



Planning for Inputs to Protected Area Facilities, Visitor Amenities and Habitat Management

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Planning for Inputs to Protected Area Facilities, Visitor Amenities and Habitat Management

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Nishorgo Support Project

Prepared by:
S. M. A. RASHID, Ph.D.
Consultant to IRG

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With Partners : CODEC, NACOM & RDRS



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EXECUTIVE SUMMARY

This document primarily focuses on the activities to fulfill Objectives 5 and 6 of Nishorgo Support Project (NSP) aimed at improving the existing facilities, visitor amenities and services, and wildlife and habitat management within the five selected Protected Areas (viz., Teknaf Game Reserve (TGR), Chunati Wildlife Sanctuary (CWS), Lawachara National Park (LNP), Rema-Kalenga Wildlife Sanctuary (RKWS) and the proposed Satchari National Park (SNP). The major input for carrying out this improvement is the Reimbursible Project Aid amounting to US\$2.0 to 2.5 million.

Improvement of the existing facilities to support PA management was based on the proposal and consultation with the Forest Department. However, in this document the major thrust was given to habitat and wildlife management within the PAs and 13 major activities were identified to achieve the goals.

Three options are proposed for the implementation of the identified activities. The RPA allocation falls short if all the proposed activities are to be implemented (Option 1: US\$5,871,702). Option 2 (US\$2,499,772) and Option 3 (US\$2,020,625) are within the range of the available budget, whereby some prioritization and/or readjustment need to be done to match up with the objectives and complement the practicalities for implementation. For example, in estimating some of the costs indicative costs were taken into account, which may be adjusted when finalizing the work plan.

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1. BACKGROUND AND PURPOSE OF THE REPORT

The Nishorgo Support Project (NSP) is aimed at the conservation, management and development of visitor amenities and facilities for the five Protected Areas (PAs) (Table 1) in Bangladesh, viz., Teknaf Game Reserve (TGR), Chunati Wildlife Sanctuary (CWS), Lawachara National Park (LNP), Rema-Kalenga Wildlife Sanctuary (RKWS) and the proposed Satchari National Park (SNP). Detailed activities have been spelled out in the management plans and participatory conservation management planning documents for all of these sites, except for the proposed SNP, prepared by the Asian Development Bank (ADB) funded Forestry Sector Project (FSP). The activities mentioned in the FSP reports could be further examined for relevance with the goals of NSP and prioritized for implementation.

Table 1. Protected Areas, included in the Nishorgo Project.

Forest Division and Conservation Area	Area (hectares)*		
	Conservation Area	External Buffer Zone	Total
Sylhet Forest Division			
Lawachara National Park	1,163	87	1,250
Rema-Kalenga Wildlife Sanctuary	1,795	710	2,505
Satchari National Park (proposed)	243	0	243
Cox's Bazar Forest Division			
Teknaf Game Reserve	22,632	4,141	26,773
Chittagong Forest Division			
Chunati Wildlife Sanctuary	13,098	3,944	17,042
Total	38,931	8,882	47,813
* data based on Tescult 2001a			

This document further elaborates on some additional activities than those suggested in the FSP reports. Financial requirements are also detailed for implementation of the activities required to fulfill Objectives 5 and 6 of the proposed Project Concept Paper (PCP) submitted by the Forest Department (FD) under the present Terms of Reference (TOR) (see Terms of Reference).

Habitat management is a very technical science requiring in-depth biological knowledge on the ecosystems, habitat types, inter- and intra-actions among biotic (microorganisms, plants and animals) and abiotic factors. Forest Department staff at the field level may have vast experience but regular, specific and standardized data need to be collected and punched in appropriate software for analyses, assessment and reporting, and of course, accountability and transparency. The activity plans should then be developed accordingly for habitat management needs and purposes. The experience and field survey information may be further analyzed and interpreted using Geographical Information System (GIS) for developing management and monitoring programs. Regular monitoring of the habitat using well-verified and tested indicators, is an inseparable activity for habitat management.

The existing data at the GIS-based Resources Information Management System (RIMS) Unit in the FD contains no system of maintaining exclusive data for the PAs. Rather the database is more inclined in maintaining data for all the Forest Divisions as a whole to aid in forest resources management and also in perspective planning in forestry. Despite its importance in applied aspects of forestry resources management, the facility and existing hardware are underutilized, neglected, and also starved of manpower (Table 2).

Table 2. Current manpower at the GIS-based RIMS unit of the Forest Department.

Posts	Permanent	Dev. Project
Deputy Conservator of Forest	1	-
Asst. Conservator of Forest	0	1
Asst. Computer Programmer		
Research Officer	1	-
Draftsman	1	1
Computer Operator	1	-
Data Operator	1	-
Support Staff	-	-

RIMS database contains digital vegetation data of Chittagong, Cox's Bazaar, Sylhet, Sunderbans (East and West) and Coastal Forest Divisions acquired from 1995 aerial images (FRMP inventory 1995-1998) and ENRS (1997) data. This data need to be evaluated, standardized and analyzed for appropriate use in information dissemination and application in PA resources management. An assessment is also needed as to what more data are needed to serve the purpose of habitat and wildlife management, quantification of habitat types, and identification of areas within the PAs that are in need of immediate restoration activities. Perhaps there is a need to change the mindset of the senior forest staff to utilize the modern technologies available for forest and other natural resources management.

The FD has developed its own method of maintaining GIS-based RIMS data arising from digitizing the LANDSAT/SPOT satellite images, aerial photographs and from the field surveys. For example for the sake of preparing working plans, forest areas are demarcated for clear felling or plantation. The GIS-based RIMS Unit marks these areas within each Forest Beat as polygons. Each polygon is then assigned a numerical number called Discreet Land Unit (DLU). The numerical numbers for each DLU is not standardized and keeps on changing either each year or with each working plan causing confusion for both the professionals and the users alike. This data storage system needs to be evaluated and standardized for future references.

An inventory to document the currently existing faunal and floral diversity of the PAs is a priority. IUCN (2004) has highlighted the need for such actions in the proposed National Biodiversity Strategy Action Plan. The information that is gathered needs to be compared with previous information (Gittins & Akonda 1982, Khan 1982, FRMP 1995) related to areas within the PAs or with some of the studies carried out by academic institutions and other NGOs. Keystone species need to be identified within each PA and detailed biological information is urgently wanted for managing them. For example, some information is available for the hoolock gibbons (*Hylobates hoolock*) at Satchari NP (proposed), Lawachara NP and Chunati WS (Siddiqui 1986, Ahsan 1993, Feeroz et al. 1994) or the elephants (*Elephas maximus*) (Khan et al. 1983, IUCN 2003) or mammals at Teknaf GR (Rashid et al. 1989). These information and suggested activities need to be verified and updated to understand the current situation and activities planned for managing the key wildlife species and populations. Each of these

populations needs to be studied as they react differently in varied habitat conditions and to different sets of human disturbances. The FD needs to employ more wildlife biologists at the field level (for example, wildlife graduates from the Department of Zoology, University of Dhaka) to work rigorously to collect the basic information for management purposes. Moreover important habitats and ecosystems critical for the survival of wildlife has to be identified and management needs assessed for their perpetuity.

The FD staff often use ‘core area’ and ‘buffer area’ to define areas for protection and plantation and/or utilization by people but these area need to be demarcated. The basis of this zonation (*i.e.*, ‘core’ and ‘buffer’) is not clear. This has been interpreted with a different set of wordings to describe resource management and resource utilization (Tescult 2000a) as shown in the following Table 3.

Clearly there is a need to harmonize the definitions for uniformity standardization of the words used to mean the ‘core’ and ‘buffer’ areas. This will need comprehensive and in-depth discussion with the FD staff. This is an area where co-management philosophy should be exercised. However, detailed studies and monitoring on the available resources, resources utilization should be planned to evaluate the present situation.

Table 3. Management zoning for Protected Areas (modified after Tescult 2000a).

Zone	Main Management Objective
Ecosystem Management Zone	-long-term protection and rehabilitation of forest cover (long-rotation plantations >25 years old)
Habitat Management Zone	-restoration and manipulation of habitat for selected wildlife species, incorporating short-rotation and long-rotation plantation
Sustainable Use Zone	-sustainable use of plantations, primarily at the periphery of the existing PAs, and of natural forest managed for cultivation
Village Use Zone	-housing, agricultural fields (primarily paddy) and homestead woodlots associated with villages
Intensive Use Zone	-site management around administrative buildings and built visitor facilities
Transportation Corridor (where applicable)	-right-of-way management along the highway and railroad within the PA, and the largely parallel power transmission line
External Buffer Zone	-sustainable use of plantations and natural vegetation on FD lands adjacent to the PAs, where such use can reduce pressure on the PA's resources
Tea Estate Lands (where applicable)	-sustainable use of forest and secondary vegetation on Tea Estate lands bordering the PA

The concern for the conservation and management of the Protected Areas was clearly evident during the recently held 2nd World Park Congress at Durban, South Africa. The *World Parks Congress: Durban Accord 2003* calls all countries of the world for:

1. Establishment of a Protected Areas Learning Network, to support managers and policy makers in their efforts to effectively establish and manage protected areas in the 21st century.

