

Chapter 1

**BIODIVERSITY CONSERVATION &
WILDLIFE MANAGENMENT PLAN**

BIODIVERSITY CONSERVATION & WILDLIFE MANAGEMENT PLAN

1.1 INTRODUCTION

Biodiversity has ethical, social, and economic values distinct from bio resources. The social, ethical, cultural and economic values of biodiversity have been long recognised in religion, art and literature of the Himalayan region and were at an all-time high and resources were freely available to sustain the population needs and developments. However, the current explosive growth of human population and rage pressure on the mother nature for sustaining the ever increasing demands is causing huge species loss in floral and faunal components day by day. The loss of biological diversity and degradation of habitats and ecosystems will immensely affect the present and future generations as the species lost today may have food, medicine and industrial value presently not known to mankind. The diverse floristic and faunal wealth of Himalaya has been depleted both qualitatively as well as quantitatively, owing to various reasons such as unplanned land use, overgrazing of natural grasslands, and developmental needs. Looking at this alarming destruction of habitat, the foremost priority that stares the biologists of today is the proper management and conservation of present biological components (both terrestrial and aquatic). This is possible only through consistent exploration, inventory and systematic recording of the various biotic entities. Although in recent past there has been a deep concern and awareness for the conservation of fragile Himalayan ecosystem.

The Himalayan landscape is a wide matrix of variety of ecosystems ranging from forests, grasslands, alpine meadows and agro-ecosystems and is distributed in patches. It represents one of the most important mega centre of biodiversity of the world, although covering only 18% of the geographical area of India, it

accounts for more than 50% of the vegetation wealth. The high vegetation diversity and peculiar environmental factors of Himalaya sustain a variety of wild life which supports 528 species of birds, 241 species of mammalian out of 1228 bird species and 372 mammalian species respectively recorded in the country so far. Likewise 147 species of reptiles, 74 species of amphibians and 218 species of fishes have been documented from the Himalaya which amount to 35%, 36% and 17% respectively of known species in the country. Further, rich and diverse floristic and faunalistic wealth of Himalaya is undoubtedly due to its immensely varying climatic and geographical conditions with varied ecological habitats and provide a high degree of diversity at species level. Another fascinating feature of the Himalayan flora and fauna is that it has elements from surrounding and adjacent countries like Tibet, China, Malaya, Nepal & Myanmar and even from far flung and separated continents.

Arunachal Pradesh holds an important position as a biodiversity conservation area and is an identified region for 'biodiversity hot spot', 'endemic bird areas (ICBP), global eco-regions of WWF, conservation significance areas (Biodiversity Conservation Prioritization Project – BCPP) and conservation sites (State Biodiversity Conservation Strategy Action Plans – SBCSAP). The major threats to the biodiversity of this region include growing human influx, extraction of the forest produce, hunting and poaching. The traditional livelihood system of the local tribes is at times also seen to be in conflict with conservation. For instance, age-long agriculture system of shifting slash and burn cultivation (Jhum) is a destabilizing factor in biodiversity conservation. However, it needs to be mentioned that the tribes in Arunachal Pradesh are an integral part of the forest ecosystem more than anywhere else in the Himalayan region. The customs and cultures of the local tribal communities have evolved with the local biodiversity and play a significant role in figuring out the key issues of biodiversity conservation.

The entire catchment of Demwe Lower Hydroelectric project is a storehouse of the large array of diversity in timber, fuel, fodder, food, fibre, wild fruit, vegetables

and medicinal plants which are naturally or artificially growing in the region (a detailed analysis has been given in the baseline status in EIA report).

1.2 CONSERVATION STATUS AND MAJOR THREATS

The influence zone area of Demwe Lower H.E. project is rich in the floral and faunal diversity (see floral and faunal elements in the EIA report).

1.2.1 Flora

The project area is rich in diversity and along the river valley, patches of primary undisturbed forests specially on the left bank are seen and are dominated by species such as *Ailanthus*, *Albizzia* spp., *Dalbergia* spp., *Duabanga grandiflora*, *Ficus* spp., *Terminalia myriocarpa*, *Pterospermum acerifolium*, etc. The shrub layer is rich and includes species like *Acacia pennata*, *Acacia pruinescen*, *Boehmeria longifolia*, *Boehmeria macrophylla*, *Calamas* spp., *Clerodendron colebrookianum*, *Debregeasia longifolia* and *Desmodium laxiflorum*. Plants of economic importance such as timber, medicinal, edible fruits were common at the project site. However, there was no endangered category of species.

The vegetation particularly along riverbanks in some places are degraded along the accessible bank. A few fodder trees that have been seen are *Ficus* spp. that was the dominant species particularly roadside. Beside this, *Musa* sp. was also found to be scattered here and there on both the bank of Lohit River along the submergence area. Most of the area around the dam is steep with rock outcrop and low vegetation density. The forest at the disturbed area was dominated by *Ficus* spp., and shrubby species and the trees showed three distinct strata viz., canopy layer of trees with 8 m height, shrub layer and the ground layer. However, undisturbed primary forest of the area had distinct stratification. The canopy cover of forests at Dam site and submergence area is <40% (open forest) due to rock outcrops, whereas the Catchment area represents shifting cultivation sites, degraded forests and primary forests with >60% cover. The colony site is represented by young as well as old growth plantations. Overall, One hundred and sixty nine plant species of angiosperms were recorded during

floristic survey in the project area at different sampling seasons. The number of plant species belonging to different groups is given in Table 1.1.

Table 1.1: Summary table of plants belonging to different groups recorded during the vegetation survey

Plant Group/Life form	No. of species		
	Monsoon	Winter	Summer
Angiosperms	168	160	166
Dicots	138	135	137
Monocots	30	25	29
Trees	72	72	72
Shrubs	52	52	52
Herbs	39	31	38
Climbers	7	7	6
Gymnosperms	2	2	2
Pteridophytes	7	7	7

Source: Primary data sampling

The conservation efforts toward plants have not been given adequate attention particularly of those which are of potential economic and scientific value. Therefore, our economically important plants are diminishing day by day due to unplanned development and over exploitation of floral wealth. The categorization of conservation status based on Red Data Book suggests that a total of 6 species comes under conservation status in the entire catchment and influence zone. Out of them 4 species are Rare and two species are of Endangered category (Table 1.2). Among these, species none of them was recorded from the submergence zone.

Table 1.2: Conservation status of the flora species in the Demwe Lower hydroelectric project

S.No.	Status	Name	Catchment	Influence	Project Area
1	Endangered	<i>Dioscorea deltoidea</i>	1	1	-
2	Endangered	<i>Acer oblongum</i> Var. <i>microcarpum</i>	1	1	-
3	Rare	<i>Begonia burkillii</i> ; <i>Calanthe manii</i> <i>Paphiopedilum wardii</i> ; <i>Phoenix</i> <i>rupicola</i>	4	4	-
Total			6	6	-

Source: Secondary data and data from primary surveys

1.2.2 Fauna

About 20 species of birds inhabiting this area belong to the Endemic Bird Areas (EBA). State Biodiversity Conservation Strategy Action Plans (SBCSAP) includes Tengapani – Madhuban – Wakro and Demwe - Sewapass – Tidding areas as conservation sites owing to the presence of a number of threatened species of plants and animals. The lower tropical stretch on the outer fringes of the influence zone is reported to be home of some threatened species mostly on the basis of secondary literature (Table 1.3)

Table 1.3: Conservation status of the faunal species in the Study Area, Influence Zone and Catchment Area of Demwe Lower hydroelectric project

