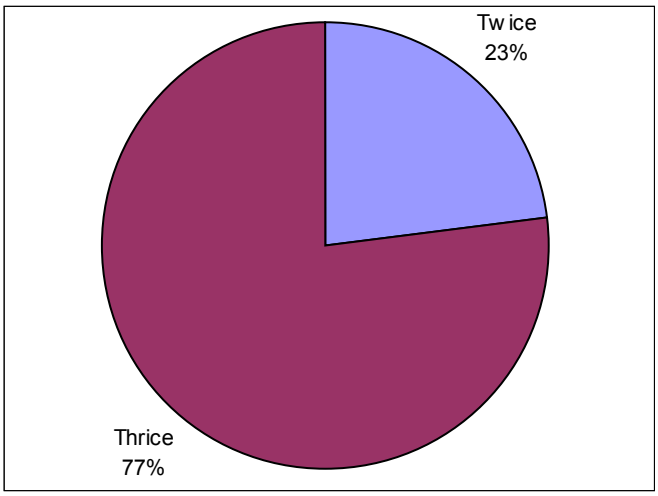


Figure 7: No. of Meals Eaten Per Day

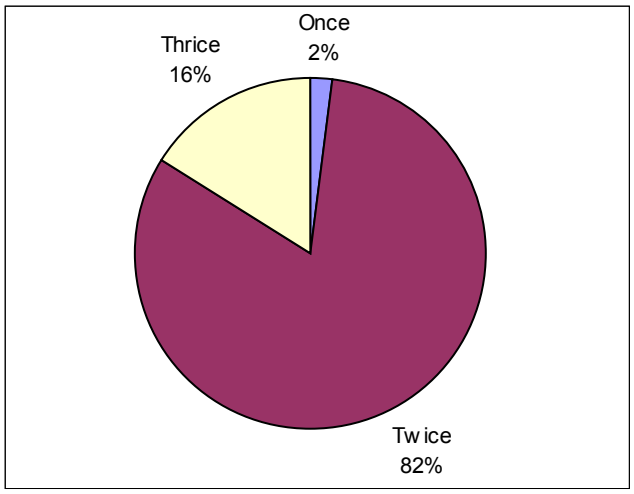


Figure 8: Times Food Cooked

V. Poverty Indicators

In order to predict the comparative poverty status over the last five years, respondents were asked to comment on the increase or decrease of six selected poverty indicators on a five point scale. Accordingly, as shown in Figure 9, 57 per cent reported that *food availability* decreased over the last five years. On the subject of taking *less than two meals per day*, 47 per cent and 42 per cent of the respondents respectively said that it has decreased and remained the same. About 41 per cent of the respondents commented that *access to health facility* has increased; 56 per cent said access to *child education* has increased; 61 per cent said that *sanitary toilets* have increased; and 44 per cent think that the *purchasing of clothes* remained the same. Thus overall the poverty indicators show that the economic well-being has gradually gone up over the last five years with the exception of food availability. The decrease in food availability with a decrease in the quantity of taking less than two meals per day might indicate that the supply of food from the surrounding environment has decreased, but people are meeting their food demand from the market sources.

