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Bangladesh Forest Department

Management Plan
For
Khadimnagar National Park

Bangladesh Forest Department
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Management Plan
For
Khadimnagar National Park

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List of Acronyms

ACF - Assistant Conservator of Forests
ADB - Asian Development Bank
AIG - Alternative Income Generation
ANR – Assisted Natural Regeneration
CBC – Community Based Conservation
CBD- Convention on Biological Diversity
CCF - Chief Conservator of Forest
CF - Conservator of Forest
CMC – Co-management Committee (the operational body of the Co-management Council which is referred to in full to avoid confusion, except that CMC may refer to the combination of both committee and council in some places)
CMO – Co-management Organization
CPG – Community Patrol Group
DCCF- Deputy Chief Conservator of Forest
DCF- Deputy Conservator of Forest
DFO - Divisional Forest Officer
EIA - Environmental Impact Assessment
FCC- Forest Conservation Club
FD - Forest Department
FG - Forest Guard
FRH- Forest Rest House
KHNP- Khadimnagar National Park
FRMP - Forest Resource Management Project
FSP - Forestry Sector Project
GIS - Geographic Information System
GoB- Government of Bangladesh
IPAC – Integrated Protected Area Co-management
IUCN - International Union for Conservation of Nature
JFM – Joint Forest Management
LDF - Landscape Development Fund
MIST- Management Information System
NACOM - Nature Conservation Management
NGO - Non-Governmental Organization
NIC - Nature Interpretation Centre
NP- National park
NSP - Nishorgo Support Project
NTFPs - Non-Timber Forest Products
PA - Protected Area
PCVA – Participatory Community Vulnerability Assessment
PF- Protected Forest
PF- Peoples Forum
PBSA - Participatory Benefit Sharing Agreement
PP - Project Proforma
PRA - Participatory Rural Appraisal
RF - Reserved Forest
RIMS - Resource Information Management System
RO- Range Officer
RRA - Rapid Rural Appraisal
TA - Technical Assistance
TFF – Tree Farming Fund
UNDP - United Nations Development Program
UNO- Upzilla Nirbahi Officer
UP- Union Parishad
USAID - United States Agency for International Development
VCF- Village Conservation Forum
WC - Working Circle

Executive Summary

Khadimnagar National Park (KHNP) is under the jurisdiction of North Sylhet range -1 of Sylhet Forest Division. The park is located 15 km northeast of Sylhet city near the Sylhet–Tamabil highway within Khadimnagar Sadar Upazilla. This forest was once rich in floral and faunal diversity. At present it is a secondary forest due to over exploitation and habitat degradation. Khadminagar NP is surrounded by six tea gardens which enhance the scenic attraction of visiting the area.

This management plan has been developed to cover not only the protected area but also the surrounding impact area; these are the focus of the Khadimnagar Co-Management Council and Committee (CMC). This plan was prepared in a consultative, participatory process and becomes the defining reference for activities of Forest Department (as well as the CMC) within Khadimnagar National Park and sets out guidelines and activities for the CMC in the impact area for 10 years period **(2015-2025).**

Khadimnagar National Park (KHNP) is an important habitat for both flora and fauna. This ecosystem has great value for the local environment and livelihood. The long term vision is to restore a healthy biodiverse semi-evergreen forest; and this is actively supported and protected by local communities and enterprises who benefit from tourism, non-timber forest products, and soil and water conservation, and who adopt sustainable land management adapted to future climate changes. The aims of this plan are: 1) to preserve and rehabilitate degraded forest and to restore biodiverse evergreen forest through enhanced natural regeneration; 2) to limit biomass extraction from the NP; 3) to achieve sustainable natural resource use in the landscape ; 4) to promote improved livelihoods for 3,038 households living around and impacting the NP based on sustainable climate change resilient enterprises and services; and 5) to promote nature based tourism based on suitable visitor facilities that provide sustainable income flows for co-management and livelihoods.

The management plan takes into account recent developments towards co-management under the Wildlife (Preservation and Security) Act 2012 and international standards on biodiversity conservation of protected areas. The management prescriptions are given on the basis of zonation i.e. core zone, buffer zone and impact zone.

The management issues and threats identified are: Landuse, forest resource extraction, habitat degradation and fragmentation, climate change, tourism, and wildlife conservation and protection.

The original forests of Khadimnagar were moist deciduous with mixed tropical evergreen trees dominated by *Diptercarpus* spp. (Garjan) along with bamboo as under story; but now most of the area is mixed grasses and scrub forests. In addition Sylhet region is highly vulnerable to extreme climatic event. Flash flood, rain storms, and landslides already cause losses to people, livestock, crops and natural vegetation; and may intensify over time.

The basic principle of this management plan is a people oriented approach where local stakeholders are organized and represented from their villages and interest groups, along with Forest Department and other government agencies in the Khadimnagar Co-management council and its executive committee .The plan assesses the present situation of biodiversity, resource protection and management, human interferences, impact zone landscape positions, and based on this analysis sets out priority management actions for a ten year period.

Khadimnagar National Park covers 678.8 ha. Within its immediate impact or landscape area are six privately owned tea estates surrounding the NP along with 6686 ha of private land of which 1924 ha area covered with tea garden.

The boundary of Khadimnagar National Park is not well demarcated. Although the NP was notified in 2006, no efforts have so far been made to physically demarcate the boundary in the field. The situation has been exacerbated by heavy human pressure on the forest resulting in degradation of remaining forest, loss of habitat, and loss of wildlife. It is a high priority to define and demarcate the boundary and to update the record of rights if this plan of actions is to be implemented.

There is no buffer forest around the NP. But there are six tea gardens adjacent to the NP which to some extent acts as a buffer zone, although people living in the tea gardens extract forest resources and one tea garden was forced by the courts to abandon an area planted with tea within the NP. Closer linkages and coordination with the management of these tea gardens are needed, and their representatives should be included in the co-management council and committee.

Non-Timber Forest Products (NTFPs) play an important role in Khadimnagar NP and its impact zone providing livelihoods and employment to the forest dependent communities. Unfortunately over-exploitation of NTFPs including illicit cutting of fuel wood, bamboo, etc. has resulted in the degradation of the forest and NTFP resources. In Khadimnagar large scale plantations have been raised by FD including bamboos. Now the bamboo plantations are mature and there are dead stems. To reduce fire hazard it is appropriate to permit limited extraction of matured bamboos without adversely affecting habitat, a quota for bamboo stems for identified forest using households on condition that they end all other damaging practices (such as hunting or cutting saplings) can be developed.

Linkages with markets and service providers will be encouraged by the CMC and People's Forum (PF) so that poor people currently exploiting the forest and NP can earn higher incomes while reducing natural resource extraction. This may be by intensifying enterprises on their lands, or by developing new skills and employment such as in small scale industry, tourism, and cottage industries.

There are 22 villages represented within the CMC of KHNP, inhabited by 3,038 families (31,937 people). A total of 16 stakeholder categories have also been identified in Khadimnagar NP area, of which 11 are primary ones. The primary stakeholders are local elites, FD, forest villagers, forest settlers, fuel wood collectors, sun-grass collectors, bamboo collectors, charcoal producers, and hunters. Secondary stakeholders include farmers, dry leaf collectors, medicinal plant collectors, timber merchants, brick field owners, sand collectors, fodder collectors and livestock grazers.

Protection of habitat against illicit felling, encroachment, and grazing are the primary responsibility of FD working with co-managers. Khadimnagar NP needs an additional 10 well trained staff including an Assistant Conservator of Forests to be posted as a responsible officer for the National Park. Co-management is based on a 55 member Co-management Council and 21 member Co-management Committee, representing almost all local stakeholders (except tea gardens which should be corrected), and including representatives of a People's Forum which itself represents the 22 villages. These bodies provide forums to discuss problems and take decisions, and ensure local participation in protecting remaining forest and its regeneration, and promote development of alternative livelihoods to reduce pressure on regenerating forest.

This management plan specifies actions in two zones in accordance with the Wildlife Preservation and Security Act, 2012: core and landscape/impact zones (no buffer zone on Forest Department lands exists but some recommendations for tea gardens are made). During 2015-2025 in the core zone no roads and other substantial infrastructure development will be permitted. Selected existing trails used by resource extractors will be designated as visitor walking trails and some facilities for ecotourism will be developed. 100 ha, Enrichment planting with indigenous forest tree species will be done following the framework method (Thali model) and Assisted Natural Regeneration planting will be taken up in 100 ha of degraded/barren lands where natural regeneration is not coming up due to lack mother trees during the 10 years period of management plan. In all zones where there is degraded/bare land soil conservation measures (e.g. localized planting of native trees, bamboo and bushes) will be taken up to reduce erosion of stream/chara banks and to restore vegetation on slopes in private lands in the impact/landscape zone. In the landscape/impact zone landowners will be encouraged to adopt land management practices that stabilize slopes and conserve soil and water, and links between CMC, People's Forum and villages with other relevant agencies and organizations to help enhance their livelihoods and community resilience to climate stresses.

Sapling regeneration and density will be monitored in sample representative areas jointly by the co-management stakeholders (CMC and FD).

FD will provide/arrange (with outside assistance as needed) suitable training for its staff and co-management stakeholders in protected area management including management of wildlife and nature based tourism, forest restoration, and climate change resilience. Links will be made with agencies that can provide training to local people to enhance enterprises without threatening natural resources. As there is no buffer zone adjacent to the NP, some infrastructure for eco-tourism may be developed within the NP. In addition to interpretive displays, toilets, foot trails and resting places, this may include (provided it does not adversely affect wildlife) picnic site and shop, and as an attraction one arboretum/botanical garden with orchid house focused on indigenous species. The park will be publicized in electronic and print media to promote nature based tourism, raise the profile of the NP, and increase its use as part of formal and informal education.

Private-public partnership will be encouraged to increase eco-tourism based on local resources available in Khadimnagar National Park area, and to increase resources available for nature conservation based on mutual transparency. This will involve agreed respectful publicity for building up the image of the contributors, KHNP, FD and co-managers.

Monitoring and review will assess management activities, NP conditions and achievement of the management plan objectives. The results of monitoring and evaluation may be used to adapt the strategies to improve the management performance.

Introduction

This management plan has been prepared primarily for use by FD and CMC of Khadimnagar National Park.

Co-management enables active participation of local communities in forest management and offers direct and indirect benefits of sustaining their livelihoods, apart from achieving conservation goals. Since the 1990s in many countries, including Bangladesh, co-management has been adopted to address the limitations of previous top-down management. In Bangladesh the Forest Department has formally adopted co-management for protected areas and their landscapes, by actively involving forest dependent communities in decision making and protecting forests and their wildlife.

The Management Plan was developed following a landscape approach (core zone and impact zone/landscape zone). The plan focuses on: the rehabilitation, protection and conservation of forests and constituent of biodiversity, sustainable use of landscape areas to achieve conservation on a broader scale with the involvement of local people and other key stakeholders in co-management, resilience to climate change, visitor use and management, facilities development and livelihood diversification in the impact zone. This Management Plan is expected to guide in addition to the FD and CMC, policy makers, decision makers, local stakeholders and funding agencies.

The main purpose of the management plan is long-term management to bring the maximum area of Khadimnagar NP under forest cover to restore habitat and biodiversity in the best possible condition and thus resilient the climate change, to encourage eco-tourism, and to ensure sustainable livelihoods and natural resources for adjacent communities who actively support conservation.

The plan provides a 10 year framework for management, within which the scope, timing and relative emphasis on specific activities can be modified by field managers on the basis of experience, success and program achieved as the plan is implemented. In order to ensure success in implementation, resources need to be mobilized as required for the key activities set out. Sufficient flexibility has been kept to make necessary modifications and adjustments to management activities, which are based on:

(1) Restoring forest-based physical, biological and aesthetic features of Khadimnagar NP

(2) Improving food security and resilience of populations to natural hazard including climate change and human-wildlife conflicts

(3) Increasing the revenue generation potential of the NP for promoting conservation and local development

(4) Realizing the NP's potential as a venue for tourism based on wildlife, recreational, educational, cultural and aesthetic appeal

(5) Integrating Khadimnagar NP into local and regional development processes, especially for the surrounding local communities to ensure wider acceptance of the value of the NP

(6) Improving the FD's staff welfare, motivation and capabilities.

PART 1: Current Status of Protected Area

1 Description

1.1 Basic facts of KHNP

1.1.1 Location

Khadimnagar National Park (KHNP) is located in Khadimnagar Union of Sylhet Sadar Upazilla and Fatehpur Union of Guainghat Upazilla at $24^0$56´ to $24^0$58´ N and $91^0$55´ to $91^0$59´ E (Figure 1). The park is under the authority of Khadimnagar forest beat of North Sylhet Range-1 under Sylhet Forest Division. It is situated approximately 15 km northeast of Sylhet city.

1.1.2 Area

KHNP was declared as a national park in 2006 under the Wildlife Preservation Act 1974 with an area of 678.8 ha (1676.73 acres) for the purpose of preservation of remainning natural hill forest in Khadimnagar Reserve Forest.

1.1.3 Boundary

Khadimnagar National Park has a total of 24 km boundary (see zonation map).

Itis bounded by the following:
North: Gulni Tea Garden
South: Khadim Tea Garden
East: Charagang Tea Garden, Cantonment and Habibnagar Tea Garden
West: Kalagul Tea Garden and Borjan Tea Garden.

1.1.4 Legal Status and special regulatory provision

The national park was established in 2006 through Gazette Notification No. PA BA MA (SHA-3) 31/2004/335 according to Bangladesh Wildlife (Preservation) Amendment Act, 1974 (Annex 1).

1.1.5 Historical description of the site

The Khadimnagar forests were declared reserved forests in 1914.The Tilagarh and Khadimnagar reserve was abandoned tea garden and fuelwood extraction was rampant as it is close to Sylhet town. From 1928 onwards the land was brought under the fuelwood working scheme of plantations. The plantations raised comprised of Teak, Garjan, Jarul, Chapalish and Malakana spps. Bamboo, Murta and Cane were also planted in these areas. Hence most of the forest in KHNP is secondary forest. Part of the NP is termed Scattered Tree (ST) which consists of scattered and sporadic remnants of original high forests. The surrounding tea gardens have greatly influenced the condition of the NP. It is very near to the Mazar of Saint Shah Paran, Tilagarh forest and Ratargul swamp forest. Khadimnagar forest was used during the Second World War as an ammunition depot. Some remnant structures of Second World War still remain there.

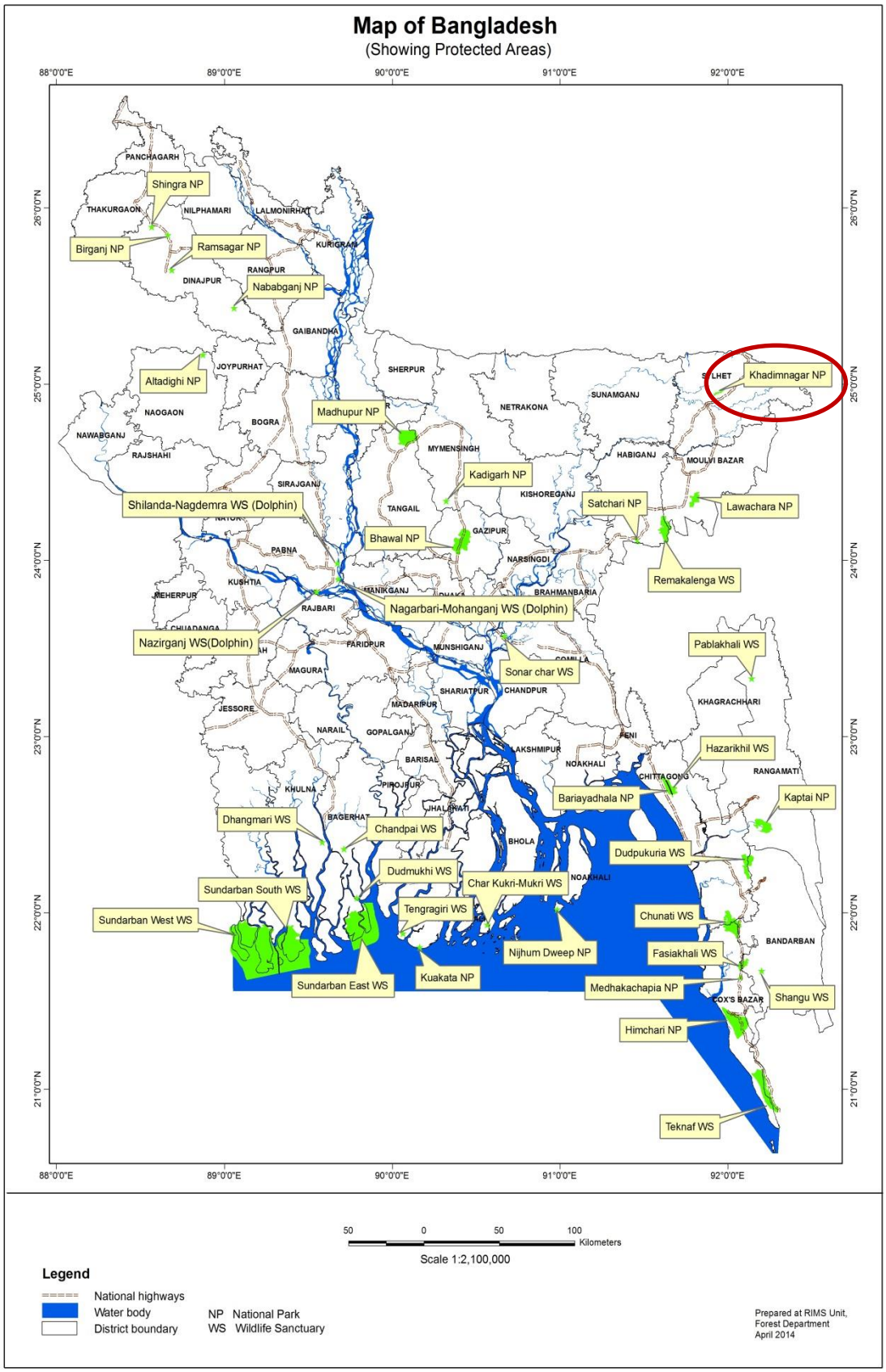

Figure 1 PAs of Bangladesh

1.2 Physical features

1.2.1 Geology and Soils

The hills are dissected by numerous valleys, separated by ridges up to 50 m height. The hills are generally low and gently sloping. Soil ranges from clay loams to pale brown (acidic) clay loams on the hills (FMP 1998).

