



LANDSCAPE DEFINITION AND APPLICATION FOR NISHORGO PILOT SITES

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1. INTRODUCTION

A plausible definition of landscape is presented in this Section along with relevant descriptions of the core areas of 5 Nishorgo Pilot Sites (Lawachara National Park, Rema-Kelinga Wildlife Sanctuary, proposed Satchuri National Park, Chunoti Wildlife Sanctuary and Teknaf Game Reserve). Appropriate landscapes are subsequently identified in Section 2 after field visits to the sites and holding stakeholders' consultations.

1.1 Background

Participatory forestry projects, supported by donors, have been implemented in Bangladesh on a large scale since 1981 when a community forestry project was taken up by Forest Department (FD) with the financial support from Asian Development Bank (ADB). Sectoral forestry development projects such as Forestry Sector Project (FSP) have been implemented with a major policy shift in favor of a participatory management of forests and protected areas. Local people and communities participated in developing, protecting and managing forests/plantations in lieu of usufructory rights. The Nishorgo Support Project (NSP) is a project of the FD, Ministry of Environment & Forest, funded by USAID and implemented by International Resources Group (IRG). The project is supporting a broad Nishorgo Program of FD, which is a comprehensive effort to improve the management of country's protected areas (PAs).

At the heart of Nishorgo Program is a focus on building gainful partnerships between the FD and key local, regional and national stakeholders, who can assist in the conservation efforts for a PA. An effective implementation of the Nishorgo Program will help conserve biodiversity through facility development, capacity building, and gainful partnerships with stakeholders. Under its partnership with the Government of Bangladesh, the USAID Bangladesh is providing targeted technical support to main aspects of the Nishorgo Program. The NSP works closely with the FD and key conservation stakeholders to develop and implement a co-management strategy to help conserve the country's PAs where relevant partnerships for biodiversity conservation are essential. The Project is working at five initial pilot sites (Lawachara National Park, Rema-Kelinga Wildlife Sanctuary, proposed Satchuri National Park, Chunoti Wildlife Sanctuary and Teknaf Game Reserve), of which the first 3 PAs are in Sylhet Forest Division and 1 PA in Chittagong (South) Forest Division (recently transferred to Chittagong Wildlife and Nature Conservation Division) and 1 PA in Cox's Bazar South Forest Division.

The country's PAs have been an intimate interspersed of human habitations and cultivation through them with traditional dependency on neighbouring forests for their livelihood in a largely agrarian economy. In addition to development pressures on forest land, the traditional dependence of local communities on forests has historically been an important aspect of forests management in Bangladesh. As a result, the biodiversity conservation priorities cannot be set in isolation from local forest resource use and development. Anthropogenic pressures including increased commercial extraction of forest produce, and forest land encroachment for habitations and agriculture, brought by manifold increase in human and cattle population, led to shrinkage and degradation of PAs in Bangladesh. Illegal removals from the forests have increased off late, thereby jeopardizing the very existence of biodiversity in some of the PAs. This has adversely affected the local people and communities as well as the conservation status of wildlife habitat. The livelihood of the natural resources dependent people is affected adversely.

A basic principal of PA management is that every Park should have a management plan that will guide and control the management of Park resources, the uses of the area, and the development

of facilities needed to support that management and use. As a part of co-management planning process appropriate landscapes have been defined for all the 5 pilot PAs covered under NSP. This document defines a landscape and identifies appropriate landscapes for all the 5 pilot Nishorgo PAs by applying a landscape approach of PA co-management. It was thought necessary to first describe the notified areas of the PAs (oftenly referred as core areas) in order to understand the surrounding landscapes identified for each of the 5 PAs. Therefore, the 5 pilot Nishorgo PAs have been described in this Section after defining a landscape. Appropriate landscapes for the 5 pilot Nishorgo PAs have been identified in the following Section 2 by following the landscape definition as presented below.

1.2 Landscape Definition

Main focus of co-management under a landscape approach is on conservation of forests and constituent biodiversity resources, sustainable use of specified areas where this can help to achieve conservation on a broader spatial scale, and involvement of local people and other key stakeholders in PA co-management. Landscape approach as a guide to development interventions in surroundings of a PA, is useful for the Park managers, planners, decision-makers, researchers, donors and other stakeholders including local forests dependent communities. A landscape approach of PA co-management focuses on an appropriate spatial scale to integrate relevant habitat/forest system, ecosystem and social/institutional system. It is an holistic approach that takes into account relevant factors impinging on the co-management of PA in the context of a broader spatial scale. Surrounding landscape is taken as a planning and development unit for integrated a PA co-management. It addresses the needs of households and co-management activities in the context of a broader economic, natural resource and socio-institutional environment of a PA. It provides a framework to manage a PA for multiple uses by addressing interactions between local economy, local stakeholders and natural resource base of a PA.

Landscape management of a PA entails biodiversity conservation by linking surrounding ecosystems with relevant human systems. It helps restore ecological processes both within a PA and in surrounding landscapes by accounting presence and needs of local inhabitants. It promotes active involvement of main stakeholders in PA co-management and biodiversity conservation. However, the boundaries of an identified integrated system (the spatial scale) need to be kept within manageable limits after assessing field specific situation. The structure and conditions of surrounding landscape must be accounted for in the co-management of a PA.

1.3 Locations of Nishorgo Pilot Protected Areas

Of the 5 pilot PAs covered under NSP, 3 are located in Sylhet Forest Division of north-eastern Bangladesh whereas 2 PAs are located in south-eastern Bangladesh (one each in Chittagong South Forest Division and Cox's Bazar South Forest Division).

Bangladesh Railway serves well as all the 3 PAs in north fall near to the main railway line running through Sylhet forest division. Due to their well connectivity (through road and railways), the northern PAs are very attractive for eco-tourism and biodiversity, particularly for the people of large urban centers such as Dhaka. They are well connected by the national highway, which also provides easy access to the nearest national/international airport at Sylhet.

The southern PAs are well connected mainly by road but also by air as both Chittagong and Cox's Bazar have airports.

1.3.1 Location of Lawachara National Park

Lawachara NP (in Kamalganj Upzila of Maulvibazar District) is located nearly 160 km northeast of Dhaka and approximately 60 km south of Sylhet city. It lies between 24030' – 24032' N and 91037' – 91047' E and is nearly eight km east of Srimongal, on way to Kamalganj. The NP comprises forests of southern and eastern parts of West Bhanugach Reserve Forest (RF) within Lawachara, Chautali and Kalachara Beats of Maulvibazar Range. The NP was notified in 1996 as per the Wildlife (Preservation) (Amendment) Act, 1974, with a total forest area of 1250 ha.

1.3.2 Location of Rema-Kalenga Wildlife Sanctuary

Rema-Kalenga WS (in Chunarughat and Madhabpur Upazilas of Habiganj District) is located nearly 130 km east-northeast of Dhaka and approximately 80 km south-southwest of Sylhet city. The Sanctuary lies in between 24006' – 24014' N and between 91036' – 91039' E. The WS, bordering on east and south by the Indian state of Tripura, comprises forests of southern and eastern parts of Tarap Hill RF covering Kalenga, Chonbari and Rema Beats of Habiganj-2 Range. The WS was originally notified in 1981 with a total forest area of 1095 ha, and expanded to 1795 ha in 1996, and now includes nearly 85% of the high forest remaining in Tarap Hill RF. Parts of Tarap Hill RF are contiguous with the Sanctuary's western and northern boundaries.

1.3.3 Location of proposed Satchuri National Park

The proposed Satchuri NP (in Chunarughat Upzila of Habiganj District) is located nearly 130 km east-northeast of Dhaka and approximately 60 km southwest from Srimongal (between Teliapara and Srimongal) on the erstwhile Dhaka-Sylhet highway (a recently constructed bypass road now serves as the main Dhaka-Sylhet highway). This road forms the northern Park boundary (nearly 1.8 km) starting from near Satchari Beat Office to the border of Chaklapunji Tea Estate. The proposed NP comprises forests of Raghunandan Hill RF, covered under Satchuri Range. A proposal for notifying the NP, with a total forest area of 242.82 ha (600 acre), was submitted by FD to the MOEF on 22 December, 2003.