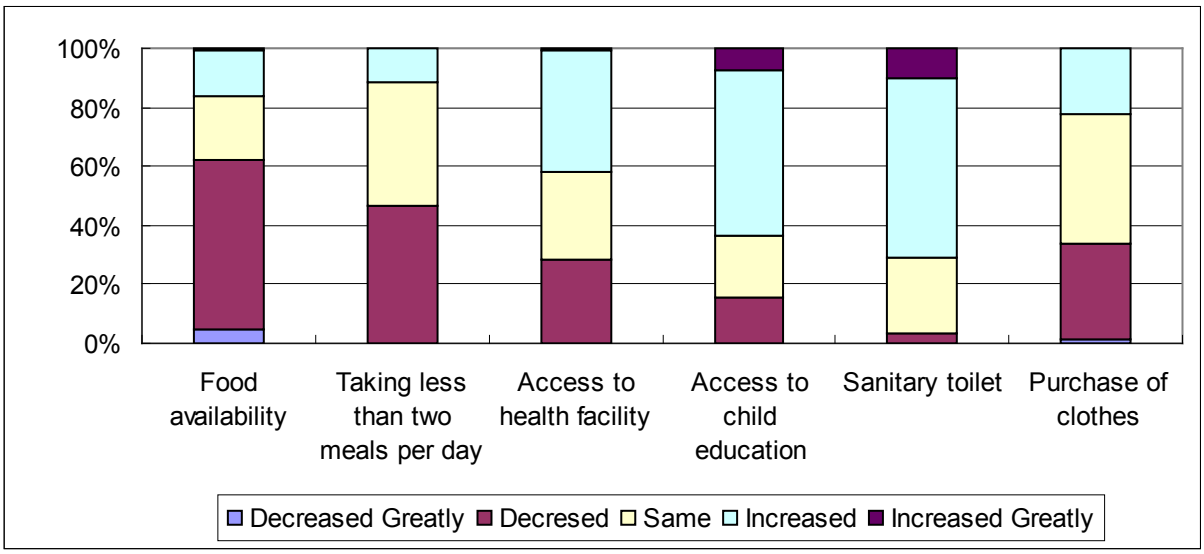


Figure 9: Poverty Indicators

7.2.2 State of the Environment/ Deforestation

I. Environment Indicators

With the objective to forecast the comparative environmental resources status over the last five years, respondents were asked to comment on the increase or decrease of twelve selected indicators on a five points scale (see Figure 10). In doing so, special emphasis was provided on deforestation. Accordingly, most of the respondents reported that the environment resources decreased while in some cases it has decreased significantly. However, in some cases positive signs were also reported. Among the negatively commented indicators, 60 per cent of the respondents commented that f*orest area* has decreased; *land productivity* has decreased (62 per cent); *fuel wood supply* has decreased (66 per cent); *fisheries resources* have greatly decreased (38 per cent); *herbal trees or plants* have greatly decreased (37 per cent); *timber and other building materials* have decreased (65 per cent); *medical plants* have decreased (32 per cent); *wildlife* has decreased (58 per cent). On the positive side, respondents have reported that *forest area encroachment* has decreased (44 per cent); *deforestation* has decreased (45 per cent); *cutting of trees* has decreased (60 per cent); *trees in homestead* have increased (55 per cent).

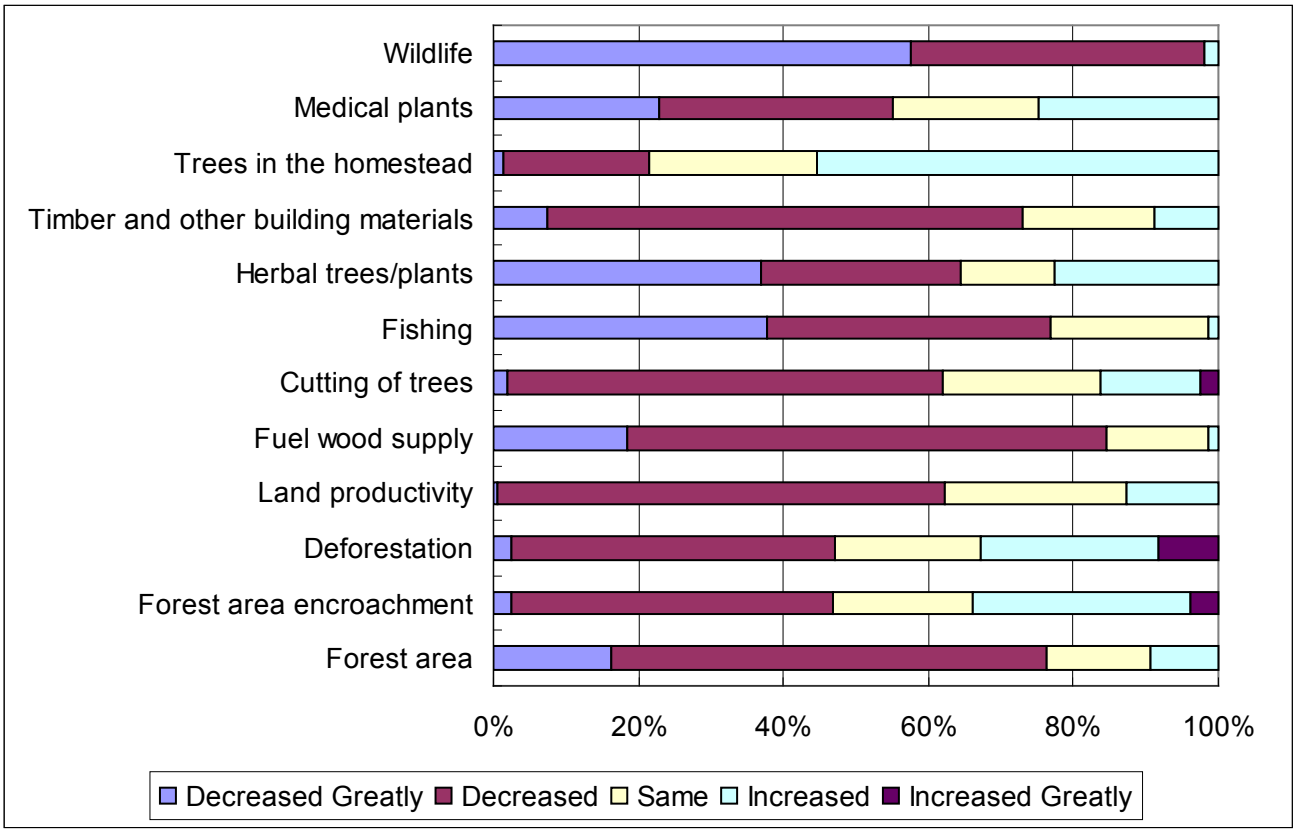


Figure 10: Environmental Indicators

II. Factors Responsible for Resource Decrease

Twenty-eight per cent of the respondents identified encroachment by pressure groups as the number one reason for decrease in resources (see Figure 11). Among others, 24 per cent, 18 per cent, 17 per cent and 13 per cent pointed out poor protection by forest department, encroachment for agriculture, lack of law and order or corruption, illicit

felling and theft, respectively, as the reasons for the decrease in resources. Only 3 per cent of the respondents identified poverty as the cause of reduction of resources.