1.2.2 Topography and Land Forms

The landscape has a broken topography comprising of undulating low rolling hills broken by the V-shaped valleys of two main charas (streams) within the NP.

1.2.3 Water areas

KHNP is characterized by good rainfall and so a large amount of water is drained from the surrounding and inside hills of KHNP. The area is traversed by numerous creeks. Such tree cover as is present helps to regulate water flows which pass from the charas through the adjacent landscape towards Sylhet town to the south and north. The network of charas retains water year round and provides good habitat and drinking water source for wild animals and local people. So aquatic habitats associated with forest cover and riparian (streamside) vegetation is an important part of overall habitat composition and associated wildlife.

1.2.4 Physical processes (Erosion and Accretion)

Because of deforestation and heavy rainfall, erosion and gully formation is common in KHNP, especially along the charas. Erosion and landslides adversely affect the flow of water in the charas and sediment loads and flash floods to downstream areas.

1.3 Climatic Characteristic

Khadimnagar National Park has a tropical monsoon climate, characterized by basically four seasons: winter (December-February), summer (March-May), monsoon (June-September) and autumn (October-November). The climate is warm and humid. April and May are the warmest, and December and January are the coolest months (Figure 2). Average maximum temperature is 31˚C and average minimum temperature is 10˚C. The annual rainfall is 4,195.9 mm, most of which falls between June and September (Figure 3).

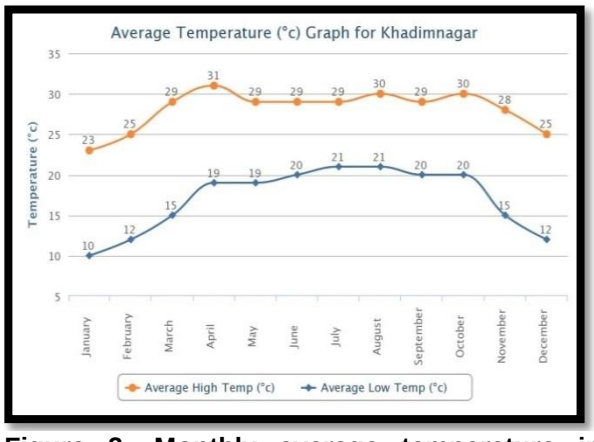

Figure 2: Monthly average temperature in Khadimnagar National Park (source: http://www.worldweatheronline.com/sylhet-weather-averages/bd.aspx)

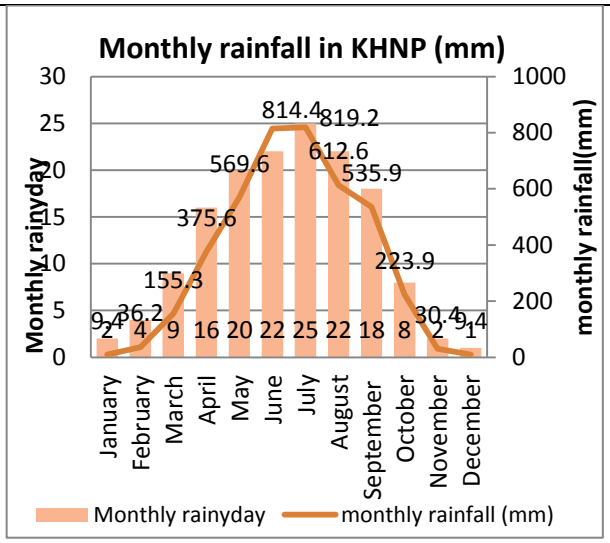

Figure 3: Monthly rainfall at Khadimnagar National Park (source: http://www.bmd.gov.bd/?/p/=Climate)

1.3.1 Temperature trend

Figure 4 shows the variation of annual mean temperature at Sylhet since 1961. Mean temperature varies between years, but has been increasing at the rate of +0.11°C/10 years (decade).

If the present trend of temperature rise continues, the average temperatures that will prevail in 2030 and 2050 in Sylhet are shown in Table 1.

Table 1 Projection of average temperature in Sylhet region in ^{o}C

Period	1961-1990	2030	2050
Annual mean temperature	24.46	25.1	25.3
Pre-monsoon mean temperature	25.40	25.7	25.8
Monsoon mean temperature	27.51	28.3	28.6
Winter mean minimum temperature	-	15.3	16.0

Source: BMD, 2012 and BCAS, 2013

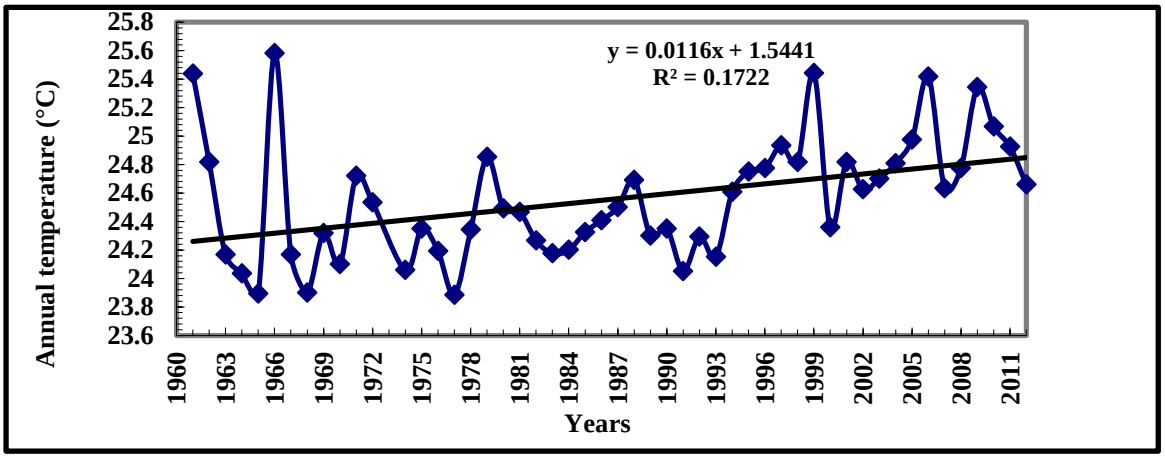

Figure 4 Trend in annual mean temperature at Sylhet during 1961-2012(Source: BMD, 2012 and BCAS, 2013)

1.3.2 Rainfall

With the present trends in annual and KHNP seasonal rainfall, it projected that the annual total rainfall will change little (Table 2) and is likely to be 4190 mm in 2050, when total rainfall in monsoon will average 2690 mm, and pre-monsoon rainfall will likely average 1270 mm. AGCM model forecasts 4080 mm annual rainfall in 2030, which compares well with the projected value of 4170 mm. The notable predicted change is increased pre-monsoon rainfall.

Table 2 Projected rainfall in Sylhet region

Period	1961-1990	2030	2050
Annual rainfall	4130	4170	4190
Pre-monsoon	1056	1195	1270
Monsoon	2779	2695	2690

Source: BMD, 2012 and BCAS 2013

1.4 Ecosystem, Flora and Land uses of PA and Landscape

The KHNP and its landscape harbor terrestrial, forest and aquatic ecosystems. Diversity of flora, fauna, micro-organism, edaphic and microclimatic factors including rainfall, humidity, sunshine, aspect and soil all govern the ecological processes and functioning of the KHNP ecosystem.

A number of different habitats harboring their own biodiversity can be found in the NP including tropical evergreen and semi-evergreen mixed forests; grasslands, bamboo and cane; short and long-rotation plantations; small streams; homesteads and settlements; water bodies; and cultivated lands. The small streams drain water that collects in the depressions and valleys in the hilly landscape and serve as important habitats for flora and fauna, as well as provide drinking water for both humans and animals.

1.4.1 Flora

There is no authorized floral diversity report for KHNP, but research done by Department of Forestry and Environmental Science, Shahjalal University of Science and Technology has recorded so far 74 plant species in KHNP of which 26 were trees, 17 were shrubs and 31 were herbs (Annex 3-5). *Dipterocarpus turbinatus*, *Hopea odorata*, *Artocarpus chaplasha* and *Syzygium cuminii* are the major tree species of KHNP. Plantations of some species such as *Tectona grandi* and *Acacia auriculiformis* have been raised. Besides these species Agar, Bamboo (*Bambusa vulgaris*, *Melocanna baccifera*, *Bambusa tulda*), Bet, Chickrassi, Arjun, Bohera etc. have also been planted in this protected area. A list of NTFP has also been given in annex 12.

1.4.2 Landscape land uses and tenure

The combined NP and landscape area for KHNP is about 5974 ha (Table 3) of which 789.01 ha is in the core zone (NP) and about 5195 ha forms the landscape zone /impact zone. A diversified land cover is found in the KHNP area. These land uses include forests, plantations, herb, shrub, bush, fallow or agricultural land, water bodies including river, wetland, aquaculture and settlement. Over the past few decades, land cover has changed significantly due to anthropogenic pressures, such as illegal felling and harvesting, conversion of land to agricultural uses. Land uses are presented in Table 3 and land use map of KHNP is shown in Figure 5.

Table 3 Land use of Landscape area (ha) of KHNP (Source: CREL, 2014)

Land cover Statistics inside Landscape area of KHNP			
Landcover	Core (Ha)	Impact (Ha)	Landscape (Ha)
Degraded forest	198	917	1115
Forest	479	351	830
Irrigated agriculture	3	1619	1622
Palm garden		48	48
Plantation		92	92
Settlement	1	1782	1782
Tea	98	1826	1924
Water bodies		51	51
Total	779	6686	7465

*** About 100 ha area in core area is GIS mapping error**

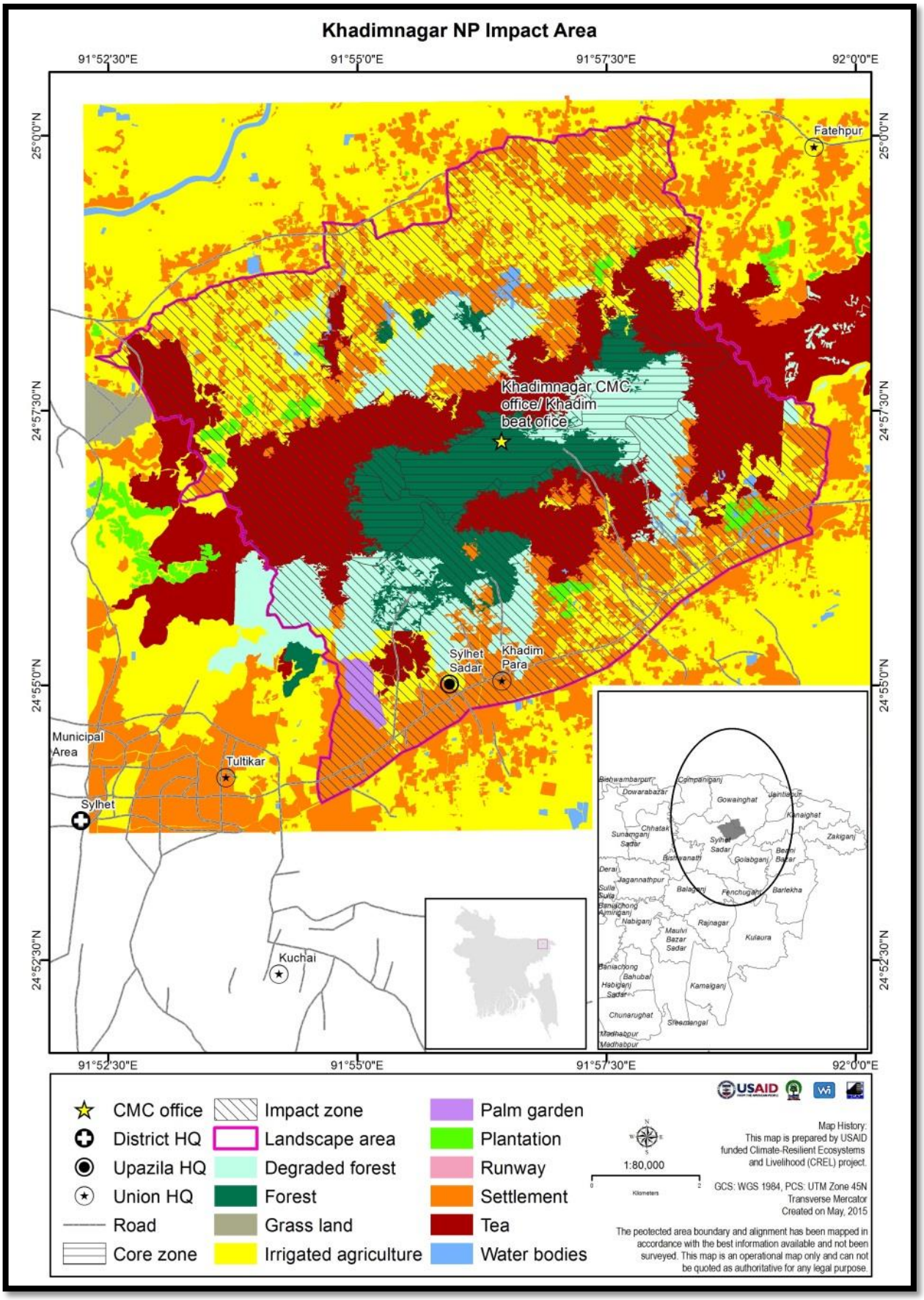

Figure 5 Land use map of KHNP

1.5 Fauna

Before it was cleared for tea gardens the forests of Khadimnagar would have been rich in faunal diversity, and since it was returned to afforestation there has presumably been some recovery of those species able to move into this isolated forest. Based on surveys undertaken for IPAC and CREL, 160 species of birds have been recorded so far within the NP, including a number of forest dependent birds of which an apparently healthy population of Kalij Pheasant is most notable. According to secondary reports a total of six amphibian species, nine reptile species and 26 species of mammals (including Rhesus Macaque, globally vulnerable Capped Langur, and globally endangered Fishing Cat) have been recorded in KHNP (Nishorgo 2013). The species reported are listed in Annex 6.

1.6 Socio Economic Profile

1.6.1 Population and settlement

Within the Khadimnagar National Park landscape are 22 villages with 3,038 households including worker's households of tea gardens and an overall population of 31,937 in 2009, of which 15,225 were male and 16,712 female.

Communication system is good within the landscape area. There are schools, college, madrasahs, markets, and different organizations in the area. The infrastructural information is presented in table 4.

Table 4 Infrastructural properties of Khadimnagar National Park landscape

Name	Area/ number
Metalled/Pucca road	10 km
Earthen road	60.5 km
Educational institute	53
Bazaar	3
Police station	2
Bridge	2
Culvert	106

1.6.3 Livelihood activities and resource uses

A household survey was done in KHNP CMC area under IPAC project in 2009 and it appears that in the locality, majority of the people (55-60%) are poor, followed by middle class 20-25%, extreme poor 17-20%, and 3-5% are rich. The major primary occupation of the local people is agriculture (65-70%), principally paddy cultivation, followed by day labor (20-25%), fuelwood and timber poaching (3-5%), small business (2-3%), service (3%) and over KHNPs employment (1-2%). The literacy rate is low (35-40%). Currently 80- 85% children go to schools. In average, about 15 % people of the area (including tea estate) are unemployed, this figure vary with KHNP, being most in chaitra, Baishakh, Jaistha, Ashar.

Most of the people of this region more or less dependent on forest or forest resources (table 5). Majority of the people in the villages use fuel-wood for cooking So, KHNP is at the verge of degradation of her resource base. Trees are scattered and so as natural regeneration. Exploitation of fuel-wood is rampant and without any limit, degraded forestlands inside the park are invaded by grasslands and bamboos.

Table 5 Resource uses of KHNP Areas

Name of resources	Reasons for resource exploitation	Users	Dependency
Fuel wood	HHs consumption and for commercial purpose	Local people, tea stall, hotel owners	High
Timber	Commercial and HH building material	Local people, furniture mart	Medium
Sungrass	Commercial and HH thatching material	Local people, Local Market	Low
Other NTFPs*	Commercial and HHs Consumption	Local People	High
Wildlife	Poaching	Local People	Very Low
Bamboo	Commercial and HH building material	Local People	High

* Includes bamboo, cane, medicinal plants, fruits, vegetables, dry leaf and grass etc.

1.7 Past Management System and Plans

Scientific forest management in this sub-continent was started during British rule in 1876. In those days, forests were managed primarily for revenue collection. Only valuable trees were extracted from the forest to get more revenue. Then a forest management plan or work plan is prepared for each forest division. This management plan guides forest manager to manage forest or to perform day-to-day work in the forest. This plan spells out where to cut trees, how much to cut and what to plant to cover up the cleared up forest etc. on annual basis. From the time of the first reservation in1914 until the year 1937, there was no regular working plan for the forests of the present Sylhet Division. The first working plan was prepared in 1938 by N.N. Das to cover the period 1938-1947. Again under Ahmed working scheme, a system was introduced in1950 for conservation of selected natural areas for artificial regeneration. Together with this system, other working shemes, periodic blocks, felling series and cutting sections were also introduced (Chowdhury, R.A. 1964). For the next four decades, plantation development became the main thrust of forestry. Last forest management working plan for Sylhet Division was prepared for the period of 1999-2008. Prior to declaration of Khadimnagar National Park the forest was declared as ReserveForest in 1957. Lastly, in 2006, Khadimnagar National Park was declared as Protected Area but no management plan was prepared. This is a first attempt to prepare a management plan for the Khadimnagar National Park.

2 Emerging management issues

2.1 Administration of Forest PA

Khadimnagar National Park is under administrative jurisdiction of Khadimnagar forest beat of North Sylhet Range-1 under Sylhet Forest Division. There is no separate administrative setup for the management of the PA. At present KHNP has only 5 personnel including foresters and forest guards which is insufficient in number (Table 8). For effective management of the national park a separate management body is necessary headed by an ACF. The required additional staff suggested by FD officials is also shown in table 8. This needs to be reformed with authority.

The current work force has very limited facilities for proper functioning. The range office and beat offices are in ramshackle condition. Lack of working/field equipment like Pickup, motor cycle, Computer, GPS, fire-protecting equipment hinders the effective working of the FD personnel. The same condition is for the housings of the respective officers. Offices and quarters of range officer and beat officers need to be renovated with necessary facilities and equipment. There is no rest house to stay inside the park.