1.3.4 Location of Chunoti Wildlife Sanctuary

Chunoti Wildlife Sanctuary (WS), one of the two pilot PAs in south-eastern region covering a RF area of 7,763.94 ha (covering 7 forest blocks of Chunoti and Jaldi Forest Ranges), was gazetted as WS in 1986. Its management has recently been transferred from Chittagong (South) Forest Division to the recently created Chittagong Wildlife and Nature Conservation Division. The Sanctuary falling within Banskhal and Lohagara Upzilas of Chittagong District and Chakoria Upzila of Cox's Bazar District covers 7 union councils (Chunoti, Adhunagar, Herbang, Puichari, Banskhal, Borohatia and Toitong). A range of low hills in the extreme southern part of Chittagong District is part of Chunoti WS. The Sanctuary is accessible from Chittagong City via the national highway to Cox's Bazar (the Sanctuary lies almost halfway in between Chittagong and Cox's Bazar – nearly 70 km south of Chittagong), which borders the eastern boundary over a distance of nearly 15 km; another metalled road leading south from Chittagong runs parallel to the western boundary (at an average of 3-5 km away). So the Sanctuary is well connected from Dhaka through air and roads via Chittagong and Cox's Bazar. A narrow railway gauge connects the nearest (nearly 25 km from the northern boundary of the WS) railway station Dohazari to Chittagong main railway line. Although the Sanctuary is not popular presently as an eco-tourism spot, its well connectivity through road, railway and air makes it a potential future

candidate. The existing well developed trail system can in future be used as nature trails by potential tourists.

1.3.5 Location of Teknaf Game Reserve

Teknaf Game Reserve (GR), as a part of Teknaf peninsula, is located in the country's far south-eastern corner, near to Myanmar border. It was established in 1983 over a RF area of 11,615 ha covering 11 forest blocks in three Forest Ranges (Whykong, Silkhali and Teknaf) of Cox's Bazar (South) Forest Division. It is situated in Ukhia and Teknaf Upzilas of Cox's Bazar District, and lies in between the Naf river on eastern side and Bay of Bengal on western side. The GR is part of a linear hill range (reaching an altitude of 700m) gently slopping to rugged hills and cliffs running down the central part of the peninsula, with a north-south length of nearly 28 km and an east-west width of 3-5 km). A number of deep gullies and narrow valleys are crossed by numerous streams flowing down to Naf river in east and Bay of Bengal in west. Most of the streams are seasonal and dry up during off-monsoon season. The northern boundary of the GR starts near Whykong town (which is nearly 50 km from Cox's Bazar), extending in south up to Teknaf town. A metalled road connecting Cox's Bazar with Teknaf runs in between the Naf river and eastern boundary of the GR. Although a four wheel drive can reach Teknaf on western side through an unbroken stretch of beach from Cox's Bazar during low tide, no metalled road exist presently. Many earthen and brick soled roads traverse the GR from east to west including one on the north most boundary.

1.4 Biodiversity Conservation Values of Nishorgo Pilot Protected Areas

The forests of all the 5 PAs are very rich biologically, located as they are on the high rainfall bio-geographic zone with evergreen and semi-evergreen forests. The PAs represent several features of the bio-diversity of north-eastern subcontinent, which is one of the mega biodiversity region with many floral endemic species. Many important rivers flow through the region comprising the PAs, forming fertile floodplains with enhanced economic activity and high population density. The PAs are home to many tribes with their traditional lifestyle dependent on natural resources including forests for their forests-based livelihood. Many Forest Villages were historically established within the RFs, now part of the PAs, in order to ensure a regular labor supply for forestry activities including harvest of natural forests followed by raising plantations. These forests play an important role in regulating water flows and checking soil erosion. Indeed the conservation of the PAs is very important as their forests form important catchments and were so designated historically as head water reserves for many rivers and numerous water bodies. They are part of transnational watersheds with intense forests-water interactions that have regional implications. In addition to providing a sanctuary to wildlife, these forests also may in future form water sanctuaries required for the conservation of water and soil, and in carbon sequestration. The protection and conservation of these forests is particularly important in view of significant loss of natural forests in the country.

Socio-economic values of the PAs are important because a number of communities including ethnic minorities reside within and around the forests on which they depend for their livelihood opportunities. Biological values of the PAs include providing shelter to biodiversity comprising important flora and fauna, habitat connectivity, presence of threatened and endemic species, and improvement of degrading habitat. Their main ecological functions are catchment conservation of several rivers and water bodies (*haors, beels, ponds, etc.*), control of soil erosion, ecological security, irrigation and agricultural production, carbon sink and environmental amelioration.

They provide significant scope for wildlife education and research, nature interpretation and conservation awareness due to their rich biodiversity, which if not conserved, may be lost for future generations. The PAs are also a potential source of eco-tourism, aesthetic values, dense high forests, historical and cultural values, scenic beauty and ethnic diversity. Finally many conservation values of the PAs are global, regional and national but also with local socio-economic implications.

1.5 Forest Boundaries of Nishorgo Pilot Protected Areas

Lawachara National Park is part of West Bhanugach RF, which was reserved in early nineteenth century by following the reservation process per the Forest Act 1878, the Assam Forest Manual 1898 and the Forest Act 1927. The settlements claims of local communities were settled and legal boundaries identified with names of forest blocks, compartments, etc. Working Plans were prepared with topographical maps (1 inch to 1 mile or 1 : 63,360) and specific recommendations for the maintenance of legal boundaries of forest blocks and compartments were given. The boundaries of forests could not, however, be maintained, as a result of which some forest areas have been brought under encroachment for cultivation and settlements. Although the Park was notified by the Government in 1996, no efforts have so far been made to physically demarcate the boundaries in the field. The situation got exacerbated with heavy biotic pressure on forests and encroachment of forest land. As a result, the forests have become fragmented with reduced extent of suitable habitats and ensuing adverse effects on wildlife. This has adversely affected the ecological boundaries of Lawachara Park with limited wildlife corridors and breeding space.

Rema-Kalenga WS is part of Tarap Hill RF, which was reserved in early nineteenth century when the settlements claims of local communities were settled and legal boundaries identified with names of forest blocks, compartments, etc. Working Plans were prepared with topographical maps (1 inch to 1 mile or 1 : 63,360) and specific recommendations for the maintenance of legal boundaries of forest blocks and compartments were given. As in case of Lawachara the boundaries of forests could not, however, be maintained. Although the WS was notified by the Government, no efforts have been made to physically demarcate the boundaries in the field. The forests have become fragmented with reduced extent of suitable habitats and ensuing adverse effects on wildlife. This has adversely affected the ecological boundaries of the Sanctuary with limited wildlife corridors and breeding space.

The proposed Satchuri National Park is a part of Raghunandan Hill RF, which was reserved (Gazette No. 4238-R dated 22nd October, 1914) in early nineteenth century and the settlements claims of local communities were settled and legal boundaries identified with names of forest blocks, compartments, etc. Working Plans were prepared with topographical maps (1 inch to 1 mile or 1: 63,360) and specific recommendations for the maintenance of legal boundaries of forest blocks and compartments were given. The boundaries of forests could not, however, be maintained, as a result of which many forests have been brought under encroachment for cultivation and settlements. Although the Park has been proposed to be notified by FD, no efforts have been made to physically demarcate the boundaries in the field. These forests have become fragmented with reduced extent of suitable habitats and ensuing adverse effects on wildlife. This has adversely affected the ecological boundaries of Park with limited wildlife corridors and breeding space.