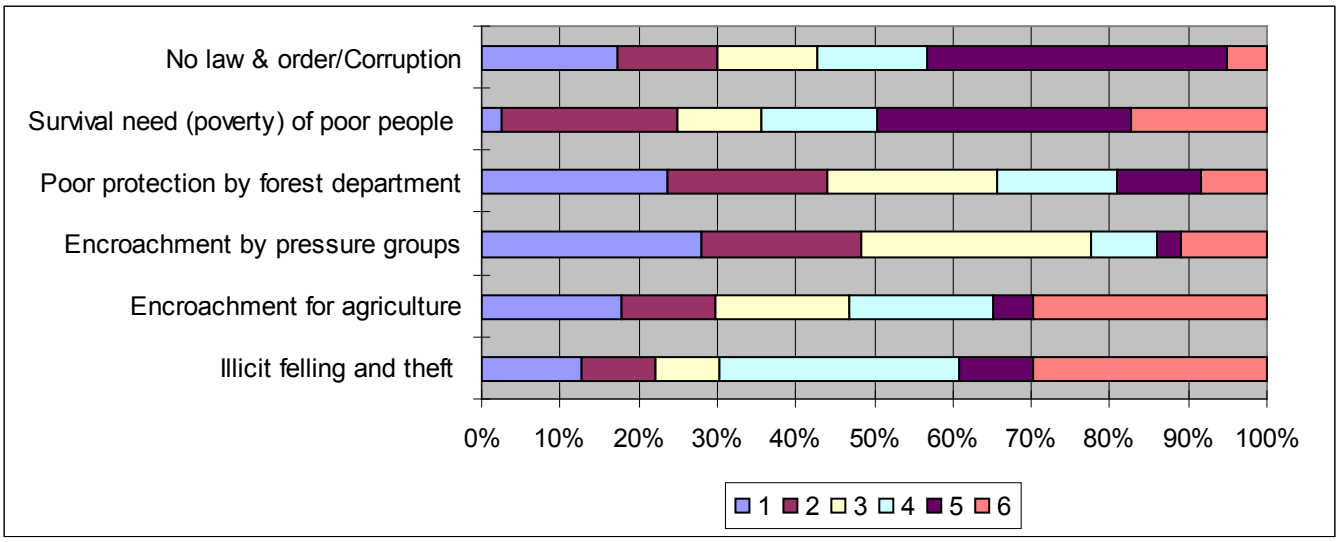


Figure 11: Factors Responsible for Resource Decrease

III. Deforestation Status

Sixty-four per cent of the respondents said that deforestation is going on while 35 per cent commented negatively in general (see Figure 12). Interestingly, this response contradicts with the findings in environmental indicators section where 45 per cent of the respondents commented that deforestation is decreasing. This may be because the respondents implied

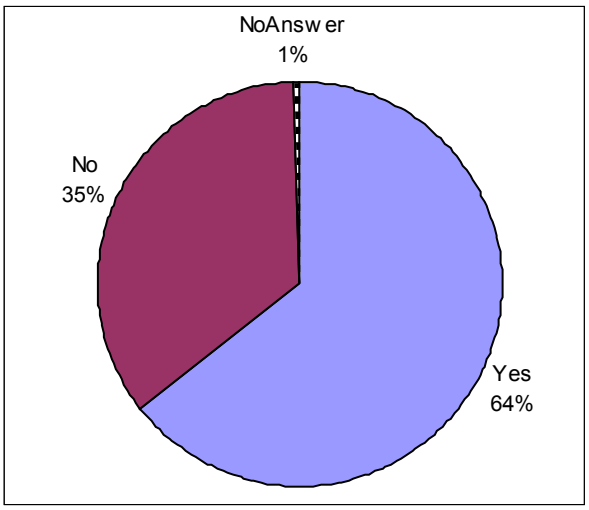


Figure 12: Deforestation Status

about the relative level of deforestation–deforestation is still going on, even though it may not be at the same rate.

IV. Who is Responsible for Deforestation?

The majority of the respondents (71 per cent) commented that forest department is responsible for deforestation (see Figure 13). Among other reasons, local powerful people, thieves, wood merchants were identified as other agents of deforestation. Only 1 per cent of the respondents blamed poor people for deforestation.