2.2 Co-management institutions

Traditional top-down management failed to conserve forest PAs, so a new management approach was adopted in 2005 by FD with the help of USAID, namely co-management as a partnership between FD (as legal custodian of the PA) and local communities and other stakeholders. Co-management was introduced in KHNP in 2009. Co-management has been officially formalized through a Co-management Council and Co-management Committee, each with fixed membership; this includes representatives from a Peoples' forum (PF) which comprises representatives of all Village Conservation Forums (VCF) set up in each village impacting the PA. The component bodies involved in co-management of KHNP are shown in Table 6).

Table 6 Co-management structure of Khadimnagar National Park

SL No	Name of Activity/ Organization	No organization	Member
1	Council	1	55
2	Co management Committee (CMC)	1	21
3	Peoples Forum (General Body)	1	44
4	Peoples Forum (Executive Body)	1	11
5	Village Conservation Forum (VCF)	22	1173

Co-management system was adopted with a view to conserving the forest through the participation of local community or stakeholders. Co-management was adopted to improve forest conservation through the participation of local community, FD and other stakeholders. There is an issue to limit the role of local influential persons in the CMC, as they can use this position to exploit forest resources. The prospect of material benefit including payments for workshops, meetings and guarding has and will likely continue to attracted participation and association with FD, rather than volunteering for the good of the environment.

2.3 PA and landscape boundary delineation

KHNP was proclaimed as national park in 2006 with an area of 678.8 ha under Khadimnagar beat. But no efforts have been made to physically demarcate the boundaries in the field and the situation got exacerbated with heavy biotic pressure on forests. This has adversely affected the ecological boundaries of NP with limited movement corridors and breeding space for wildlife. It is mandatory to survey, recognize and demarcate all the marginal boundaries of the NP through the existing surveying technique.

2.4 Forest and Habitat Management intervention

KHNP and its surrounding landscape zone encompass terrestrial, aquatic and forest ecosystems. A variety of plants, animals and micro-organisms, and the ecological processes that govern their functions are noticed in KHNP. The predominant influence of edaphic and microclimatic factors including rainfall, humidity, sunshine, aspect and soils led to the development of typical ecosystems in KHNP. The following four broad ecosystems (habitat types) in KHNP and its landscape zone are identified as:

- Natural high forest
- Plantations,
- Grasslands and bamboos,
- Wetlands and water bodies.

The first three ecosystems are important from the PA management point of view. Plantation and grasslands harbor mammals, ground birds and reptiles some mammals and reptiles. The water bodies and wetlands harbor important fish species, water birds and amphibians.
KHNP supported moist tropical evergreen and semi-evergreen forests, which over the period substantially altered due to heavy biotic pressure. As a result, the habitat has degraded and fragmented, adversely affecting by restricting their movements through a barrier effect. Illegal extractions of forest resources also act as habitat destruction agent and a barrier to rejuvenate the forest again.

2.5 Encroachment, illegal extraction and forest destruction

There is no encroachment in Khadimnagar national Park but risk of encroachment in the future due to increase of human population in the tea garden colonies.
Illegal extraction of forest resources is a common scenario in KHNP. It includes illicit felling, fire wood cutting, illegal hunting of birds, bamboo collection etc. Lack of fuel wood materials, poverty, lack of knowledge and awareness towards forests and forest resources are the main causes of extraction of forest resources. Fuel-wood collection is the main factor of forest destruction as extractions as during the collection seedlings and saplings are also cut which hold back the ecosystem to rejuvenate again.

2.6 Existing dependence on and use of forest resources

There are 22 villages within the CMC of KHNP, of which there are around 3038 families with around 31,937 people. Most of the villagers are poor and they are more or less dependent on forest resources. These large numbers of people depend on forest land and forest resources for the reasons of fuel-wood collection, livestock grazing, fodder collection, bamboo and cane extraction, green and dry leaf collection, fruits and vegetables collection, sun-grass collection, medicinal plant collection.
Fuel wood collection is the main factor of forest deterioration as during the collection seedlings, saplings and bamboos are also cut which hinder the ecosystem to rejuvenate again.

2.7 Gender, youth and tribal communities

There is no forest village located inside the Khadimnagar National Park but there also inhabited ethnic community called Patra community surrounding KHNP Like Foringura, Dalaipara, Ramnagor, Kalagul bosti they are partially dependent on forest. They collect vegetables; house building materials and fuel wood from the RF. At present 70 % of the Patra are day laborers. Though they are partially dependent on forest resources for their livelihood but due to a small number of populations, this has overall little impact on the RF. There have no innate tendency of encroaching land or establishing new settlements inside the RF. In the Foringura village, male HHs members of ethnic Patra community are involved in wooden made handicraft practices. Education facilities need to increase for their social development.

2.8 Ecotourism and education/information

KHNP has very high potential for ecotourism due to its easy access and proximity to Sylhet city. The Park is very near to Ratargul Swamp Forest and adjacent to the tea garden. Visitor can easily visit the both place due to their proximity. But in KHNP there are insufficient facilities of eco-tourism. Facilities development is the main issues for ecotourism. There are 13-trained eco-guide in KHNP, but lack of tourist and associated tourist facilities they are useless at present. There is no specific database about the visitors' number and publicity about KHNP is rare, which also lead to the potentiality of KHNP in vulnerable situation.

2.9 Existing carbon stock (by land cover)

Carbon stock is an indicator to understand forest situation. It is increasingly important as solutions is sought to address climate change. A carbon inventory was conducted in KHNP to identify forest carbon situation to prepare the management plan considering climate change. Annex 9 depicted that the status of **CO_2** stock of KHNP is **298.3 Mg ha^{-1}** (moderate) and there is an opportunity to increase carbon sequestration by increasing forest cover.

2.10 Management constraints

- Lack of a management plan
- Illegal extraction of forest produces (e.g. fuel wood and bamboo)
- Grazing
- Illegal saw milling (16 saw mills)
- Climatic consequence (Storm)
- Soil erosion
- Lack of transport and modern equipment facilities
- Lack of funds
- Lack of trained professionals
- Limited resources (funds, equipment, trained personnel) among FD and CMC engaged stakeholders to manage and protect the NP.

2.11 Conflicts and resolution

A total of 16 stakeholders are identified in KHNP area whereby 9 are primary ones. The primary stakeholders are local elites, local FD, forest villagers, fuel wood collector, bamboo and cane collector, sun-grass collector, fodder collectors, tourist and hunter. Secondary stakeholders are farmer, timber merchant and brick field owner. Different sectors of the government have very weak relationship and coordination among them. One hinders the activities of others. Sometimes the illegal allocation of forest land to others for private uses has brought a serious complication in the management of Khadimnagar Natitional Park. Table 7 represents the sources of conflict with their resolution in KHNP.

Table 7 Sources of conflict with their resolution in KHNP

Sources of conflict	Resolution
Land disputes	By arranging local salis through local member and chairman with the help of local elites, meeting with land administrative authorities.
Encroaching forestland	FD and local influential people make negotiation
Tree Felling	Forest cases and awareness building
To establish influence in the locality	Salis
Man- wildlife conflict	Habitat restoration and stop land encroachment in forest areas. Awareness building among local settlers about wildlife
Inter-departmental conflict	Allocation of forest land for settlement recording as khas land. Co-ordination with the administrative authority should be improvement to stop the settlement of forest land

2.12 Climate change impacts on vegetation, fauna and ecosystem services

Climate change has become a burning issue in the recent years. From recent participatory community vulnerable assessment report, some climatic disasters have been identified in the KHNP. These are Cyclone and storms, Excessive rainfall, Landslide, Flash flood, Water logging, Downward movement of water table. Adaptation measures to mitigate these climatic hazard with the upcoming situation has also identified in PCVA report. Village wise climatic threats with their management an intervention of Khadimnagar CMC is shown in annex 7 & 8.

The same hazards have great impact on vegetation, fauna and ecosystem of KHNP. Changes in vegetation pattern consequently alter the ecosystem and forest types. The root system of vegetation is the natural barrier to prevent soil erosion and helps to retain soil water through infiltration process. During heavy rainfall vegetation cover retains water and serves the water to regulate all year round. In the absence of forest, heavy rainfall causes landslide and surface run-off. Ecosystem services of KHNP like provisioning (food, fresh water), regulating services (cyclone and storm regulation, water purification), supporting services (soil formation, nutrient cycling) are in extremely vulnerable condition due to climatic effect.

3 Institutions

3.1 Forest Department

Forest Department is mainly responsible for the protection, conservation and development of KHNP. To complement limited resources co-management has been adopted with active involvement of local communities in supporting protection of remaining forest. Nevertheless for more effective management of the NP a PA-specific team of FD is needed (Table 8). An enlarged FD team will also need sufficient modern equipment (Annex 11)

Table 8 Present and required manpower of FD for KHNP

Rank	Existing	Additional Recommended staff
ACF	0	1
Range Officer	0	1
Office assistant cum computer operator	0	1
DR/ Forester	1	0
Forest Guard	3	4
Care taker	0	1
Plantation Mali	1	1
Cleaner	0	1
Total	5	10

3.2 Co-management Organization

Co-management organization (CMO) in KHNP consists of the following types of bodies:

- Co Management Committee (CMC)
- Co-management Council
- Peoples Forum
- Village Conservation Forum

3.2.1 Structure and roles & responsibilities of Co Management Committee (CMC)

The CMC is the executive body of the Co-Managemetn Council.

- DFO and Upazila Nirbahi Officer (UNO) are the advisors of the CMC

The respective Range Officer (RO) serves as the Member- Secretary;

- People belonging to the respective categories\groups elect members for the CMC according to the quota mentioned in government order;
- All members are elected for 2-year tenure except the nominated (ex-officio) members and no person can be a member for more than 2 consecutive terms;
- The members of the CMC elect one chairperson, one vice-chairperson one treasurer among themselves;
- The maximum number of members of the committee is 29.

Responsibilities of the CMC are:

- To scrutinize the activities of VCF and PF;
- To enable voluntary work in forest conservation and management;
- To facilitate effective conservation of natural resources;
- To ensure effective participation of all the stakeholders in forest management;

- To help in the implementation of adopted development activities;

3.2.2 Structure and roles & responsibilities of Co-management Council (CMC)

To establish participatory PA management through co-management, the council has been formed with the full support and active participation of all relevant stakeholders in HNP and its landscape. Different categories of stakeholders select/ elect their own representa-tives for the Co-management Council. The categories are: Civil Society (maximum 5 persons), Local Administration (maximum 3 persons), Forest Department (maximum 8 persons), Local Government (Union Parishads, maximum 5 persons), Local Community (maximum 39 persons largely from the People's Forum and Community Patrol Groups, but including other members of civil society and any minority groups), and representatives from other Government bodies (maximum 5 persons). The Local Member of Parliament, Upazila Parishad Chairman and Divisional Forest Officer are the advisors of the council. The UNO and the respective Range Officer serve as the Chairman and Member Secretary of the Co-management Council (as well as the CMC). The Co-management Council can have a maximum of 65 members, of which at least 15 must be women.

3.2.3 Structure and roles & responsibilities of Peoples Forum (PF)

The peoples Forum is formed by election of representative from villages and local communities within the Protected Area landscape. All key stakeholders should be represented, particularly women, the youth, lower income households, and important resource users groups. Thirty-three percent of the members of the peoples forum will be women.

- Uses of natural resources and livelihood issues are taken into account in the preparation and implementation of Protected Area co-Management plans;
- Recommend and support initiatives for protecting the natural's resources of the protected Area and conserving biodiversity and assist the Forest Department and Co-management institutions in implementing tree plantation, reforestation, habitat restoration, nature tourism activities and other management activities of the protected area;
- Assist to prepare Protected Area Co-management plans and Annul work plans for landscape area conservation and development in and around the Protected Area;
- Provide any other require assistance to the Co- Management Committee on Protected Area.

3.2.4 Structure and roles & responsibilities of Village Conservation Forum (VCF)

Village conservation forum is an inclusive platform of the Co-Management process where the poor villagers or resource users, except specific categories like member of local government, civil society member and owner of the resource user that ensures participation. It offers equal opportunities to majority village institutions, including women and indigenous community to discuss, criticize and propose relevant activities for Co-Management Organizations.

The following steps to be taken to form VCF: - Organize village meeting to describe the objective of the census;

- Household census to be conducted for identifying the position and condition of the village people;
- At the time of census, clearly describe the power and responsibilities of the VCF, PF and CMC; 50% of the committee members should be women;
- Elect Peoples Forum from the VCF.

- VCF can monitor and discuss the implementation of the development projects and suggest PF and CMC to improve the quality of work;
- To select labor for cleaning or any sorts of activities inside the forest. VCF will assist PF, CMC and FD;
- VCF may during the meeting take decision to form its own committee to look into the issues and make suggestions; To control the anti-conservation activities;
- VCF is responsible to inform the CMC if any such type of activities happened in their village; - VCF can ask CMC to provide the project proposal and financial document of CMC to go through for inspection if they have any question or confusion; VCF are responsible to give comments and recommendations of CMC activities through PF, if they are not satisfied by the answer of the CMC they can raise the question in front of Divisional Forest Officer (DFO);
- VCF is mandated to meet at least four times in a year may meet more according to the necessity of community.

3.3 Training and capacity building

To develop skills and capacity among the KHNP landscape communities, many of whom are poor with limited capacity to take up better earning occupations and enterprises, several government and non-government organizations (NGOs) are active in the area. Some NGOs work on social welfare, some work on economic solvency, some work on climate change, some work on livelihood programs. NGOs are now the leading training and capacity building institutions serving local people see Table 9 for details.

Local level BFD staffs, CMO members, resource users groups as well as other local stakeholders are needed to facilitate with trainings on various subjects and skills such as; organization building, leadership and management for newly formed co management institutions, AIGA, sustainability and resilience covering all activities under sustainability and resilience programmed, responsible nature-based tourism management and implementation, human-wildlife conflict mitigation for the conservation natural resource and biodiversity of KHNP. *Again, Inter CMC knowledge sharing may be effective for capacity building*.

Table 9 List of institutes with their training and capacity building programs

Name of NGO/CBOs	Area	Capacity building program
CNRS	KHNPCMC area	Climate change, Biodiversity Conservation, VCF Formation,
CARITAS	Surmagate	Livelihood activities
FIVDB	Saheb Bazar	AIGA, Education, Micro-credit
IDEA	KHNP CMC area	Sanitation Programme
ASA	Saheb Bazar	Microcredit
PASKP	Saheb Bazar	Sanitation, Health
BRAC	Surmagate	Micro credit, Health and Education
TMSS	Majortilla	Micro credit, Health
Grameen Bank	Saltikor	Micro credit

Capacity building for sustainable CMO:

CMOs are the main vehicle to support Government for improved management of the Khadimnagar National Park. CMO's functional and financial capacity needs to build for their active role in management and conservation. Functional and financial capacity refers to legitimacy of the organization, functional capacity for improved management, organization has good governance and capacity for inclusiveness, has the capacity to prepare

participatory and adaptive management plan and resource mobilization capacity for sustainable funding to implement the plan.

Ultimately, it has to continue to deliver valued services or benefits through protecting and sustaining biologically significant eco-systems and improving the lives of people dependent on the area. In this connection system need to introduce for enhancing CMO capacity on regular basis so that they will able to contribute in the PA management. CMO leaders need to know the modern management system that are implemented in other countries through study tour and cross visit, attending and participating in workshops and symposium, need to build leadership capacity, able to enhance knowledge on NRM and climate change through training.

4 Values of the protected area

4.1 Ecosystem

Ecosystem is defined as ‘a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit’. And ecosystem services as "the benefits people obtain from ecosystems". Ecosystem services have been categorized into provisioning, regulatory, supporting and cultural services. Based on this classification, the ecosystem services of KHNP are provided in table 10.

Table 10 Ecosystem services in KHNP

Service Type	Services
Provisioning Services	Timber, Fuel wood, Thatching materials
Regulatory Services	Climate regulation, Disease regulation Water regulation, Water purification
Supporting Services	Soil formation, Nutrient cycling, Primary production
Cultural Services	Spiritual and religious, Tourism, aesthetic, Educational

Khadimnagar National Park support 74 species of plants of which 26 is tree species, 17 is shrubs and the remaining 31 is herbs. The park is also a habit for different fauna. A complete picture on the biological resources of the forest is not available. As revealed from secondary data collection, a total of 20 species of amphibians, 9 species of reptiles, 28 species of birds and 26 species of mammals have been recorded from the forest. All the species have direct or indirect service value in this region.

4.2 Socio-economic

The biodiversity of the forest offers a wide range of Non-Timber Forest Products to forest depending communities around the Park. Traditionally, the local people are used to collect various resources from the KHNP and other adjacent state forests. Tea estate villagers are dependent for fuel wood and building materials for meeting household needs on the forest. It seems that there is no alternate source for its supplies. They also collect vegetables, fruits and hunt some wildlife.

4.3 Cultural

There are two worship points in this park where the ethnic people perfom puja (worship). The park is surrounded by six tea gardens which has a unique scenic value.

4.4 Archeological Value

Khadimnagar National park is a place of remnant structure used during the Second World War. There is a mazar of Saint Shah Poran adjacent to the park.

5 Threats to the Park and its Biodiversity

5.1 Resource extraction

Collection of fuel wood and house building materials are widespread within the PA and remain as major threat to the biodiversity of the KHNP. Local people collect dry leaf and sungrass, vegetable, fruits and medicinal plants. The collection of these forest resources removed the indigenous, non-traditional timber trees and small trees and shrubs.

5.1.1 Illegal timber felling

Illicit felling is a major threat to the KHNP. Widespread timber felling in the past caused to the reduction in the forest coverage, but was replanted with short rotational plantations. The entire process poses most threat to the park.

5.1.2 Collection of fuelwood, bamboo and other house building materials

Collection of fuel wood, bamboo and house building materials are widespread within the PA and remain as important threat to the biodiversity of the KHNP.. All these contribute to forest regeneration and poor abundance of these exploited species.

5.1.4 Coal extraction Activities

Coal extraction from PA is one important illegal practice, which is another important threat to the biodiversity of the KHNP. Some natural trees gradually disappeared due to this practice.