Common name	Scientific name	SA	IZ	CA	IUCN	ZSI	WPA
Hoolock gibbon	<i>Bunopithecus hoolock</i>	A	P	P		EN	I
Slow loris	<i>Nycticebus coucang</i>	A	P	P		IK	I
Tiger	<i>Panthera tigris tigris</i>	A	-	-	EN	VU	I
Common leopard	<i>Panthera pardus</i>	A	P	P		VU	I
Clouded leopard	<i>Neofelis nebulosa</i>	A	P	P		EN	
Leopard cat	<i>Prionailurus bengalensis</i>	A	P	P		VU	I
Fishing cat	<i>Prionailurus viverrinus</i>	A	P	P		VU	I
Himalayan Black	<i>Ursus thibetanus</i>	A	A	P	VU		I

Common name	Scientific name	SA	IZ	CA	IUCN	ZSI	WPA
Bear							
Asian elephant	<i>Elephas maximus</i>	A	P	P		VU	I
Mainland Serow	<i>Nemorhaedus sumatraensis</i>	A	P	P		VU	I
Takin	<i>Budorcas taxicolor</i>	A	A	P		IK	I
Himalayan musk deer	<i>Moschus chrysogaster</i>	A	A	P		EN	I
Wild boar	<i>Sus scrofa</i>	A	P	P	IK	EN	III
Indian pangolin	<i>Manis crassicaudata</i>	A	P	P		VU	
Chinese pangolin	<i>Manis pentadactyla</i>	A	P	P		IK	I
Indian porcupine	<i>Hystrix indica</i>	A	P	P	VU		IV

SA = Study area (Project components area), IZ = 10km influence zone from project components, CA = Catchment area, EN = endangered, VU = vulnerable, P = presence, A = absence

Source : Secondary data and data from primary surveys

Biodiversity Conservation Prioritization Project (BCPP) by WWF prioritized Demwe-Sewak Pass–Tiding along the Tezu – Hayuliang road as an important area of conservational significance. Figure 1.1 illustrates the conservation significance of the proposed project area as it lies within the global and national priority settings given by Chatterjee et al (2006) in the Review of Biodiversity of Northeast India, WWF, New Delhi.

These areas do not have the minimum basic network like roads, communication, watching towers, adequate presence of forest personnel and other facilities. The biodiversity in the region is already under threat due to the shifting cultivation, regular hunting and poaching, deforestation and forest encroachment. The projected developmental activity would tend to increase the industrialization and urbanization of the area and can affect biodiversity adversely.

1.2.3 Protected Area

Kamlang Sanctuary is the nearest protected area to the proposed Demwe Lower H.E. project, located in the southeastern part of Lohit district. None of the project

components fall within the Wildlife Sanctuary. It covers a total area of 783 sq. km and falls within the latitude $27^{\circ}40'-28^{\circ}00'$ N and longitudes $96^{\circ}20'-96^{\circ}55'E$. Lang river borders Kamlang sanctuary in North, which join Lohit river on the left bank. The aerial distance of the nearest point of Kamlang Sanctuary from Lohit river is about 4.2 km away from Lohit river. The formation of dam would lead to the submergence of 1131 ha area. Proposed reservoir would creek the Lang river and would be outside from the boundary of Kamlang Wildlife Sanctuary.

The forest types comprise of Assam Alluvial Plains Semi-evergreen, Sub-Himalayan light alluvial semi-evergreen forests and *Terminalia* – *Duabanga* forests. The dominant plant species of Kamlang sanctuary are *Bischofia javanica*, *Castanopsis indica*, *Canarium bengalensis*, *Duabanga grandiflora*, *Dillenia indica*, *Dysoxylum procerum*, *Magnolia hodgsonii*, *Messua ferrea*, *Pterospermum acerifolium*, *Shorea assamica* and *Terminalia bellirica*. Kamlang Wildlife Sanctuary is known to harbour a variety of mammals (Elephant, Hoolock gibbon, Slow loris, Fishing cat, Leopard cat, Barking deer, Wild boar), birds (Kaleej pheasant, Red jungle fowl, Serpent eagle, vultures, Assam Wreathed hornbill, Great Indian pied hornbill, Rufous-necked hornbill, cormorants, etc.), reptiles (Python, Keelbacks, Cobras, Common worm snake, Common wolf snake, etc.) and a number of amphibian species.

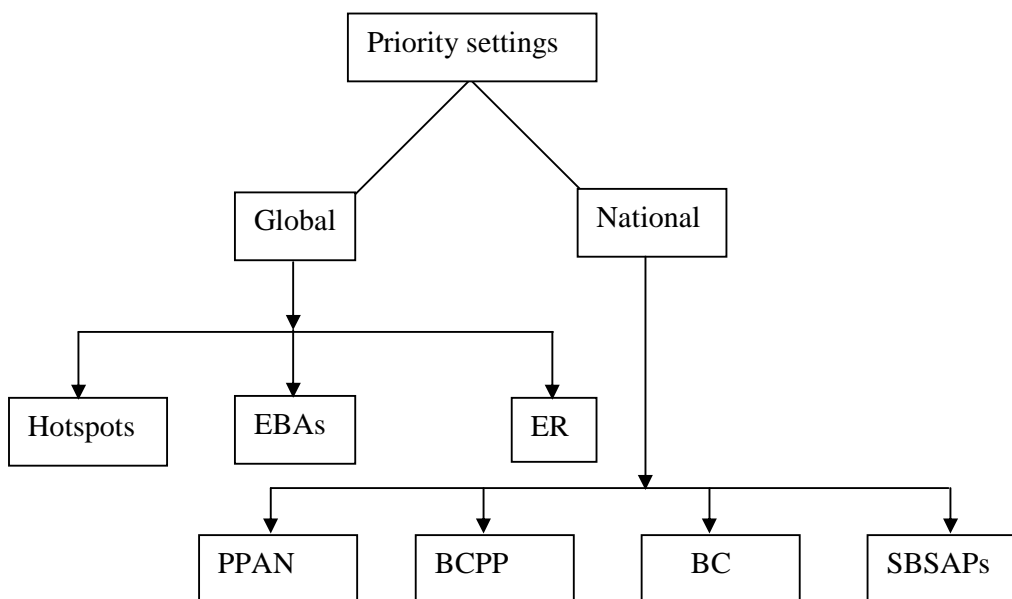
1.3 BIODIVERSITY CONSERVATION PLAN

The Biodiversity conservation and Wildlife Management Plan for the proposed 1750 MW Demwe Lower H.E. project has been formulated considering the existing wildlife (fauna and flora) profile of the region, customs, cultures and traditional rights of Mishmi tribes, conservation significance of the area, State Biodiversity Conservation Strategy Action plans (SBCSAP) and Biological Diversity Act (2002). It may be stressed here that during the primary flora/fauna survey in the project area where construction activities are proposed, none of the species of rare, threatened or endangered category was recorded; however, recognizing the need for conservation and likelihood of their existence in the vicinity areas, a comprehensive biodiversity management plan is drawn up.

Following objectives have been taken into consideration for the preparation of Biodiversity Management Plan for the proposed Demwe Lower H.E. project.