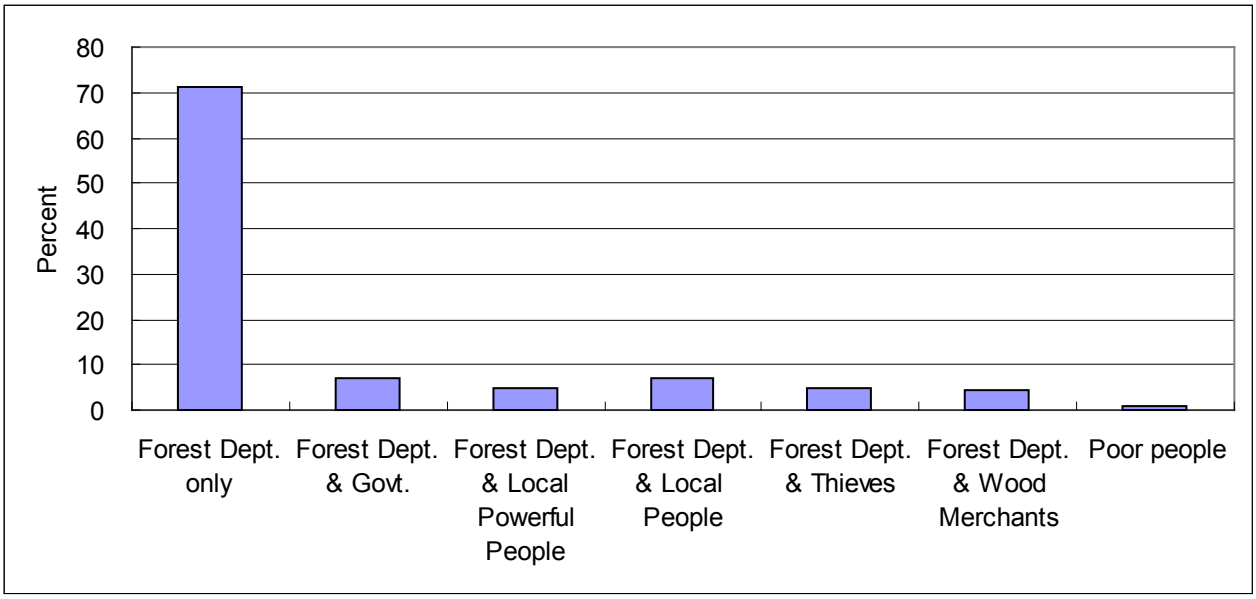


Figure 13: Responsibility for Deforestation

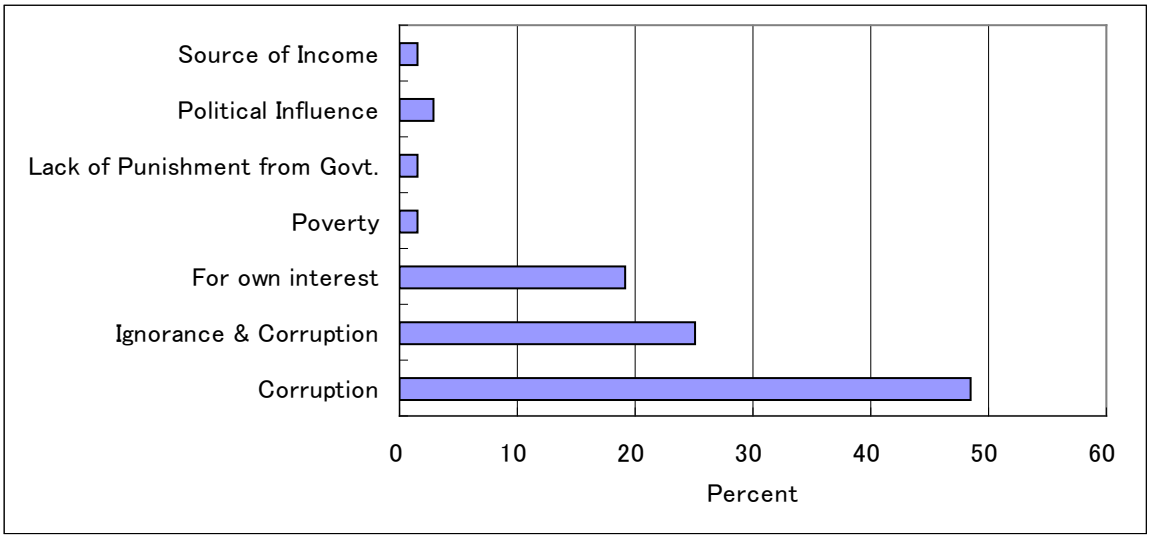


Figure 14: Factors Causing Deforestation

V. Factors Causing Deforestation

On factors causing deforestation, 49 per cent of the respondents consider corruption as the main cause (see Figure 14), while 25 per cent and 19 per cent identified ignorance and corruption and serving own interest, respectively, as the other reasons for deforestation.

7.2.3 Poverty-Deforestation Nexus

I. Poverty Leading to Deforestation

As shown in Figure 15, on question regarding whether poor people are causing deforestation, 68 per cent of the respondents commented negatively, while 31 per cent of the respondents commented positively. Thus the majority of the respondents do not agree that poverty is the main cause for deforestation.

II. Deforestation Leading to Poverty

Eighty-seven per cent of the respondents think that deforestation makes people poorer (see Figure 16) while only 13 per cent differ with this relationship.

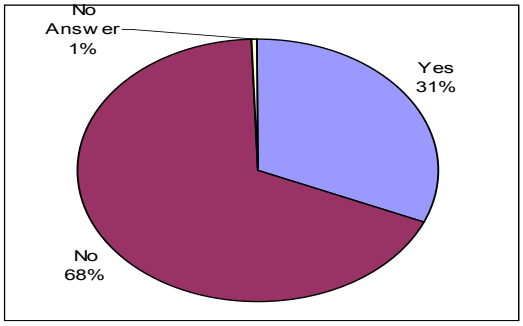


Figure 15: Poverty leading to deforestation

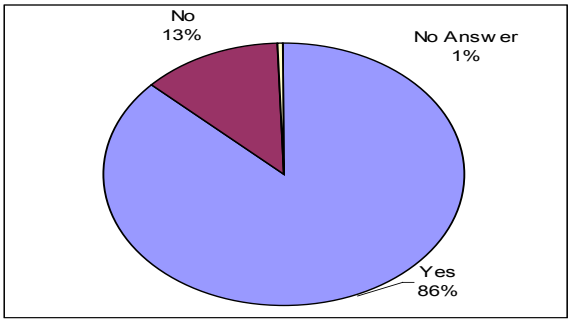


Figure 16: Deforestation leading to poverty

7.2.4 Policy Related Issues

I. Role of Participatory Forestry

Regarding participatory or social forestry programme implemented by the forest department, 82 per cent of the respondents reported positively, 14 per cent commented negatively and 4 per cent had no comment (see Figure 17). Therefore, it can be concluded that respondents have a positive image about the participatory/social forestry.

II. Alternative to Participatory Forestry

On the question related to alternatives to social/participatory forestry, 84 per cent of the respondents suggested natural forestation, 12 per cent suggested plantation by local people and 4 per cent think plantation of foreign tress should be stopped (see Figure 18). Thus, respondents are with the opinion of natural forestation by local people. These survey findings were later echoed by the respondents in the free comment area of the survey questionnaire.