5.2 Livestock grazing

Livestock, mainly cattle and buffalos, grazing is widespread within the PA area, particularly during certain period of the year the cattle browse on seedling and undergrowth and thus interfere with natural regeneration of the forest.

5.4 Human- wildlife conflict

Fragmentation of habitat, food scarcity and increased human activities pose serious challenges to habitat conservation and human wildlife conflict management in KHNP.

5.4 Poaching

Although not widespread, the local Tea laborer community hunt /trap some wildlife, the important species sought are Guishap, small deer, jungle fowl, Matura, sometimes monkeys and some species of birds. It is reported that sometimes people from distant places come to the forest for bird hunting. This is a threat to the wildlife of the park as the population is now highly reduced.

5.5 Conflict between conservation and development

At present, there have no sufficient tourist facilities like seating place, Trail indicator, Signboard, tourist shop, eco tour guide and water supply etc. So, some development work is needed with minimum disturbance. If tourism is not planned, it could be a serious problem in future.

PART 2: Analyses of Current Management Practices and Future Program

6 Objectives

6.1 General policy framework

As a signatory party of the CBD Bangladesh has developed National Biodiversity Strategy and Action Plan (NBSAP).
According to the guideline of NBSAP (GoB 2004) and National Forest Policy (1994) regarding CBD the primary objective of Bangladesh' biodiversity conservation policy is "*to establish conditions to conserve, and wherever necessary, to restore the biodiversity of Bangladesh as an essential component to ensure the wellbeing of the present and future generations, and equitable sharing of benefits*". This involves maintenance and improvement of environmental stability for proper functioning of ecological systems, and ensuring the preservation of the unique biological heritage of the nation as an asset for the benefit of the current and future generations. Co-management is one of the widely accepted approaches for protected areas management."

6.2 Objectives

The long term vision of the KHNP management plan is to maintain the park as part of the forest landscape of Sylhet and its supported biodiversity in such a way that key species of the area are preserved, while conserving the ecosystem services for the benefit of local populations and future generations to ensure sustainable livelihood and resilience to environmental hazard, including climate change. Additional to that, the park should be a show case of a well conserved ecosystem as a source for nature based tourism, education and science. Within this perspective, the following management objectives are proposed for Khadimnagar National Park:

(1) Protect and maintain physical, biological and aesthetic features of KHNP as a part Sylhet forest ecosystem

- Regulate land use through zoning and zone demarcation of the area, taking into account land value and function as well as crucial and vulnerable habitats of wild species;
- Protect crucial habitats such as resting sites of birds and large trees for monkey;
- Research, surveys and monitoring of biodiversity resources to understand ecological values, processes and threats;
- Control invasive species, including livestock and other domestic animals in core zone;
- Develop and implement effective surveillance and law enforcement.
- Reduce the dependency on the PA by improving livelihood of people by AIGA

(2) Improve food security and resilience of populations to natural hazard including climate change and human-wildlife conflicts

- Resilience to climate change through adaptation;
- Improved watershed management in the PA as well as in the impact zone;
- Reduce human-wildlife conflict by adapted landuse planning, zoning and effective compensation measures.

(3) Increasing the revenue generation potential of the park promoting conservation and local development

- Develop entry fee collection system for visitors of the park;
- Develop benefit sharing for local stakeholders;
- Promote of investment in tourism development.

(4) Realizing and utilizing the Park's potential as venue for tourism based on wildlife, recreational, educational, cultural and aesthetic appeal

- Develop tourism infrastructure (information facilities, observation shelters, nature trails, picnic sites);
- Promote of tourism in urban centres of Bangladesh;
- Support local and private initiatives in the field of tourism development;
- Control impact of tourism (pollution, animal disturbance, noise disturbance).
- Established an arboretum and orchid house inside the national park.

(5) Integrating National Park into local and regional development process, especially surrounding local communities to ensure wider acceptance of the Park's values

- Create awareness among stakeholders including local resource users as well as key actors determining land and resource use, involving also local educational institutes;
- Establish co-management and benefit sharing.

(6) Improving the BFD's staff welfare, motivation and capabilities

- Enhancing office and accommodation facilities for BFD staff;
- Improving logistics and mobility;
- Supplying field equipment (uniforms, arms, GPS);
- Training (law enforcement, co-management, and ecotourism).

7 PA and Landscape Zoning

7.1 Zoning of landscape area

For the better management of Protected Areas the Landscape Areas of KHNP is divided into three zones i.e. Core zone, Buffer zone and landscape zone / Impact zone (Figure 6).

7.1.1 Core zone

The entire forest area that was declared as National Park in the official gazette is designated as core zone due to its high conservation value and its proximity to riverine, intertidal or beach areas. The total area of core zone 678.8 ha. Main aim of the management of core zone is long-term protection of existing vegetation including remaining forests, degraded forests and mixed plantations, and rehabilitation of the area towards natural forest habitat and biodiversity conservation. Forest management in this zone will focus on conserving remaining natural forests and bringing back natural vegetation (composition and structure), wherever possible. This will be achieved by providing protection (against illicit removals of forest produce, poaching, encroachment, grazing and fire) and encouraging natural processes for regeneration and rehabilitation of degraded forests. The visitor use of the core zone will be regulated to allow low impact tourist activities in terms of hiking and wildlife watching; high impact visitor activities such as motorized transport and group picnic will not be allowed.

7.1.2 Buffer zone

There is no forest department's forest land for buffer zone in Khadimnagar Nationals Park. But there are six numbers of private owned teagardens around the Khadimnagar NP, playing important role in the protection of the PA. These tea gardens can act as buffer zone for which close coordination is needed with the gardens authority.

7.1.3 Impact zone/ landscape zone

Landscape zone is the remainder 6686 ha areas within the landscape boundary outside the forest land areas. Landscape zone is created around the protected areas to control the biodiversity of the protected areas and reduce the dependency on forest resources. As opportunities for receiving tangible benefits from the conservation-oriented management of core zone are limited, adequate provisions will be made for off-forest livelihood opportunities provided to the local stakeholders in the interface landscape. Subsistence consumption needs of local people for fuelwood, NTFPs and timber will be met through co-management practices.

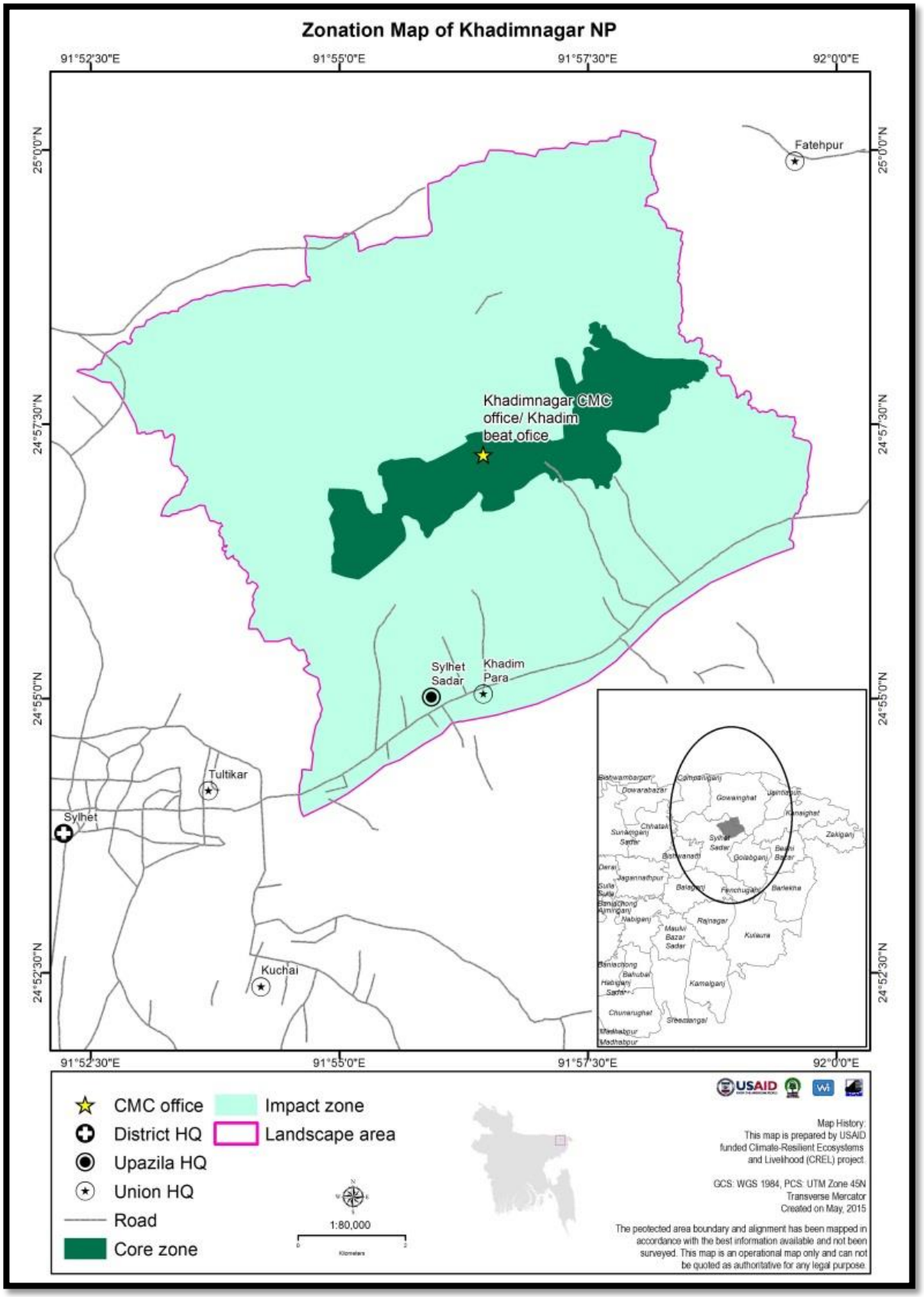

Figure 6 Zonation map of KHNP

7.2 Boundary delineation

All the marginal boundaries of the KHNP will be recognized, surveyed and drawn on the maps and on ground. The borders of different management zones will be defined, mapped and also be recognized on the ground during the implementation of the plan. Zoning boundaries should be determined by GPS in the field and where necessary consolidated concrete pillars need to be positioned in the field. The GPS data will be stored and can be mapped showing the boundaries. The benefit of natural features like rivers, streams/charas, ridges, roads, etc. may be taken out during the demarcation. Posts e.g. concrete pillars, or other markers e.g. wooden or iron pillars, trenches, mounds, etc. will be fitted in place at all important and turning points and will be labeled. Every now and then boundary and markers are vulnerable to alteration due to human-interference or natural calamities. Therefore, a regular annual maintenance program will be necessary for boundary and pillar renovation and maintenance.

7.3 Actions to address encroachment and tenure issues

There is no encroachment in the Khadimnagar National Park. But it is at the risk of encroachment in near future due to population pressure. There is a tenural conflict for 17 acres between Forest Department and tea estate. At present the land under control of Forest department. To protect future encroachment boundary demarcation and regular patrolling is needed.

8 Management actions

8.1 Management of PA (conservation priority area)

8.1.1 Rules and norms

The particular forest area declared and notified as NP is designated as core zone due to its high conservation value. The Main objective is to protect, rehabilitate or restore and maintain the remaining vegetation in good stocking and encourage natural regeneration to gradually bring back to natural condition of the forests.
The core zone is constituted to preserve constituent forests and biodiversity as almost natural conditions by providing an effective protection measures against all forms of biotic interference (illicit felling, forest land encroachment, poaching, forest fires and cattle grazing) and maintaining natural course of ecological succession. Forest management in this zone will focus on conserving remaining natural forests and bringing back natural vegetation (composition and structure) and restore habitat for wildlife wherever possible. This will be achieved by providing protection (against illicit removals of forest produce, poaching, encroachment, grazing and fire) and encouraging natural processes for regeneration and rehabilitation of degraded forests.

In the protected areas no felling will be done. Even no tending operation is encouraged. Only in case of emergency some cleaning activities can be done in the KHNP like removal of dead or over mature bamboos and sungrass.

8.1.2 Restoring habitat and ecosystems

KHNP national park is in vulnerable condition due to heavy biotic pressure. Around 198 ha of the core zone is in degraded condition. To improve the existing condition habitat improvement work like, Assisted Natural Regeneration (ANR), enrichment plantation, shrubs/trees and palatable grasses, rehabilitation of degraded forest areas, soil and water conservation, watershed development may be undertaken. To restore the identified site indigenous tree species that were previously available in the site are recommended.

- ANR is recommended in the areas where there is natural rootstock or natural regeneration is coming. 100 ha area of core zone will be taken for ANR to assist the natural recovery of the forest during the ten year period.
- As there is no mother tree in KHNP, enrichment plantation with indigenous wide crown tree species will be carried out using Thali model (Figure 7 A) and fence plantation (Figure 7 B). Fence plantation will be raised in patches of one ha each. Thali plantation may also be protected through fencing in several patches. Around 100 ha of core zone will be brought under enrichment plantation using Thalli, or fence model during the 10 year period. In Thalli plantation recommended spacing is (5m*5m) i.e. approximately 400 seedlings per hectare and in case of fence plantation spacing will be (3m*3m) i.e. 1000 seedlings per hectare. Protection against illicit felling, fuel wood extraction, encroachment and burning, plant succession will progress over a period towards semi-evergreen forests.
- In case of completely denuded and barren areas spacing will be (2m* 2m) i.e. 2500 seedlings per hectare will be planted. For this purpose 100 ha area will be brought under habitat restoration work during the 10 years period.
- To stabilize the chara bank from erosion of stream/chara banks plantation is also recommended. Habitat improvement will be done in 100 ha area.

- For slope protection or where landslide occurs frequently, gully plugging is recommended and plantation with fibrous root spps like bamboo and other tree species will have to be done.
- An arboretum will be established in 5 ha area with the local species which grows in the Sylhet region.
- An orchid house will be established near to NP office.
- An artificial lake will be made by constructing a cross dam.

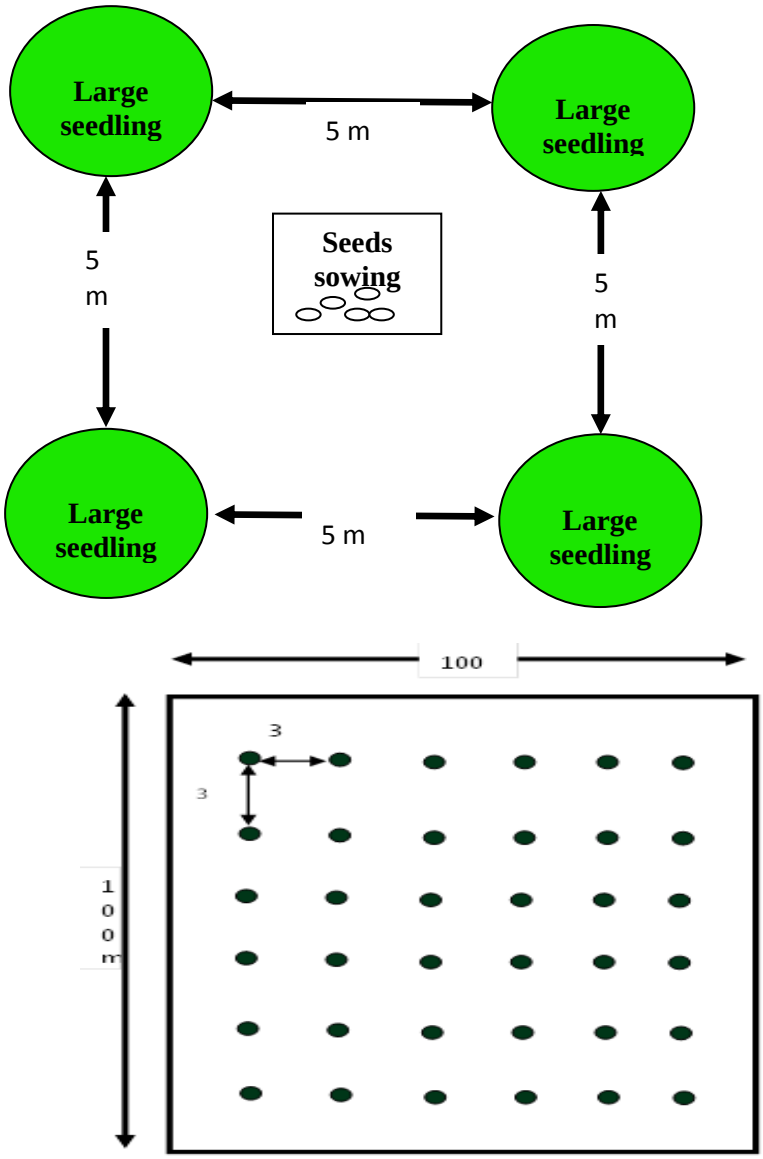

Figure 7 A. Thali plantation B. Fence plantation

- *No burning will be allowed at any plantation activities*

8.1.3 Wildlife Conservation and Recovery

For the conservation and recovery of wildlife, habitat needs to be restored. Wildlife fodder/fruit species may be introduced in order to provide better habitat facilities to biodiversity in identified restoration site. If any restoration site lies in between wildlife browsing patch then it is recommended to introduce wildlife preferred **indigenous tree or grasses, for instances, bamboo, chalta, kanthal, Dumur (Ficus),Chapalish, gillalata**

etc. Areas that are used as water source and resting place of wild animal need to be restored and conserve. Wildlife movement corridor needs to protect from all types of human interference and keep it free from further fragmentation. Dhepa or low lying areas should be protected for samber. Breeding sites of wildlife will be protected and maintained. For Birds trees with twisted boles, furrowed bark or natural cavities will be retained to provide shelter to wildlife including birds.

8.1.4 Action to improve Climate Change resilience

To improve climate change resilience creation of buffer forests to protect the core zone from disturbances by increasing their resistance and resilience, assist ecosystem shift or evolution towards a new desired state that meets altered conditions. Buffering measures will focus on preventing disturbances, such as invasive species (e.g. by preventing their spread or removing them), managing the forest actively after a disturbance (e.g. by assisting the establishment of adapted and acceptable species). Measures that facilitate ecosystem shift or evolution aims to ease and manage natural adaptation processes. Such measures will include the reduction of fragmented landscapes, conserving genetic diversity and a large spectrum of forest types for their value and higher resilience, adopting species and genotypes that are adapted to future climates in forest plantations, planting mixed species in an uneven age structure.