- (i) To maintain a sustainable approach between customs and culture of the local communities and biodiversity conservation,
- (ii) Preservation of State's conservation sites in the surrounding areas,
- (iii) To establish gardens for the voucher specimens of threatened, newly recorded and endemic species,
- (iv) Special efforts for *in situ* or *ex situ* conservation of critical/ important plant/ animal species, if any, affected by the project,
- (v) To protect the traditional knowledge of the local people regarding biodiversity and its value and to prepare Peoples' Biodiversity Register,
- (vi) To create a data bank on 'vaids' and their traditional knowledge on medicinal plants,
- (vii) To provide incentives for research, training and public education to increase awareness with respect to biodiversity.
- viii) Noise mitigation and wildlife management

Fig. 1.1: Priority settings of biodiversity of northeast states of India including the proposed project area



EBAs = endemic bird area; ER = global eco-region; PPAN = planning for protected area network; BCPP = biodiversity conservation prioritization project; BC = Biodiversity characterization, SBSAPs= state biodiversity strategy action plans

1.3.1 Definitions

The terms and definitions used in this volume are those mentioned in the Biological Diversity Act (2002). However, some of the terms used exclusively in this plan, which are relevant, are explained below:

- 1.3.1.1** “Biological diversity” means the variability among living organisms from all sources and the ecological complexes of which they are a part and includes diversity within species or between species and of ecosystem.
- 1.3.1.2** “Biological resources” means plants, animals and micro-organisms or parts thereof, their genetic material and by-products (excluding value added products) with actual or potential use or value but does not include human genetic material.
- 1.3.1.3** “Bio-survey” means survey or collection of species, sub species, genes, components, and extract of biological resources for any purpose and includes characterization, inventorisation and bioassay.
- 1.3.1.4** “Local bodies” means panchayats, and municipalities.
- 1.3.1.5** “Cultivar” means a variety of a plant that has originated and persisted under cultivation or was specifically bred for the purpose of cultivation.
- 1.3.1.6** “Folk variety” means a cultivated variety of plant that was developed, grown and exchanged informally among farmers.
- 1.3.1.7** “Land race” means primitive cultivar that was grown by ancient farmers and their successor.

1.3.2 Activities and Development Works to be Undertaken

For the promotion of the conservation and preservation of habitats and ecosystem the following measures are proposed for the Demwe Lower H.E. project.

1.3.2.1 Establishment of gardens for voucher specimen

The entire region has diverse habitats featuring a varied biota. Many threatened, rare and endemic plant species like *Albizia arunachalensis*, *Schizostachyum fuchsianum* (Poisonous bamboo), *Acer oblongum* var. *microcarpum*, *Cyathea* spp, *Litsea mishmiensis*, *Syzygium mishmiense*, etc. are reported to inhabit this region. The proposed repositories would be of special interest to biodiversity conservation, scientific research, education and environmental awareness. Depending on the habitat of a species, three gardens are proposed at Parasuram Kund, left bank of Tidding river (upstream of Tidding- Lohit confluence) and near Ziro point. These repositories would be established in an area of 9-10 ha of degraded land. The break up of the total financial outlay for the repositories including development of nurseries, collection of seeds and plant species, small laboratory and staff for five years is given in Table 1.4.

Table 1.4: Cost estimates for establishment of gardens for voucher specimen

Particulars	Amount (in Rs.)
Salaries/wages* (Research scientist, Curator, Gardener, Peon)	92,00,000
Research Scientist (1) (basic Rs. 20280)	
Curator (3) (basic pay Rs. 11170)	
Gardener (3) (basic pay Rs. 6050)	
Peon (3) (basic pay Rs. 6050)	
Collection of seeds and plant species	2,00,000
Development of gardens (3 No)	20,00,000
Development of nurseries (2 No)	4,00,000
Plantation	5,00,000
Water supply system	2,00,000
Laboratory	

Building	10,00,000
Equipment	
5,00,000	
Contingency	5,00,000
Total	145,00,000

*In the salary head, lump sum amount for 5 years has been allocated considering the revised pay scale

A total financial outlay of **Rs. 145 lakhs** would be provided by the project authorities. The project authorities would provide funds for the establishment of repositories for 5 years. After 5 years project authorities would hand it over it to State Forest Department.

1.3.2.2 Butterfly park

Lohit valley is highly rich in the diversity of butterflies. Parasuramkund, Tidding, Salangam, Mompani are well endowed habitats for the butterflies. During the primary surveys many scheduled butterfly species like Variegated Sailer, Metallic cerulean, Sullied sailer, Elbowed pierrot, etc. were encountered. Also, a large soul of Indian cabbage white was observed along the banks of Lohit and Tidding rivers. Field investigations also revealed that a number of herbaceous flowering plants in the Parasuramkund, Mompani and areas along the riparian habitats attracted a variety of butterflies. In order to conserve these butterflies, 3 parks are suggested on the degraded lands (near Wakro, Tidding and Salangam). The area of each park would be around 1.5 – 2.0 ha. The flowering and fruit bearing plant species like *Hibiscus* spp., *Tagetes* spp., *Carthamus* spp., *Artemisia* spp., *Murra* spp., *Crotalaria* spp., *Desmodium* spp., *Clerodendrum*, *Phlogacanthus* spp., *Duabanga* spp., *Bombax ceiba*, *Bauhinia* spp., etc. are suggested for the proposed butterfly parks. Moist damp places and stream beds are the most appropriate places for the butterflies. Therefore, these parks will be located along the river beds. Total budget including fencing of enclosed areas, plantation, salaries, maintenance grant and contingency for butterfly parks is given in Table 1.5 amounting to **Rs. 96,80,000 (Rs. Ninety six lakhs and eighty thousand)**.

Table 1.5: Cost estimates for establishment of butterflies gardens

Salaries/wages (1 curator, 3 gardener/peon)	Rs. 23,80,000
Fencing in closed areas	Rs. 30,00,000
Plantation	Rs. 8,00,000
Maintenance grant (@ Rs. 2,00,000 per year/ park)	Rs. 30,00,000
Contingency (include travels etc)	Rs. 5,00,000

1.3.2.3 Preparation of Peoples Biodiversity Registers (PBR)

There is increasing realization that a vast amount of traditional knowledge on the plant species and their importance exists in the remote areas, villages and tribal areas of India. This knowledge remains both unexploited and underestimated. The Mishmi tribes of the region have a unique way of life and have developed their own system of medicine and food. Tribes use many plant species, viz. *Diplazium esculentum*, *Solanum torvum*, *S. spirale*, *S. indicum*, *paedaria foetida*, *clerodendrum colebrookianum*, *Impatiens spp.*, *Spilanthus sp.* etc. for food and medicines to cure some of the prevalent diseases. Recording and exchange of this unique system of knowledge of economic and medicinal importance of the plant species would open doors for a new strategy of conservation. In addition to the documentation of the traditional knowledge on medicinal plants, cultivars, folk varieties, the proposed PBR would also prepare a list of para taxonomists, and local 'vaid' and record their knowledge. For this purpose, it is proposed that two teams of researchers, each headed by a scientist should be engaged on contractual basis through tie-up with nearby university/research institution of repute having requisite expertise in the subject area. The activities spread over 5 years could be strengthened with a financial outlay of **Rs. 50,00,000 (Rs. Fifty lakhs)**.

1.3.2.4 Natural Resource Management

Mishmis, the predominant local tribe in Lohit Valley, have traditional rights on the forest produce. They practice shifting cultivation and hunting. Animal hunting in the region is related not only to diet of Mishmis, but is also associated with their culture and customs. Thus, the involvement of Mishmis and other tribes in

biodiversity conservation shall be crucial. The prohibition of hunting and shifting cultivation is a serious challenge in this region. The natural resource management can be achieved by joint forest management involving tribes, through local NGOs and coordinated efforts of the project proponents and the government. This joint programme should be carried at various levels like awareness programmes, reward system, salaries to villagers, awareness about continued survival and importance of wildlife, etc.

An inspiring example of Natural Resource Management is Monpa communities of Tawang district. They work on a self governance system with respect to forest conservation. In the organization - Pangchen Dzing Druk, (Pangchen means an oath) taken by villagers not to damage forests, streams, no hunting and no fishing. Similar form of resource management is proposed in this area. The constituents of natural resource management would be an Eco Development Committee (EDC), an NGO, based on the environment conservation and a Financing Body. Eco Development Committee would involve local people, Forest Department and the project proponents. EDC would discourage burning of forests, hunting and slash and burn agriculture. Some of the local people will be appointed in the EDC on payment of honorarium basis. The EDC would prepare a plan for sustainable exploitation of forest resources. The participating NGO would run awareness, teaching and training programmes for the local communities. The project proponent (Demwe Lower HE Project) would provide the finances for supporting the activities of EDC and NGO for at least 5 years. Total financial outlay for the natural resource management would be **Rs. 50,00,000/- (Rs. Fifty lakhs)**.