2. Strengthening of the capacity of protected areas personnel and other primary stakeholders to apply adaptive management to deal effectively with current and future threats to protected areas in the 21st century.
3. Focus on the key policy issues of sustainable finance and the need for a major increase in investment in protected areas, including from governments.
4. The need to ensure proper valuation of protected area costs and benefits in economic decision making at all levels, and the need to ensure that protected areas and surrounding communities benefit from protected areas.
5. The policy linkages between protected areas and relevant international Conventions and programs, such as the Man and the Biosphere Reserve Program, the World Heritage Convention, and
6. To develop Governance Principles for Protected Areas to address the need to recognize the territorial rights, knowledge, and practices of indigenous peoples in relation to protected areas, and of the necessity of their full participation in such areas.

The protected areas are either important hotspots for biodiversity or unique ecosystems along with their ecological functions that need special attention and management protocols. As such these should be treated with priority and under a prescribed plan addressing the needs and fulfilling the objectives as a PA. The Bangladesh Wildlife Preservation Act 1974 (BWPA) calls for appropriate management of the PAs and the proposed Bangladesh National Biodiversity Strategy Action Plan (IUCN 2004) recognizes the need for revising and revamping the existing PA management system in Bangladesh to accommodate the modern concepts and management framework. Long-term management plans supported by the required facilities and services, skilled manpower are some of the conditions that need to be met. Nishorgo Support Project provides with the opportunity to attain this.

1.1 Objectives

The six broad objectives to be pursued by Nishorgo Support Project (NSP) include the following. However the present report primarily focuses on Objectives 5 and 6 (also see Terms of Reference).

1. Develop a functional model for formalized co-management of Protected Areas.
2. Create alternative income generation opportunities for key local stakeholders associated with pilot co-managed Protected Areas.
3. Develop policies conducive to improved Protected Area management and build constituencies to further these policy goals.
4. Strengthen the institutional systems and capacity of the Forest Department and key stakeholders so that improvements in co-management under the Project can be made permanent.
5. Build or reinforce the facilities within Protected Areas that will enable better management and provision of meeting visitor expectations at co-managed sites.
6. Design and implement a program of habitat management and restoration for pilot Protected Areas.

2. REVIEW OF PAST RECOMMENDATIONS:

The Forest Department (FD) - a government agency - is responsible for the management of wildlife sanctuaries and other protected areas in Bangladesh. At present FD has no specialized capacity for protected area management, although its territorial management system provides a ready-made management presence. Specialized training will need to be developed and delivered to the relevant personnel. This could include the formation of an elite corps of protected areas management staff who, in addition to a minimum level of forestry training and in-service experience already achieved, would be the focus of specialized protected areas management training and subsequent assignment to the NSP-supported protected areas.

No expenditure was proposed on new buildings and other facilities in the existing PAs except in accordance with the provisions of an approved management plan (AWB 1991). Management plan guidelines for four of the five PAs under the NSP is already proposed by FSP (Tescult 2000a, b, c, d) but yet to be approved by the FD/MOEF. Assuming that these management plan guidelines are final, proposal for expenditures of some of the developmental activities prescribed in the guidelines for the respective PAs may be considered for implementation.

Description of the five Protected Areas included in the Nishorgo Support Project is given below. The sequencing is not in terms of any priority.

2.1 Chunati Wildlife Sanctuary

Chunati WS contains important floral and faunal biodiversity resources, and although the Sanctuary is rapidly being degraded by uncontrolled land use there is still the possibility of effective conservation of these resources if specific and timely actions are taken. Due to its proximity to the Chittagong-Cox's Bazaar Highway the area also provides some ready opportunities for day-use ecotourism (nature walks, wildlife viewing), but it does not have sufficient attractions to become an important tourist destination (Tescult 2001a). The major focus of future management will need to be on conservation of biodiversity resources.

It is anticipated that the aims of conserving floral and faunal biodiversity in Chunati, as well as providing for local needs for forest products on a sustainable basis, can be met through a carefully designed and implemented zoning system. The system needs to be based on a gradation of zones where the types and intensities of land use are determined by conservation values, land capability, and the documented resource requirements of designated user groups. Consistent with the participatory approach, people currently living on the periphery of the Sanctuary will need to play important roles in planning and implementing appropriate land uses. It is anticipated that management would combine enforcement approaches (where absolutely necessary for the protection of key resources) with participatory management and benefit sharing in cooperation with local resource users (Tescult 2001b).

The management planning and implementation process for Chunati WS may include the following activities:

1. Review and revision of boundaries, based on current vegetation cover, land ownership and land use;

2. Comprehensive surveys and evaluation of remaining biodiversity resources;
3. Preparation and implementation of a spatially-based management plan based on modern protected area conservation and management principles;
4. Intensification of tree production on unused, degraded areas, both within and adjacent to the conservation area boundaries;
5. Raising awareness among local residents, the general public, and government agencies whose activities impinge on the PA, about the purpose of the PA and its ecological and economic importance;
6. Training of staff in conservation management;
7. Development of appropriate support facilities; and,
8. Support to the development of ecotourism and environmental education.

2.2 Lawachara National Park

Lawachara National Park (LNP) is located approximately 160km northeast of Dhaka and 60km south of the city of Sylhet, in the civil administrative units of Upazila Kamalganj, District Maulvibazaar. The LNP and a proposed extension incorporate the southern and eastern parts of West Bhanugach Reserved Forest, within Lawachara, Chautali and Kalachara Beats, Maulvibazar Range, Sylhet Forest Division.

The area represents the most accessible hill forest in Sylhet FD, and its biodiversity conservation and ecotourism values have long been recognized (Olivier 1979; Phillipson 1988). The LNP was formally established on July 7th 1996, incorporating an area of 1250ha vide GOB Gazette Notification No. PBM(S-3)7/96/367.

The potential for ecotourism and cultural tourism in Lawachara National Park and the surrounding tea estates, wetlands and other remnant forest areas of Maulvibazaar District has long been recognized (Phillipson 1988; Khan et al. 1993, 1994; Newton et al. 1996). However, visitor use of the PA is currently limited to occasional group visits to the Janakichara Nursery (along the main highway ~0.8km from the southwestern Park entrance), and to mostly official visitors to FD's Shaymoli Rest House, located adjacent to Lawachara Beat Office. School groups and individual travelers both local and foreigners, occasionally visit Dolobari Village. Magurchara Village also receives occasional visitors, both drop-ins and as part of tours arranged by Bangladesh Parjatan Corporation. Lawachara is considered to be the best forest in the country for bird-watching (Thompson et al. 1996), but this use currently involves only very limited numbers of visitors.

Visitor facilities previously developed at the Janakichara Nursery (a hilltop viewpoint/picnic shelter, toilet and mini-zoo) have fallen into disrepair and are currently unusable.

At present there are no visitor facilities associated with the Shaymoli Rest House area, apart from limited accommodation (3 bedrooms). In addition to official guests, visitors staying outside of the Park (e.g., at the British DFID Guesthouse) also make some day use of the Rest House and surrounding forest area, primarily during the winter months of November-February. This general area, which includes the Lawachara Beat Office complex (to be converted to Park Headquarters) and BFRI facilities, will be developed for day use, including a Park Office where visitor information will be available, an Environmental Education Centre, and a system of nature trails (Tescult 2000a).

[N.B: DfID Guest House is presently handed over to the Tea Board authorities (Bill Collis, pers. comm., 2004). There are a couple of other rest houses, one run by HEED International and the other by BTRI, both of which provide limited access to the visitors.]

2.3 Rema-Kalenga Wildlife Sanctuary

Rema-Kalenga Wildlife Sanctuary is located approximately 130km east-northeast of Dhaka and 80km south-southwest of the city of Sylhet, in the civil administrative units of Upazilla Chunarughat, District Habiganj. The Sanctuary and its proposed buffer zone (a 1km-wide strip bordering the Sanctuary on the west and north) comprise the southern and eastern parts of Tarap Hill Reserved Forest, incorporating parts of Kalenga, Chonburi and Rema Beats, Habiganj-2 Range, Sylhet Forest Division. The Indian State of Tripura borders the Sanctuary on the east and south.

The Sanctuary represents the largest remaining area of natural forest in Sylhet Forest Division (GoB 1992). The original Sanctuary area of 1,095ha was notified in 1981 and was expanded to 1,795ha in 1996, and now includes 85% of the high forest remaining in Tarap Hill RF.