8.1.5 Smart Patrolling (CPGs, FD)

Khadimnagar National Park is well protected forest area. According to CMC personnel CPG formation for the protection of KHNP is not needed. But SMART (Special Monitoring and Reporting Tool) patrolling may be apply by the FD. With the technical support from CGEIS, BFD has developed in the the Sundarban Reserved Forest a GIS/ GPS based system for the systematic collection of patrolling data (Anon, 2003).

8.2 Management of Buffer zone

There is no forest land around KHNP as buffer zone. The park is surrounded by private owned tea garden. These tea gardens are acting as buffer zone. There should have close liaison with the tea garden authorities in all types of protecting measures.

8.3 Management of impact zone/ Landscape zone

8.3.1 Rules and norms

Landscape zone is created around the protected areas to control the biodiversity of the protected areas and reduce the dependency on forest resources and to create corridors for the movement of wildlife. Landscape zones will focus on the surrounding areas including the villages those are dependent on forest and its resources who will be helpful in protecting and conserving the core zone, and creating congenial habitat for wildlife. As opportunities for

receiving tangible benefits from the conservation-oriented management of core zone are limited, adequate provisions will be made for off-forest livelihood opportunities provided to the local stakeholders in the interface landscape. Subsistence consumption needs of local people for fuelwood, NTFPs and timber will be met through co-management practices.

8.3.2 Social forestry

Social Forestry programs will be encouraged with a view to meet the forest product requirements of local population and to reduce dependency on forest, to reduce the process of ecological and climatic degradation through proper soil and water conservation and to improve the socio economic condition of the People. Due to scarcity of land, marginal and fallow land (slopes of roads, rails and embankments) will be brought under social forestry. Local people will be involved in social forestry program The Plantation established under social forestry program will be harvested at the end of rotation (10 years) and the sale proceeds are distributed according to clause-20 of Social Forestry Rules-2011. Strip plantation (20 km) is recommended on both sides of the village roads involving local community. Awareness and training program will be conducted to make the people capable of homestead plantation. Adequate support will be provided for raising homestead plantation including horticultural and spice garden.

8.3.3 Livelihood diversification and enhancement

To reduce the dependency on forest diversification program for local communities needs to be explored through alternative income generation activities. Main objective of livelihood programs for landscape development is to develop appropriate linkages with livelihood programs and other projects/initiatives that will reduce biotic pressure on forests by providing alternative livelihood opportunities to poor stakeholders living in and around the PA.
Landscape Development Fund (LDF) will be used to provide finance for the members of user groups and co-management councils/committees, and their federations will be encouraged to set up micro-enterprises to generate value additions locally. The benefits from eco-tourism may also be ploughed back for the development of local communities and PA. The program will be focused mainly in the identified interface landscape zone but also in the core zone where local communities are living. The following appropriate production technologies, which may be implemented as a part of off-PA development interventions, were identified based on field investigations done by the partner NGO (CNRS):

8.3.3.1 Integrated homestead farming

Homestead farming provides livelihood security of people and enhances their income by creating livelihood assets and self-employment opportunities. This activity will include component like vegetables (on open fields, machans, and other unutilized places around houses), cash crops (Betel nut), horticultural and tree nursery, and apiculture (domesticated wild bees).

8.3.3.2 Cultivation of high value crops

High value crops that are more nutritive, high price and more demand will be introduced. Horticultural plants, vegetables, mushrooms and spices spp. like greenpeeper, coconut, betelnut, Black pepper, cinomon, bayleaf etc. may be planted for high income. However, this production technology is suitable to those farmers, who have cultivable land and can make a minimum investment. Suitable high value crops for the surrounding landscape include tomato, potato, papaya, ginger, turmeric, yard long bean, leafy vegetables, chilly, guava, banana, jackfruit, pineapple, etc. Mushroom culture can be done at homestead level to the interested groups among the stakeholders.

8.3.3.3 Village tree nursery

Many private nurseries have grown up in the landscape of NP for meeting the demand for quality seedlings and seeds of horticultural, vegetables and tree species. Village nurseries to be developed by local people having some land will be encouraged to meet the local demand for quality seedlings and seeds. Technical and logistic support will be arranged to prospective farmers.

8.3.3.4 Food Storage and Processing

Simple food storage, processing and preservation techniques will be explained to local people for creating value addition locally and providing self-employment opportunities. For example, pickles of mango, lemon and jackfruit can be made locally for households nutrition and cash sale. Banana and Pineapple harvesting and preservation technique can be applied for better marketing.

8.3.3. 5 Livestock Rearing

Poultry and cattle rearing may be suitable livelihood for poor people residing within and outside the PA. The following livestock rearing technologies are found suitable for their implementation in and around the PA:

- Cow and goat rearing
- Dairy farm
- Broiler/Layer rearing

8.3.3.6 Fisheries

Fish culture (in micro-ponds), Duck-cum-fish culture (in family ponds),

8.3.3.7 Ecotourism

Local people may be trained as eco-guide and they can be economically benefitted.

8.3.3.8 Cottage industries

Based on bamboo and cane products or handicrafts are recommended. Sital Pati industries may be encouraged based on murta product.

8.3.3.9 Sewing activities

Involving village women particularly Tupi.

8.3.4 Actions to reduce fuel wood collection/use

Fuel wood collection is the major problem of KHNP. Most of the people around the Khadimnagar region are fully or partially dependent on fuel wood for cooking. The poor landless female and young boys are engaged in collection of fuel wood from the Khadimnagar area. Even they cut seedlings and saplings and even bamboos for fuel wood. It is creating heavy pressure on the forest areas of KHNP. To reduce the pressure on the forest the following measures may be taken.

- Introduction of improved cooking stoves (ICS)
- Facilitate training program about the benefits of ICS
- Providing kerosene stoves to the inhabitants
- Biogas may be considered as another good substitute for fuelwood.
- Compressed rice husk (brickets) may be supplied
- Fuel wood plantation may be raised in the social forestry programs

8.3.5 Measures to improve community level resilience to hazards and climate change

KHNP is vulnerable to a number for climatic effect like drought, cyclone and storms, flood, landslide etc. A number of adaptive measures may be taken to improve community level resilience to hazards and climate change.

- Tree plantation in the degraded land, coastal embankment, homestead etc and deep rooted tress and creepers will be used for controlling landslide
- Drought and saline tolerant tree and crop species needs to be introduced
- New ponds may be excavated or existing ponds may be re excavated for the supply of pure natural drinking water
- Rainwater harvesting and conservation in community ponds, community reservoirs and household tanks and motki(earthen jar)
- Installation of deep tube wells
- Village based information center may be established to give warning about natural disasters
- Community based cyclone shelter may be established
- Mass awareness, training and campaign about various natural calamities
- Planned construction of embankment with appropriate drainage system, height and width considering cyclone water level
- shelter center for cattle may also be established
- For the rehabilitation of affected people contact will be established with various government and non-government organization
- High rise ponds to protect fishes from the risks of flood and high tidal inundation may be another adaptation option to climate change

8.4 Management Information System of PA

Management Information System (MIS) of Protected Area is envisaged as an integrated system which will be used to support the planning, implementation and monitoring of multi-objective forest management activities. The MIS can be used for strategic, tactical and operational planning and implementation, and operational control in and across administrative units and levels of the organizational hierarchy. Besides the databases and models required to support decision-making in the many programs of the Department, the MIS also has the ability to maintain current forest inventories, generate maps of spatially-oriented data, land cover types, plantations of various years, location of landscape villages etc. The MIS will facilitate archiving,

- Information on PA land cover classes, years of plantation and distribution, landscape area zonation, co-management organizations and members, landscape villages with population statistics;
- Forest inventory data and analysed results;
- Plantation and harvest records including, nursery information (species wise stock details by beat and range), plantation journals and felling records.
- Human resources records from FD personnel including list of concerned officers and staffs with duration of each posting.
- project based intervention records, including list of projects with relevant project documents, lists of beneficiaries, members of various components of co-management organizations e.g. community patrol groups, eco-tour guides, local service providers etc.
- Socio-economic studies including CMO scorecard assessments, project beneficiaries, sample beneficiary surveys, gender scorecard analysis, value chain assessments etc.
- Forest offence records including encroachments, illicit harvests/removal of resources, poaching, human-wildlife conflicts etc.
- Technical studies conducted from projects, academic institutions and others.

8.4.1 Develop Management Information System (MIS)

Protected area MIS could have following modules, in a web-based IT environment:

- Plantation Monitoring Information System (PMIS) – plantation and felling records including journals;
- Forest Cover Change Monitoring Information System (FCCMIS) – GIS based landscape maps;
- Climate Change Monitoring Information System (CCMIS) PCVA and village based Climate Change Adaptation and Mitigation Plans;
- Co-management institutions Monitoring Information System (CMCMIS) – Co-management organizations and memberships;
- Forest Protection Management Information System (FPMIS) – Joint Patrolling of Community Patrol Groups and/or Smart patrolling;
- Forest Inventory Management Information System (FINMIS) – inventory data and results
- Nursery Management Information System (NMIS) – species wise stocks

8.4.2 Archiving PA information

- Protected Area Management Plan with associated data
- Maps of PA landscapes with land cover, plantations, zonation, forest administrative units, distribution of VCFs, and other line and point features;
- Spatial data of the protected areas including GIS, GPS, remote sensing and Google Earth information
- Plantation and nursery records.
- CMC related information; profile, list of members in Council and Committees, list of VCFs, VCF member information,
- CMC's project implementation information
- List of projects and relevant information including project activities;
- List of beneficiaries;
- Survey data and results including forest inventory, resident forest bird surveys, household surveys, etc.
- Forest Offence Records

9 Ecotourism, education and public awareness

9.1 Ecotourism

An environmentally sound eco-tourism system in the form of nature conservation, education and interpretation and to generate alternate income of the local community through the co-management organization will be established.

9.2 Appropriate visitors level and locations/zones

KHNP has scenic beauty that may give the opportunity to the visitors to enjoy the nature. However, some areas are identified that may be used as ecotourism site. These are Bomaghar, Kalibari, LaliChara, Gulni, Burjan and Tarjantilla. But a study is needed to be done to determined appropriate visitors level.

9.3 Entry fees

A certain amount of entry fee can be fixed in the ecotourism area which can be fixed by FD. The collected revenue can be used for the conservation of biodiversity, protection and development of local people.

9.4 Facilities and infrastructure development

Tourism facilities and maintenance operations are sustainable, durable, environment friendly, moderately priced, clean and self-sufficient need to be promoted in and around the NP. Some of the feasible tourism facilities of KHNP are as follows

- Basic picnic facilities such as sheltered and outdoor tables, simple toilets and litter disposal buckets/boxes will be provided in the identified picnic spots preferably near to beat office of KHNP.
- Nature trails (Khadimnagar Beat Office to Tarjantilla) will be developed for visitors' movement on foot, traversing key natural and cultural features of interest (e.g. patches of dense forests, cliffs, cultural remnants, natural streams/charas, religious places etc.). Trails will be of three types short, medium and large. Sign-posts with adequate information will be provided at main foot trail heads. A list of do's and don'ts for visitors will also be prepared and made available at important visit places. Golghor, simple toilets and litter disposal buckets/boxes will be provided along the foot trails.
- A watch tower (Khadimanagr near to beat office) will be built to get a overview of the area at a glance.
- Students' dormitory (Khadimanagar) will be built to provide accommodation to students. Local entrepreneurs' will be encouraged to set up nature camps and cottages for tourists in interface landscape zone.
- A Nature Interpretation Centre (Khadimnagar) will be established in where landscape features of NP may be depicted in pictorial forms including topographical and biodiversity patterns. Local exhibits, murals, dioramas, specimen of plants and wildlife, trophies and photographs may be added with proper leveling and description.
- *Conservation and protection of Bomaghor*
- *Development a code of coduct for visitors*

9.5 Promoting visits

The publicity of the NP will be improved for propagating the scenic beauty of the KHNP, including chara, green hills and tea garden surrounding the park etc. Adequate coverage in

the electronic and print media (TV, Radio, Videos, newspaper, magazines, brochures, etc.) will be ensured for this purpose. Publicity and information materials having basic information about the NP will be provided to visitors by means of fixed signs, brochures, leaflets, printed guides, seminar, drama etc. at key road access points. Mass Communication Officer of FD will have to play strong role in this program.

9.6 Ecotourism services (guides, training)

Tourist guide will be developed by involving unemployed youth members/naturalists of co-management councils/committees and user groups as eco-guides. They will be trained as eco-guides by organizing a series of training workshops on communication and interpretation skills (including on what to speak, how to speak, presentation skills, body language assessment, team building exercises, etc.). They will also be trained on animal signals and calls, bird identification, biotic influences, local culture, etc. and how to move, walk and enjoy scenery without disturbing the nature.

9.7 Education and interpretation

Schools and colleges will be targeted for conservation education and increase awareness about ecotourism. Conducting talks, essays writing and competition will be included in neighboring schools as a part of awareness development. SabujaVahinis (Green Brigades) will be formed and trained in nearby schools and madarsas. Nature interpretation as an educational activity will focus on revealing meaning and relationships of complex ecosystems and landscapes. A Nature Interpretation Centre, as a part of environment education will be established at KHNP. It will consist of work through displays, audio-visuals, explanatory printed materials, items of historical and conservation significance, computer interactive media, etc. A video film on wildlife and its habitat and local cultural aspects may be developed for showing to visitors at NIC.

A museum may be established based on local NTFP to introduce local livelihood and culture of the KHNP area.

10 Funding and resource mobilization

10.1 Budget requirements/ costs

Funding and resource mobilization is very important for implementing the management plan. A summary of main prescription has been prepared (Table 13). To implement the management plan several activities were identified which needs a total budget of **Tk million 379.7175 (Annex 10)** for ten years period. These budget requirements cannot be fulfilled by the FD. The revenue budget of GoB mainly confined for meeting the salary of FD staffs. Separate budget is needed to allocate to FD in ADP for implementing the plan.

10.2 Resource mobilization

Internal financing within the PA, landscape, entry fees, GoB revenue allocations and fund from local communities may be extracted for the sustainable management of KHNP. At present no such fund are being mobilized for the management and improvement of PA. FD allocation towards the management of KHNP is very negligible from which nothing can be managed or developed. Generally the development budget is an important source of funding for implementing the projects. There is no separate or specific allocation for the PA for the management of the protected areas. Separate project can be taken for the management of PA. Part retention of locally generated revenue from the visitors to PAs can be achieved (on the pattern of social forestry plantations- an account, opened on the pattern of TFF, can be managed by FD) for funding PA management activities. Possible sources of revenue generation from entrance and special use may include- Park entry fee, rest house fee, donation etc.

10.3 External fund raising strategy

External fund is required to implement the management prescription of the plan. If needed donor funding projects can be taken by FD for the management of PA. At present several funds can be searched from GEF, Carbon funds, World Bank, Asian Development Bank, European Commission, and Japan International Co-operation Agency can extend to support these projects. Small projects with trust fund or foundations can also be taken. There might be charitable donations, private sector linkages to enhance the fund and for conservation of species special fund may be available from the conservation agencies or NGOs.

10.4 Potential for ecosystem services payment (carbon payments)

KHNP has limited opportunity to accumulate its required funding through its ecosystem services especially through carbon trade. Because it has limited carbon stock at present (298.3 CO_2 Mg ha^{-1}) , but through the effective implementation of this management plan scope of carbon trading will be enhanced tremendously because it is expected that forest cover will be augmented during the implementation period of this management plan.

11 Monitoring, adjustment of plans and research

11.1 Monitoring forest protection

Monitoring and research are tools for better understanding of the functions of KHNP in order to sustainably manage constituent forests and biodiversity. An appropriate conservation monitoring and research program will be developed with the following main objectives:

- To understand the trend of change upgrading or degradation of KHNP ecosystem;
- To understand the biodiversity resources, ecosystem and landscape environment of KHNP;
- To establish a baseline listing of all flora and fauna species for assessing their current abundance, distribution, and functional relationship among biotic communities;
- To develop quantitative population estimates for selected key species, and develop detailed information on their current distribution and habitat use;
- To identify priority research and monitoring topics to help in the management program.

One of the main parameters of monitoring forest protection may be “Declining incidence of illegal cutting. All the activities and information regarding this parameter will be properly monitored time to time and documented by the association of FD staff and co-management organizations. For effective monitoring assessment parameters along with core indicators is given in table 11.

Table 11 Indication of forest monitoring with assessment parameters

Core indicators	Assessment parameters
Declining incidence of illegal cutting	Increased number of trees
	Increased canopy cover
	Increased natural regeneration
Frequent sighting of wild animals and birds	Sighting of Birds
	Phagents and horn bill sighting

11.2 Monitoring changes in habitat/biodiversity/indicator species

A well-developed technique of monitoring in multi-species management scenario is to select one or more key species, and to ensure that habitat suitability for this species or a group of species is retained. Main species need to be considered for purposes of macro-level habitat management require regenerating forest areas with grasses and bamboo for food and shelter, and water bodies for drinking and bathing. The long-term aim will be to maximize gains in quantity and quality of habitat, and quality of associated species. The following parameters (Table 12) may be used to monitor changes in habitat and biodiversity.

Table 12 Indicators of habitat improvement

Core indicators	Assessment parameters
Improved wildlife habitat	Wildlife movement will be ensured through the existing corridors
	Increased the number of wildlife
	Damage to local inhabitants will be reduced.
Increased production of natural resources in targeted areas (Increase in natural and assisted regeneration of tree species)	Changes in plant coverage in a photo
	% area coverage
Increased biodiversity (Increased density of indicator bird Species)	Density (number/sq.km) of indicator bird species through sighting an counting
Increasing Carbon stock	% of basal area and density will be increased

11.3 Research

11.3.1 Socio-economic research

Socio-economic research is an integral part of proper management of resources and may be taken up on priority basis based on management objectives. Possible topics of investigation may include

- the institutional development and economic sustainability of co-management council/committee and user groups formed at different levels,
- impacts and dependence of local people on the NP,
- impacts of human activities on natural habitats,
- forward and backward linkages of nature tourism,
- sustainable collection, harvesting, storage and processing and marketing of NTFPs

Many of these studies will be carried out through action research and by associating local stakeholders. Prioritization of research topics will be decided in a Workshop in which key persons from FD and other relevant stakeholders will participate. A computerized data base and retrieval system will be established.