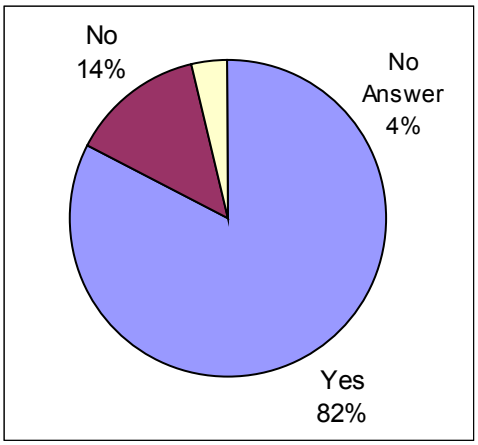


Figure 17: Role of Participatory Forestry

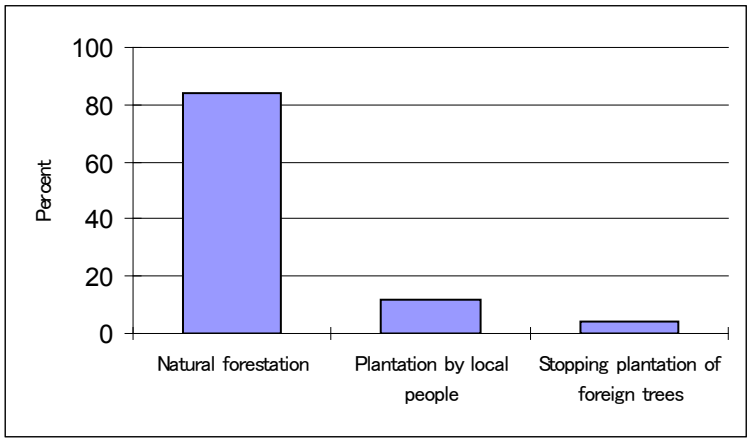


Figure 18: Alternative to Participatory Forestry

8. POLICY RECOMMENDATIONS

In conclusion, we can say that the relationship between poverty and environment is indeed complex and a simplistic view of the poverty-environment link may lead to policies that reduce poverty at the expense of the environment or protect the environment at the expense of the poor. Overall, it is the non-poor–wealthier farmers and encroachers, agricultural investors, influential politicians and corrupt government officials–who use the most resources and have the greatest environmental impact. Some of the possible policy options are discussed below.

Expand and Protect the Asset Base of the Poor

From the survey findings it was revealed that 36 per cent of the respondents were facing eviction pressure and 73 per cent reported to have such pressure from the forest department (see Figures 5 and 6). Thus there is a serious urgency to create an environment where poor people can maintain their asset base. Policymakers should encourage policies that protect and strengthen the resource rights that the poor already have by focusing on the legal system, traditional authorities, local land boards and tribunals, the government, and other institutions and policies that influence local-level resource access, control and benefit-sharing. It should also help develop policies that augment the asset base of the poor through the expansion of environmental entitlements (for instance, through land reform or by turning over the management of resources like wetlands or forests to local groups). Protecting women's traditional use rights and securing land tenure rights for women should also be priorities. Many capacity building and community-based projects have been successful in preserving environmental resources, strengthening community rights-based approaches and establishing ownership of property and resources. For example, the government of Bangladesh in partnership with NGOs and with support from UNDP establishes natural resource management

projects to prevent environmental degradation, promote sustainable use of resources, and ensure community participation in sustainable management plans.

Reduce the Vulnerability of the Poor to Natural Disasters

Key policy options in terms of mitigating the effect of natural disasters include strengthening early warning systems and indicators, participatory disaster preparedness and prevention capacity; supporting the coping strategies of vulnerable groups; and expanding access to insurance, emergency work programmes and other risk management mechanisms. Policy measures to address the poor's vulnerability to environment-related conflict include improving conflict resolution mechanisms for natural resource management and addressing political questions that affect access and use. Incorporating women into these participatory planning processes as well as conflict resolution mechanisms and ensuring that emergency and recovery plans are gender-sensitive are critical. In order to accomplish these priorities, the government should engage all concerned institutions in improving local capacity that promotes local initiatives and self-sufficiency.

Give Poor a Chance to Co-manage Forest Resources

Policies that allow the government and poor communities to join forces in improving and managing natural resources can work well when the resource has multiple stakeholders with conflicting objectives and unequal power. In the case of co-investing, the state helps local communities improve resources they already own, such as an irrigation system; in the case of co-managing, the state gives local people specific benefits in return for various responsibilities for protecting the resource (like a forest). In the survey findings we have found that respondents were in favour of natural forestation and greater participation of local residents in the forestation programme (see Figure 16). Also, empowering, engaging and providing incentives to the poor for positive poverty-environment outcomes, intensifying collective efforts to manage and conserve biodiversity, and implementing community-based natural resource management systems should be priority policy areas for policy-making authorities. Ensuring that women and their organisations take part in the decision-making processes and benefit from these schemes is critical. Good practices include improved environmental conservation, access to clean water and sanitation, biodiversity protection, food security, and energy efficiency through co-management practices.