The main activities to be undertaken are to:

1. Demarcate and permanently mark the Sanctuary boundaries;
2. Complete comprehensive surveys of the Sanctuary's biodiversity resources;
3. Implement a spatially-based internal zoning plan;
4. Intensify tree production in included and adjacent agricultural and village areas, using a participatory approach;
5. Convert existing short-rotation plantations adjacent to the Sanctuary boundaries to participatory management models;
6. Raise awareness among local residents, the general public, and government agencies whose activities impinge on the Sanctuary area, about the purpose of the Sanctuary and its ecological and economic importance;
7. Train staff in conservation management; and,
8. Develop appropriate support facilities.

These activities will be undertaken under three primary management programs: Administration, Resource Management and Protection, and Development. A modest Visitor Use and Visitor Management program also will be implemented (Tescult 2000c).

A large block of contiguous natural forest (672ha) comprising the southern part of the Sanctuary has been designated as Ecosystem Management Zone, where the main management aim is long-term protection (Tescult 2000c). An additional large area of natural forest cover and limited old plantation (total 916ha) in the central and northern sections of the Sanctuary has been designated as Habitat Management Zone, with the primary objectives of delimiting consumptive use of forest resources adjacent to and between areas converted to paddy fields, of ensuring that such uses remain within sustainable levels, and of ensuring that forest cover remains suitable for wildlife. Together these two zones comprise approximately 88% of the total Sanctuary area (Tescult 2000c).

Most of the remainder of the area (206ha) has been designated as Village Use/Sustainable Use Zone, which incorporates all village housing, homestead and field crop areas (mainly paddy) included within the Sanctuary boundaries. Objectives in this area are to restrict agricultural use to legitimate Forest Villagers, to provide assistance with the development of mixed species homestead plantations, and to reclaim excess agricultural areas to participatory plantations and natural forest cover. In addition, a one kilometer wide buffer zone will be established along the western and northern boundaries of the Sanctuary, where the management focus will be on sustainable use and maintenance of wildlife habitat suitability in natural forest and plantations on FD lands (total area 1172ha), and on maintenance and sustainable use of forest cover and secondary vegetation on Tea Estate lands (area ~400ha) and khas lands (~50ha), bordering the Sanctuary. In areas where discrete human populations make traditional or otherwise established subsistence use of the Sanctuary/buffer zone areas and their resources, this use will be formalized in Land Use Agreements negotiated and administered with the assistance of selected and specially trained NGOs.

2.4 Satchari National Park (proposed)

Satchari NP (proposed) – only three hours drive from Dhaka offer some of the similar characteristics and species diversity as that of Lawachara NP. A portion of Satchari Forest Beat (600 acres = 243ha) under Raghunandan Reserve Forest located in Upazilla Chanarughat, District Habiganj, has been proposed by the Forest Department for declaration as National Park as per the Bangladesh Wildlife (Preservation) Order 1973 (President's Order No. 23 of 1973) later amended as an Act - Bangladesh Wildlife (Preservation) (Amendment) Act 1974. The area consists of hills, hill streams and some lowland with varied habitat types. This area still supports some of the pristine habitats necessary for the survival of some of the nationally and internationally important and highly endangered wildlife species. Worth mentioning species are Himalayan bear, Hoolock Gibbon, Leaf Monkeys, Civets, Flying Squirrel, Porcupine, Scaly Anteater, several species of small Cats and others. In addition the area also supports a diverse assemblage of indigenous tree species, like Ghondroi, Dhup, Chapalish, Cham, Chalta, Pakoir, Jalpai-khundor, Neoor, Shoroi, Awal, Shak-shama, Mon-ghonta, Chikrashi, Garjan, Tata-Taiyuus, etc., many of which have been exterminated from many of the other forested areas in Bangladesh. Moreover the beautiful landscape carries unique aesthetic value.

The national highway (N2) cuts across the Satchari Forest Beat. The location of the proposed NP is north of this national highway. The proposed site's proximity to the highway provides the opportunity to attract visitors to visit the NP for recreation. Thus there are scopes for developing facilities and amenities for both local and foreign tourists. These facilities can offer varied services like bird watching (Thompson et al. 1996), mountain biking, nature trails, etc., to meet the demands of the visitors, including provision for overnight lodgings. However, there should be very strict rules and regulations and monitoring system to maintain the habitat for its perpetuity and from future degradation.

2.5 Teknaf Game Reserve

The Teknaf Game Reserve located almost 40km south of Cox's Bazaar township, is one of Bangladesh's largest protected areas, surpassed in size only by the Sundarbans Wildlife Sanctuaries and Pabla Khali Wildlife Sanctuary in the Chittagong Hill Tracts. It incorporates a very high level of biodiversity, but is under an increasing degree of threat from uncontrolled land use.

The immediately adjacent coastal areas west of the Reserve is notified as Environmentally Critical Area (ECA) under the Bangladesh Environment Conservation Act 1995. The Reserve comprises a broad variety of habitats within a relatively compact area, including representative but increasingly fragmented and degraded examples of evergreen and semi-evergreen hill forests, tidal mudflats and mangrove vegetation along the Naaf river to the east, and broad sandy and rocky beaches along the Bay of Bengal bordering the Reserve to the west. Further information regarding the ECAs can be collected from the GEF-funded Coastal and Wetland Biodiversity Management Project (CWBMP). These habitats support what is considered to be the highest biodiversity in Bangladesh --a documented total of 290 species of plants, 55 species of mammals, 286 species of birds, 56 species of reptiles and 13 species of amphibians (Anonymous 1978, Khan 1982, Khan et al. 1983, Rashid et al. 1989).

The Reserve area has long been known for its elephants, and was established in 1983 specifically for their protection. Elephants are still widely distributed in the area, with an estimated numbers of around 100 during 1982-83 (Khan et al. 1983). The numbers have since declined drastically in the Teknaf Peninsula, including the Reserve. The USFWS/IUCN-Bangladesh recently carried out a survey of the elephants in Bangladesh and the numbers estimated for the Reserve are between 30-35 individuals (IUCN 2003). This is still an important population to draw immediate attention for conservation and protection. These elephants are part of a larger population scattered over the Chittagong Hill Tracts and down through to the Teknaf Peninsula, and contiguous with populations in adjacent parts of India and Myanmar, although movement routes into and out of the Reserve have been cut off. Reestablishment of elephant movement corridors demands immediate consideration for implementation to help the largest terrestrial animals to survive.

Estimates of both the Reserve population and the total country population of elephants are very crude, but the Teknaf population probably represents around 15% of the total number of wild elephants currently remaining in Bangladesh (most recently estimated as 196-227 resident and 83-100 non-resident individuals by IUCN (2003)). Elephants are of high conservation importance, as they are considered critically endangered (facing a very high risk of extinction in the wild in the near future) within their total ranges in Asia, as well as in Bangladesh.

The current designation as a Game Reserve does not provide adequate protection to either wildlife populations or habitat (a Game Reserve is defined under Bangladesh legislation as "an area declared by the Government as such for the protection of wildlife and increase in the population of important species wherein capturing of wild animals shall be unlawful", but which also allows for "...hunting and shooting of wild animals under a special permit"...). Re-designating the Reserve as a Wildlife Sanctuary would provide more scope for protection (Tescult 2001c) (a Wildlife Sanctuary is defined as "an area closed to hunting, shooting or trapping of wild animals and declared as such by the Government as undisturbed breeding ground primarily for the protection of wildlife inclusive of all natural resources, such as vegetation, soil and water, and in which no person shall enter or reside; cultivate any land; damage or destroy any vegetation; hunt, kill or capture any wild animal within one mile from the boundaries; introduce any exotic species of animal; introduce any domestic animal or allow any domestic animal to stray; cause any fire; or pollute water flowing in or through provided that the Government may, for scientific purposes or for aesthetic enjoyment or betterment of scenery, relax all or any of the prohibitions specified above"). This definition provides scope both for protection and rational, sustainable utilization of resources, and is compatible with participatory development of surrounding buffer zones. However, the important concept behind this proposition is the actual planning and on-the-ground actions or else this upgrading will remain only on papers.

3. PROTECTED AREA FACILITIES

The facilities proposed in the “Infrastructure Guidelines” (Tescult 2001a) were mainly for tourism, and more specifically for ecotourism but additionally can also serve the purpose of Park administration. Ecotourism is here defined as "environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features – both past and present) that promotes conservation, has low visitor impact, and provides for beneficially active socio-economic involvement of local populations" (Ceballos-Lascurain 1996). Facilities that are required by conservation areas staff (e.g., living quarters) or for area management (e.g., access, and offices) also have been addressed (Tescult 2001a) and subsequently consulted during the present PCP preparation phase.