11.3.2 Ecological and biological research

Main topics of ecological research may include identification of fragile habitats and ecosystems, environmental impact studies, water body studies, evaluation of the contribution of the NP in water yield and conservation, impacts of forest grazing and forest fires on natural regeneration and wildlife, and impacts of habitat changes and eco-tourism on wildlife. Some relevant topics of biological research may include wildlife-population viability analyses, population dynamics and feeding behavior, wildlife niche use behavior, wildlife distribution patterns, wildlife seasonal variability and movements, and wildlife health and diseases. The needs of species that are dependent on specific habitats (e.g. streamside areas) or specific components (e.g. standing and fallen dead trees) will also be studied for site-specific habitat management.

12 Gender, Youth and tribal Community

There is no forest village located inside the Khadimnagar National Park but there also inhabited ethnic community called Patra community surrounding the reserve forest. Foringura, Dalaipara, Ramnagor, Kalagul bosti community partially dependent on forest.
For empowerment and lifestyle improvement of gender, youth and ethnic community of KHNP area the following step may be taken;

- Formal and informal education for youth, men, women and ethnic community
- Technical training for livelihood improvement
- Special donation
- Awareness building for biodiversity conservation.
- Training for livelihood

13 Model structure for annual plans

Table 13: Model structure for annual plans

Program	Activities	Timing	Main output	Responsibilities
Coordination	Meeting	Monthly	• Resolution forest land tenure problem • Increased administrative support	DFO and Deputy commissioner, Sylhet
	Meeting with law enforcing Agency	Quarterly	• Reduced forest offence and crime • Increased security support • Increased forest protection support	Police, Army with FD
	Co-management committee meeting (CMC)	Monthly	• preparation of monthly plan provement of forest tection	CMO and FD
	Co-management committee meeting (CMC)	Quarterly	• Quarterly progress assessment	CMO and FD
	council meeting (CMC)	Half-yearly	on making and ng MO	CMO and FD
Habitat protection program	Mapping	First year, second year and third year	• Zoning map • Boundary map	FD and CMO
	Boundary demarcation	First year, second year and third year	• Delineating boundaries	FD and CMO
	Control of illicit felling through patrolling	Full planning period	• Reduced biotic interference • Increased vegetation cover • Increased regeneration • Increased biodiversity	FD/ CMC
	Control of forest grazing through patrolling	Full planning period	• Reduced biotic interference • Increased vegetation cover • Increased regeneration • Increased biodiversity	FD/CMC
	Control of encroachment through patrolling and motivation,	Full planning period	• Prevent encroachment • Recovery of forest land	FD/CMC

	law enforcement			
	Resolving forest conflicts	Full planning period	• Increased forest protection	FD/ CMC
Core zone management	Enrichment plantation	Full planning period(yearly)	• Increased vegetation cover • Increased biodiversity	FD
	Assisted natural regeneration	Full planning period(yearly)	• Increased Vegetation cover • Increased natural regeneration • Increased biodiversity	FD
	Biodiversity conservation through protection	Full planning period(yearly)	• Increased biodiversity	FD
	Orchid house	Full planning period(yearly)	• enhance tourism	FD
	Arboretum	Full planning period(yearly)	• Established gene pool	FD
	Lake	Full planning period(yearly)	• habitat improvement	FD
Landscape zone/ Community services and actions	Climate resilient activity described in annex 8 and 9	Full planning period	Adaption to climate change impact	National and International NGOs, LGED, DPHE, DDM, Ministry of Agriculture, with close coordination of FD
	Homestead plantation	Full planning period(yearly)	• Livelihood improvement	CREL/FD/CMC
	Climate resilient cultivation	Full planning period(yearly)	• Increased food security	CMC/ CREL/ Department of Agriculture
	Alternative Income Generating Activities (AIGA)	Full planning period(yearly)	• Improved livelihood • Reduced dependency on forest resources	CREL/ NGOs/ FD/CMC
Infrastructure including visitor facilities	Renovation and maintenance of Forest rest house	Full plan period (yearly)	• Improved visitor facilities	FD/CMC
	Renovation and maintenance of staff quarter	Full plan period (yearly)	• Improved staff facilities	FD/CMC
	Nature trail development (As specified in section 9.4, page 62	First Year and second year	• Improved ecotourism	FD/CMC
	Nature interpretation center and museum	second year, third year and fourth year	• maximum enjoy minimum impact on the PA	FD/CMC
	Observation tower	second year and third year	• Improved tourism facilities	FD/CMC
	GolGhar (resting facilities)	Second year and third year	• Improved tourism facilities	FD/CREL/CMC

	Construction and maintenance picnic site	second year and third year	• Improved tourism facilities	FD/CMC
	Sign board	second year	• Improved ecotourism	FD/CMC
	Tube well	Full planning period	• Improved quality of ecotourism	FD/CMC
	Toilet	First year and second year	• Improved ecotourism	FD/CMC
	Park gate	First year and second year	• Improved management	FD/CMC
	Ticket counter	First year	• Improved tourism management	FD/CMC
	Waste bin	First year and fourth year	• Improve waste management • Less pollution	FD/CMC
	Student dormitory	second year, third year and fourth year	• Increase learning	FD/CMC
Visitor management	Park gate	First year and second year	• Increase protection	FD/CMC
	Parking place	First year and second year	• Sustainable traffic management	FD/CMC
	Tourist shop and cafeteria	First year, second year and third year	• Increase tourism facilities • Local Livlihood	FD/CMC
	Development code of conduct	First year and second year	• Increased ecotourism management	FD/CMC
	Monitoring and recoding visitors entry	Full planning period	• enhanced ecotourism management	FD/CMC
	Training eco-guides	Full planning period(yearly)	• Trained eco-guide for nature conservation	FD/CMC
	Publicity materials	Full planning period(yearly)	• Awareness about nature based tourism	FD/CMC
	Entry fee collection	Full planning period	• revenue earning	
Capacity building and research	PA archive development	Full Planning period	• Knowledge management • help effective decision making	FD /CMC
	Training assessment for participatory PA management	Full Planning period	• Training identified	FD
	Training of staffs and stakeholders on conservation	Full planning period	• Trained personnel	FD
	Meeting and workshop	Full planning period	• Capacity building	FD/CMC
	Conservation research studies	Full planning period	• Develop Guidelines for conservation	FD/CMC
	Biological	Full planning	• Develop	FD/CMC

	research	period	Guidelines	
	Research on utilization	Full planning period	• Develop Guidelines	FD/CMC
	Ecological research	Full planning period	• Develop Guidelines	FD/CMC
	Silvicultural research	Full planning period	• Develop Guidelines	FD/CMC
	Human- wildlife conflict management	Full Planning period	• Biodiversity conservation • Reduce property damage	FD
Capacity building for Livelihood program	Selecting priority production technologies (reconnaissance surveys)	First year and second year	• Assessed Demand – supply	FD
	Identifying a list of feasible production Technologies	First year and second year	• Feasible production technologies identified	FD/CMC
	Stakeholders' Consultations on the proposed production technologies	First year and second year	• Locally accepted Effective approach identified	FD/CMC
	Developing skills and loan for alternative income generation (poultry, fisheries, nursery, sewing etc.)	First year and second year	• Livelihood development	FD/CMC
Staffing and resource need	Staff recruitment and equipment as described in section table 8	First year and second year	• effective management	FD
Fund raising Plan	Potential financial sources and As described in chapter 10; page 36	Full planning period	• Financial efficiency	FD, CMO

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Annex

Annex 1: Gazette notification of Khadimnagar National Park

THE PEOPLE'S REPUBLIC OF BANGLADESH

MINISTRY OF ENVIRONMENET AND FOREST

Section 3

NOTIFICATION

No.PABAMA (SHA-3) 31/2004/335. – In exercise of the power conferred by section 23 (2) of Bangladesh Wildlife (Preservation) Act, 1973, the Government of the People's Republic of Bangladesh, is pleased to declare the forest area measuring about 678.80 ha (1676.73 acres) situated within the boundaries specified in the Schedule below according to the notification no. 595 dated 18 May, 1957 under section 20 of the Forest Act 1927 (XIV of 1927) to be a National Park.

Schedule

District- Sylhet

Range- North Sylhet Range-1 under Sylhet Forest Division

Name of the Forest- Khadimnagar

Approximate area- 1676.73 acres (678.80 ha)

Boundaries

North- From the point of junction of the eastern edge of Madhurchara stream with Southern boundary of Kalagul Tea Garden of consolidated Tea and Lands Co. Ltd., the boundary is demarcated eastward, south-eastward and north- eastward along the southern boundary of the said Kalagul Garden, i.e. along the southern boundaries of dag Nos. 506, 497, 496 and 542 of sheet No. 34, mouza Lullicherra to meet the south- east corner of dag No. 499 of the same mauza.Thence north-wards and north-eastwards along the boundary of Kalagul and Barjan Tea Garden of the aforesaid Co. Ltd., i.e. along the boundary of dag Nos. 499, 500, 543, 141, 140 and 139 of the said mauza till it meets the south-west corner of dag No. 138 marked by a brick pillar. Then eastwards and northwards along the southern and eastern boundaries of dag No. 138 to meet its north-east corner. Thence eastward along the southern boundary of sheet No. 27, mauza Lullicherra up to the north-west corner of the dag No. 585 of the same mauza. Thence along the western, southern and eastern boundaries of the said dag No. 585 to meet against the southern boundary of sheet No. 27. Then eastwards along with southern boundary of sheet No. 27, mauza Lullicherra upto the north-west corner of Dag No. 586. Thence the boundary runs along the western, southern and eastern boundaries of the dag No.587 to meet the southern boundary of Gulni Tea Garden of aforesaid Co. i.e. along the southern boundary dag No. 103, 104 and 106 of mauza Gulni Cha Bagicha till it reaches the Champacherra, then northwards along the said cherra till it reaches the south-east corner dag No. 61 of mauza Barnagar Cha Bagicha, then northwards along the boundary said dag No.61 till it reaches the boundary of dag No. 53 of mauza Barnagar Cha Bagicha, then along the southern and eastern boundary of dag Nos. 53 and 48 of the said mauza it reaches the north east corner of the said dag No. 46 of Baranagar

Cha Bagicha, then along the southern and eastern boundary of the said dag till it reaches the north east corner of the said dag No. 46, then eastward along the southern boundary of dag Nos. 70 and 71 of mauza Fatehpur Cha Bagicha use it reaches a certain cherra (Galla Cherra), then southward along the said cherra in a zig-zag way till it reaches the south-west corner dag No. 140 of mauza Fatehpur Cha Bagicha 2nd part, then eastward along the southern boundary of the said dag till it reaches the Pallacherra, then south wards along the said cherra till it reaches south-west corner of dag No. 120 of mauza Fatehpur Cha Bagicha, then eastwards along the southern boundary of the said dag till it reaches the Kinaicherra stream which forms the eastern boundary of sheet No. 308, Fatehpur Cha Bagicha, Part II.

East- From the last mentioned point the boundary runs south-westerds along the eastern boundary of the sheet No. 308, Fatehpur Cha Bagicha, part II, till it meets the northern boundary of sheet No. 296, mauza Cherragang Khas. Thence the boundary runs westwards along the northern boundary and southwards along the western boundary of this sheet till it reaches the Cherragang stream. Thence from the said stream to meet the north-west corner of periodic dag No. 9 of sheet No. 24, mauza Cherragang. Thence southwards, eastwards and northwards along the western, southern and eastern boundaries of the said dag No. 9 till meets the Cherragang stream again. Thence down the stream for 1.30 chains to meet a point marked by brick pillar on the southern edge of the said stream and on the boundary of the land belonging to Cherragang Tea Garden of consolidated Tea and Lands Co. Ltd.

South-From the last mentioned point the boundary runs along the northern boundary of Cherragang Tea Garden of consolidated Tea and Lands Co. Ltd., i.e., along the southern boundaries of dag No 2 of mauza (Cherragang and dag No. 185 of mauza Lullichera (both the dags comprise the reserve Forest), till it meets the south- east corner of dag No. 150 of mauza Lullicherra . Then the boundary is demarcated at following bearing and chainages to meet the western boundary of dag No. 473 of mauza Lullicherra belonging to Khadimnagar

Tea Garden of Consolidated Tea and Lands Co. Ltd.

Bearings	Chainages (Links)
11-0´	28-20
345-0´	15-20
254-30´	4-00
249-30´	3-40
178-0´	22-0
231-30´	61-40
313-30´	11-0
322-30´	11-20
286-0´	9-30
226-0´	4-0
160-0´	25-40

Thence the boundary follow the northern boundary of the said Khadimnagar Garden till it meets the eastern edge of dag No. 453, mauza Lullicherra.

West- From the last mentioned point the boundary runs northwards along the eastern edge of the dag Nos. 453 and 489 of mauza Lullicherra upto the starting point.

By order of the President
(Jafar Ahmed Chowdury)
Secretary

Annex 2: Useful glossary

Biodiversity	The variety of life and its processes including complexity of species, communities, gene pools and ecological functions .
Buffer zone	It is an area peripheral to a national park or equivalent reserve, where restrictions are placed upon resource use or special development measures are undertaken to enhance the conservation values of the area**.** This peripheral area can provide the local inhabitants with the privilege of regular consumption of forest products.
Core zone	These areas are securely protected sites for conserving biological diversity. The entire forest area that was declared as National Park in the official gazette is designated as core zone.
Framework tree species	The framework species method involves planting mixtures of 20-30 indigenous forest tree species, which are typical of the target forest ecosystem. these species i) are fast-growing with dense spreading crowns that rapidly shade out competing weeds and ii) are attractive to seed-dispersing wildlife, especially birds and bats. In addition, framework species must be easy to propagate in nurseries. High quality seedlings of 20-30 framework tree species, 5-60 cm tall (30 cm for the fastest growing species) are planted 1.6 – 1.8 m apart at the beginning of the rainy season. Weeds are vigorously controlled and fertilizer is sometimes added, but after 2-3 rainy seasons the canopy closes, the forest becomes self-sustaining and no further maintenance is required. Once the "framework" of a forest has been re-established, the other components of the ecosystem can return naturally.
Impact zone	The extent of area outside the legal boundaries over which local villagers have a traditional PA based forests based dependency and/or over which significant wildlife damage occurs.
Landscape	Landscape comprises the visible features of an area of land, including the physical elements of landforms such as mountains, hills, water bodies such as rivers, lakes, ponds and the sea, living elements of land cover including indigenous vegetation, human elements including different forms of land use, buildings and structures, and transitory elements such as lighting and weather conditions. Ecologically landscape consists of mosaic of natural communities – associations of plants and animals and their related processes and interactions.
Keystone species	Animals or plants which by virtue of their presence or absence alter the structure of a community.
Succession stage:	A stage or recognizable condition of a plant community which occurs during its development from bare ground to climax.

Annex 3 List of tree species in KHNP

Local name	**Scientific name**	**Family**
Chattim	*Alstonia scholaris*	Apocynaceae
Arjun	*Terminalia arjuna*	Combretaceae
Bahera	*Terminalia belerica*	Combretaceae
Haritaki	*Terminalia chebula*	Combretaceae
Sal	*Shorea robusta*	Dipterocarpaceae
Garjan	*Dipterocarpus turbinatus*	Dipterocarpaceae
Minjiri	*Cassia siamea*	Leguminosae
Ping	*Cynometra polyandra*	Leguminosae
Loha kat	*Xylia dolabriformis*	Leguminosae
Jarul	*Lagerstroemia speciosa*	Lythraceae
Champa	*Michelia champaca*	Magnoliaceae
Pitraj/Rata	*Aphanamixis polystachya*	Meliaceae
Neem	*Azadirachta indica*	Meliaceae
Chickrasi	*Chickrassia tabularis*	Meliaceae
Mahagoni	*Swietenia mahagoni*	Meliaceae
Toon	*Toona ciliata*	Meliaceae
Sil koroi	*Albizia procera*	Mimosaceae
Chapalish	*Artocarpus chaplasha*	Moraceae
Dewa	*Artocarpus lacucha*	Moraceae

Dumur	*Ficus roxburghii*	Moraceae
Dhakijam	*Syzygium grande*	Myrtaceae
Kadam	*Anthocephalus chinensis*	Rubiaceae
Udal	*Sterculia villosa*	Sterculiaceae
Agor	*Aquilaria malacensis*	Thymalaceae
Gamar	*Gmelina arborea*	Verbenaceae
Teak	*Tectona grandis*	Verbenaceae

Annex 4: List of Shrubs species in KHNP

Local name	**Scientific name**	**Family**
Asam lata	*Eupatorium odoratum*	Compositae
Niltarulata	*Ipomoea rubens*	Convolvulaceae
Shialbuka	Antidesma acuminata	Euphorbiaceae
Chukka	*Antidesma ghaesembila*	Euphorbiaceae
Bishuti	*Cnesmone javanica*	Euphorbiaceae
Paniala	*Flacourtia jangomas*	Flacourtiaceae
Hastikorna	*Leea acuminata*	Leeaceae
Dadmardan	*Cassia alata*	Leguminosae
Ban Ukra	*Urena lobata*	Malvaceae
Bantejpata	*Melastoma malabathricum*	Melastomaceae
Jali bet	*Calamus guruba*	Palmae
Bonjamir	*Glycosmia pentaphylla*	Rutaceae
Uzaru	*Firmiana colorata*	Sterculiaceae
Bhandariphool	*Clerodendrum kaemferi*	Verbenaceae
Bhat	*Clerodendrum viscosum*	Verbenaceae
Lantana	*Lantana camara*	Verbenaceae
Tara	*Alpinia allughas*	Zingiberaceae