Chunoti Wildlife Sanctuary covers 7 forest blocks, which were covered under regular working plans until separate management plans were prepared for all the PAs including the Sanctuary.

Although recommendations were included in the Plans for the demarcation and maintenance of legal boundaries of forest blocks, no such demarcations are available in the field. Even after the declaration of the Sanctuary no efforts have been taken for the physical demarcation of boundaries.

Teknaf GR covers 11 forest blocks, which were covered under regular working plans for their management. Separate management plans for Teknaf GR were prepared under Forest Resources Management Project and Forestry Sector Project. But many recommendations of the plans including boundary demarcation and maintenance could not be implemented. As a result, neither physical boundary signs are available presently nor effective steps have been taken for checking forests land encroachment, particularly for betel leaf cultivation.

1.6 Biophysical Situation of Nishorgo Pilot Protected Areas

The low and rolling hills (of upper tertiary rocks) of the PAs are composed of upper tertiary rocks in which soft sandstone supports a vegetation cover of mixed tropical evergreen and semi-evergreen forests. The region has been formed from the sediments brought down by rivers draining from neighbouring hills. A series of isolated low and high hills, derived from sandstones and shales, and interspersed with narrow floodplains of small rivers, are found in the PAs. They represent north-eastern hills, interspersed with north-eastern piedmont plains. The soils can be categorized as hill brown sandy loams with slight to strong acidity. They are shallow over sandstone bedrocks on high hills and accumulation of humus on the top of soil is small due mainly to rapid decomposition of debris under moist warm tropical conditions. The well drained sandy loam soil with good humus are present but near nullahs and streams the soils are sandy; in swampy areas forest soils are clayey.

The PAs originally supported mixed tropical evergreen and semi-evergreen forests, which over the period have been substantially altered due to heavy biotic interference and the plantations of exotic species established after clear-felling of natural vegetation. Encroachments of forests has resulted in conversion of many low lying areas into paddy cultivation. As a result, the habitat has fragmented, adversely affecting the wildlife by restricting their movements through a barrier effect. However, at places good natural re-growth, particularly of ground flora and middle storey in northern PAs, has come up due to favorable climatic and edaphic conditions, thereby enhancing the PA's *in-situ* conservation values. Old plantations raised particularly in the northern sites have grown up in shape of tall multi-storied structure with re-growth of ground flora and a middle storey of naturally occurring species. Consequently the vegetation at many places particularly in the northern PAs has approached towards natural structure and species.

The climate of the PAs is in general warm and humid but the weather is cool and pleasant during winter; the humidity is high throughout the year. There is heavy dew during winter when rainfall is low. The water condensation is thus distributed throughout the year in different forms and greatly influences plants and wildlife. The area covered under the PAs is one of the wettest in the country and so the rainfall is quite high, with maximum rainfall falling during June to September from South-West monsoon. Pre-monsoon Nor'westerly and cyclonic storms are accompanied by high speed winds and rains, which do considerable damage to property and trees. In the absence of adequate steep gradient required to carry huge monsoon rainfall, the water gets collected in depressions, locally known as *haors* and *beels*. The water recedes during dry season, enabling local people to cultivate the remainder land with winter crops. The level of swamps is, however, being raised gradually due to siltation.

There are a number of rivers (and their tributaries), and shallow depressions (e.g. *haors*), which are wetlands providing marshy sanctuaries to migratory birds and livelihood to local fishermen. They provide good habitat, drainage and drinking water source for the wild animals and local people. The rivers possess main characteristics of a flat alluvial country as the current is sluggish, the course tortuous and the bottom muddy. The waters are surcharged with materials brought from surrounding hills during monsoon rains and a large portion of the silt is deposited in the immediate neighbourhood of the streams. A number of sandy-bedded streams and nallahs pass through the PAs and so aquatic habitats associated with forest cover and riparian (streamside) vegetation and animal species are important part of overall habitat composition. Many of these streams are subjected to intense collection of sand during dry season for commercial sale. The PAs form the catchment areas of a number of small streams, locally known as *cheras*.

1.7 Forest Habitats of Nishorgo Pilot Protected Areas

The forests of the PAs are composed of mixed tropical evergreen and semi-evergreen plant species, characterized by high rainfall and a multi-tier vegetational assemblage of rich biodiversity. Therefore, the PAs are categorized under the tropical evergreen and semi-evergreen biogeographic zone. The influence of microclimatic and edaphic factors including rainfall, humidity, aspect, sunshine and soil is predominant on these forests. Five broad types of habitats in the PAs can be identified as i) high forests represented by the remaining natural forests, ii) plantations including the monoculture of exotics, iii) grasslands and bamboos, iv) wetlands, and v) cultivated fields; the first two being the largest in extent and also important from PA management point of view. The cultivated fields (mainly of paddy) and grasslands, which harbour some mammals, ground birds and reptiles, get inundated during monsoon rains. The water bodies harbour important fish species, water birds and amphibians.

Presently all the PAs have some natural forests, and the plantations raised earlier by converting high forests of great biodiversity value. Large deciduous trees are mixed with evergreen smaller trees and bamboos. The top canopy particularly in northern PAs includes *Artocarpus chaplasha*, *Dipterocarpus turbinatus*, *Elaeocarpus floribundaas*, *Dillenia pentagyna*, *Castanopsis tribuloides*, etc. The shrub species comprise of *Adhatoda zeylanica*, *Carea arborea* and others, whereas bamboos species are *Bambusa tulda*, *Bambusa polymorpha*, *Bambusa longispiculata*, etc, and *Saccharum*, *Daemonorops*, *Thysanolaena* as main grass species. A number of fodder and fruit bearing plants occur naturally but forest fires in summer and illicit felling have adversely affected their natural forest regeneration. Major parts of natural forests of the PAs were converted by raising long rotation plantations (of teak, mahogany, garjan, karai, sal, gamari, shiso, toon, pynkado, agar, jarul, cham, jam, etc) taken up since 1920s for production forestry. Parts of the original forests have been removed and the PAs' conservation value currently stems from the remaining natural forests and the plantations, which have developed a tall, multi-storied structure particularly in northern PAs. The PAs represent accessible hill forests, and so their biodiversity conservation and eco-tourism values need to be recognized. Although plantations occupy substantial part, a portion of the PAs still have some natural forests, where the under-storey of shrubs, herbs and bamboo is good. The enrichment plantations of indigeneous tree species and under-planting of bamboo and cane has been taken up in some areas. In the oldest of these areas the vegetation cover has taken on the structure of natural forest particularly in northern PAs.

Initially these forests were managed, and rightly so, under selection-cum-improvement silvicultural system as the natural regeneration of main species was good and the terrain was generally hilly. Unfortunately they were subsequently opened for clearfelling followed by artificial regeneration by planting species such as garjan, champ, bonak, karai, jam, gamar, sal, teak, jam, kumbi, haritiki, bohera, dhakijam, hargoza, jarul, kadam, malakana, gamar, rata and gondrai (the first plantations were taken up in 1922 as documented in Working Plans). Teak plantations have been particularly subject to illicit felling by local people but also by outsiders due to high value teak timber. Similarly NTFPs such as cane and creepers are illegally harvested and some wildlife damage also done by hunting.

1.8 Fauna of Nishorgo Pilot Protected Areas

A number of animal species (mammals, birds, reptiles and amphibians), both forest-dwelling and wetland-associated species, of different genera and families are found in the 5 PAs that also are home to avifauna of many species (representing a substantial portion of the country's known bird species) dependent on good undergrowth and forest cover. Some of the forest-dwelling and wetland-associated species are at high risk of extinction. The PAs support herpetofauna, including frogs, toads, turtles, lizards, snakes and a rich diversity of other faunal groups such as invertebrates and fishes. Many large mammals such as tigers, leopards, bears, wild dogs and sambar have disappeared from the PAs due to habitat degradation and hunting. However, elephants still use both Chunut and Teknaf as movement corridors. The viable populations of many small and medium-sized mammal species that can survive in limited forest areas and/or disturbed or secondary habitats (e.g., jackals, small cats, barking deer, wild pigs, etc.) are found in the remaining disturbed and fragmented habitat. A rich diversity of other faunal groups such as reptiles, vertebrates, fishes and amphibians is present.