Develop Rural Infrastructure and Alternative Fuel for Poor People

Sixty-six per cent of the respondents were with the opinion that the fuel wood supply has decreased over the past five years (see Figure 10). Hence, policy measures should be designed to develop alternative fuel for poor people. Most technology development is

directed toward the needs of the non-poor, and infrastructure development is heavily influenced by powerful elites. Supporting policies that spur the development of environmentally friendly technologies and infrastructure geared toward the needs to the poor, especially poor women, on whom the burden of environmental degradation and hazards largely falls, should be a priority in policy-making. Priorities should include: rural energy services and community water access; garbage collection, and sanitation; renewable energy; and access to energy services (heat, light). Use of alternative fuels like bio-gas and other bio-fuels like solar energy should be explored and, if feasible, should be popularized and made available to rural households at an affordable cost.

Employ and Compensate the Poor

Some macro-environmental improvements, such as the establishment of nature reserves and reduction in greenhouse gasses, are public goods whose economic benefits accrue only partly to poor local people. However, many such endeavours are labour-intensive and they offer employment opportunities for local communities, such as guards in national parks, forests and biodiversity reserves. These should be supported as these are "win-win" outcomes in policy options. Government or the appropriate authority should encourage policies that compensate the poor for managing natural resources sustainably, for example by paying local farmers to control agricultural burning.

Focus on Energy Services that are Efficient

Increasing the level of energy services can help people meet their basic needs. Indeed, small improvements in the level of commercial energy services available to the very poor could generate dramatic changes in their quality of life. One way to ensure that the poor do indeed benefit is to focus policy not on increasing the supply of energy (in other words, the supply of fuels or electricity), but rather on improving the level of energy services (such as efficient lighting and water-pumping technologies and efficient cookstoves). In many countries projects are underway which provide appropriate, cost-effective energy solutions to rural poverty–improving the livelihoods of rural inhabitants through improvements to health, education, and enterprise development.

Promoting Cross-sectoral Programming

Though there has been some progress on the conceptual level (at least in terms of seeing the role of poverty issues in environmental programming), operationally, poverty experts and environment experts, sitting in different ministries, by and large, still work separately, and environmental and poverty policy, plans, and programmes are developed on different tracks. The rigid functional divisions that characterise governments, as well as international development agencies, work against integration. Government and NGOs have an important role to play in encouraging the development of cross-sectoral policies

and approaches, promoting macro-level coherence for local-level impacts, and sharing what it learns with its partners to shape the policy agenda. Bringing the poverty dimension into environmental protection and resource management plans and considering environmental questions in national poverty reduction plans and strategies are something policymakers should strongly advocate.

Underscoring the Governance Dimension

There is no denying the fact that good governance is the linchpin of development; this is certainly the case when it comes to addressing poverty-environment issues. Empowering the poor and counteracting the influence of power strongholds can only be achieved through governance reform, such as improving accountability, transparency, participation, and representation at all levels. Priority areas include: engaging poor and marginalised groups in policy and planning processes to ensure that the key environmental issues that affect them are adequately addressed; putting the poverty-environment needs of women and children higher on the agenda; implementing measures to tackle ills that stem from corruption, such as illegal logging, unregulated mining, and the construction of huge power and water investments; and improving people's access to environmental information. Promoting decentralisation and local environmental management of both natural resources and environmental services is also the key.

Making women's Equality an Explicit Goal

Recognition that women are more seriously affected by the effects of environmental degradation and particularly vulnerable to environmental hazards like pollution and biological pathogens have led to many projects that address women's immediate needs as users of environmental services and managers of natural resources. Some of these projects have taken an instrumentalist approach that overburdens women; others have acknowledged that lack of property rights reduces women's capacity to conserve environmental resources, but have not then addressed this important fact. Overall, the aim of gender mainstreaming in environment projects and policies primarily has been to make those initiatives more effective in the short term and more sustainable in the long term– not to promote equality between men and women. There is scope for policy makers to promote equality by encouraging everyone involved to address underlying questions of property rights and access to and control over environmental assets.

Environmental Impact of the Afforestation Programme

Afforestation programmes designed to encourage forestation should also consider the environmental impact of the foreign fast-growing tree species. Respondents in the survey claimed that land productivity, wildlife, fishing, medical plants, etc. have decreased over the last five years (see Figure 10). Also, interviews with the local residents revealed that,

the high growth trees like *Akshmoni* consumes a lot of water and have a drying effect on the surrounding natural trees. All these claims, though not scientifically proven yet, deserve immediate attention and further studies. Before going for plantation, environmental impact assessment of a particular species of tree should be conducted.

Regulating the Protector

Seventy one per cent of the respondents blamed forest department for deforestation (see Figure 13). In different sections of the survey questions, respondents held forest department and other power pressure groups responsible for the decrease in forest resources. Hence, there is serious lack of understanding and transparency in the activities of forest department. Measures to involve local residents more in the afforestation programmes and increasing the accountability of the forestry department should be taken by the policymakers.

Championing Capacity Building

At the national level, policies can contribute to a positive relationship between poverty and environment–a "virtuous" rather than "vicious" circle. Many such policy options do not require additional resources, but rather depend upon reallocating investments toward the poor. Most policies, however, require significant investment in institutional strengthening and capacity building for integrated programming and pro-poor/pro-environment policy-making. Building national capacity has emerged as a particularly elusive goal in development cooperation, and initiatives in all sectors have constantly faced both a lack of necessary skill and weak institutions. And building capacity for integrated programming–when ministries are organised along sectoral lines and poverty reduction and environmental protection/management plans are drawn up separately–is particularly challenging.