The types of facilities to be developed in each of these areas is determined in large part by short to medium-term management considerations, including:

potential for visitor use, which in turn depends on the type and condition of natural resources, accessibility and other factors (Table 4), and;

facilitate conservation of resources (necessitating, for example, boundary marking, and the development of staff support facilities and amenities).

Table 4. Ecotourism potential in NSP-supported conservation areas (modified after FSP 2001a)

Area	Major Positives	Major Negatives	Eco-tourism Potential
Lawachara NP *	<ul style="list-style-type: none"> • good access • bird-watching • cultural features 	<ul style="list-style-type: none"> • part of proposed extension recently logged 	high
Teknaf GR * (proposed for regazettement as a wildlife sanctuary)	<ul style="list-style-type: none"> • good access • good remnant forest cover • high biodiversity including remnant elephant population • topography and views 	<ul style="list-style-type: none"> • uncontrolled land use and degrading vegetation cover • unplanned/incompatible coastal development 	high
Rema-	<ul style="list-style-type: none"> • good remnant forest cover 	<ul style="list-style-type: none"> • poor access 	moderate

Kalenga WS *	• high biodiversity		
Chunati WS *	• relatively good access	• extremely degraded vegetation cover and continuing uncontrolled land use • danger to staff and visitors due to land use conflicts	low
Satchari NP * (proposed)	• good access • some remnant forest cover • high biodiversity • bird-watching	• degrading vegetation cover • proximity to highway • increasing human activities	high

Facilities and services requirements were determined for each of the NSP's five conservation areas from the FSP's feasibility studies. Further details of which can be found in participatory conservation management planning for Lawachara National Park (Tecsult 2000a), Rema-Kalenga Wildlife Sanctuary (Tecsult 2000b), Madhupur National Park (Tecsult 2001a), Teknaf Game Reserve (Tecsult 2001b) and Himchari National Park (Tecsult 2001c). These areas need boundary marking, access maintenance and control, and staff quarters in common (Table 5). Needs for visitor facilities vary, but in all areas are relatively modest given the relatively early stage of ecotourism development in Bangladesh.

Table 5. Facility and services development requirements in NSP-supported conservation areas (modified after FSP report (Tecsult 2001a))

Facility/development	National Parks		Wildlife Sanctuaries		
	Lawachara	Satchari *	Teknaf	Rema-Kalenga	Chunati
Access roads (paved)	m	m	m		m
Access roads (unpaved)	•	•	•	•	•
Accommodation (staff)	•	•	•	•	•
Accommodation (visitors)	•	•	•	•	•
Biodiversity research laboratory	•	•	•	•	•
Environmental education/visitor information centers	•	•	•	•	•
Landscaping	•	•	•	•	•
Observation hides and platforms	•	•	•	•	•
Offices	•	•	•	•	•
Public recreation areas	•	•	•	•	•
Public toilets	•	•	•	•	•
Signs and markers (boundary)	•	•	•	•	•
Signs and markers (entrance)	•	•	•	•	•
Signs and markers (facilities/amenities)	•	•	•	•	•
Signs and markers (trails)	•	•	•	•	•

Trails (nature)	•	•	•	•	•
Trails (patrol)	•	•	•	•	•
Utility corridors	•	•	•	•	•
Waste management	•	•	•	•	•
Wetland restoration/rehabilitation (incl. water sources)	•	•	•	•	•

m=maintenance only; * = proposed

Under current practice, the Bangladesh government agency responsible for the management of all conservation areas (national parks, wildlife sanctuaries and game reserves) is the Forest Department. These areas are managed under FD's territorial system, with few staff (only 3 out of 17 people) assigned for special programming for conservation areas. Tourism development in Bangladesh is the responsibility of Bangladesh Parjatan Corporation (= National Tourism Authority), but this body has no direct authority or mandate in conservation areas. The NBSAP (IUCN 2004) has strongly recommended for institutional linkages for achieving common goals.

3.1 Recommendations

The FD has to be very clear in their planning and decision on as to how they spend the NSP money. The Reimbursable Project Aid (RPA) of US\$2.0 to 2.5M is far from enough to carry out all proposed activities in all the five selected PAs. However, the logical option would be to prioritize the needs for PA management and implement those ranking high in the priority list. Several cases are discussed below.

1. Physical demarcation of the PAs is important and much needed to arrest encroachment into the PA area by the villagers living in adjacent areas or within the PAs. The FD can decide which of the PAs need immediate demarcation. Priority among the PAs will be Lawachara NP, Chunati WS and areas in close proximity of human habitation of Teknaf GR and Rema-Kalenga WS. The rate of encroachment and habitat degradation at Chunati is known to be very high. Some sections of the proposed Satchari NP bordering the tea estates and indigenous people villages may need demarcation. The expenditure for demarcation of PA boundaries constitutes a lion share of the proposed costs. Prioritizing and selecting the PAs or sections of the PAs that need immediate demarcation can minimize the costs.

However on the basis of the available funds and the priority actions, the Satchari NP (proposed) due to its small size and proximity to the national highway, the FD stands in a better position for investment than some of the other PAs (see Table 1). Some funds can be saved since there is already an office of the FD. Some extension work may be needed to accommodate the visitor facilities and services. As for the other PAs, sections of the PAs where it is deemed necessary to demarcate only such sections may be considered for demarcation.

Demarcation process may arouse some unwanted situations and the FD should ensure smooth handling through prior negotiations and consultations with the people living in and around the PAs.

2. The newly commissioned Wildlife and Nature Conservation Circle (WNCC) with its existing structure neither have the capacity to delegate any conservation work nor has adequate skilled manpower to undertake any habitat or wildlife management assignment.

Only a Conservator of Forests (CF) currently heading the WNCC, a Divisional Forest Officer (DFO) (among four DFO positions) and four-trained wildlife biologists [Assistant Conservator of Forests (ACF)] are there to contribute. The positions for the remaining three Wildlife Divisions have no appointed/designated DFOs. There is a dearth of knowledgeable and trained wildlife staff particularly at the field level. Forest Department needs to employ more wildlife graduates to make WNCC a responsible organ of the FD. The FD may consider appointing at least two research staff (permanent or project-based) for conducting the wildlife studies in the PAs. Another option may be collaboration with relevant NGOs, specialized in natural resources management or inviting university research students to carry out studies on flora and fauna for a specified period.

3. Adequate incentives should be provided for staff employed in Wildlife and Nature Conservation Circle and Divisions.
4. A detailed inventory of biodiversity within each of the PAs is a priority. Species playing the role of either a keystone species or as a symbolic flagship species should be identified for in-depth studies, and preparation of conservation and management plans.
5. For wildlife resources management purposes, detailed biological information of existing wildlife and on the habitat utilization within the PAs is essential. For example, habitat restoration is a priority for some of the PAs. If there is not sufficient information at hand, say for example, the dietary habits of any target species, it will not be possible to select the plant species for plantation and habitat improvement for the wildlife in question. This calls for urgent intensive and detailed scientific studies on the flora and fauna of each of the PA and information gathered can then be used for developing wildlife and habitat management plans. This sets the base for aided restoration of habitat.

Collecting comprehensive biological information at least for some of the endangered or keystone species within each of the PAs like Asian elephants, hoolock gibbon, Asiatic bear, crab-eating mongoose, leopard, etc., should be a major priority for wildlife management. Along with this the habitat and food requirements is also critical for management. A modest amount of the funds should be allocated for restoration of the habitat. Supporting or complimentary studies on propagation and natural regeneration of forest plants are of prime importance albeit one has to ensure the arrest or reduction of anthropogenic disturbances. Moreover the role of various animals in the pollination, dispersal and regeneration of forest tree species should be studied, evaluated and appreciated.

6. There is some impropriety in the expense heads. For example, the need for updating and capacity building of the GIS-based RIMS unit has not been realized or mentioned in the PCP. There is a component of TA for capacity building under the USD6.5M to be utilized by IRG but that includes limited capacity building activities. This is of great importance for habitat management exercises in this 21st century. Moreover, there is tremendous scope for development and enhancement of this unit, in terms of both manpower and facilities. Special attention is deserved and additional effort needed in acquiring recent GIS-based data of the PAs.
7. For the sake of updating and mapping the current status of the PAs, three options are available for the project to proceed. Existing maps are based on almost twenty-year old 1986-LANDSAT satellite images and updated with field data as recent as 1998. Moreover the available data are not formatted in GIS-ArcInfo software. For the GIS-based RIMS Unit to update it is essential that RIMS should have the latest high-resolution images (e.g.,

IKONOS) of at least the PAs. These can be used for preparing the base maps (verified through on-the-ground surveys), digitized, interpreted and later plotted for updated base maps and used by the NSP and FD. Overlaying the updated maps on the older ones will show the extent of habitat degradation that has happened and an idea of the amount of area that need to be restored and rehabilitated.