1.3.2.5 Identification of invasive species and recovery of susceptible species

The proposed project area is not under severe anthropogenic pressure. However, *Ageratina adenophora*, *Ageratum conyzoides*, *Bidens bipinnata*, *Mikania micrantha*, *Chromolaena odoratum* and *Ambrosia artemisifolia* are some of the invasive species that have been introduced unintentionally or by natural means in this area. The increased human activity and disturbance in natural

ecosystems is the main cause of the spread of invasive species. This trend may prove to be adverse for the native plant diversity leading to decline in number of endemics in future. In order to understand this problem and manage it successfully the following measures are suggested:

- (i) Identify the areas where biological invasions have occurred and are threatening.
- (ii) Identify the exotic invasive species that are invading these habitats.
- (iii) Identify the institutions/experts who can undertake inventorisation and researches to suggest management measures to control this negative impact of invasive species.
- (iv) Inventorise the native species which are threatened by invasions and that require rehabilitation and management.
- (v) Researches on control of weed including bio control measures and floral biology
- (vi) Removal of exotic invasive plant species and obnoxious weeds.

Total budget for these activities is suggested to be **Rs. 50,00,000 (Rs. Fifty lakhs)**.

1.3.2.6 Forest Protection Plan

As stated earlier, the surroundings of the proposed project (Tengapani – Madhuban – Wakro and Demwe - Sewapass – Tidding) represent a habitat heterogeneity which has conservation significance. The area does not have the minimum basic amenities such as road and communication network. The wildlife protection force is not adequately equipped with watching towers, wildlife personnel and other field work facilities. In addition to the efforts of various government and non-government organizations, a number of strengthening measures for these conservation sites are suggested. Various activities which are warranted for the biodiversity conservation and management of conservation sites are described in the following paragraphs:

- i) For the improvement of vigilance and measures to check poaching, check posts and watch towers will be needed. In order to strengthen the working capacity the officers of the State Forest/Wildlife Department they must be provided with necessary equipment that would increase their capability and efficiency. Equipment such as a camera, GPS, wireless, binoculars and other minor equipment (altimeter, spot scope, search lights, sleeping bags, health kits, etc.).
- ii) Under the reward for informers programme it is proposed to engage the workers of EDC who are well acquainted with the area and are resourceful in gathering information for anti-poaching (particularly of butterflies, medicinal herbs and endangered species) and better vigilance. These youth could be hired on a contractual basis.
- iii) The construction of bridges, inspection paths for more effective and meaningful patrolling of the staff should be undertaken.
- iv) The construction of an office complex for the purpose would be essential to monitor all these activities.
- v) Improvement of vigilance by procurement of field vehicles and motorbikes.
- vi) Creation of veterinary facilities and rescue camps for healthcare of wild animals and for controlling diseases. For this purpose it is essential to maintain a stock of medicines in addition to setting up of a *mobile-rescue-cum-publicity-van*.
- vii) Organizing occasional public awareness programmes, conducting training camps, preparation of research documents, pamphlets, brochures, hoardings, etc.
- viii) Provision of fire lines within critical areas to protect the forest from accidental fires

The break up of the budget amounting to **Rs. 257 lakhs** for these activities is given in Table 1.6.

Table 1.6: Cost estimates for Forest Protection Plan

Particulars	Amount (in Rs)
Salaries/wages/Contingency (for 5 years) (10 forest guards, 1 forester)	96,00,000
Equipment (Camera, Wireless, Laptop, V-Sat, GPS etc)	30,00,000
Reward programmes	10,00,000
Fire lines	50,00,000
Check posts and watch towers	10,00,000
Construction of bridges and patrolling paths	15,00,000
Office Complex	15,00,000
Vehicles	8,00,000
Mobile rescue van	8,00,000
Veterinary facilities	15,00,000
Total	257,00,000

1.3.2.7 Safeguards during construction phase

During the construction phase, various adverse impacts on the wildlife are anticipated in the surrounding areas of the proposed project in terms of increased noise levels, land vibrations during tunneling and blasting, release of air and water pollutants, etc. Mammals are the most vulnerable group affected by these negative impacts, which affect their movement, behaviour and breeding habit. To avoid and minimize the negative impacts from these activities project authorities are advised to prepare strict guidelines as follows.

- (i) Strict restrictions shall be imposed on the workers at project sites to ensure that they do not harvest any species/produce from the natural forests and cause any danger or harm to the animals and birds in the wild.
- (ii) Minimum levels of noise during construction activities will be maintained and no activity shall be carried out at night where the project site is in the close vicinity of animal/bird or human habitats especially located in the vicinity of dense forest area.

- (iii) The fuel wood to the labourers shall be provided from plantations meant for the purpose and/or the provision made for the supply of the free/subsidized kerosene/LPG from the depots being set up for this purpose to avoid forest degradation and destruction of animal habitats.
- (iv) To avoid the deterioration of water quality and release of pollutants into the river, project authorities would provide proper sanitation facilities and garbage disposal bins to the workers/colony areas.
- (v) The interference of human population would be kept to a minimum in the adjacent forested areas and it would be ensured that the contractors do not set up labour colonies in the vicinity of forests and wilderness areas.
- (vii) The project authorities will be bound by the rules and regulations of the Wildlife Protection Acts (1972), Biological Diversity Act (2002), Forest Act (1980), Environment Protection Act (1986) and guidelines of State Biodiversity Conservation Strategy Action Plans (SBCSAP) for the preservation of habitats and protection of wild animals.
- ix) It will be ensured that the noise levels in no case go above 100-120 dB in the project area, particularly where human and wildlife habitats are located. One of the measures proposed to be adopted is that the blasting is to be restricted and avoided during nights, early mornings and late afternoons, which are the feeding times of most of the fauna. Blasting will be resorted to only if extremely necessary. For this strict blasting regime, i.e. controlled blasting under constant and strict surveillance should be followed. Some of the suggested methodologies for reduction and mitigation of noise so as to cause as little disturbance to the animals as possible are given below:
 - (a) Only well maintained/new equipment that produces lesser noise would be installed at the work sites.
 - (b) The best way to control the noise is at source. Certain equipment that needs to be placed permanently at one place like generators, etc. would be housed in enclosed structures to cut off the noise.
 - (c) The heavy equipment like rotating or impacting machines will be mounted on anti-vibration mountings.

- (d) Wherever combustion engines are required they will be fitted with silencers.
- (e) The traffic (trucks, etc.) used by the project works will be managed to produce a smooth flow instead of a noise producing stop and start flow. Necessary training/orientation will be provided to the traffic operators/drivers. Sounding of loud horns, etc. in the forested areas should be banned. Project authorities will use water sprinklers on the road to avoid the dust from construction activities.
- (f) While clearing the land of vegetation for any project work, the project authorities will ensure that the work area has sufficient layer of tree cover around it. It will act as an effective noise absorber and dust barrier. The tree layer will act as buffer zone and these are known to cut off noise by about 3-12 dB at a site depending upon the density of vegetation. These measures will be planned in advance and well before starting operation at any site.
- (g) The project authorities will monitor the noise at critical sites from time to time.

1.3.2.8 Research and Development activities

Efforts have been made to document the status, distribution pattern, habitat requirements and conservation strategy for the floral as well as for the faunal species falling under the RET schedule. Appropriate budgetary provisions have been made for promoting conservation of these species. However, it is recognized that for some of the species, propagation protocols and conservation strategy are not fully documented. It is therefore proposed to earmark a lumpsum provision of Rs 50 lakhs for supporting R & D activities by identified national, international research organizations.