8.1 Lessons and Experience from Other Countries

There are many examples around the world which illustrate successful management of natural resources and poverty alleviation. The following three cases show the benefits of social forestry when it is implemented successfully by tailoring it to local needs. The examples suggest that the community forestry projects should continue addressing local development needs, encouraging women's participation in community forestry, and working toward dispute settlement of community forest-user groups if it wants to win the support of local communities for protecting forest resources.

Joint Forest Management in India

The principal features of India's Joint Forest Management (JFM) program, which seeks to enhance environmental stability and the benefits to local people, include: setting up

village protection committees (VPC), management plans to be established and monitored by the forest department, and local use of grass and non-timber forest products and potentially a share of the income from the timber sold by the forest department. Not surprisingly, in such a large and diverse country, the results of applying the JFM approach have varied considerably. In the original area, in southwest Bengal, where it was first applied in the 1970s, there have been tangible results. Protection and controlled use by villagers, in an area which previously suffered from overexploitation which was depleting subsistence and income flows and adversely affecting agricultural productivity, resulted in increased fuelwood availability, significant improvement in the local environment (reduced erosion, improved water supplies, etc.) and a reduction in seasonal out-migration, suggesting that incomes from employment and from sale of non-timber products have increased. Moreover, this appears to have been of greater proportional benefit to the poor because they are able to invest more labour in forest exploitation (though fuelwood headloaders, among the poorest in most communities, did not share in the increase in benefits). The approach has been most successful in villages bordering extensive tracts of degraded forest land, where the forest-to-household ratio is relatively high. There are ethnically homogeneous communities possessing local forestry knowledge, and benefits accrue from minor forest products at a relatively early stage. In areas where there have been less progress with JFM some of the more frequently encountered problems relate to difficulties in pursuing the dual objectives of achieving both sustainable forest management and enhanced local benefits. Conservation usually means restricting or prohibiting existing gathering or harvesting activities of importance to sections of the poor, at least temporarily. The subsequent changes in the composition of protected forests can have differential impacts on different categories of user, and may not be able to produce benefits commensurate with the costs people incur in pursuing JFM. Problems can also arise between different stakeholder groups, and over relationships between VPCs and the forest department (Arnold and Bird 1999).

Hill Community Forestry in Nepal

In 1978, the government passed legislation enabling substantial amounts of public forest land in the middle hills to be handed over to local communities to manage, in recognition of the practical difficulties of managing the country's dispersed forest resources through the forest department. Local management was to be achieved through the *panchayats*, which would enter into agreements with the government to manage local areas under agreed forest management plans. However, *panchayats* usually proved to be unsuitable bodies to undertake local forest management as the areas they administered seldom coincided with user group boundaries. Though forest management committees were formed, they seldom functioned as representative discussion and decision-making bodies. Management plans designed by the forest department to increase productivity tended to

be neither technically acceptable nor intelligible to villagers; and cumbersome bureaucratic procedures discouraged local involvement. The system was therefore progressively revised to incorporate features of the indigenous control and management systems that many communities within the middle hill areas were practicing spontaneously. These systems were typically based on user groups, rather than whole communities, which established management rules that were enforced by use of forest watchers and other social sanctions. Following the passage of a Decentralization Act in 1982, the focus on the user group was formalised, with more authority and responsibility progressively devolving to these groups, and was given legal authority in the 1993 Forest Act. Ownership of the land remains with the State, but trees legally belong to user groups, though the State reserves the right to take back possession of the community forest if the terms and conditions of handover are not met. Management control rests solely with the users of the resource, who now develop their own operational plans, set the prices at which the produce is sold and determine how surplus income is spent. By June 1997, there were 6,000 user groups managing 450,000 hectares, with a further 6,000 waiting for formal registration.

Concerns have been expressed about domination by local elites, politicisation of the user group system, and pressures from the forest department for user groups to focus on tree planting rather than harvesting. Nevertheless, the Nepal experience has been encouraging; advancing effective management of forests by local users found in most situations and gives it a sound legal basis. And recent studies have shown that, where user group management is active, the condition of the managed forests has often improved (Arnold and Bird 1999).

Success of Social Forestry in a Chinese Village

Nongla village of China, located in a bare limestone area, had been traditionally underdeveloped. Harsh living conditions and the shortage of water have hindered economic growth and perpetuated poverty. Due to the efforts of villagers in afforestation over the past 10 years, about 72 per cent of village-owned land has now been planted with Chinese medicinal herbs and fruit trees. As a result, the land under forest cover in and around the village reached 90 per cent and villagers' per capita annual cash income rose to 3,180 yuan (US$383) in 2001, a big increase from 100 yuan (US$12) 20 years ago. Before social forestry was introduced, the villagers thought that their land could only be used to plant corn–the growth of which was frequently damaged by flooding. With the help of extension services provided by township, country and autonomous regional level governments, the villagers have acquired the skill to grow medicinal plants. The village is an example of success in both poverty reduction and sustainable development through the

sensible development of local resources as well as protection of the environment (ESCAP 2003).