8. NSP team members, such as CEGIS might provide with support to upgrade the present GIS-based RIMS unit of the FD. In addition, they may provide hands-on training to the FD staff to enhance their capacity in remote sensing, data interpretation, analyses, and other allied aspects. However, the FD needs to employ more people for its RIMS unit to utilize the resources available in a more efficient manner.
9. Detailed and comprehensive studies should be planned for listing the biodiversity of each of the PAs and protocols to be developed to monitor them at regular intervals, say every two years.
10. Keystone and/or endangered fauna and flora species deserve special attention for biological studies, gathering detailed information on their ecological needs that might be used for preparing management and conservation plans.

4. PROPOSED ACTIVITIES

4.1 Activity# 1: Land use and forest cover maps for each of the five designated PAs

4.1.1 Objectives:

1. Assessment of the forest resources and habitat types
2. Assessment of the nature of current land use practices
3. Better management of the habitats and forest resources
4. To identify areas suitable for establishing visitor facilities/amenities
5. Compliance with the best PA management practices and visitor services

4.1.2 Rationale:

An up-to-date land use and habitat classification map is essential to understand the current land use practices, assess the forest resources, preparing management plans and design implementation plans to get positive results from result-oriented projects like Nishorgo Support Project (NSP). NSP is unique in its objectives focussing only on the PAs and co-management of the forestry resources. The existing data with the GIS-based RIMS Unit is a decade old that needs to be updated to assess the current situation of the PAs. With the updated land use and habitat maps it will be easy to ascertain the present status of the PAs in terms of their boundaries, quantification of the different habitat types and physical changes that have occurred since the particular forest areas were notified as PAs.

Data from reconnaissance surveys followed by some detailed surveys of priority areas will verify the actual ground situation and through appropriate analyses and interpretation will allow Planning for inputs to protected area facility, visitor amenities and habitat management

developing realistic base maps to work on. The need for development of a PA management system ignored over the years has given rise to problems like boundary delineation, encroachment into PA area, habitat degradation, etc. This can be assessed with an updated land use map. Moreover, a system need to be developed for regular monitoring, the data can be fed into the system for updating the base map and resources assessment.

It is also a known fact that the FD lacks the capacity to manage the PAs. Having a proper and standardized base map will allow the FD staff to foresee the issues necessary to address for PA management. With some technical help the staff can improve their capacity in PA management.

Up-to-dated base maps supported by field surveys will help in selecting locations for nature trails and other visitor amenities.

4.1.3 Activities:

1. Acquisition of latest satellite imageries (high resolution IKONOS or aerial images) for each of the PAs and prepare updated land use base maps. Maps to be standardized with previous maps by comparing with previous RIMS data/maps
2. Identify different land use practices
3. Produce actual maps based on groundtruthing using Differential GPS for habitat types and land use classification
4. Develop questionnaires for visitor needs survey
5. Install PA location approach markers, signs for visitors' convenience
6. Survey team to be comprised of GIS specialists, land use planners, landscape architects, PA management specialist, botanists and zoologists
7. Calculate in terms of areal coverage of habitat types and land use
8. Identify areas suitable for:
9. Establishing visitor center and/or education center
10. General purpose visitor use
11. Walking trails (general visitors – trail location and trail length)
12. Nature trails for specific needs like bird-watching, nature photography, bike trails, rock-climbing (trail location and trail length)
13. Wildlife corridors
14. Questionnaire survey of the visitors to assess the needs and types of visitor services and educational/awareness materials

4.1.4 Implementing Agencies:

1. RIMS Unit - Forest Department
2. NSP Team

4.1.5 Expected Outputs:

1. Acquisition of latest satellite imageries
2. Updated 2004 land use and forest vegetation maps of the designated PAs
3. Vegetation classification and boundary delineation
4. Quantification of habitat types within each designated PAs
5. Selection of nature trail locations and
6. Information and assessment of visitor needs

4.1.6 Budget:

Activity (for each site)	Persons	Nos	Unit Price Tk. (=USD)	For each site (Tk)	Total for all five sites Tk (= USD)
Reconnaissance survey, marking DGPS reference sites	6	20 days	1000/person	120,000	600,000 (= USD10,345)
Transportation (rent-a-car if needed)		20 days	1,500 per day	30,000	150,000 (= USD 2,586)
Acquisition of IKONOS images – CEGIS		694 (sqkm)	4,640 =USD80/sqkm (+ tasking fee \$5.000/site)		4,060,000 (= USD 70,000)
Interpretation, geo- referencing, data standardization, analyses, processing and map production - CEGIS					8,707,540 (=USD 150,130)
Visitor questionnaire survey		1,000 Nos.	50/ques'naire	50,000	250,000 (=USD 4,310)
Total					13,767,540 (=USD 237,372)

4.2 Activity#2: PA boundary demarcation: markers, signs

4.2.1 Objectives:

1. Demarcation of PA boundaries using permanent on-ground physical reference markers complying with DGPS coordinates for future referencing
2. Establish PA core and buffer areas based on realistic zonation criteria

4.2.2 Rationale:

It is imperative for PA management that the Park managers are fully aware of spatial area under their jurisdiction. In addition by demarcating the PA boundaries the people living around the PA and the visitors are also informed of the PA boundaries. Just by demarcation, the people by default know the limitations of their activities. However for the purpose of management, the delineation makes it clear to the managers, the extent of forest and wildlife resources, the habitat types that he has to manage. Further, demarcating the PA areas help in the preparation of the management plans of the resources and the habitats alike.

Unfortunately, negligence in the past has now posed serious threats to the ownership claims of the FD in some sections of the PAs. The human population has increased manifold, demand for the forest resources has also increased, PA land encroached for human settlements and for cultivation, and many more. It is high time now that the boundaries of the PAs are marked. In lieu of these problems, the areas of high encroachment should be identified and some flexibility to be maintained in the form of co-management but not at the cost of the land ownership.

Classification of the PA structure based on ecosystems, habitat types carry most of the weight in PA management. A clear understanding of the vegetation, wildlife, habitats and ecosystems is essential based on which criteria should be developed to demarcate areas within the PA for

classification in ‘core’ and ‘buffer’ areas. Under the present circumstances to make things workable an up-to-date land use maps and PA aerial images are unavoidable.

4.2.3 *Activities:*

1. Review resource mapping and resource utilization/assessment methods currently in practice
2. Refer to the original GOB gazette notification for PA notified boundaries for location of reference points
3. Use DGPS for marking demarcation reference points to feed GIS-based RIMS maps and the newly acquired IKONOS or aerial images for identification, delineation and comparison of changes in PA physical boundaries and habitat structure
4. Identify prominent landmarks features for identification, get DGPS coordinates
5. Construct easily visible, durable and easily maintained physical structures (like pillars) for permanent future references (in addition to the natural landmarks) at the selected sites
6. Location approach markers, signs of the PA

4.2.4 *Methods:*

1. Acquire GOB gazette notification (see PA site-specific management plans prepared by TecSult Int’l Ltd). For the Satchari NP, the proposed gazette notification boundaries see Annex 2).
2. Ground surveys for comparison with map images (can be linked with Activity #1)
3. Identify areas with high encroachment problems and quantify the area
4. Conduct some RRA/PRA surveys in those areas for reaching some sort of co-management partnership with the FD
5. Resources mapping and assessment
6. Conduct research for value-added products of the resources currently utilized by the people dependent on it
7. Feel the sentiment of the local people and proceed gradually, may be starting with temporary or natural markers and later marking the boundaries with permanent markers with DGPS bearings.

4.2.5 *Implementing Agencies:*

1. RIMS-Forest Department
2. NSP Team members

4.2.6 *Expected Outputs:*

1. Initiation of the process for demarcating the PA boundaries
2. Selection of criteria for core and buffer area within the PAs
3. Identification and quantification of encroached areas
4. Initiation of the process for co-management between FD and local people

4.2.7 *Budget:*

Activity	Nos.	Unit Price	Total Tk. (= USD)
DGPS markers - survey			See Activity #1

Concrete Pillar markers (on average 4 pillars per ha, 100m apart)			
Lawachara – 1,250 × 4	5,000	235	1,175,000 (20,259)
Rema-Kalenga – 2,505 × 4	10,020	235	2,354,700 (40,598)
Teknaf – 26,773 × 4	107,09	235	25,166,620 (433,907)
Chunati - 17,042 × 4	68,168	235	16,019,480 (276,198)
Satchari – 243 × 4	972	235	228,420 (3,938)
Sub-Total	191,25		44,944,220 (774,900)
Steel ID-plates for pillars	191,25	650	124,313,800 (2,143,342)
Signs, Billboards (50 per site × 5)	250	10,000	2,500,000 (43,104)
Sub-Total			126,813,800 (2,186,445)
Grand Total			171,758,020 (2,961,345)

In view of high costs to be incurred for Steel ID-plates for pillars, it is recommended to give less priority to this item. So steel plates will be erected only when adequate funds are made available in future under some project.