1.9 Biodiversity Utilization in and around Nishorgo Pilot Protected Areas

The role of NTFPs in locally providing livelihoods, employment and income to forest dependent communities locally is recognized. Traditionally NTFPs play an important role in sustaining livelihoods of rural poor and forest dwellers in forest areas of Sylhet, Chittagong and Cox's Bazar. Rural communities collect from the forests foods such as honey, mushrooms, fruits, nuts, tubers, leaves and numerous other forest products. They collected a variety of NTFPs (e.g. honey, creepers, grass, fruits, nuts, tubers, leaves, bark, bamboo, canes, medicinal plants, wild animals, etc.). Medicinal plants collected from natural forests continue to form the main resource base for traditional medicine and health practices. A majority of rural population in the country depends on traditional medicines as allopathic medicines are expensive and not easily available in the countryside. Local biodiversity, trees, shrubs, herbs, grasses, animal products and minerals form a major resource base of these traditions. Local people depend on Kabirajs, who prescribe traditional medicines based on their experiences. There is increasing demand for herbal medicines in urban areas as well due to their curative properties and no harmful side effects.

A regular flow of benefits from NTFPs is a good source of livelihood, employment and income to local people. However, sustainable management of forests and the PAs is necessary for managing NTFPs sustainably. Some NTFPs collected by local people (e.g. sungrass) offer opportunities for self-employment if NTFPs based cottage and small-scale industries are promoted locally through co-management committees and their federations. They may be assisted (e.g. micro-level finance from LDF and skill development training through partner

NGOs) in establishing value addition units locally. Isolated forests of the PAs, surrounded by large population, are not adequate in meeting a huge demand of a predominantly agrarian population. Although no commercial harvesting is being done presently by FD in the PAs, the forests are under tremendous biotic pressure for forest produce and forest land for cultivation mainly by local people but also from the people from neighbouring towns and Tea Estate labourers. Bamboo, cane and sungrass are important furniture and house building material (used as thatch for roof construction). Although the relatively easy accessibility of the PAs is a source of easy access to visitors to the Park, it also provides a scope for illicit removal of forest produce from the forests and encroachment of forest land.

2. LANDSCAPES IDENTIFICATION

In this Section appropriate interface landscapes are identified for each of the 5 pilot Nishorgo Pilot Sites by considering both interface biophysical landscape and the stakeholders landscape. Based on an interface landscape exercising influence around the boundaries of a PA, the present situations of the surrounding landscape (both biophysical and stakeholders landscapes) of five pilot Nishorgo PAs are described as below.

2.1 Landscapes of Northern Protected Areas

2.1.1 Landscape of Lawachara National Park

A number of villages and tea estates fall within the zone of influence of Lawachara NP. The Park is intimately surrounded by a number of villages, towns, cultivated fields and Tea Estates. It is bordered on the north, west, south and south-east largely by Tea Estates whereas a part of the eastern boundary (nearly 1 km.) is bordered by FD lands (mainly grasslands) under long-term lease to HEED Bangladesh (a health and participatory development NGO). Most of the north-eastern boundary of the Park and proposed extension are bordered by FD lands under Kalachara Beat. Local population including ethnic minorities, who depend on agriculture for their livelihood, meet their consumption needs for forest produce from nearby forests. The area used for betel leaf production by the residents of Lawachara Forest Village is an enclave within a larger area used by BFRI for silvicultural research. The boundary between the Park and the BFRI area is nearly 2 km. in length. It is anticipated that BFRI research will be coordinated with FD, and this area will remain under forest cover.

In view of the locations of 18 identified villages of local stakeholders and the biophysical system a 3 km-wide interface landscape zone around the Park's boundaries is decided for an effective Park management. A detailed description of the identified interface landscape is presented as below.

2.1.1.1 Tea Estates

There are 4 Tea Estates (Fulbari, Khaichara, Jakchara and Gilachara) bordering the Park and 2 neighbouring Tea Estates (Noorjahan and Bharaura), which have substantial impacts on the forests covered under the Park. Some parts of adjoining Tea Estates have not so far been brought under tea cultivation and have over the period developed as unmanaged secondary vegetation, which provide additional wildlife and plant habitat as a transition zone between mixed forests/plantations and tea gardens. Small areas along Tea Estates have been converted to citrus, pineapple and banana plantations by individual families. The trend of converting secondary vegetation areas into monocultures has not been good for wildlife as it adversely affected their additional habitat comprising secondary vegetation.

A large number of labour employed by the Tea Estates and their family members depend on the forests for meeting livelihood consumption needs. The unemployed villagers from Fulbari, Jakchara and Khaichara Tea Estates are particularly involved in fuelwood collection and illicit felling. Huge amount of labor required for managing Tea Estates gives rise to tremendous pressure on nearby forests for fuelwood, fodder, timber and other forest products. Shade tree species such as *Albizia lebbec* and *Deris robusta* are planted inside the tea plantations for providing shade to tea bushes. Sometimes illicit fellers pass through adjoining Tea Estates (e.g.

Bharuara, Jakchara and Gilachara) to fell trees inside the Park. Along the transport routes they also fell shade trees inside the estates. This means joint efforts are required from FD staff and estate managers for controlling illicit felling.

Some of the poor families of Tea Estate workers may be involved in protecting the forests covered under the Park. User groups can be formed and money from landscape development fund (LDF) can be used in development activities. But this will require a policy decision from the Tea Employers Association, Chittagong, who will issue suitable instructions to the Tea Estates management. The FD may approach the Chairman of Tea Employers Association to issue such instructions to the identified 6 Tea Estates authorities.

Exploratory drilling for natural gas on Tea Estate lands adjacent to Lawachara NP has indicated that an extensive gas-bearing structure underlies the Park. An intense fire resulting from a drilling accident in 1997 jumped across the highway and railroad line and burned an estimated 8 ha of natural forest used for betel leaf cultivation adjacent to Magurchara village. Fortunately this drilling was subsequently stopped. Any future proposals for pipeline construction or other infrastructure development will need to be rerouted well outside of the Park in order to avoid habitat loss during construction and operation. This is important as a gas pipeline has recently been allowed to pass through the Park.

2.1.1.2 Forest Villages

Two recognized Forest Villages, Magurchara Punji (40 households) and Lawachara Punji (23 households) inhabited by khasia ethnic minority and now located within the core zone, were established by FD in 1950s under an agreement signed between the FD and the representatives of the tribal community. Three acres of forest land was assigned to each household (presently a household has 8-10 family members) for the practice of betel leaf cultivation and in turn they provided voluntary labor required for FD activities including nursery, plantations and protection of forests. They continue to practice betel leaf cultivation for which they plant betel cuttings near trees and start harvesting betel leaves after three years upto 25-30 years. Betel vines are grown on the trees which are lopped every year. Mulching is practiced by using cleaning and weeding materials and no fertilizer is added. Each forest village has a chief (locally known as Mantri), who looks after the interests of his community and maintains a close liaison with FD. Of the two forest villages, Magurchara is comparatively more developed due mainly to its good location (it is situated on the Srimangol-Kamalganj Highway) and the money received by the villagers as compensation to the damage done by the gas fire.