Annex 5: List of herb species in KHNP

Local name	**Scientific name**	**Family**
Upathlenga	*Achyranthes aspera*	Amaranthaceae
Haichashak	*Alternanthera sessilis*	Amaranthaceae
Kantanotey	*Amaranthus spinosus*	Amaranthaceae
Ban note	*Amarantus viridis*	Amaranthaceae
Kachu	*Colocasia esculenta*	Araceae
Bonadia	*Lasia spinosa*	Araceae
Dul Kachu	*Xanthosoma violaceum*	Araceae
Dudhilata	*Doemia extensa*	Asclepiadaceae
Kasoni	*Cichorium endivia*	Compositae
Hati lata	*Argyreia splendens*	Convolvulaceae
Keumul	*Costus speciosus*	Costaceae
Bhui amla	*Phyllanthus nirruri*	Euphoriaceae
Painna ghas	*Axonopus variegata*	Gramineae
Lemongrass	*Cymbopogon citratus*	Gramineae
Fuljhar	*Thysalonema maxima*	Gramineae
Lazzaboti	*Mimosa pudica*	Leguminosae
Kheri	*Phaseolus aconotifolius*	Leguminosae
Bonpiaz	*Crinum pratense*	Liliaceae
Satipata	*Curculigo recurvata*	Liliaceae
Bala	*Pavonia odorata*	Malvaceae
Nakphul	*Sida acuta*	Malvaceae
Rashna	*Vanda roxburghii*	Orchidaceae
Ban naringa	*Biophytum sensitivum*	Oxalidaceae
Paporomia	*Peperomia pellucida*	Piperaceae

Hankish gota	*Coix lachryma-jobi*	Poaceae
Binna	*Vetiveria zizanioides*	Poaceae
Jaoful	*Thysanolaena maxima*	Poaceae
Thankuni	*Centella asiatica*	Umbelliferae
Ban dhone	*Eryngium foetidum*	Umbelliferae
Bankhual	*Seseli indicum*	Umbelliferea
Ban halud	*Curcuma aromatica*	Zingiberaceae

Annex 6: List of fauna in Khadimnagar National Park

Birds

Sl	English Name	*Genus*	*Species*	National Status	Ha	KNP status
1	Red Junglefowl	*Gallus*	*gallus*	Resident	F	r
2	Kalij Pheasant	*Lophura*	*leucomelanos*	Resident	Fe	r
3	Rock (Feral) Pigeon	*Columba*	*livia*	Resident	V	1
4	Oriental Turtle-Dove	*Streptopelia*	*orientalis*	Resident	Fe	1
5	Eurasian Collared Dove	*Streptopelia*	*decaocto*	Resident	V	1
6	Red Turtle-Dove	*Streptopelia*	*tranquebarica*	Resident	V	1
7	Western Spotted Dove	*Spilopelia*	*suratensis*	Resident	V	1
8	Grey-capped Emerald Dove	*Chalcophaps*	*indica*	Resident	F	uc
9	Orange-breasted Green Pigeon	*Treron*	*bicinctus*	Resident	Fe	1
10	Grey-fronted Green Pigeon	*Treron*	*affinis*	Resident	Fe	1
11	Thick-billed Green Pigeon	*Treron*	*curvirostra*	Resident	Fe	1
12	Yellow-footed Green Pigeon	*Treron*	*phoenicopterus*	Resident	F	1
13	Large-tailed Nightjar	*Caprimulgus*	*macrurus*	Resident	F	1
14	Asian Palm-Swift	*Cypsiurus*	*balasiensis*	Resident	V	1
15	Greater Coucal	*Centropus*	*sinensis*	Resident	V	1
16	Lesser Coucal	*Centropus*	*bengalensis*	Resident	B	1
17	Green-billed Malkoha	*Phaenicophaeus*	*tristis*	Resident	F	1
18	Jacobin (Pied) Cuckoo	*Clamator*	*jacobinus*	Summer visitor	V	1
19	Chestnut-winged Cuckoo	*Clamator*	*coromandus*	Summer visitor	Fe	1
20	Western Koel	*Eudynamys*	*scolopacea*	Resident	V	1
21	Violet Cuckoo	*Chrysococcyx*	*xanthorhynchus*	Resident	Fe	1
22	Plaintive Cuckoo	*Cacomantis*	*merulinus*	Resident	V	1
23	Square-tailed Drongo-Cuckoo	*Surniculus*	*lugubris*	Resident	Fe	1
24	Common Hawk Cuckoo	*Hierococcyx*	*varius*	Resident	V	1
25	Indian Cuckoo	*Cuculus*	*micropterus*	Resident	V	1
26	White-breasted Waterhen	*Amaurornis*	*phoenicurus*	Resident	W	1
27	Indian Pond Heron	*Ardeola*	*grayii*	Resident	W	1
28	Cattle Egret	*Bubulcus*	*ibis*	Resident	W	1
29	Barred Buttonquail	*Turnix*	*suscitator*	Resident	Fe	1
30	Brown Boobook (Hawk Owl)	*Ninox*	*scutulata*	Resident	V	1
31	Asian Barred Owlet	*Glaucidium*	*cuculoides*	Resident	Fe	1
32	Spotted Owlet	*Athene*	*brama*	Resident	V	1
33	Collared Scops Owl	*Otus*	*lettia*	Resident	VF	1

Sl	English Name	*Genus*	*Species*	National Status	Ha	KNP status
34	Oriental Scops Owl	*Otus*	*sunia*	Resident	F	1
35	Brown Fish Owl	*Ketupa*	*zeylonensis*	Resident	VF	1
36	Black-shouldered Kite	*Elanus*	*axillaris*	Resident	V	1
37	Oriental Honey-buzzard	*Pernis*	*ptilorhynchus*	Resident	F	1
38	Jerdon's Baza	*Aviceda*	*jerdoni*	Resident	Fe	1
39	Black Baza	*Aviceda*	*leuphotes*	Winter visitor	Fe	1
40	Crested Serpent Eagle	*Spilornis*	*cheela*	Resident	FV	uc
41	White-rumped Vulture	*Gyps*	*bengalensis*	Resident	V	1
42	Changeable Hawk Eagle	*Nisaetus*	*cirrhatus*	Resident	F	1
43	Crested Goshawk	*Accipiter*	*trivirgatus*	Resident	Fe	r
44	Shikra	*Accipiter*	*badius*	Resident	V	r
45	Besra	*Accipiter*	*virgatus*	Resident	Fe	1
46	Brahminy Kite	*Haliastur*	*indus*	Resident	V	1
47	Black Kite	*Milvus*	*migrans*	Resident	V	1
48	Common Hoopoe	*Upupa*	*epops*	Resident	V	1
49	Blue-bearded Bee-eater	*Nyctyornis*	*athertoni*	Resident	Fe	1
50	Asian Green Bee-eater	*Merops*	*orientalis*	Resident	V	1
51	Chestnut-headed Bee-eater	*Merops*	*leschenaulti*	Resident	Fe	1
52	Blue-tailed Bee-eater	*Merops*	*philippinus*	Resident + Summer visitor	V	1
53	Indian Roller	*Coracias*	*benghalensis*	Resident	V	1
54	Common Kingfisher	*Alcedo*	*atthis*	Resident	W	1
55	White-breasted Kingfisher	*Halcyon*	*smyrnensis*	Resident	V	1
56	Coppersmith Barbet	*Psilopogon*	*haemacephalus*	Resident	VFd	1
57	Blue-eared Barbet	*Psilopogon*	*cyanotis*	Resident	Fe	1
58	Lineated Barbet	*Psilopogon*	*lineatus*	Resident	F	1
59	Blue-throated Barbet	*Psilopogon*	*asiaticus*	Resident	Fe	1
60	Eurasian Wryneck	*Jynx*	*torquilla*	Winter visitor	V	1
61	White-browed Piculet	*Sasia*	*ochracea*	Resident	Fe	1
62	Greater Flameback (Goldenback)	*Chrysocolaptes*	*guttacristatus*	Resident	F	1
63	Black-rumped (Lesser) Flameback (Goldenback)	*Dinopium*	*benghalense*	Resident	V	1
64	Rufous Woodpecker	*Microptemus*	*brachyurus*	Resident	Fe	1
65	Greater Yellownape	*Chrysophlegma*	*flavinucha*	Resident	Fe	1
66	Lesser Yellownape	*Picus*	*chlorolophus*	Resident	Fe	1
67	Bllack-naped (Grey-headed) Woodpecker	*Picus*	*guerini*	Resident	Fe	1
68	Grey-capped Pygmy Woodpecker	*Picoides*	*canicapillus*	Resident	Fd	1
69	Fulvous-breasted Woodpecker	*Dendrocopos*	*macei*	Resident	V	1
70	Common Kestrel	*Falco*	*tinnunculus*	Winter visitor	V	1
71	Amur Falcon	*Falco*	*amurensis*	Passage migrant	V	1
72	Eurasian Hobby	*Falco*	*subbuteo*	Winter visitor	V	1
73	Vernal Hanging Parrot	*Loriculus*	*vernalis*	Resident	FeB	1
74	Blossom-headed	*Psittacula*	*roseata*	Resident	F	1

Sl	English Name	*Genus*	*Species*	National Status	Ha	KNP status
	Parakeet					
75	Red-breasted Parakeet	*Psittacula*	*alexandri*	Resident	FeB	1
76	Rose-ringed Parakeet	*Psittacula*	*krameri*	Resident	V	1
77	Hooded Pitta	*Pitta*	*sordida*	Summer visitor	Fe	1
78	Ashy Woodswallow	*Artamus*	*fuscus*	Resident	V	1
79	Common Iora	*Aegithina*	*tiphia*	Resident	FV	1
80	Large Woodshrike	*Tephrodornis*	*gularis*	Resident	Fe	1
81	Large Cuckooshrike	*Coracina*	*macei*	Resident	F	1
82	Black-winged Cuckooshrike	*Coracina*	*melaschistos*	Winter	F	1
83	Rosy Minivet	*Pericrocotus*	*roseus*	Winter visitor	Fe	r
84	Ashy Minivet	*Pericrocotus*	*divaricatus*	Winter visitor	F	1
85	Small Minivet	*Pericrocotus*	*cinnamomeus*	Resident	Fd	1
86	Scarlet Minivet	*Pericrocotus*	*flammeus*	Resident	Fe	r
87	Bar-winged Flycatcher-shrike	*Hemipus*	*picatus*	Resident	Fe	1
88	Brown Shrike	*Lanius*	*cristatus*	Winter visitor	V	1
89	Long-tailed Shrike	*Lanius*	*schach*	Resident	V	1
90	Grey-backed Shrike	*Lanius*	*tephronotus*	Winter visitor	B	1
91	Black-naped Oriole	*Oriolus*	*chinensis*	Winter visitor + Passage migrant	F	1
92	Black-hooded Oriole	*Oriolus*	*xanthornus*	Resident	V	1
93	Black Drongo	*Dicrurus*	*macrocercus*	Resident	V	1
94	Ashy Drongo	*Dicrurus*	*leucophaeus*	Winter visitor	F	1
95	Bronzed Drongo	*Dicrurus*	*aeneus*	Resident	F	1
96	Hair-crested Drongo	*Dicrurus*	*hottentotus*	Resident	F	1
97	Greater Racket-tailed Drongo	*Dicrurus*	*paradiseus*	Resident	Fe	uc
98	Black-naped Monarch	*Hypothymis*	*azurea*	Resident	F	uc
99	(Common) Green Magpie	*Cissa*	*chinensis*	Resident	Fe	1
100	Rufous Treepie	*Dendrocitta*	*vagabunda*	Resident	VFd	1
101	Grey Treepie	*Dendrocitta*	*formosae*	Resident	Fe	1
102	Jungle (Large-billed) Crow	*Corvus*	*macrorhynchos*	Resident	V	1
103	Great Tit	*Parus*	*major*	Resident	Fd	1
104	Barn Swallow	*Hirundo*	*rustica*	Winter + Resident (non-breeder)	V	1
105	Bengal (Rufous-winged) (Bush) Lark	*Mirafra*	*assamica*	Resident	B	1
106	Zitting Cisticola	*Cisticola*	*juncidis*	Resident	V	1
107	Grey-breasted Prinia	*Prinia*	*hodgsonii*	Resident	B	1
108	Plain Prinia	*Prinia*	*inornata*	Resident	B	1
109	Black-headed Bulbul	*Pycnonotus*	*atriceps*	Resident	Fe	1
110	Black-crested Bulbul	*Pycnonotus*	*melanicterus*	Resident	F	1
111	Red-whiskered Bulbul	*Pycnonotus*	*jocosus*	Resident	FB	uc
112	Red-vented Bulbul	*Pycnonotus*	*cafer*	Resident	VB	1
113	White-throated Bulbul	*Alophoixus*	*flaveolus*	Resident	Fe	1
114	Common Tailorbird	*Orthotomus*	*sutorius*	Resident	VB	1
115	Asian Fairy Bluebird	*Irena*	*puella*	Resident	Fe	1

Sl	English Name	*Genus*	*Species*	National Status	Ha	KNP status
116	Blue-winged Leafbird	*Chloropsis*	*cochinchinensis*	Resident	Fe	1
117	Golden-fronted Leafbird	*Chloropsis*	*aurifrons*	Resident	F	1
118	Orange-headed Thrush	*Zoothera*	*citrina*	Resident	F	1
119	Taiga (Red-throated) Flycatcher*	*Ficedula*	*albicilla*	Winter visitor	FV	1
120	Verditer Flycatcher	*Eumyias*	*thalassina*	Winter visitor	F	1
121	Pale-chinned (Brooks's) Blue Flycatcher	*Cyornis*	*poliogenys*	Resident	Fe	1
122	Grey-headed Canary-Flycatcher	*Culicicapa*	*ceylonensis*	Winter visitor	F	uc
123	Oriental Magpie-Robin	*Copsychus*	*saularis*	Resident	V	1
124	White-rumped Shama	*Copsychus*	*malabaricus*	Resident	F	uc
125	Common Stonechat	*Saxicola*	*torquata*	Winter visitor	VB	1
126	Chestnut-tailed Starling	*Sturnus*	*malabaricus*	Resident	V	1
127	Pied (Myna) Starling	*Sturnus*	*contra*	Resident	V	1
128	Common Myna	*Acridotheres*	*tristis*	Resident	V	1
129	Jungle Myna	*Acridotheres*	*fuscus*	Resident	V	1
130	Common Hill Myna	*Gracula*	*religiosa*	Resident	Fe	1
131	Velvet-fronted Nuthatch	*Sitta*	*frontalis*	Resident	F	1
132	Oriental White-eye	*Zosterops*	*palpebrosus*	Resident	F	1
133	Blyth's Reed Warbler*	*Acrocephalus*	*dumetorum*	Winter visitor	VB	1
134	Dusky Warbler	*Phylloscopus*	*fuscatus*	Winter visitor	BW	1
135	Tickell's Leaf Warbler	*Phylloscopus*	*affinis*	Winter visitor	B	1
136	Yellow-browed Warbler	*Phylloscopus*	*inornatus*	Winter visitor	F	1
137	Greenish Warbler	*Phylloscopus*	*trochiloides*	Winter visitor	F	uc
138	Blyth's Leaf Warbler	*Phylloscopus*	*reguloides*	Winter visitor	F	1
139	Yellow-bellied Warbler	*Abroscopus*	*superciliaris*	Resident	Fe	r
140	Lesser Necklaced Laughingthrush	*Garrulax*	*monileger*	Resident	Fe	1
141	Greater Necklaced Laughingthrush	*Garrulax*	*pectoralis*	Resident	Fe	1
142	Rufous-necked Laughingthrush	*Garrulax*	*ruficollis*	Resident	B	1
143	Abbott's Babbler	*Malacocincla*	*abbotti*	Resident	Fe	c
144	Puff-throated (Spotted) Babbler	*Pellorneum*	*ruficeps*	Resident	F	c
145	White-browed Scimitar Babbler	*Pomatorhinus*	*schisticeps*	Resident	Fe	1
146	Striped Tit Babbler	*Macronous*	*gularis*	Resident	Fe	uc
147	Chestnut-capped Babbler	*Timalia*	*pileata*	Resident	BG	1
148	Pale-billed (Tickell's) Flowerpecker	*Dicaeum*	*erythrorynchos*	Resident	VF	1
149	Scarlet-backed Flowerpecker	*Dicaeum*	*cruentatum*	Resident	Fe	r
150	Ruby-cheeked Sunbird	*Anthreptes*	*singalensis*	Resident	F	1
151	Purple-throated Sunbird	*Nectarinia*	*sperata*	Resident	Fe	1
152	Purple Sunbird*	*Nectarinia*	*asiatica*	Resident	VB	1
153	Crimson Sunbird	*Aethopyga*	*siparaja*	Resident	F	uc
154	Little Spiderhunter	*Arachnothera*	*longirostra*		Fe	uc
155	Forest Wagtail	*Dendronanthus*	*indicus*	Passage	F	1
156	White Wagtail	*Motacilla*	*alba*	Winter visitor	VW	1
157	Rosy Pipit	*Anthus*	*roseatus*	Winter visitor	Wh	1

Sl	English Name	*Genus*	*Species*	National Status	Ha	KNP status
158	Baya Weaver	*Ploceus*	*philippinus*	Resident	V	1
159	White-rumped Munia	*Lonchura*	*striata*	Resident	Fe	1
160	Scaly-breasted Munia*	*Lonchura*	*punctulata*	Resident	V	1
	No of species recorded					**160**