1.4 WILDLIFE MANAGEMENT PLAN

The influence zone and catchment of proposed project is very important ecological niche for the wildlife. A part of the Kamlang Wildlife sanctuary forms the catchment of the Demwe Lower H.E. project. It harbours about 58 species of

mammals, 87 species of birds, 20 species of reptiles and a large numbers of invertebrates including butterflies. The sanctuary is very rich in floral diversity harbouring about 50 species of trees (*Albizia lebbek*, *Amoora wallichii*, *Anthocephalus cadamba*, *Bobax ceiba*, *Magnolia griffithii*, *Mesua ferrea* etc), and a large species of herbs, Shrubs, climbers and bamboos. Many species in the Wildlife Sanctuary, viz. Mishmi takin, Serow, Musk deer, Leopard, Clouded leopard, Leoprad cat, Clawless otter, Himalayan black bear, Red panda, Hoolock gibbon (mammals), Black eagle, Serpent eagle, Grey peacock pheasant, Hornbills (birds), Indian python (Reptile), etc. have great conservation value (see details in EIA). The proposed project does not have direct impact on the Kamlang Wildlife sanctuary and none of the project activity falls in within the sanctuary. However, a few species of Wildlife Sanctuary share their habitat with the immediate vicinity of proposed project. Similarly, many plant species in the protected area are threatened and endemic. Considering the fact, a Wildlife Management Plan for sanctuary has been proposed with respect to the conservation. The Wildlife Management Plan emphasizes on following measures in the protected areas.

- i. Proper regulation of movement of floating population and settlement of camps near wildlife habitat
- ii. Recovery and improvement of wildlife habitat
- iii. Regular immunization of livestock against FMD and other communicable diseases.
- iv. Up-gradation of check list of wildlife of the area
- v. Expansion of wildlife habitat
- vi. Infrastructure development
- vii. Control and management of forest fires
- viii. Enforcement of law
- ix. Reduction of cattle and liaison with the project developers
- xi. Special conservation of habitat vulnerable species
- xii. Improvement of existing waterholes and spring
- xiii. Rehabilitation of a small wildlife health cum ex-situ conservation centre.

- xiv. Patrolling and surveillance
- xv. Identification of decimating factors
- xvi. Anti-poaching and hunting operational measures
- xvii. Study of wildlife population during the project implementation
- xviii. Enhancing bird diversity and dynamics
- xix. Eco-development and community participation
- xx. Awareness, education and sensitizing of fringe population
- xxi. Recruitment of field staff

The implementation of Wildlife Management Plan shall be in line with the guidelines of the Kamlang Wildlife Sanctuary and all the rules of the protected area shall be applied in the course of the project operation. The activities of conservation management and improvement of the affected area by the project shall be for a period of five years from the final approval of the project by the Ministry of Environment and Forests Government of India. The Conservation plan shall be implemented by the Wildlife Circle Forests, Environment and Wildlife Management Department, Government of Arunachal Pradesh.

1.4.1 Cost Estimates

Table 1.7 shows the statement of physical and financial target for Wildlife Management.

Table 1.7: Cost estimates for Wildlife Management Plan for Demwe Lower H.E. project

S.No	Activities	Unit	Rate (in Rs.)	Quantity	Cost (in lakhs)
1	Habitat improvement	ha	1,000	80	8.00
2	Construction of watchtowers	No	2,50,000	3	7.50
3	Construction of Check posts	No	3,50,000	2	7.00
4	Improvement of footpath	km	3,50,000	4	14.00
5	Waterholes/check dams	cum	1,000	500	5.00
6	Estimation of wildlife	ha	22,500	20	4.50

S.No	Activities	Unit	Rate (in Rs.)	Quantity	Cost (in lakhs)
7	Immunization of wildlife	Head	500	800	4.00
8	Conservation of vulnerable spp.	ha	15,000	25	3.75
9	Control of forest fires	ha	15,000	20	3.00
10	Patrolling and surveillance	ha	12500	50	6.25
11	Anti-poaching	km	35000	25	8.75
12	Eco-development	ha	186000	1.5	2.79
13	Enhancing wildlife diversity	ha	20200	15	3.03
14	Awareness, education and training	No	80000	5	4.00
15	Recruitment of field staff (guards etc)		-	6	57.60
16	Infrastructure development (camera, wireless etc)		-	-	20.00
	Total				159.17
17	Administrative expenses	%	12	12	19.10
	Total				178.27
	Contingencies	%	3	3	5.34
	Grand Total (lakhs)				183.61

1.5 BIODIVERSITY MANAGEMENT COMMITTEE (BMC)

The proposed Biodiversity Management Committee (BMC) will follow the guidelines of National Biodiversity Authority and State Biodiversity Conservation Strategy Action Plans (SBCSAP) to implement, monitor and evaluate the Biodiversity Management Plan of the proposed Demwe Lower H.E. project. The activities of BMC shall be under the direct administrative control of the Chief Wildlife Warden/Principal Chief Conservator of Forests, Arunachal Pradesh. The BMC will comprise of following members.

- i. Chief Wildlife Warden/Principal Chief Conservator of Forests, Chairman
Arunachal Pradesh
- ii. Chief (Environment), Demwe Lower HE Project Member Secretary
- iii. DFO (s) (wildlife) of the concerned Division Member(s)

- iv. Two experts form University or renowned R & D Institutions Member
- v. Panchayat Representatives from at least 3 villages Member
on a rotational basis
- vi. Representative of a well known local NGO Member

The Chairman of the committee will have the right to assign various activities to various members for proper functioning and result-oriented tasks. Total budget for the committee's routine functioning would be **Rs. 10,00,000**.

1.6 COST ESTIMATES


The project authorities will provide the funds for Biodiversity Management Plan of Demwe Lower H.E. project in Arunachal Pradesh for five years. The total estimated cost of the Biodiversity conservation and Wildlife Management Plan would be **Rs. 892.41 lakhs** (Rs. Eight hundred-forty two lakh and forty one thousand only) (Table. 1.8).


Table 1.8: The estimated cost of biodiversity conservation and management plan

Particulars	Amount (Rs. In lakhs)
1. Establishment of gardens for voucher specimen	145.00
2. Butterfly parks	96.80
3. Preparation of PBR	50.00
4. Natural Resource Management	50.00
5. Research and Developmental Activities	50.00
6. Identification of invasive species/recovery of susceptible species	50.00
7. Forest Protection Plan	257.00
8. Wildlife Management Plan	183.61
9. Biodiversity Management Committee	10.00
Grand Total	892.41


Annexure 1.1: Pertinent details for conservation of rare, threatened and vulnerable flora/fauna of Demwe Lower HEP



A. Flora

Scientific Name	Conservation status	Habitat & Climate requirement	Distribution pattern
<p><i>Acer oblongum</i> var. <i>microcarpum</i></p> <ul style="list-style-type: none"> ○ Kingdom: <u>Plantae</u> ▪ Subkingdom: <u>Viridaeplantae</u> <p>Phylum: <u>Tracheophyta</u></p> <p>Subphylum: <u>Euphyllophytina</u></p> <p>Infraphylum: <u>Radiatopses</u></p> <p>Class: <u>Magnoliopsida</u></p> <p>Subclass: <u>Rosidae</u></p> <p>Superorder: <u>Rutanae</u></p> <p>Order: <u>Sapindales</u></p> <p>Family: <u>Aceraceae</u></p> <p>Genus: <u>Acer</u></p> <p>Specific epithet: <i>oblongum</i> - Wallich ex DC.</p> <p>Botanical name: - <i>Acer oblongum</i> var. <i>microcarpum</i> Wallich ex DC</p> <p>Remark : Not found in project area & Kamlang Wildlife sanctuary</p>	<p>A wide variety of measures can be used to conserve biodiversity, including both in-situ and ex- situ methods. In situ conservation effects include legal protection of endangered species, the preparation and implementation of species management or recovery plans and the establishment of protected areas to conserve individual species and habitats. Ex -situ conservation centers such as arboreta, aquaria, botanic gardens, seed banks, clonal collections, forest nurseries, zoological gardens etc., can help to conserve stocks of both wild and domesticated animals, plants and microorganisms.</p>	<p>SUBTROPICAL FORESTS</p> <p>Occur in districts between altitudes 800m to 1900m. These are essentially evergreen and dense in nature. The trees attain large dimensions (25-40m high). The forests are rich in species diversity and dominated by Fagaceae members</p>	<p>Subtropical pine forest in the Mishmi Hills, Lohit District (Arunachal Pradesh), Uttarakhand, etc. India ENDEMIC</p>
<p><i>Paphiopedilum wardii</i></p> 	<p>A wide variety of measures can be used to conserve biodiversity, including both in-situ and ex- situ methods. In situ conservation effects include</p>	<p>Grows on granite rocky surface covered with mosses and leaf litter.</p>	<p>Australia: New South Wales China India, Lohit district of</p>