2.1.1.3 Interface Villages

In addition to 2 Forest Villages, a total of 16 villages have been identified (through RRA/PRA carried by NACOM, 2004 during May-July 2004) having varied stakes in the forests. These villages lie within 1 km. of the Park boundary; 4 villages (Baligaon, Bagmara, Rashtila and Chatakchara) are just at the outskirts of the Park. Of the 18 villages, 6 villages (Bagmara, Magurchara, Lawachara, Baligaon, Dolubari and Biranpur slum) have been identified as having major stakes, another 6 villages (Botertol slum, Rashtila, Saraibari, Veerachara and Radhanagar) with moderate level of stakes and the remaining 6 villages (Langurpur, Ballarpur, Noagaon, Tilagaon, Bhasaniganj and Bongaon) with minor level of stakes in the forests covered under the Park. Local people from Lawachara, Magurchara, Dolubari and Biranpur are involved mainly

in fuelwood collection, whereas people from Baghmara, Radhanagar, Rashtila, Baligaon, Verachara and Chatakchara are involved in illicit felling as well.

2.1.1.4 Assessment of Stakeholders

Three main categories of stakeholders (primary, secondary and institutional) have been identified by NACOM (2004) through RRA/PRA carried out in Lawachara Park. A total of 15 primary stakeholders are involved directly with the extraction of forest produce whereas 4 secondary stakeholders exert influences indirectly on the forests covered under the Park. The institutional stakeholders (FD, NGOs, Union Parishads and Gram Sarkar, Banks, BDR and Police) are involved with the development and administration activities around the Park. Main NGOs presently operating around the Park include HEED, ASA, BRAC, Grameen Bank, CARITAS and IRPK.

Primary stakeholders include fuelwood collector, illegal timber feller, bamboo collector, house building material collector, vegetable collector, honey collector, sungrass collector, forest land encroacher, betel leaf cultivator, fodder collector, cultivator, visitors, bark collector, hunter and fruit collector. Most of the primary stakeholders from the neighbouring villages are poor who earn their livelihoods by carrying out forest-based activities. Fuelwood collectors, illegal timber fellers and betel leaf cultivators have major stakes in the forests.

Secondary stakeholders, who are linked with forest-based activities through utilization and trade, include timber trader, sawmill owner, brickfield owner and furniture shop owner. There are 10-12 licensed timber traders (Mohaldars) in Srimangal and 15-20 in Bhanugach Bazaar. Currently a total of 9 sawmills in Kamalganj area and 12 sawmills in Srimangal are in operation. A number of furniture shops (nearly 30 and 25 shops in and around Bhanugach Bazaar and Srimangal respectively) use sawn timber from the sawmills. Both timber and fuelwood are collected locally and then transported by roads and railways. There are 7 brickfields near Kamalganj and Srimangal and fuelwood is used in initiating fires for coal operated brickfields.

2.1.2 Interface Landscape of Rema-Kalenga Wildlife Sanctuary

A number of villages, cultivated fields, tea estates, khas lands, forests and international border fall within the zone of influence of Rema-Kalenga WS. The WS is intimately surrounded by a number of villages, cultivated fields, forests and Tea Estates. It is bordered along most of its northern and western boundaries by RFs (nearly 11.5 km in length), along part of its south-western boundary by Tea Estate lands (nearly 3.5 km in length), along its southern and eastern boundaries by India (nearly 15 km), and along a small portion of its northern boundary by khas lands (approximately 1 km in length).

Of the total 850 ha Tea Estate lands adjoining to the Sanctuary, 144 ha are under tea, 40 ha under rubber, and the remainder under scrub and natural forest. Most of the labourers living on Rema Tea Estates exert enormous biotic pressure on the nearby forests and wildlife of the Sanctuary. Some workers get involved in illicit felling from the WS and they transport the forest produce through the Tea Estates. Hoogli (east of the WS but near to Tarap Hill RF) and Purkul (north-west of the WS) though not adjoining to the WS are other important Tea Estates. Khas lands adjacent to the Sanctuary have been partially converted to citrus and banana plantations.

Land adjacent to the Sanctuary in India has been converted to rubber plantations and paddy fields. Little or no natural forest borders the Sanctuary on the east or south, although some scrub vegetation remains. A contingent of the Bangladesh Rifles (BDR) is responsible for maintaining security along the Bangladesh-Indian Border (bordering Indian state of Tripura), which forms the eastern and southern boundaries of the Rema-Kalenga Sanctuary. BDR has established two camps in the area, one adjacent to the Kalenga Beat Office and one in the interior of the Sanctuary along the southern boundary. The presence of substantial staff of BDR brings additional biotic pressure on one hand but on the other hand helps check illicit felling from the forests.

A 4 km-wide interface landscape zone around the Sanctuary is taken in view of relevant human system as described below and biophysical scenario.

2.1.2.1 Interface Villages

Based on a RRA/PRA study conducted by NACOM during May-July 2004, a total of 22 villages have been identified having stakes of different levels in the WS. Of these, Debrabari Forest Village is located inside the WS, 9 villages (Kalengabari, Kalibari, Mongoliabari, Puranbari, Chakidarbari, Chanbari, Rema-Balumara, Hatimara and Krishnachara) are on the periphery of WS, and 12 villages (Harinmara, Himalia, Chamaltoli, Nichintapur, Lalkear, Barabda, Sayadabaj, Alinagar, Krishnanagar, Basulla, Kabilashpur and Jamburachara) are located outside of the WS.

Ten villages inside and on the periphery of WS have major stakes in the WS as local villagers depend on the WS for meeting their basic consumption needs. In addition to fuelwood, timber, bamboo and other NTFPs, they collect vegetables, fruits, fodder and sungrass from the WS. The collected vegetables include bamboo shoots (manthana), dhekishak, kachshak, bandhugi, banaita, banana thor, banana muchhi, ramkala, thankuni, aorai kalai, karam, gantha, muia, palon shak, kachu, kachur lati, etc. The forest fruits collected by them include kow, jam, hill mango, lata mango, chamkatahal, latkon, dumur, hill banana, amra, hortuki, boira, tera, jambura, kanthal, cane fruits, etc. For consumption they also hunt jungle fowl, wild boar, hill moyna, parrots, shalik, etc. Tipra tribals from Debrabari Forest Village get involved in forest protection efforts by joining patrol parties of FD. The remaining 12 villages lying outside the WS have minor stakes mainly in terms of associated with fuelwood collection. A number of Tripura villages/housing clusters (for example, Chonbari, Mongoliabari, Kaliabari, Krishnachara, together comprising 60 or more households) are scattered (from Chonbari Beat Office to near the Indian Border) along the north-western and northern boundaries of the Sanctuary.

Local people practice cultivation of paddy on rainfed fields and horticulture on their home gardens. They depend heavily on nearby forests for meeting their subsistence consumption needs. The settlements in the vicinity of the Sanctuary include Kalenga Office Tila (comprising 57 Bengalee households) near to the Kalenga Beat Office and Hizmalia (comprising nearly 200 households) at the western edge of the RF near Kalenga Beat Office. Local people are involved in paddy farming, small scale trading and as daily laborers. They also use nearby forests for fuelwood, timber and cultivation on encroached forest lands (nearly 400 families were evicted from the RF areas in 1982).

2.1.2.2 Tea Estates

There is one Tea Estate (Rema) bordering the WS and two neighbouring Tea Estates (Hoogli and Purkul). Huge amount of labor required for tea collection exert heavy impacts on the forests of WS and Tarap Hill RF. Some parts of these Tea Estates have not so far been brought under tea cultivation and have over the period developed unmanaged secondary vegetation, which provide additional wildlife habitat. For example, of the total 850 ha lands of Rema Tea Estate adjoining to the Sanctuary, 144 ha are under tea, 40 ha under rubber, and the remainder under scrub and natural forest. A large number of workers employed by the Tea Estates and their family members depend on the nearby forests for meeting their forests-based consumption needs. The unemployed villagers from Rema and Hoogly Tea Estates are particularly involved in fuelwood collection and timber felling. For instance, nearly 1200 workers and their dependents living on Rema Tea Estates put heavy biotic pressure on the Sanctuary. Some workers get involved in illicit felling from the WS, and they transport the forest produce through the Tea Estates. On an average 200 local people enter Rema-Kalenga forests mainly for fuelwood (150-200 mounds on an average each day), bamboo and timber collection. In addition to local consumption of fuelwood, a substantial amount is transported to nearby centres such as Gazipur, Lalmukh Bazar, Sindhurkhan Bazar and Chunarughat.