4.3 Activity #3: Developing and marking nature trails

4.3.1 Objectives:

1. Support and development of eco-tourism industry
 2. Provide opportunity and allow the visitors to enjoy nature and observe wildlife
 3. Develop protocols for nature watch along the trails (DO's and DON'Ts)
 4. Register and monitor visitors using nature trails
- (Note: nature trails are not picnic or camping spots)

4.3.2 Rationale:

With the population boom and urbanization there is a serious dearth of recreation areas and facilities for the general public. PAs can provide a unique recreation opportunity for the urban and rural dwellers alike with amenities to visit the forested areas to enjoy, understand and appreciate nature, observe wildlife, and leisure activities. The pre-condition for opening up this venture, however should be through developing proper guidelines for the visitors, vigilant monitoring and enforcement of the rules and regulations.

With the recent boost and support by the government to the tourism industry, the FD can contribute a lot in the development of this industry by providing opportunities, facilities and amenities to the increasing numbers of local and foreign visitors to the country. To accommodate the visitors and to provide them with opportunities for relaxing and observing nature, trails should be developed and maintained in some sections of the PAs.

4.3.3 Activities:

1. Reconnaissance surveys to select trails through diverse habitats and landscape of the designated buffer zone allowing visitors to observe and enjoy nature (can be linked with Activities #1 and #2)
2. Trails could be part of the existing paths within the PAs, whereby new extended trail routes could be developed
3. Each trail to be marked on the ground (also in the base map), and with adequate numbers of information boards providing detailed information on the habitat, wildlife and “DOs and DON'Ts”
4. Printed materials on the guidelines to use the PA facilities and nature trails
5. Additional information boards should contain detailed trail network to orient the visitor of his/her location and other geography and to provide the visitors' with options to choose trails and that they remain on the trails
6. Trails should have some visitor amenities like resting places and rest rooms, which are to be attended and regularly maintained
7. Communication facilities like walkie-talkies at each of these resting places to handle or attend to any emergency situation or rescue operation
8. Construct board-walk/catwalk where necessary to avoid any blockage to any forest streams
9. Construction of hides and screens along the trails for observing wildlife
10. There should be sufficient numbers of thrash or waste disposal containers along the trails at convenient locations for the visitors. These have to be maintained and regularly cleaned
11. The number of visitors entering the PAs or using the nature trails should be strictly regulated.

12. Provision for hefty on-spot fines in cases of littering or fire

4.3.4 *Implementing Agencies:*

1. Forest Department
2. NSP Team members
3. Local co-management partners

4.3.5 *Expected outputs:*

1. Promotion of eco-tourism
2. Selection of trail locations and development of nature trails in specific sections of PAs
3. Development of facilities and amenities for the visitors
4. Awareness among the visitors and users of PA facilities on the importance of conservation and management of natural areas
5. Since this is a service-oriented venture, proper guidelines will be developed to assist and monitor the visitors and their activities
6. Additional revenue will be collected from the visitors in the form of entrance fee, photography fee, etc.

4.3.6 *Budget:*

Activity	Nos.	Unit Price	Tk. (=USD)
Survey (link with Activities #1, #2)			} 2,175,000 (= USD 37,500)
Trail markers (wooden)			
Trail Information Boards		Gross	
Resting Facilities		100,000	
Mobile Toilets/Restrooms		75,000	
Trash Cans (wooden – see FSP designs)	One each 100m apart	1,500	
Hides (wooden – at few selected areas)		150,000	
Boardwalks (wooden – where necessary)			
Observation Screens (wooden – selected sites)		10,000	
Labor costs for trail development		100/person/d ay	

(To be determined on the length of the nature trails)

4.4 Activity #4: Office and field equipment: Use, care and maintenance

4.4.1 Objectives:

1. Develop protocols for the use, care and maintenance of office and field equipment by the staff
2. Provisions for renting equipment to visitors

4.4.2 Rationale:

Very often the field equipment like binoculars, camera, etc., intended for use by the PA staff, particularly wildlife staff are kept at the Divisional HQs, miles away from where it should be. The very logical reasons for this is the lack of knowledge and training of the field-level staff on the usage procedures and proper storage facilities at the field level. With the establishment of administrative-cum-visitor facilities at the respective PAs this problem will no longer be there, thus allowing storage of field equipment. Renting out some of the equipment (like binoculars) to the visitors and charging a modest fee from the visitors on the use of still/video cameras within the PA can be an additional income source.

Location of some of the PAs (e.g., Rema-Kalenga WS) is quite remote and with no power supplies. For the working of humidifiers and maintenance of the optical equipment power supply is essential and using solar power will be a cheaper option than installation of land-based power connection from the grid lines. Maintenance again will be a key factor for efficient service.

4.4.3 Activities:

1. One room within the Education/Visitor center should be equipped with humidifiers for keeping the room warm and dry to prevent fungus from growing on the optical lenses
2. Cost-efficient and durable humidifiers to be constructed (assembled) with locally available technologies
3. Inventory of the field and other equipment
4. Establish or procure appropriate storage facilities particularly for optical equipment like binoculars, cameras, telescopes
5. Assign a staff with specific responsibilities
6. Provide training to PA staff on the use and care of equipment
7. Determine the fee for renting optical equipment to visitors
8. Maintenance of a register on equipment use

4.4.4 Implementing Agencies:

1. Forest Department

4.4.5 Expected Outputs:

1. Storage facilities for optical equipment
2. Training of PA staff on selected equipment use and maintenance to ensure optimal performance and longevity of the equipment

4.4.6 Budget:

Activity	Nos.	Unit Price	Total Tk. (=USD)
Training + materials	1 person × 2 days × 5	10,000	50,000 (862)
Humidifier	5 Nos.	50,000	250,000 (4,310)
Solar Power + accessories	5 sets	100,000	500,000 (8,621)
Carrying Costs (Gross)			5,800 (100)
Total			805,800(13,893)

4.5 Activity#5: Preparation and installation of information billboards

4.5.1 Objectives:

1. Awareness on the importance of PA
2. Awareness on the need for conservation of forests and wildlife

4.5.2 Activities:

1. Selecting easily visible sites for hoisting information billboards on the uniqueness of the habitat and wildlife of the PA
2. Prepare billboards with information highlighting the conservation needs
3. Construct steel-framed billboards (FSP specifications)
4. On average, ten billboards for each site at strategic locations

4.5.3 Implementing Agencies:

1. Forest Department
2. NSP Team members

4.5.4 Expected Outputs:

1. Awareness about the PA among the general people
2. Information dissemination about the natural resources and the need for their conservation

4.5.5 Budget:

Activity	Nos.	Unit Price	Total Tk. (= USD)
Permanent Steel-framed Billboards with information	50	10,000	500,000 (8621)
Charges for installation	50	2,000	100,000 (1,725)
Total			600,000 (= USD 10,396)

4.6 Activity #6: Developing environmental and conservation education programs

4.6.1 Objective:

1. Developing educational materials directed at different age and education levels
2. Organize special programs, including audio-visuals for the visitors
3. Develop hands-on activities for the students to acquaint them with nature
4. Educational materials addressing the need and importance of conserving nature and managing PA in particular

4.6.2 Activities:

1. Identify and list extraordinary features, flag-ship species
2. Prepare scripts (concise and meaningful) to highlight the importance, uniqueness of the respective PA. Highlight these unique features and the need for protection and conservation
3. Design and plan communication means (pamphlets, worksheets, questionnaires, quiz programs, etc)
4. Link the PA issues with human activities so that people realize and know how their activities are affecting the PAs

4.6.3 Implementing Agencies:

1. NSP Team members
2. Forest Department

4.6.4 Expected Outputs:

1. Development of educational programs for awareness building particularly for policy makers, administrators, students and the general masses
2. Audio-visuals for awareness campaign

4.6.5 Budget:

Activity	Nos.	Unit Price	Total (= USD)
Audio-Visuals: Making of a film on nature for regular screening at the Visitor Center	1	300,000	300,000 (5,175)
Educational and information materials (regular production for free distribution to the visitors)	100,000	15	1,500,000 (25,862) (To be replenished regularly)
Development and production of worksheets for students (regular production – different educational levels)	Gross estimates	25	500,000 (8,621) (To be replenished regularly)
Total			2,300,000 (=USD 39,658)

4.7 Activity #7: Regular pictorial newsletter/bulletin on the Protected Areas

4.7.1 Objective:

1. Production and dissemination of information on the PA management issues, activities, programs
2. Awareness building and update on the PAs