<p>Kingdom: <u>Plantae</u></p> <p>Subkingdom: <u>Viridaeplantae</u></p> <p>Phylum: <u>Tracheophyta</u></p> <p>Subphylum: <u>Euphyllophytina</u></p> <p>Infraphylum: <u>Radiatopses</u></p> <p>Class: <u>Liliopsida</u></p> <p>Subclass: <u>Liliidae</u></p> <p>Superorder: <u>Liliana</u></p> <p>Order: <u>Orchidales</u></p> <p>Family: <u>Orchidaceae</u></p> <p>Subfamily: <u>Cypripedioideae</u></p> <p>Tribe: <u>Cypripedioideae</u></p> <p>Subtribe: <u>Paphiopedilinae</u></p> <p>Specific epithet: <i>wardii</i></p> <p>- Summerh.</p> <p>Botanical name: - <i>Paphiopedilum wardii</i> Summerh</p> <p>Remark : Not found in project area & Kamlang Wildlife sanctuary</p>	<p>legal protection of endangered species, the preparation and implementation of species management or recovery plans and the establishment of protected areas to conserve individual species and habitats. Ex -situ conservation centers such as arboreta, aquaria, botanic gardens, seed banks, clonal collections, forest nurseries, zoological gardens etc., can help to conserve stocks of both wild and domesticated animals, plants and microorganisms.</p>		<p>(Arunachal Pradesh ENDEMIC)</p>
<p><i>Dioscorea deltoidea</i></p>  <p>Domain: <u>Eukaryota</u></p> <p>Kingdom: <u>Plantae</u></p> <p>Subkingdom: <u>Viridaeplantae</u></p> <p>Phylum: <u>Tracheophyta</u></p>	<p>A wide variety of measures can be used to conserve biodiversity, including both in-situ and ex- situ methods. In situ conservation effects include legal protection of endangered species, the preparation and implementation of species management or recovery plans and the establishment of protected areas to conserve</p>	<p>Found at an altitude of 1000 - 3000 m in subtropical Himalayas</p>	<p>China, Nepal, Pakistan, Thailand, Afghanistan, Vietnam, India Himalaya, Kashmir to Assam, Darjeeling).</p>



Subphylum: <u>Euphyllophytina</u> Infraphylum: <u>Radiatopses</u> Class: <u>Liliopsida</u> Subclass: <u>Liliidae</u> Superorder: <u>Dioscoreanae</u> Order: <u>Dioscoreales</u> Family: <u>Dioscoreaceae</u> Genus: <u>Dioscorea</u> Specific epithet: <i>deltoidea</i> - Wall. Botanical name: - <i>Dioscorea deltoidea</i> Wall. Remark : Not found in project area & Kamlang Wildlife sanctuary	individual species and habitats. Ex -situ conservation centers such as arboreta, aquaria, botanic gardens, seed banks, clonal collections, forest nurseries, zoological gardens etc., can help to conserve stocks of both wild and domesticated animals, plants and microorganisms.		
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Scientific Name	Conservation status	Habitat & Climate requirement	Distribution pattern
<i>Begonia burkillii</i> 	Rare Kingdom: Plantae Phylum: Magnoliophyta Class: Magnoliopsida SuperOrder: <u>Violanae</u> Order: <u>Begoniales</u> Family: Begoniaceae Genus: <i>Begonia</i> Species: <i>Begonia burkillii</i>	ASIA-TROPICAL <u>Indian Subcontinent:</u> India - Arunachal Pradesh Abor hills. 300-1000 m	Grows on moist shady banks at 600- 1800 m altitude.
<i>Calanthe manii</i>	Rare <i>Calanthe mannii</i> Phylum Magnoliophyta Class Liliopsida Order Asparagales	Himalaya to Vietnam Himalaya (Kumaun	On rock boulders and along the streams in <i>Quercus</i> forest

Scientific Name	Conservation status	Habitat & Climate requirement	Distribution pattern
	Family Orchidaceae Genus Calanthe	to Bhutan), Assam. Khasi hills	From eastern Himalayas at altitudes of up to 3,000m though it is also known from lower habitats. Laos, Sikkim, and Bhutan
<i>Phoenix rupicola</i>  Cliff Date Palm	Rare. Kingdom: <u>Plantae</u> Phylum: <u>Tracheophyta</u> Subphylum: <u>Euphyllophytina</u> Class: <u>Liliopsida</u> Superorder: <u>Arecales</u> Order: <u>Arecales</u> Family: <u>Areaceae</u> Subfamily: <u>Phoenicoideae</u> Genus: <u>Phoenix</u> Specific epithet: <i>rupicola</i> Botanical name: - <i>Phoenix rupicola</i>	Native to India (Arunachal Pradesh, Meghalaya, Sikkim) Tista Mishmi hills. 450 m Native to the mountainous forests of <u>India</u> and <u>Bhutan</u> from 300 to 1200 m, usually occurring on cliffs, hillsides and similar terrain.	Thrives among the rocks and cliffs in the Himalayan Mountains. Rocky cliffs, and gorges in the Indian Himalayas. It is easy and fast growing, suitable for tropical as well as temperate climates, and will even tolerate moderate frosts

B. Fauna


Scientific Name	Distribution pattern	Habitat requirement	Food requirement
 <p><i>Moschus chrysogaster</i></p> <p>Classification</p> <p>Kingdom: Animalia</p> <p>Phylum: Chordata</p> <p>Class: Mammalia</p> <p>Order: <u>Artiodactyla</u></p> <p>Family: <u>Moschidae</u></p> <p>Genus: <u>Moschus</u></p> <p><i>Species: chrysogaster</i></p> <p>Remarks: The elevation of proposed project is 300-425. Musk deer is not found in the project area as its habitat requirement is 2,200-4,300.</p>	Alpine forest and scrub at elevations of >3,000m on the eastern and southern edge of Tibet and the southern slopes of the Himalayas	Himalayan musk deer are most active between dusk and dawn, alternately resting and feeding throughout this period. At night, musk deer can be seen in the open areas of their habitat as they graze, while during the day, they remain in dense cover. Neighboring individuals may utilize common latrines, an activity which becomes more frequent during the mating season. Himalayan musk deer are sedentary, remaining within a defined home range throughout the year. In females these are about 125 acres in size, while male musk deer will control a territory which encompasses the ranges of several females, defending it against intrusion by rival males. The Himalayan musk deer does not undertake any seasonal migrations, remaining in the same	Essentially, musk deer are browsers and select easily digestible, nutritious foods that are high in protein and energy (sugars) and low in fiber. Forbs (i.e, herbs) and woody plants(shoots, twigs) constitute the bulk of the diet in summer and winter, respectively., Where available, musk deer may switch to feeding largely on arboreal lichens (<i>Usnea</i> spp.), which are low in protein but high in energy