Hoogli (east of the WS but near to Tarap Hill RF) and Purkul (north-west of the WS) Tea Estates are not adjoining to the WS and so have only minor stakes in the WS. But these two Tea Estates are important for the Tarap Hill RF as they are very close to its boundaries and so indirectly affect the WS. Shade tree species such as *Albizia lebbec* and *Deris robusta* are planted inside tea gardens for providing adequate shade to tea bushes. Timber smugglers many times pass through Tea Estates to enter in Tarap Hill RF and the WS. Along the transport routes they sometimes get involved in felling of trees inside the Tea Estates. So joint protection efforts are required from FD field staff and Tea Estate managers for control of illicit removals. Some of the poor labourers may be involved in the protection of forests of the WS by forming groups for taking income generation activities through LDF. However, this policy decision will require vetting from the Tea Estates Employers Association (Chittagong). The FD will approach the Chairman of Tea Employers Association to issue suitable instructions to the authorities of three identified Tea Estates.

2.1.2.3 Stakeholders Assessment

Three main categories of stakeholders (primary, secondary and institutional) have been identified by NACOM (2004) through RRA/PRA carried out in Rema-Kalenga WS. The primary stakeholders having direct involvement from the surrounding villages include fuelwood/timber collector, illegal loggers, fruit/vegetable collector, encroachers, forest produce collector, etc. Four categories of secondary stakeholders (not directly involved with forest extraction but are linked with forest-based activities including timber processing, trading and utilization)) include fuelwood traders, furniture shop owners, sawmill owners and timber traders. The fuelwood traders of Gazipur Bazar, Sindurkhan Bazar and Chunarughat Bazar buy fuelwood from the primary collectors for trading. They procure fuelwood from individual collectors and stack them for sale for local consumption and but for subsequent transport by truck and train to Habiganj, Brahmanbaria, Srimongal, Moulvibazar and Comilla. There are several furniture shops at Chunarughat for the sale furnitures, manytimes made of illicit timber collected mainly from Taral Hill RF. A total 12 saw mills process both legal and illicitly felled timber for making

furnitures in these furniture shops. Nearly 15-20 timber traders of Gazipur, Nalmuk Bazar, Sindurkhan Bazar and Chunarughat Bazar are associated with timber trading.

Main institutional stakeholders, involved with the developmental and administration activities in the interface landscape zones include FD, NGOs and credit Banks, community-based organizations, Police, BDR and local government bodies such as Union Parishads and Gram Sarkar. A number of NGOs (ASA, BRAC, BRDB, PASA, Krishi Bank, Grameen Bank, etc.) are active in income generating activities and micro-credit programs in the surrounding landscape. There is only one community-based organization (Village Development Programme based at Basulla in Gazipur) with 64 members, which deals with local cultural and welfare activities in the locality.

2.1.3 Interface Landscape of Satchari National Park

A number of villages and Tea Estates fall within the zone of influence of the proposed Satchari NP. The Park is intimately surrounded by a number of villages, towns, cultivated fields, Tea Estates and the remainder forests of Raghunandan Hill RF. The Park is situated in Paikpara Union of Chunarughat Upzila (of Habiganj). The Park is bordered on the north by Dhaka-Sylhet Highway (a major part of the remainder Raghunandan Hill RF lies north of Dhaka-Sylhet Highway), on the west and west-east by Satchari Tea Estate, on the east by Chaklapunji Tea Estate, and on the south-east by Raghunandan RF lands (now under plantations of teak raised during 1962-66 and the plantations of short rotation tree species raised in 1988).

Old teak plantations raised during 1953-63, 1948-52 and 1959-65 are located beyond the southern boundary of the Park up to the international border of the Indian state of Tripura. The remaining plantations/forests of Satchuri Range are situated to the northern side of the Park's boundary along the Dhaka-Sylhet highway. Most of the local population including ethnic minorities, who depend on agriculture for their livelihood, depend on nearby forests for meeting their consumption needs for forest produce.

The total forest area (1518.80 ha) of Satchuri Range is divided into Satchuri Beat (836.50 ha including 242.82 ha of the proposed Satchuri Park) and Telmachra Beat (682.30 ha). The forests of Telmachra Beat lie towards north-western boundary of the Park. The remainder forest area of Satchuri Range (1275.98 ha) is covered under the proposed interface landscape zone. Further north to this landscape zone lie, i) the remainder forests of Raghunandan Hill RF (forests covered under Shaltila Beat of Raghunandan Range are adjoining to the forests covered under Satchuri Range), ii) Kapaichara Tea Estate, and iii) Laskarpur Tea Estate (TE). Chandpur TE, Nabab Khan TE and Chandichera TE lie towards north-western side of the Park.

Considering the forest habitat and existing socio-economic system a 5 km wide interface landscape zone around the Park's boundary is adopted for effective management of the Park. The relevant elements of this socio-economic system are described as below.

2.1.3.1 Tea Estates

Satchari Tea Estate borders the Park entirely on the western side while on the eastern side Chaklapunji Tea Estate runs parallel to the Park boundary. Other Tea Estates located close to the Park and the neighbouring forests of Raghunandan Hill RF covered under Satchuri Beat of

Satchuri Range are Amo, Surma, Nababkhan, Chandpur, Teliapara, Kapaichora and Laskarpur. Satchari and Chaklapunji Tea Estates have major stakes in the Park as a large number of tea labourers and their families have significant dependency on the forests. A large labor force required for managing the Tea Estates gives rise to tremendous pressure on nearby forests for fuelwood, fodder, timber and NTFPs. The unemployed villagers (on an average a quarter of the male labour force remains unemployed) get involved in fuelwood collection and illicit felling of trees.

Tea Estate lands were leased out by the government on long-term basis for developing tea gardens with a specific portion of the total land being devoted for tree plantations. Although many Tea Estates plant trees regularly (for example, Finlays take up 5 ha of commercial plantations annually in each Tea Estates), some parts of the Tea Estates have not yet been brought under tea/tree cultivation. The vacant areas have over the period developed as unmanaged secondary vegetation, which provides additional wildlife habitat as transition zone between mixed forests/plantations and tea gardens. Such areas should not be converted into monoculture of cash crops (citrus, banana, pineapple, etc.) by individual families residing within Tea Estates.

The shade trees such as *Albizia lebbec* and *Deris robusta*, planted inside tea plantations for providing shade to tea bushes, are also selectively stolen by illicit fellers. Sometimes they use Tea Estates as transport routes after felling trees illicitly inside the forests covered under the Park. This means that joint efforts are required both from FD and Tea Estate authorities for controlling illicit felling of trees. Poor families can be organized into groups for implementing income generation activities by using LDF and helping FD and Tea Estate management in tree protection. Bangladesh Tea Labour Association looks after the welfare of tea workers of all member Tea Estates, each of which has a Panchayat of tea workers. But this will require a policy decision from Bangladesh Tea Association (Agrabad, Chittagong) to issue suitable instructions to the concerned Tea Estate management. Forest Department may approach the Chairman, Tea Association (it comprises 161 Tea Estates as members) to issue such instructions to the authorities of Satchari and Chaklapunji Tea Estates and also form a coordination committee of FD and Tea Estates. Some organizations (e.g. International Labour Organization) and NGOs (e.g. BRAC) are already working in the Tea Estates of Finlays for providing services such as primary education, health and women empowerment.