4.7.2 Activities:

1. Produce colorful, informative newsletter/bulletin named after the project “Nishorgo” - two issues a year (A-4 size, 2 forma, 16 pages) in dual language - Bangla/English
2. Call for articles and appoint an editorial board of professionals
3. Popular and/or technical articles to focus on activities, issues related to PAs
4. Invite articles from people of different walks of life, professionals, and visitors who have been to any of the PA.
5. Ensure provisions for Citizens’ PA Status Report
6. Editing and verification
7. Initially free distribution to media, FD, other professionals and selected general readers
8. Free distribution of newsletter/bulletin to visitors at each PA

4.7.3 Implementing Agencies:

1. NSP Team members
2. Forest Department

4.7.4 Expected Outputs:

1. Updates on the management status, activities of the PAs
2. Supplement to awareness building programs

4.7.5 Budget:

Activity	Nos.	Unit Price	Total Tk (= USD)
Editorial charges	4 issues	5,000	20,000 (345)
Type set	4 issues	40,000	160,000 (2,759)
Color separation	4 forma	20,000	80,000 (1,380)
Paper	64 reams	500	32,000 (552)
Printing	4,000 pages	20	80,000 (1,380)
Postage/Courier	2000 Nos	10	20,000 (345)
Other charges	4 issues	3,450	13,800 (238)
Total			405,800 (=USD 6,999) (to be replenished regularly)

4.8 Activity #8: Establishment of Visitor Reception and Education Centers

4.8.1 Objectives:

1. Establish a visitor reception area for the respective PA
2. Educational facilities for the general public and schools on nature and environment contributing to awareness building
3. Display of the unique natural resources, ecosystems of the respective PA
4. Awareness building of general public/visitors to enjoy, conserve and protect nature and natural resources

4.8.2 Activities:

1. Construction of eco-friendly structure to blend with surrounding forested landscape to house the administrative office, reception area, public briefing area, display area and with communication facilities
2. Maintenance of the structure has to be ensured by the FD. Mechanisms need to be developed through the money received from the visitors.

4.8.3 Implementing Agencies:

1. Forest Department
2. Professional architects/landscape designers (e.g., SAIUJ Consultants)

4.8.4 Expected outputs:

1. Establishment of a multi-purpose visitor facility

4.8.5 Budget:

Activity	Nos.	Unit	Tk. (=USD)
Environment-friendly structure blended with the landscape consisting of approach road, parking lot, reception area, ticket counters, display area and other educational facilities and visitor facilities like rest rooms, drinking water supply, cafeteria, etc.	5	To be based on the design, floor-space, facilities, materials used, etc. (see PCP)	(see Physical Structures in the PCP)

4.9 Activity #9: Habitat restoration and/or rehabilitation

4.9.1 Objectives:

1. Identify and prioritize the causes of habitat degradation in each PA
2. Mitigation measures to ensure the gradual arrest of factors for habitat degradation in each PA
3. Develop guidelines and identify indicators for monitoring the changes
4. Propagation and plantation of selective indigenous forest plant species in areas needing intervention (existing, new proposed and buffer area)
5. Identification, control and/or annihilation of Alien Invasive Species (AIS) from PAs

4.9.2 Rationale:

Management of Protected Areas and habitat restoration within the PAs has been identified as one of the key strategies in the proposed Bangladesh National Biodiversity Strategy Action Plan in order to protect and conserve the country's biodiversity. The NSP provides an opportunity to actually implement the actions proposed in the Strategy, some of which are mentioned above.

Several factors are known to contribute to habitat degradation of the forests including PAs. If this continues unabated it is very likely that Bangladesh will lose some of the important natural heritage sites as well as the natural resources and the diversity of the life forms unique to these areas.

The deteriorated ecosystems and habitats within the PAs need to be identified and quantified and measures taken to protect them from further degradation and restore them by planting similar species that used to grow in those areas. Comprehensive biological information on the resources including both flora and fauna are wanting, which is an impediment in the selection of the right species and composition. Hence the need to acquire scientific knowledge on the indigenous plant species should be a priority when considering habitat management and restoration.

Pragmatic and effective monitoring system need to be developed to monitor the changes in the habitats and other wildlife. Monitoring indicators currently being developed by NSP need to be tested and verified for efficacy. Based on the monitoring, guidelines and prescriptions can be developed for habitat restoration. Transparency in monitoring and assurances to comply with the guidelines will be key in the success of habitat restoration.

4.9.3 Activities:

1. Develop a PA management and habitat restoration policy and work plan
2. Review previous documents and carry out reconnaissance surveys to identify the factors responsible, target locations within the PA (including acreage), and magnitude of habitat degradation
3. Use aerial photographs or high-resolution satellite images to analyze land-use patterns, identify selected target areas and quantify areas under different forms of degradation and habitat types
4. Identify Alien Invasive Species (AIS) and take control measures

5. Select plant species of higher ecological value (including palatable fruit and/or fodder plants for wildlife species), for propagation and later enrichment plantation at selected target areas
6. Prepare nurseries for propagation of selected species
7. Silvicultural manipulation of canopy for reducing exotic species as well as habitat improvement, followed by enrichment plantation of palatable grasses and fruit species for wildlife
8. Ensuring arrest or significant reduction in human disturbances for either natural regeneration or survival of plantations
9. Develop enrichment plantation work plan for the target area
10. Maintenance and monitoring the plantations through surveys and reporting to the PA management authority
11. Increase and ensure surveillance patrolling in and around the PAs

4.9.4 *Implementing Agencies:*

1. Forest Department
2. NSP Team members
3. Co-management partners

4.9.5 *Expected Outputs:*

1. Identification and quantification of degraded habitats
2. Identification and control measures for Alien Invasive Species (AIS) in PAs
3. Work plan for habitat restoration
4. Selection of habitat specific plant species for plantation

4.9.6 *Budget:*

(These are indicative figures that can finally be worked out or refined while formulating the work plan)

Activity	Nos.	Unit Price	Total Tk. (=USD)
Seed Collection – Gross estimates			2,900,000 (=USD50,000)
Nurseries maintenance	5	Tk.20,000	100,000 (=USD1,725)
Enrichment Plantation			
Lawachera NP	10% of	Tk.10,000/ha	1,250,000
Rema-Kalenga WS	5% of area	Tk.10,000/ha	1,252,500
Satchari NP	10% of	Tk.10,000/ha	243,000
Teknaf GR	5% of area	Tk.10,000/ha	13,386,500
Chunati WS	5% of area	Tk.10,000/ha	8,701,000
Total			27,833,000 (=USD479,880)

4.10 Activity #10: Capacity building and facility development of FD staff in remote sensing and GIS application

4.10.1 Objectives:

1. Train FD staff on remote sensing and GIS application
2. Assess the current status to update present facilities of the GIS-based RIMS Unit

4.10.2 Activities:

1. Identify areas of capacity building in remote sensing and GIS applications
2. Procure relevant software and hardware for facility development
3. Employment of at least two more staff in the RIMS unit

4.10.3 Implementing Agencies:

1. NSP Team members
2. RIMS Unit, Forest Department

4.10.4 Expected Outputs:

1. Capacity building of the existing FD staff
2. Employment opportunities for new skilled staff
3. Opportunity to learn about the recent developments and GIS applications

4.10.5 Budget:

Activity	Nos	Unit Price	Total (= USD)
Acquire new software/upgrading present system	GROSS		2,900,000 (=USD 50,000)
Hands-on training of FD staff on new GIS applications, interpretation			
TOTAL			2,900,000 (=USD 50,000)

4.11 Activity #11: Conduct studies on endangered and locally important faunal and floral species for conservation

4.11.1 Objectives:

1. Documentation of faunal biodiversity within the PAs
2. Listing endangered species inhabiting the PAs
3. Collect biological information on the flora and fauna from management perspectives

4.11.2 Activities:

1. Develop plans for systematic, comprehensive and regular surveys
2. Develop appropriate documentation protocols
3. Develop standard survey methodology (like using grids)
4. Capacity building – train and equip staff for conducting surveys
5. Develop and maintain preservation facilities and record-keeping

4.11.3 Implementing Agencies:

1. Forest Department
2. NSP Team members
3. Universities

4.11.4 Expected Outputs:

1. Collection of biological information from the PA managers' perspectives for decision making

4.11.5 Budget:

Activity	Tk. (= USD)
Studies on flora and fauna (Gross)	10,921,632 (=USD 188,304)

4.12 Activity #12: Habitat enhancement for butterflies and other pollinating insects

4.12.1 Objectives:

1. Plantation of plant species attractive to butterflies, bees and other pollinator insects

4.12.2 Activities:

1. Identification and selection of species inviting pollinators
2. Identification and assessment of pollinating insects

4.12.3 Implementing Agencies:

1. Forest Department
2. NSP Team

4.12.4 Expected Outputs:

1. Habitat enhancement for pollinating insects

4.12.5 Budget:

Linked with studies and activities for plantation component

4.13 Activity #13: Conserving natural water sources and creating artificial water holes for wildlife

4.13.1 Objectives:

1. Improvement of habitat through restoration of natural sources of water for wildlife use
2. If necessary create artificial water holes