		area year-round despite harsh weather conditions.	
 <p><i>Neofelis nebulosa</i></p> <p>Kingdom: <u>Animalia</u></p> <p>Phylum: <u>Chordata</u></p> <p>Class: <u>Mammalia</u></p> <p>Order: <u>Carnivora</u></p> <p>Family: <u>Felidae</u></p> <p>Genus: <u>Neofelis</u></p> <p>Species: <i>nebulosa</i></p> <p>Remarks: Clouded leopard are found up to an elevation of 1500. hence present in the project area And also present in Kamlang WL sanctuary</p>	It is found in southern <u>China</u> (at least as far north as <u>Wuyi Shan</u>), the eastern <u>Himalayas</u> , <u>Nepal</u> , north-east <u>India</u> , and mainland <u>Southeast Asia</u> .	Clouded leopards occupy tropical forests at elevations up to 3000 meters. They are highly arboreal, using trees primarily for resting and also for hunting. However, they spend more time hunting on the ground than was originally believed. Sightings of clouded leopards occur most often in primary evergreen tropical forest but they have also been sighted in other habitats, such as secondary forest, logged forest, mangrove swamp, grassland, scrub land, dry tropical forest, and coastal hardwood forest.	The clouded leopard is a carnivore. Its prey includes the <u>sambar</u> and <u>muntjac</u> deer, birds, bearded pigs, <u>civet</u> , monkeys, <u>gibbons</u> , squirrels, porcupines, fish, domestic cattle and chicken
 <p><i>Hylobates Hoolock</i></p> <p>Kingdom: <u>Animalia</u></p> <p>Phylum: <u>Chordata</u></p> <p>Class: <u>Mammalia</u></p> <p>Order: <u>Primates</u></p> <p>Family: <u>Hylobatidae</u></p>	The range of the hoolocks is the most northwestern of all the gibbons, extending from <u>Assam</u> in <u>North-East India</u> , to <u>Myanmar</u> . Small populations (in each case few hundred animals) live also in the eastern <u>Bangladesh</u> and in	The hoolock gibbon is found in tropical evergreen rainforest, semi-evergreen forest, tropical mixed deciduous-dominated forest, and sub-tropical broadleaf hill forest up to 1400 m (4500'). It prefers the closed canopy/three-tiered forest (high, middle and low)	The species is an important seed disperser; its diet includes mostly ripe fruits, with some flowers, leaves and shoots.


<p>Genus: <i>Hylobates</i> Species: <i>hoolock</i></p> <p>Remarks: Hoolock gibbon is present in Kamlang wildlife sanctuary.</p>	southwest <u>China</u>	vegetation. Trees in the high tier support sleeping, resting and sun basking, while the trees in the middle and low tiers provide locomotion paths and food	
 <p>Tiger : <i>Panthera tigris</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Mammalia</u> Order: <u>Carnivora</u> Family: <u>Felidae</u> Genus: <u>Panthera</u> Species: <u>tigris</u></p> <p>Remarks : Tigers are present in Kamlang WL Sanctuary and also in the Project area</p>	found in parts of <u>India</u> , <u>Bangladesh</u> , <u>Nepal</u> , <u>Bhutan</u> , and <u>Burma</u>	It lives in varied habitats: grasslands, subtropical and tropical rainforests, scrub forests, wet and dry deciduous forests, and mangroves.. Tigers rely on concealment for stalking and ambushing <u>prey</u> . They seek areas with ample food, water, and moderately dense cover.	A tiger's favorite prey is deer and wild boar. Deer species may include sambar, chital, sika deer, swamp deer, and hog deer, among others. Depending on the habitat, tigers may also eat antelope, buffalo, guar, domestic livestock, peafowl, monkeys, <u>civets</u> , porcupines, fish, frogs, crabs, large monitor lizards, pythons, and young elephants or rhinos. Grass, fruits, and berries are also eaten.
 <p>Golden cat: <i>Catopuma temminckii</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Mammalia</u> Order: <u>Carnivora</u></p>	The Asian golden cat is found throughout southeast Asia, from as far north as southern China, west to Nepal, east of Fukien in China, and south to Sumatra	The Asian golden cat is found in dry deciduous forests, tropical rainforests, and occasionally open habitats with rocky areas	The Asiatic wild cat is believed to hunt primarily on the ground, but they are agile climbers. From examining their feces, it has been found that they eat muntjac, rats and even snakes. It is believed that they are opportunistic feeders.

<p>Family: <u>Felidae</u> Genus: <u>Catopuma</u> Species: <u>temminckii</u> Remarks :present in Kamlang WL sanctuary</p>			
 <p>Wild boar: <i>Sus scrofa</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Mammalia</u> Order: <u>Artiodactyla</u> Family: <u>Suidae</u> Genus: <u>Sus</u> Species: <i>scrofa</i></p> <p>Remarks: It is present in kamlang WL sanctuary and also in the Project area</p>	<p>Wild boar is found inhabiting the woodlands of Central Europe, Mediterranean Region (including North Africa's Atlas Mountains) and most of Asia (including India)</p>	<p>Although <i>Sus scrofa</i> is found in a wide variety of habitats as a result of domestication and introduction to new areas, the typical wild habitat is generally moist forests and shrublands, especially oak forests and areas where reeds are abundant. They are thought to be mainly limited by maximum winter snowfall, deep snow decreases their ability to travel and find food. They are sensitive to severe temperature changes. <i>Sus scrofa</i> has developed the technique of wallowing in mud or water to maintain a comfortable temperature. Wallowing also protects against sunburn and insect bites. <i>Sus scrofa</i> has even been known to wallow in their own urine to keep cool. Temperatures dropping below 50 degrees will cause discomfort. Conversely, <i>Sus scrofa</i></p>	<p><i>Sus scrofa</i> is known for its omnivorous and sometimes indiscriminate diet. The diet includes fungi, tubers and bulbs, vegetation, grains and nuts, fruit, eggs, small vertebrates, invertebrates, carrion, and manure. Such a wide range of food sources has enabled <i>Sus scrofa</i> to survive in a variety of environments, from deserts to mountainous terrain.</p>

		is prone to sunstroke in unusually warm temperature.	
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Scientific Name	Distribution pattern	Habitat requirement	Food requirement
 <p>Common leopard : <i>Panthera pardus</i></p> <p><u>Classification</u> Kingdom:<u>Animalia</u> Phylum:<u>Chordata</u> Class:<u>Mammalia</u> Order:<u>Carnivora</u> Family:<u>Felidae</u> Genus:<u>Panthera</u> Species:.. <i>pardus</i></p>	<p>In the Central Asian republics, leopard distribution is poorly known. Historically, leopards had a wider distribution in Turkmenistan, and were found in parts of Uzbekistan and Tajikistan. An old male leopard was killed by a local hunter in January 2000 in Kazakhstan, the first record of the species in this country, in a location over 600 km from possible occurrences in Uzbekistan and Tajikistan, and over 1,200 km from known occurrences in Turkmenistan. It is also possible that the leopard travelled along the foothills of the Pamirs, then proceeded via the Ugam and Pskem ranges into the Talas river valley. Habitat appears to be suitable, but the existence of any</p>	<p>The leopard has the widest habitat tolerance of any Old World felid, ranging from rainforest to desert. In Africa, they are most successful in woodland, grassland savanna and forest but also occur widely in mountain habitats, coastal scrub, swampy areas, shrubland, semi-desert and desert. They range from sea level to as much as 4,600 m on Mt Kenya (Hunter <i>et al.</i> in press). In Southwest and Central Asia, leopards formerly occupied a range of habitats, but now are confined chiefly to the more remote montane and rugged foothill areas. Through India and Southeast Asia, Leopard are found in all forest types, from tropical rainforest to the temperate deciduous and alpine coniferous (up to 5,200 m in the</p>	<p>Leopards have extremely catholic diets including more than 90 species in sub-Saharan Africa, ranging from arthropods to large antelope up to the size of adult male Eland <i>Tragelaphus oryx</i> (Hunter <i>et al.</i> in press). Densities vary with habitat, prey availability, and degree of threat, from fewer than one per 100 km² to over 30 per 100 km², with highest densities obtained in protected East and southern African mesic woodland savannas (Hunter <i>et al.</i> in press).</p>