Some parts of adjoining Tea Estates have not so far been brought under tea cultivation and have over the period developed unmanaged secondary vegetation, which provide additional wildlife and plant habitat as a transition zone between mixed forests/plantations and tea gardens. Small areas along Tea Estates have been converted to citrus, pineapple and banana plantations by individual families. The current trend of converting secondary vegetation areas into monocultures is not good for wildlife as it adversely affects their additional habitat comprising secondary vegetation. Huge amount of labor required for managing Tea Estates gives rise to tremendous pressure on nearby forests for fuelwood, fodder, timber and other forest products. Sometimes illicit fellers pass through adjoining Tea Estates to fell trees inside the Park but also shade trees inside the Tea Estates. This means joint efforts are required from FD staff and Tea Estate managers for controlling illicit felling.

2.1.3.2 Forest Village

Only one recognized Forest Village, Tiprapara inhabited by 24 households of Tripura tribe (Muktachand Devburman is village Headman), is located inside the Park (near to the old Dhaka-Sylhet highway). The village was established by FD inside the RF to provide labor for raising plantations after clear-felling natural forests. Jhum cultivation practiced by them since their settlement has now been stopped. As primary occupation, nearly two-third of the villagers practice paddy, banana and lemon cultivation on the forest land assigned to them by FD. Nearly one-third of Tripuras are day laborers as their primary occupation. All the Forest Villagers have major stakes in the nearby forests due to their livelihood dependence on forest resources. They join FD field staff in patrolling the nearby forests.

2.1.3.3 Interface Villages

Except the Tiprapara Forest Village no other village is located in the immediate vicinity of the Park due mainly to it being surrounded by Tea Estates on east and west side and the portions of Raghunandan Hill RF on north and south sides. However, four villages (Bagharu, Enatabad, Kalishiri and Ghanashyampur), located on the eastern side of the Park, have minor to medium level stakes in the Park. These four villages along with Tea Estate workers are potential beneficiaries of income generation activities to be carried out by forming organized groups. Other villages located away from the Park but near to the north-eastern and north-western parts of Raghunandan Hill RF covered under Satchari Beat are Gazipur, Halholia, Deogach, Promanandapur, Rasulpur, Ratanpur, Baghbari, Sahajahanpur, Teliapara and Goachnagar. Almost all these villages fall under the identified 5-km wide interface landscape zone.

2.1.3.4 Stakeholders Assessment

The primary, secondary and institutional stakeholders have been identified by NACOM (2004) through RRA/PRA carried out in the Park. Thirteen identified primary stakeholders derive various resources from the forests whereas five secondary stakeholders exert influence on the Park forests indirectly. Three primary stakeholders (moholdar, fuelwood collector, illegal timber feller) have major stakes, being responsible for forest degradation. Other three primary stakeholders (bamboo collectors, house building material collectors and lemon cultivators) have minor stakes whereas the remainder seven (honey collectors, sun grass collectors, fruit collectors, hunters, vegetables collectors, medicinal plants collectors and sand collectors) have only minor stakes in the forests. Most of the primary stakeholders are poor, who earn their livelihoods by carrying out forest-based activities.

The five identified stakeholders are timber traders, sawmill owners, furniture shop owners, fuelwood traders and brickfield owners. They are linked with forest-based activities through utilization and trade. There are 15-20 timber traders and 18 saw mills located at Deogach, Teliapara and Chunarughat Bazar. Sometimes there are allegations of illicit felling and illegal timber trade against timber traders and sawmill owners. Nearly 20 furniture shops are located in Chunarughat but locally made furniture is transported as far as Sylhet and Dhaka. Nearly 15 fuelwood traders, located at Teliapara, Chunarughat and Deogach, engage in procurement of fuelwood from individual collectors. In addition to local sale, the collected fuelwood is stacked and transported by trucks and train to Habigonj, Brahmanbaria, Comilla, etc. Three brick kilns, all located in Deogach Union use fuelwood and coal for their operations.

Main institutional stakeholders involved with the development and administration activities around the Park are identified as Forest Department, NGOs, CBOs, Police, BDR, banks, Union

Parshads and Gram Sarkar. Main NGOs operating around the Park are BRAC, ASA, BRDB, HEED, BASA and PASA. Main Banks involved in credit programs are Krishi Bank and Grameen Bank. The CBO currently operating at Deogach and Gazipur is Youth Development Club.

2.2 Landscapes of Southern Protected Areas

2.2.1 Interface Landscape of Chunoti Wildlife Sanctuary

A number of villages, paddy land, settlements and forest land fall within the zone of influence of Chunoti Wildlife Sanctuary. The Sanctuary is intimately surrounded by a number of villages, towns, and cultivated fields. The Sanctuary is bordered on the north by RFs of Chunoti Range, and in the south-east and south by RFs of Chunoti and Barabakia Ranges. The plantations raised under different projects including FSP still exist near Chunoti Range Office where the Chittagong – Cox’s Bazar Highway crosses the eastern part of the Sanctuary. However, a number of paddy lands and settlements are found all around the Sanctuary due to wide encroachments of forest land. Most of the local population, who depend on agriculture for their livelihood, depend on nearby forests for meeting their consumption needs for forest produce. Keeping in view both the relevant human system and biophysical system a 1 km-wide landscape zone along the boundary of the Sanctuary is taken as interface landscape zone for Chunoti Wildlife Sanctuary. However, the NSP will be focussing conservation efforts in and around a target zone that has been identified by NACOM (2005) around the elephant movement corridor.

2.2.1.1 Interface Villages

There are 70 settlements (locally called Paras) in 15 villages (included in 7 mouzas) in and around the Sanctuary, of which 42 Paras (Table 3.21) of Chunoti Range have been studied for assessing stakes in the forests of the Sanctuary (NACOM, 2004). Of the 42 identified villages/paras, 24 are located within the Sanctuary, 13 are located near the boundary whereas 5 are located within 1 km from the boundary. Nearly one-third of the total local population remains unemployed as a result of which biotic pressure on the forests is indeed high. Heavy dependence on forests and forest land has resulted in an active opposition by local people to wildlife conservation efforts. Crop damages by elephants have exacerbated this animosity. Nearly three-fourth of the total paras were found having major stakes in the WS.

Table 2.21 Villages/Paras having stakes in Chunoti Wildlife Sanctuary

Sl. No.	Village	Beat	Location	No. of Households	Stake Level

their livelihoods by carrying out forest-based activities. Main institutional stakeholders include Forest Department, LGED, local government and councils and Police.

2.2.1.3 Brickfields

Six brickfields (located at Nalbunia, Banpukur and Kolatali in Chunoti Beat; Villagerpara and ITCL Station in Aziznagar Beat and Ichachhari in Harbang Beat) owned by local influential people operate in and around the WS, of which 4 are within the boundaries. Fuelwood collected illegally from the forests is used in the brickfields as a result of which these brickfields continue to adversely affect the habitat.

2.2.1.4 Betel Leaf Cultivation

Betel leaf cultivation is widely practiced in and around the WS by local people who depend on it for their livelihood. Most of the betel leaf cultivation is practiced on forest land encroached for establishing a betel leaf vein. A large number of betel leaf veins have been established particularly in Chunoti, Aziznagar and Harban Beats. In view of its popularity betel leaf cultivation is an important income generation activity of local people who use a number of inputs (land, sapling vine, bamboo stakes, forest material for fences and roofs, irrigation, fertilizer, etc) in betel leaf cultivation. Family labour is used in growing, harvesting, processing and marketing the betel leaves. Betel leaves after processing locally are sold in the Bazars of Aziznagar, Chunoti and Deputy. The processed betel leaves also are exported to Chittagong and Dhaka by middlemen who transport the packaged leaves after purchasing from local markets.