4.13.2 Activities:

1. Inventory of the major wildlife and water sources in each PA
2. Studies to collect information on the utilization of water by key wildlife species
3. Restore existing streams flowing through the PAs through clearing the sediments, other blockages along the water ways
4. Selection of appropriate sites for creating artificial water holes, if necessary

4.13.3 Implementing Agencies:

1. Forest Department
2. NSP Team members

4.13.4 Expected Outputs:

1. Management and restoration of watershed areas for natural supply of water to wildlife in the PAs
2. Interventions for restoration of water sources like streams or rivers by sediment removal or excavation
3. Water sources for wildlife throughout the year

4.13.5 Budget:

These are indicative figures and can be refined later on during finalization, depends on the amount of earthwork and displacement area

Activity		Unit Price	Total Tk. (=USD)
Earth/sediment removal	Gross estimates	1,500/thousand cft	Tk.2,900,000 (=USD 50,000)

5. PROJECTED EXPENSES:

The available grant money for wildlife and habitat restoration (Table 6) is significantly less than the proposed budgetary requirements for implementation of the proposed activities (Table 7). However by prioritizing the activities that are deemed necessary for immediate implementation would resolve to some extent the budgetary requirements for implementation of the NSP (Table 7). The remaining activities may be implemented with requisition for more funding in the future from other sources. For example, FSP has some money left for plantation that may be used in consultation between these two projects.

Table 6. Gross estimated budget for Reimbursable Project Aid (RPA) (from revised PCP, dt. 21-03-2004)

Expense Heading	From PCP (RPA) (Tk. '000)
Physical Construction	788.80
Vehicles	52.50
Office stuff (computers, etc.)	30.80
Habitat & Wildlife Management (see Table 7)	473.61
Sub-Total	1,345.71
RPA Management Fee (7% of RPA)	101.27
Total	1,446.98

The proposed budgetary requirement (Table 7) is for all the components as proposed in the draft PCP. Three 'Options' have been budgeted for, keeping in mind the immediate needs, and actions that may compliment the present actions in the long run. Prioritization is of utmost importance in deciding what the situation demands and what can be effectively done to accomplish the objectives and the goals.

Table 7: Projected budgetary requirements for the conservation and management of the five Protected Areas under the Nishorgo Support Project.

Expense Head	Estimated Amount Tk. (=USD)		
	Option 1	Option 2	Option 3
Physical structures (see PCP)	78,880,000 (=USD 1,360,000)	78,880,000 (=USD 1,360,000)	78,880,000 (=USD 1,360,000)
<i>Vehicles</i>	5,250,000 (=USD90,517)	5,250,000 (=USD90,517)	---
<i>Office staff</i>	3,080,000 (=USD53,104)	---	---
<i>IKONOS Satellite Imagery</i>	4,060,000 (=USD 70,000)	4,060,000 (=USD 70,000)	---
Data interpretation, Land use, habitat type maps	8,707,540 (= USD 150,130)	7,540,000 (= USD 130,000)	
RIMS-GIS capacity building	8,374,000 (=USD 144,380)	8,374,000 (=USD 144,380)	---
Questionnaire Survey – assess visitor needs	250,000 (=USD 4,310)	---	---
Boundary demarcation – concrete pillars	44,944,220 (=USD 774,900)	---	---
Steel ID Plates for pillars	124,313,800 (=USD 2,143,342)	---	---
Bill boards for demarcation	2,500,000 (=USD 43,104)	2,500,000 (=USD 43,104)	2,500,000 (=USD 43,104)
Trail marking (Gross estimates)	2,175,000 (=USD 37,500)	---	---
Field equipment (binoculars, cameras, humidifiers)	1,150,000 (=USD 19,828)	---	---

Table 7 (contd.): Projected budgetary requirements for the conservation and management of the five Protected Areas under the Nishorgo Support Project.

Expense Head	Estimated Amount Tk. (=USD)		
	Option 1	Option 2	Option 3
Care and maintenance of field equipment	805,800 (=USD 13,893)	---	---
PA Information Billboards	600,000 (=USD 10,396)	---	---
Trail bill boards	260,000 (USD= 4,483)	260,000 (USD= 4,483)	260,000 (USD= 4,483)
Education Programs	2,300,000 (=USD 39,658)	---	---
Newsletter	698,000 (=USD 12,035)	---	---
Endangered fauna and related studies	5,800,000 (=USD 100,000)	10,921,632 (=USD 188,304)	10,921,632 (=USD 188,304)
Nature films	1,500,000 (=USD 25,862)	---	---
Training for capacity building of RIMS staff	2,900,000 (=USD 50,000)	2,900,000 (=USD 50,000)	---
Stream Conservation (Water sources) Gross	2,900,000 (=USD 50,000)	2,900,000 (=USD 50,000)	2,900,000 (=USD 50,000)
<i>Enrichment plantation</i>	27,833,000		
<i>Habitat restoration + grassland management</i>	8,374,000 (=USD 144,380)	8,374,000 (=USD 144,380)	---
<i>Nature Trails</i>	2,900,000 (=USD 50,000)	2,900,000 (=USD 50,000)	2,900,000 (=USD 50,000)
Management Fee (7% of the RPA)	10,127,000 (=USD 174,604)	10,127,000 (=USD 174,604)	10,127,000 (=USD 174,604)

<i>TOTAL</i>	340,555,360 (= USD 5,871,702)	144,986,632 (= USD 2,499,772)	117,196,172 (= USD 2,020,625)
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7. ANNEXES

7.1 Terms of Reference

The present consultant report is based on the following Terms of Reference. However, during discussion with the related project staffs of both the IRG and the FD it was deduced that priority input should be in Objective 6, particularly with habitat and wildlife management. The proposed activities and estimated budgets have been provided where applicable. In some cases the budget estimation was not done since actual figures will be needed to make any assumptions on the costs involved.

Following is the excerpt for the TOR signed by the consultant with IRG.

Recommend **priority activities** to achieve overall Objectives 5 and 6

Rationale and approach to each of those activities

Expected outcomes from each of those activities

Estimated cost of each of those activities. Estimated cost information should be organized in a format consistent with its ultimate inclusion in the Project Proforma (PP) structure of the GOB

Tasks Assigned:

Review existing recommendations and budgets relevant to Objectives 5 and 6 of the existing PCP.

Discuss available and programmed resources at the FD, FSP and any other programs for addressing the needs under Objective 5 and 6.

Seek and obtain feedback from the FD and key partners about recommended strategies and needs for addressing Objectives 5 and 6.

Prepare a conceptual approach and specific activities, based on the existing PCP's Objectives 5 and 6 for future implementation.

Prepare accompanying budgets for these recommended activities.

7.2 (Proposed Notification Letter of Satchari NP)

7.3 List of persons contacted (in alphabetical order):

Ahmed, Rasheduzzaman. Senior Program Officer, IUCN-Bangladesh.

Alam, Md. Khairul. Project Manager, NBSAP, IUCN-Bangladesh.

Azam, Atiqul. Divisional Forest Officer, Forest Department, Sylhet.

Collis, Bill. Winrock International, Dhaka.

DeCosse, Philip. Chief-of-Party, Nishorgo Support Project/International Resources Group, Dhaka.

Dey, Tapan Kumar. Divisional Forest Officer, Wildlife & Nature Conservation Circle, Forest Department, Chittagong.

Gani, Osman. Deputy Chief Conservator of Forest, Forest Department.

Huq, Iffat. CEGIS, Gulshan, Dhaka.

Islam, Shahidul. CEGIS, Gulshan, Dhaka.

Khan, Anisuzzaman. Senior Program Officer, Biodiversity Unit, IUCN-Bangladesh.

Khan, Mamunul. USAID, Dhaka.

Khatun, Shirina. Deputy Conservator of Forest, Wildlife & Nature Conservation Circle, Forest Department.

Mahmud, Hasan. Architect, SAIUJ Consultants, Mohammadpur, Dhaka-1207.

Mondal, Md. Iklil. Conservator of Forest, & Project Director, ADB-Forestry Sector Project, Forest Department.

Rahman, Makhlukur. Nishorgo Support Project, International Resources Group, Dhaka.

Rahman, Shamsur. Conservator of Forest, Wildlife & Nature Conservation Circle, Forest Department.

Roy, Monoj Kanti. Conservator of Forest, Central Circle & National Project Coordinator, Nishorgo Support Project, Forest Department.

Rubaiyat. Pioneer Printers, Nilkhet, Dhaka-1000.

Sharma, Ram. Nishorgo Support Project/International Resources Group, Dhaka.

Siddiqua, Raihana. Senior Research Officer, RIMS-Unit, Forest Department.