9. CONCLUSIONS

While the existence of a poverty-environment nexus is widely recognized and discussed, there is an urgent need to conduct more site-specific studies in Bangladesh. This is to help policymakers with appropriate policy instruments as well as to dispel common myths about poverty-environment nexus. This study attempted to investigate the relationship between poverty and deforestation in Tangail district of Bangladesh using site visits, interviews, and a small questionnaire survey. Results indicate that contrary to common belief, in general poor people in the study area are not the agents of environmental degradation. Depletion and degradation of forest resources are caused by encroachers (who are usually powerful and rich) and to some extent by the Forest Department staff who do not have the skill, will, or resources to protect and conserve forest resources. Because of multiple stakeholders with conflicting interests in forest resources of Tangail, policymakers should try to have a thorough understanding of all the issues before attempting to implement any policy. In recent years, deforestation and encroachment have decreased significantly, partly because of the introduction of participatory forestry in the area. However, social forestry is not a panacea for our ill-managed forestry to reap the full benefit of social forestry, all the relevant issues still need to be studied and resolved. These may include the details of benefit sharing, more involvement of women and ethnic minorities, and more transparency about social forestry in every level. Finally, poverty and environment must be looked at from a holistic point of view and involvement of the poor people instead of taking piecemeal reforms for either poverty alleviation or protection of the environment.

10. SCOPE FOR FURTHER RESEARCH

Like any study, this research has a few limitations that need to be mentioned. Perhaps the major limitation of this study is that the findings are based on a survey of only 160 random households in the Tangail Forest Division. While the sample size is sufficient to draw some preliminary conclusions, more elaborate survey with several thousand poor households must be carried out before designing a policy package. There is no doubt that poverty-environment nexus is very complex and the nexus can change over time. A study such as this one thus needs to be validated by conducting subsequent studies based on the same study area. The study also uses descriptive statistics instead of a formal statistical model to derive results and draw implications. A researcher can build a statistical model just for the sake of model building, but it is important to recognise that no amount of sophisticated model fitting exercise will lead to any meaningful result with such a small dataset. The authors of this study attempted to run a logit analysis using the binary data from the survey questionnaire. However, because of the small sample size one may end up with misleading conclusions which cannot be used for any policy analysis. Interviews, site visits, and descriptive statistics are thus used as a first step to understand the relationships between poverty and deforestation for the Tangail region. More studies need to follow, perhaps with a much larger questionnaire survey and more rigorous statistical models, to validate or refute the findings from this study.

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Appendix A

Survey Ques. No._____

Household Survey Questionnaire
Study on Poverty-Environment Nexus

Location	Name of the Interviewer:_____
District: _____	
Thana: _____	Time and Date of Interview:___ am/pm_____/01/2008
Union: _____	
Village: _____	Comments (if any):_____
Range:	

A. HOUSEHOLD INFORMATION:

A1. Name of the respondent: _____

A2. Age of the respondent:_____

A3. Number of household family members _____(Male_____Female_____Childeren_____)

A4. Main occupation of the income earners:_____

A5. Monthly total income of the household: _____

A6. Distance of the nearest forest area from the household_____metre.

A7. Type of house you live in: _____

B. LAND HOLDING AND LAND TENURE

B1. Do you own any land? Yes No

B2. How long have you been settled in the land? _____ years

B3. Was there any litigation for eviction? Yes No

B4. Do you face any pressure from any agency or any individual or community for eviction? If yes, by whom?

B5. How did you acquire your farm land?
1. Inheritance 2. Direct Purchase 3.Govt. authority 4.Tribal authority 5. Other (specify)

B6. Have you lost any land? Yes No Area

How and who has taken your land?
_____

C. FOOD, HEALTH, EDUCATION AND SANITATION STATUS

C1. How many times is food cooked in a day? _____ Number of meals eaten per day ___

C2. Do you face any shortage of food anytime during the year? Yes No
If yes, during which month(s)? _____

C3. How do you manage the shortage? _____

C4 What are your observations on the status of the following matters over the last 5 years?

	Decreased Greatly 1	Decreased 2	Same 3	Increased 4	Increased Greatly 5
Food availability					
Taking less than two meals per day					
Access to health facility					
Access to education of children					
Sanitary toilet					
Purchase of clothes					

D. ENVIRONMENTAL CONSERVATION STATUS

D1 What are your observations on the status of the following resources over the last 5 years?

D2. If resources are decreasing, what are the causes (Rank by order of importance)	
1. Illicit felling and theft	
2. Encroachment for agriculture	
3. Encroachment by pressure groups	
4. Poor protection by forest department	
5. Survival need (poverty) of poor people	
6. No law & order/Corruption	

D3. If resources are increasing, what are the reasons (Rank by order of importance)	
1. Reduction of poverty	
2. Strict supervision by forest department	
3. Participatory/social forestry project	
4. Improvement of law & order	
5. Improvement in the mentality of the people	
6. Effort by local authorities	

	Decreased Greatly 1	Decreased 2	Same 3	Increased 4	Increased Greatly 5
Forest area					
Forest area encroachment					
Deforestation					
Land productivity					
Fuel wood supply					
Cutting of trees					
Fishing					
Herbal trees/plants					
Timber and other building materials					
Trees in the homestead					
Medical plants					
Wildlife					

E. POLICY RELATED ISSUES

E1. Do you think deforestation is taking place in this region now?
Yes No

E2. Whom do you blame for deforestation and why? _____

E3. In your opinion, how can we stop deforestation?

E4. If you were a Forest Officer, how would you manage this land?

E5. Do you think participatory forestry/social forestry is the best solution to save our forests? If no, what other policy would be more effective?

E6. Do you think poor people are partly responsible for deforestation?
Yes No

Please explain the reason
_____

E7. Do you think deforestation makes people poorer?
Yes No

Please explain the reason
_____

F. FREE COMMENTS

Please feel free to express your opinion on the issues of deforestation and poverty status based on your experience of last 5 or 10 years.
(The interviewer should guide the respondent to express his or her opinion informally and freely on the above topics and note down the key comments)