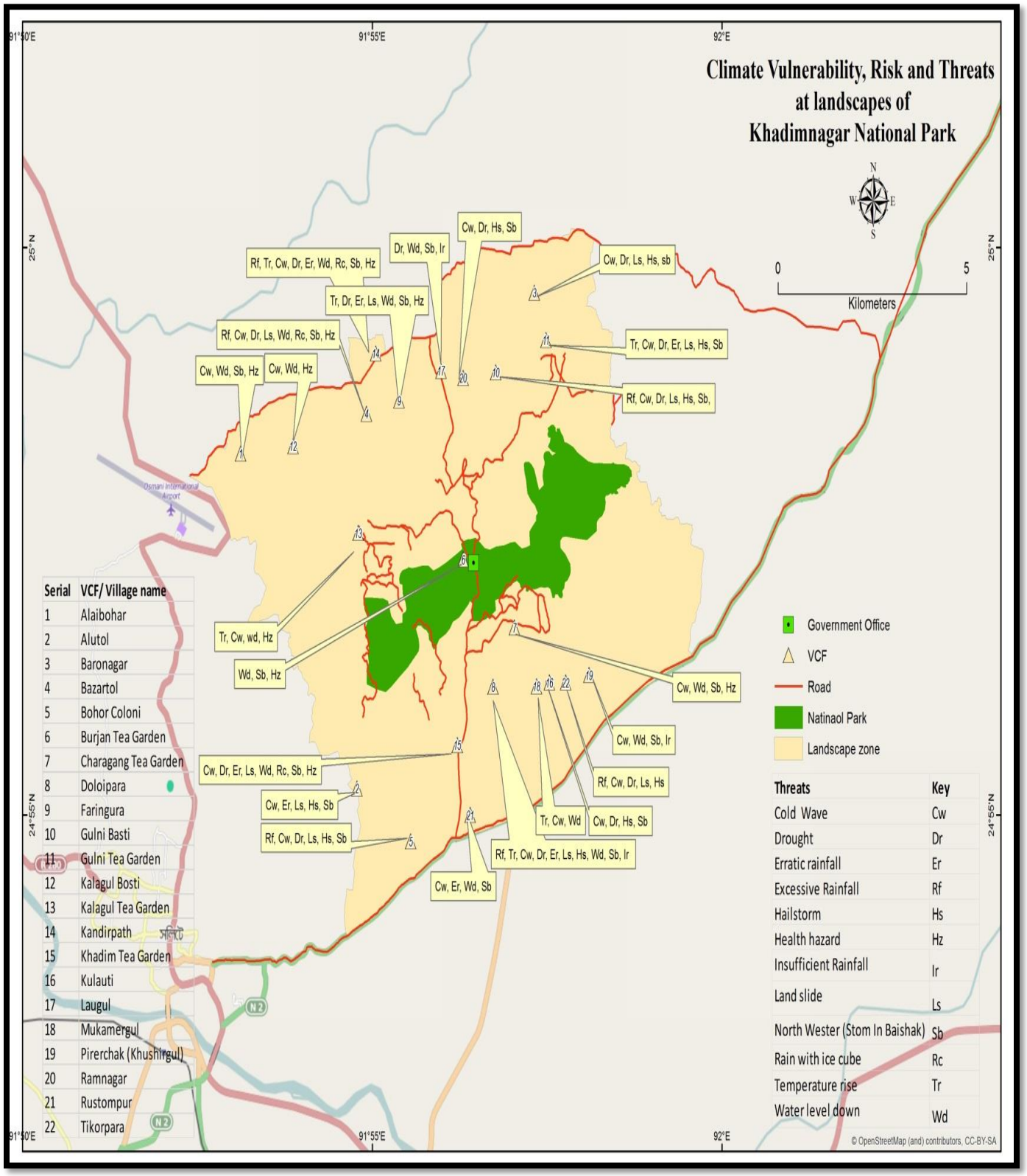
Common= c; uncommon= uc;. Rare= r; 1-5 records= number

Other vertebrates

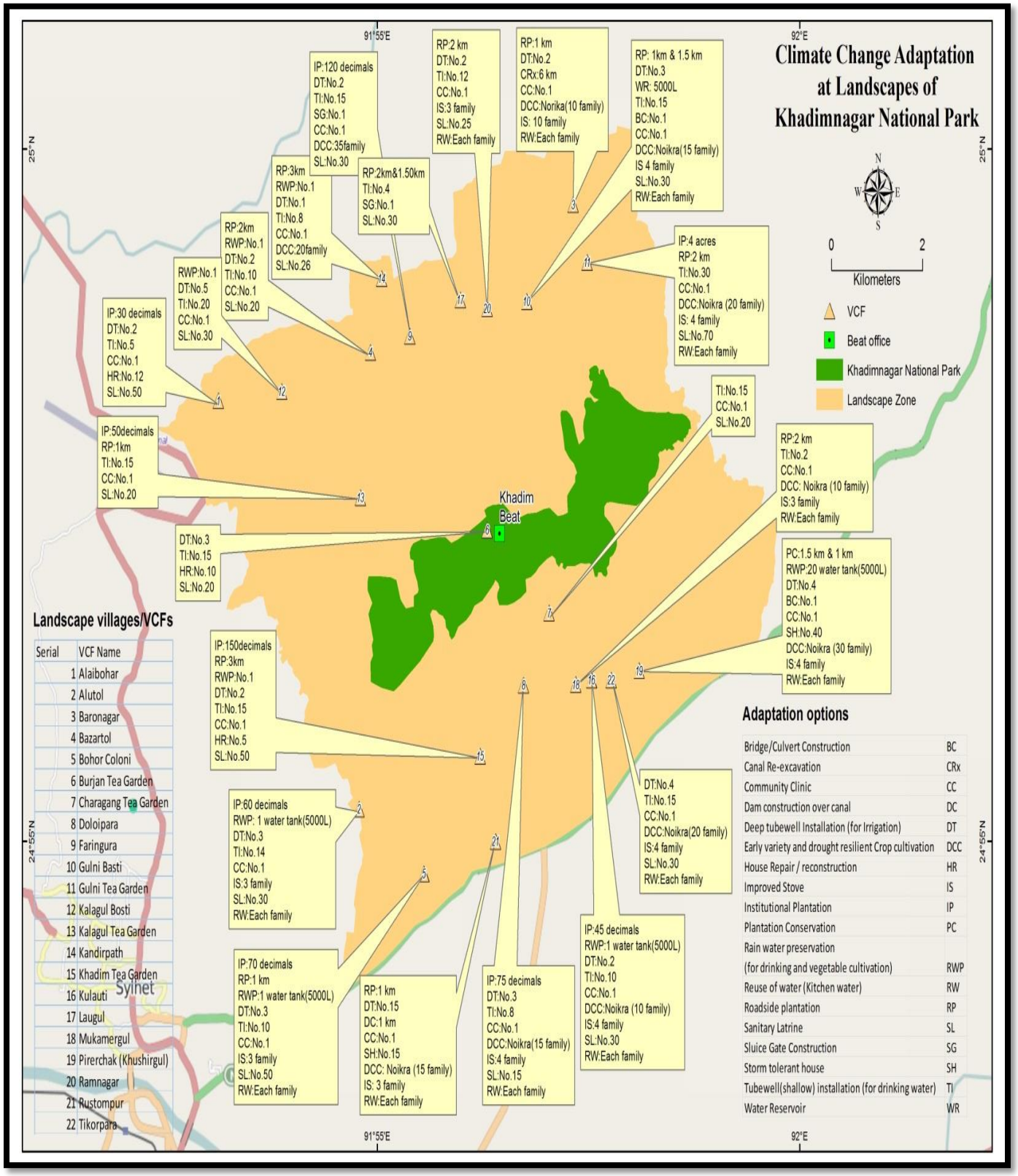
Class	English name	Local name	Scientific name	Family
Amphibians	Common Toad	Kuno Bang	*Bufo melanostictus*	Bufonidae
	Two-striped Pigmy Tree Frog		*Chiromantis vittatus*	Rhacophoridae
	Indian Bull Frog	Sona / Kola Bang	*Hoplobatrachus tigerinus*	Dicroglossidae
	Bhamo Frog		*Humerana humeralis*	Ranidae
	Two-striped grass Frog	Pana Bang	*Hylarana taipehensis*	Ranidae
	Tree Frog	Gecho Bang	*Polypedates macuiatus*	Rhacophoridae
Mammals	Asian small clawed otter		*Aonyx cinerea*	Mustelidae
	Asiatic Jackal		*Canis aureus*	Canidae
	Orange-bellied Himalayan Squirrel	Kamlapet Himalayee Katbirali	*Dremomys lokriah*	Sciuridae
		Ulluk	*Hylobates hoolock*	Hylobatidae
	Stump-tailed Macaque		*Macaca arctoides*	Cercopithecidae
	Pig-tailed Macaque	Ultoleji Banor/ Kulu Bandor	*Macaca leonine*	Cercopithecidae
	Rhesus Macaque	Banor	*Macaca mulatta*	Cercopithecidae
	Barking Deer		*Muntiacus muntjak*	Cervidae
	Slow Loris	Lojjawati Banor/Lajuk Banor	*Nycticebus bengalensis*	Lorisidae
	Fishing Cat		*Prionailurus viverrinus*	Felidae
	Flying Fox/ Indian Flying Fox	Badur	*Pteropus giganteus*	Pteropodida
	Indian Wild Pig		*Sus scrofa*	*Suidae*
	Capped Langur	Mukhpora Hanuman	*Trachypithecus pileatus*	Cercopithecidae
	Large Indian Civet	Bagdash	*Viverra zibetha*	*Viverridae*
Reptiles	Common Vine Snake	Laodoga Shap	*Ahaetulla nasuta*	Colubridae
	Emma Gray's Forest Lizard	Rokto-chusha	*Calotes emma*	Agamidae
	Common Garden Lizard	Rokto-chusha	*Calotes versicolor*	Agamidae
	Indian Rat Snake	Daraj	*Coluber mucosus*	Colubridae
	Tokay Gecko	Tokkhak/ Kokkey	*Gekko gecko*	Gekkonidae
	Bowring's House Gecko	Badame Tiktiki	*Hemidactylus bowringii*	Gekkonidae

	Common House Gecko	Tiktiki	*Hemidactylus frenatus*	Gekkonidae
	Flat-tailed Gecko	Chapta-leji Tittiki	*Hemidactylus platyurus*	Gekkonidae
	Common garden Skink		*Mabuya carinata*	Sciuridae
	Many-lined Grass Skink	Anjon	*Mabuya multifasciata*	Scincidae
	Monocled Cobra	Gokhra Shap	*Naja kaouthia*	Elapidae
	Spectacled Cobra	Khoia Gokhra Shap	*Naja naja*	Elapidae
	Python		*Python molurus*	Pythonidae
	Spot-tailed Pit Viper	Viper Shap	*Trimeresurus erythrurus*	Viperidae
	Bengal Monitor	Gui Shap	*Varanus bengalensis*	Varanidae

Annex 7: Climate change vulnerability map in Khadimnagar CMC



Annex 8: Climate change adaptation map in Khadimnagar CMC



Annex 9: Summary of Carbon Inventory in KHNP (Source: Latif et al. 2015)

Land cover type	**Area (ha)**	**Nos. Seedlings ha^{-1}**	**Nos. Saplings ha-1**	**Nos. Live trees ha^{-1}**	**CO_2 Mg ha^{-1}**
Degraded forest	198	0	1,989	360	79.7
Forest	479.0	1,326	531	1,017	362.5
Plantation	N/A	0	0	1,768	350.9
Average					298.3

Annex 10: Input requirements and tentative ten year budget for Khadimnagar National Park management plan 2015-2025

Program	Activity	Unit	Quantity/ Year							Total cost (000) Tk for 1st 5 Years	Y6-Y10		Cost for Y6-Y10	Grand Total	
			Y1	Y2	Y3	Y4	Y5	Qty Total	Unit Cost (000) TK		Qty Total	Unit Cost (000) TK		Qty for 10 years	Cost (000) TK
Habitat protection program	Mapping	LS								500	LS		500	LS	1000
	Boundary demarcation (Pillars)	LS	10	10	10			30	400	1200	LS		600		1800
	Control of illicit felling , forest grazing, encroachment	LS								700	LS		700		1400
	CM council and CM committee meeting	LS								2550	LS		2550		5100
	PF, VCF, meeting	LS								2020	LS		2020		4040
	Patrolling equipment	LS								500	LS		500		1000
	Rewards for biodiversity protection efforts	LS								50	LS		100		150
	Resolving forest conflicts	LS								100	LS		100		200
Core zone management	Enrichment planting and maintenance	Ha	10	10	10	10	10	50	120	6000	LS		3000		9000
	ANR and maintenance	Ha	10	10	10	10	10	50	120	6000	LS		3000		9000
	Habitat improvement Works	Ha	10	10	10	10	10	50	120	6000	LS		3000		9000
	Establishment of arboretum and maintenance	Ha						5	500	2500			2500		5000

	Establishment of orchid house and maintenance	No						1	5000	5000	1	5000	5000	LS	10000
Impact zone/ Community services and actions (considering PCVA)	Social forestry (seedlings)	No. (000)	10	10	10	10	10	50	0.10	5000			7500	50	12500
	Strip plantation	Km	5	5	5	5	5	25	0.10	2500			2500	25	5000
	Homestead plantation (seedling distribution)	No.	10	10	10	10	10	50	0.10	5000			7500		12500
	Climate resilient cultivation	LS						120	10	1200			1500	LS	2700
	Deep tube well installation (irrigation)	No.						50	100	5000			7500	LS	12500
	Improve stove distribution	No.						45	1.5	67.5			100		167.5
	Institutional Plantation	Ha						3	120	360			500		860
	Sanitary latrine	No.						521	20	10420			1000		11420
	Installation of tube well	No.						114	10	1140			1000		2140
	Canal re-excavation	Km						6	500	3000			4500		7500
	Dam construction	Km						5	2000	10000			15000		25000
	Bridge / Culvert construction	No.						2	5000	10000					10000
	Sluice gate	No.						2	10000	20000			500		20500
	Embankment construction	Km						1	5000	5000			7500		12500
	Pond Excavation							1	200	200			300		500
	Cyclone shelter	No.						2	10000	20000			1000		21000
	Bamboo	ha						5	80	400			500		900

	cultivation														
Livelihood program	Selecting priority production technologies (reconnaissance surveys)	LS								70			100		170
	Identifying a list of feasible production Technologies	LS								30			100		130
	Stakeholders' Consultations on the proposed production technologies	LS								25			100		125
	Developing skills and loan for alternative income generation (poultry, fisheries, nursery, sewing)	LS								300			500		800
Tourism and visitor management Training and research Administrative staff recruitment	Nature Interpretation Centre and maintenace	No.						1	20000	20000			1000		21000
	NTFP Museum	No.						1	20000	20000			1000		21000
	Park gate	No						1	10000	10000			500		10500
	Parking place development	LS						1	1000	1000			500		1500
	Tourist market and cafeteria	No.						2	5000	5000			500		5500
	Watch Towers	No.						1	20000	20000			500		20500
	Student Hut / Dormitory	No.						1	10000	10000			1000		11000

	Construction and maintenance of ecotourism Area	No.								10000			1000		11000
	Nature trails construction and maintenance	LS						6	200	1200			1000		2200
	Identifying suitable sites for Nature Camps	No.						2	50	100					100
	Sign arrow/ boards	No.						20	1.5	30			100		130
	Toilets construction and maintenance	No.						4	300	1200			800		2000
	Resting Facility (gol garh)	No.						4	500	2000			800		2800
	Tube well for picnic spots and toilets	No.						4	500	2000			800		2800
	Trash cans	No.						10	1.5	15			20		35
	Identifying & training eco-guides	LS								50			50		100
	Preparing publicity Materials	LS								2000			2500		4500
	Film making (audiovisuals) for NIC	No.							2000	2000			2000		4000
	Training assessment for participatory PA management	LS								500			750		1250
	Training of staffs and stakeholders on conservation	LS								500			750		1250

	Meeting and workshop	LS								500			750		1250
	Carbon inventory	LS								2000			3000		5000
	Floral and faunal Inventories	No.	2	2	1			5	40	1000			1500		2500
	Conservation research studies	LS								500			750		1250
	Ecological research	LS								500			750		1250
	Silvicultural research	LS								500			750		1250
	ACF (1)	m-m													As per national pay scale
	RO (1)	m-m													
	Office assistant/ Computer operator (1)	m-m													
	Foresters/ DR (1)	m-m													
	FG (7)	m-m													
	Plantation Mali (2)	m-m													
	Care taker (1)	m-m													
	Cleaner (1)	m-m													
Facility Development Programs	Renovation and Maintenance of Forest rest house	No.						1		500			750		1250
	Renovation and maintenance of Range officers quarters	No.						1		500			750		1250
	Renovation and maintenance of Beat Officers' quarters	No.						1		500			750		1250
	Renovations and maintenance of	No.						1	1250	1250			1500		2750

	FGs barrack														
	Construction and maintenance of ACF's Quarters	No.	1							10000			1000		11000
	Double-cab pickups and maintenance	No.	1					1	3000	3000			1000		4000
	100 cc motorcycles and maintenance	No.						2	150	300			150		450
	Desktop Computer + laptop computer + Printer	No.	2+ 1+ 1					3+1	50+ 20	170			300		470
	Field equipment (survey ins.+ GPS +Binocular + Torches +fire protection)	LS								500			750		1250
	Digital camera	No.	2					2	500	1000			1500		2500
	Rifle	No	7					7	40	280					280
	PA Archive development and maintenance	LS								1000			1000		2000
Total										264427.5			115290		379717.5

Activities and Indicative Cost Estimate

The budget requirements for the implementation of the Management Plan for KHNP are projected based on the information gathered from FD field offices and official documents.

This proposed schedule of activities and costs is based on the major input requirements identified in the Management Plan. It is intended as both a summary of the major inputs required during the five-year life of the Plan, and as a guide to further detailed costing by FD staff charged with its implementation. Costs shown are subject to revision during the Plan implementation period.

Annex 11 proposed equipment for KHNP

Name	No. unit
Digital Camera	2
Binocular	2
GPS	2
Torches	20
Desktop computer	2
Printer	1
Laptop computer (For ACF)	1
Rifle (1 for each FG)	7
Double cab Pick up (KHNP office)	1
Motor bike 100 cc	2
Rain coat	20

Annex 12: Major NTFP species in KHNP

Sl No	Name	Scientific Name	Use
01	Borta	*Artocarpus lecucha*	Fruit
02	Shimul tula	*Bombax ceiba*	Cotton
03	Mitinga	*Bambusa tulda*	Bamboo
04	Baria	*Bambusa vulgaris*	Bamboo
05	Muli	*Melocana Beccifera*	Bamboo
06	Jali bet	*Calamus guruba*	Bet
07	Korak bet	*Calamus latifolius*	Bet
08	Murta	*Schumannianthus dichotomus*	Pati pata
09	Bohera	*Terminelia bellirica*	Medicine
10	Haritaki	*Terminelia cebula*	Medicine
11	Dumur	*Ficus hispida*	Food ,Medicine
12	Amloki	*Phyllanthus emlica*	Medicine
13	Agar	*Aquilaria agallocha*	Perfume,Medicine
14	Sungrass	*Saccharum spontanium*	Thatch material
15	Kalichari Bash	*Gigantachia andamanica*	Fencing bamboo
16	Dhekia	*Diplazium polypodioides*	Vegitable
17	Alulata	*Dioscirea pentaphylla*	Food,Medicine
18	Gilalata	*Entada rhedii*	Medicine
19	Kalilata	*Derris trifoliata*	Food,Rope
20	Bees	*Apis dorsata*	Honey,Wax
21	Ful jharu	*Thysanolaena maxima*	Broom