2.2.1.5 Forest Land Encroachment

Forest land encroachment for agriculture, betel leaf cultivation, brickfields and settlements is quite common inside the WS. Forest land is encroached permanently but also for a temporary period mainly for grazing, fishing and betel leaf cultivation. Many times the village elites are directly or indirectly associated with forest land grabbing mainly for establishing homesteads and cultivation. Institutional encroachment is common for setting up school, madarasa, graveyard, mosque, nursery, etc. A shelter village (Guccha Gram) has been established for 100 households by the Government inside the WS. Although the official records of FD show 1734 acres of forest land under encroachment in Chunoti Range, the extent of encroachment may be more than the officially recorded figures. In some cases the encroachment has been regularized by issuing land ownership documents as khas land. This phenomenon of forest land encroachment is still continuing and needs to be stopped immediately.

2.2.2 Interface Landscape of Teknaf Game Reserve

A large number of villages/paras, cultivated fields including betel leaf areas, khas lands, brick fields, prawn farms and water bodies fall within the zone of influence of Teknaf Game Reserve. It is bordered along most of its northern boundaries by RF, along southern boundary by Teknaf town including BDR establishments, along its western boundary by Bay of Bengal and along eastern boundary by Naf river bordering Myanmar. In view of natural features both on eastern (Naf river with varying distance upto 4 km from the GR's boundary) and western (Bay of Bengal

with varying distance up to 2 km from the GR's boundary) sides, the boundaries of a landscape zones are naturally fixed on these two sides. Keeping in view of both relevant human system and biophysical system a zone of 1 km from the northern and southern boundaries of the GR is taken as an interface landscape zone.

As a result of refugee influx from Myanmar, a number of Rohingya camps and settlements have come up in between the Naf river and the eastern boundary of GR. A large number of betel leaf cultivation areas are noticed, particularly in and around the western boundary facing the Bay of Bengal. Local people cultivate betel leaf as a cash crop for which they collect forest materials such as bamboo, leaves, grass and small trees from the GR for erecting fences around their betel leaf fields, providing support to betel vines and also for roof construction for shade. On encroached forest lands they burn forest floor for the preparation of betel vine beds and also weed eradication. A part of land adjacent to the eastern boundary of the GR along the Bay of Bengal has been converted to prawn farms. Little or no natural forest borders the GR on the west, although some scrub vegetation remains. Bangladesh Rifles (BDR) is responsible for maintaining security along the Bangladesh-Myanmar Border. The presence of BDR staff brings additional biotic pressure on one hand but on the other hand may help check illicit felling from the forests.

2.2.2.1 Interface Villages

Based on a RRA/PRA study conducted by NACOM during May-July 2004, a total of 115 settlements locally called paras or villages (spread over 6 unions : Zaliapalong, Whykong, Baharachara, Hnilla, Sabrang and Teknaf) have been identified having stakes of different levels in the GR. A total of 53 settlements are located inside the GR boundaries whereas the remainder 62 paras are situated (adjacent or outside the GR) in the interface landscape zone. Nearly two-third of total paras (the villages inside and on the periphery of WS) have major stakes in the WS as local villagers depend on the GR for meeting their basic consumption needs. In addition to fuelwood, timber, bamboo and other NTFPs, they collect vegetables, fruits, fodder and sungrass from the GR. They collect vegetables and fruits, and also hunt wild birds, etc. The remaining one-third paras (lying mainly outside the GR) have minor stakes mainly in terms of associated with fuelwood collection. There are a number of tribal settlements (Tonchonga mainly in Shilkhali, Monkhali and Roikhong; and Rakhain-also known as Mogh- mainly in Hnilla and Whykong, etc.). Most of them are poor and get engaged as agricultural labourers, fuelwood collectors, fisherman, jhum cultivators, weavers, etc. The Rohingas (refugees from Myanmar) are located mainly at Jahajpura, Shamlapur and Teknaf. Only two settlements (Noyapara Camp 1 and 2) of Rohingas are legally recognized by the Government.

As per the PRA report nearly 70% of local people are very poor followed by poor as 19% and the remainder as middle class. Nearly 80% of local people are landless but have homestead land on which they cultivate a variety of fruit trees. Some practice cultivation of paddy on rainfed fields and betel leaf cultivation on encroached land. They depend heavily on nearby forests for meeting their subsistence consumption needs; per the PRA report about 90% of total households depend on forests for meeting their fuelwood needs. Local people are involved in paddy farming, small scale trading and as daily laborers. Agriculture is the main income source of 53% of households, followed by fishing and shrimp collection (30%), day labourers (10%) and others (7%). On the western side of the GR facing Bay of Bengal most of the local people depend on fish collection and betel leaf cultivation whereas on the eastern side facing the Naf river most of the people depend on agriculture and forests. They also use nearby forests for fuelwood, timber

2.2.2.2 Stakeholders Assessment

Primary and secondary stakeholders groups have been identified during the RRA/PRA exercise based on their involvement in the extraction of forest resources directly or indirectly (through forest-based trading, etc.). There are 22 primary stakeholders (fuelwood/timber collectors, betel leaf growers, forest produce collectors, hunters, fishermen, etc.), who are directly involved in forest resources extraction activities with major/moderate stakes whereas 7 secondary stakeholders (brick field owners, timber/fuelwood merchant, saw mill owner, Boat owner/maker, Zeep owner, tea stall owner and outside visitors) have indirect influence on forests. Timber and fuelwood trading takes place in Bazars of Teknaf (Teknaf Beat), Ledha (Mosumi Beat), Kalur (Mosumi Beat), Gum Gachhiola (Mosumi Beat), Whykong, Unchiprang (Roikhang Beat), Khanjorpara (Moidho Hnilla Beat), Noyapara (Moidho Hnilla Beat), Mina (Moidho Hnilla Beat), Bangla (Mathabanga), Morishbunja (Mathabanga), Shamlapur, Palong Khali, etc. The institutional/organizational stakeholders include the government organizations (FD, BDR, Police, Local Government, etc.), NGOs and CBOs. Major NGOs operating in the area include Gonosastha, BRAC, ASA, SHED, SDVR, Grameen Bank and Kisholaya focusing on income generation activities through micro-credit, health, education, nutrition, etc. A number of CBOs (e.g. youth clubs, sammittees, etc.) currently operating in the interface landscape would be useful in NSP implementation. Forest Protection Committee at Jhazpura is actively protecting shilkhali garzan forests.

2.2.2.3 Brickfields

Of the total 8 brickfields in and around the GR, 6 are located inside the boundaries; a clear violation of the Brick Act, 1989 and the Wildlife Act, 1974. On an average each brickfield consumes about 300 monds of fuelwood every day during their operation period of 7-8 months in a year and most of this demand is met illegally from the forests thereby degrading the GR.

2.2.2.4 Betel Leaf Cultivation

Betel leaf cultivation is quite a popular activity in and around the GR and a large number of people depend on it for their livelihood. Most of the betel leaf cultivation areas are located on the western side of the GR, particularly in Shaplapur, Shilkhali and Jhazpura. Many times forest land is encroached for establishing a betel leaf vein that is vacated after harvesting the betel leaves. In view of its popularity it seems that betel leaf cultivation is more profitable than paddy cultivation. Main inputs in betel leaf cultivation include land, sapling vine, forest material for fences and roofs, irrigation, fertilizer, etc. Family labour is used in harvesting, processing and marketing the betel leaves.

2.2.2.5 Forest Land Encroachment

Forest land encroachment, particularly near the flat and gently sloping boundaries around the GR, for agriculture, brickfields, refugee camps and settlements is a serious problem in the GR. Many times the village elites are directly or indirectly associated with forest land grabbing. As per the official records of FD 795.54 acres of forest land has been encroached in Whykhong (86.50 acres encroached by 258 persons), Shilkhali (496.96 acres encroached by 1100 persons) and Teknaf (212.08 acres encroached by 848 persons) Ranges. However, the extent of encroachment may be more than the officially recorded figures.