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
	<p>leopard subpopulation in any of these three countries is uncertain (Shakula 2004). In Pakistan, the leopard is thinly distributed in montane areas, and there have only been a handful of confirmed records in recent years (Ahmed 2001). Leopards occur widely in the forests of the Indian sub-continent, through Southeast Asia and into China, although they are becoming increasingly rare outside protected areas.</p>	<p>Himalaya), and also occur in dry scrub and grasslands (Nowell and Jackson 1996).</p>	
 <p>Leopard cat : <i>Prionailurus bengalensis</i></p> <p>Kingdom:<u>Animalia</u> Phylum:<u>Chordata</u> Class:<u>Mammalia</u> Order:<u>Carnivora</u> Family:<u>Felidae</u> Genus:<u>Prionailurus</u> Species: <i>bengalensis</i></p>	<p>The leopard cat is a widespread species in Asia. It is found throughout most of India west into Pakistan and Afghanistan (Habibi 2004), through the Himalayan foothills, across most of China, and north to the Korean peninsula and into the Russian Far East (Nowell and Jackson 1996). It is found throughout Southeast Asia, and on the islands of Sumatra, Java,</p>	<p>The species can range up to 3,000 m in parts of its range, which extends into the Himalayas along river valleys. It occurs in a broad spectrum of habitats, from tropical rainforest to temperate broadleaf and, marginally, coniferous forest, as well as shrub forest and successional grasslands. The northern boundaries of its range are limited by snow cover; the leopard</p>	<p>Open and closed forest habitats were used in proportion to their occurrence, and activity patterns showed crepuscular and nocturnal peaks. On Borneo, Rajaratnam <i>et al.</i> (2007) found that leopard cats hunted rodents in oil palm plantations, and used forest fragments for resting and breeding. Murids dominate the diet (85-90%: Grassman <i>et al.</i> 2005b, Rajaratnam <i>et al.</i> 2007). Other small</p>


Scientific Name	Distribution pattern	Habitat requirement	Food requirement
	Borneo and Taiwan. It is found on numerous small offshore islands of mainland Asia (Nowell and Jackson 1996, Sunquist and Sunquist 2002).	cat avoids areas where snow is more than 10 cm deep. It is not found in the cold steppe grasslands, and generally does not occur in arid zones, although there are a few records from relatively dry and treeless areas in Pakistan. Leopard cats occur commonly in dense secondary growth, including logged areas, and have been found in agricultural and forest (rubber tree, oil palm, sugarcane) plantations. The species can live close to rural settlements. Leopard cats are excellent swimmers, and have successfully colonized offshore islands throughout their range (Nowell and Jackson 1996; Sunquist and Sunquist 2002).	mamals, eels and fish have also been reported, as well as occasional scavenging of carrion (Nowell and Jackson 1996).
 Fishing cat <i>Prionailurus</i>	The fishing cat has a broad but discontinuous distribution in Asia, with large gaps - some the result of its association primarily with wetlands, some the result of recent	Fishing cats are strongly associated with wetland. They are typically found in swamps and marshy areas, oxbow lakes, reed beds, tidal creeks and mangrove areas	fish comprised 76% of the diet, followed by birds (27%), insects (13%) and small rodents last (9%) (Haque and Vijayan 1993). Molluscs, reptiles and amphibians are also taken


Scientific Name	Distribution pattern	Habitat requirement	Food requirement
<p><i>viverrinus</i></p> <p>Kingdom:<u>Animalia</u> Phylum:<u>Chordata</u> Class:<u>Mammalia</u> Order:<u>Carnivora</u> Family:<u>Felidae</u> Genus:<u>Prionailurus</u> Species: <i>viverrin</i></p>	<p>extirpation, and some supposed due to a lack of confirmed records. It is primarily found in the terai region of the Himalayan foothills, and eastern India into Bangladesh, where it is widely distributed and locally common in some areas (Khan 2004), although in eastern India few prime habitats remain (Kolipaka 2006). On the island of Sri Lanka, it occurs apparently all over the island, and has been found on waterways near the capital city of Colombo in degraded habitats.</p>	<p>and are more scarce around smaller, fast-moving watercourses. Along watercourses they have been recorded at elevations up to 1,525 m, but most records are from lowland areas. Although fishing cats are widely distributed through a variety of habitat types (including both evergreen and tropical dry forest: Rabinowitz and Walker 1991), their occurrence tends to be highly localized. Fishing cats are good swimmers, and unlike most other small cats may prey primarily on fish rather than small mammals.</p>	<p>(Haque and Vijayan 1993, Mukherjee 1989). However, they are capable of taking large mammal prey, including small chital fawns (Nowell and Jackson 1996, Sunquist and Sunquist 2002), and have been seen scavenging livestock carcasses and tiger kills (Nowell and Jackson 1996). Predation on small domestic livestock and dogs has also been reported (Nowell and Jackson 1996).</p>
 <p>Himalayan Black Bear <i>Ursus thibetanus</i></p> <p>Kingdom:<u>Animalia</u> Phylum:<u>Chordata</u> Class:<u>Mammalia</u> Order:<u>Carnivora</u></p>	<p>This species occupies a narrow band from southeastern Iran (Gutleb and Ziaie 1999) eastward through Afghanistan and Pakistan, across the foothills of the Himalayas, to Myanmar. It occupies all countries in mainland Southeast Asia except Malaysia. It</p>	<p>Asiatic black bears occupy a variety of forested habitats, both broad-leaved and coniferous, from near sea level to an elevation of 4,300 m (in northeastern India, A. Choudhury, Rhino Foundation for Nature pers. comm.). They also infrequently use open</p>	<p>Foods include succulent vegetation (shoots, forbs and leaves) in spring, turning to insects and a variety of tree and shrub-borne fruits in summer, and finally nuts in autumn (Bromlei 1965, Reid <i>et al.</i> 1991, Huygens <i>et al.</i> 2003). In some places the diet contains a sizeable portion of meat from</p>

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
Family: <u>Ursidae</u> Genus: <u>Ursus</u> Species: <i>thibetanus</i>	<p>has a patchy distribution in southern China, and is absent in much of east-central China. Another population cluster exists in northeastern China, the southern Russian Far East, and into North Korea. A small remnant population exists in South Korea. They also live on the southern islands of Japan (Honshu and Shikoku) and on Taiwan and Hainan. The species now occurs very patchily through much of its former range, especially in Iran, Afghanistan, Pakistan, mainland southeast Asia and China. Its distribution in parts of China and Myanmar remains very poorly known. The distribution of the Asiatic black bear roughly coincides with forest distribution in southern and eastern Asia (FAO 2006), except that in central and southern India this species is replaced by the sloth bear (<i>Melursus</i></p>	<p>alpine meadows. Individual bears move to different habitats and elevations seasonally (Izumiyama and Shiraishi 2004), tracking changes in food abundance</p>	<p>mammalian ungulates (which they either kill or scavenge, Hwang <i>et al.</i> 2002)</p> <p>In temperate forests, Asiatic black bears rely heavily on hard mast in autumn, in part to put on sufficient fat reserves for winter denning (hibernation). Therefore, these bears tend to focus their activities in habitats with high abundance of oak acorns, beechnuts, walnuts, chestnuts, hazelnuts, or stone pine seeds (Schaller <i>et al.</i> 1989, Hashimoto <i>et al.</i> 2003).</p> <p>Asiatic black bears also use regenerating forests, which may have a high production of berries or young bamboo shoots. They also feed in plantations, where they may damage trees by stripping the bark and eating cambium, and in cultivated areas, especially corn and oat fields and fruit orchards (Carr <i>et al.</i> 2002, Yamazaki 2003, Mizukami <i>et al.</i> 2005, Gong and</p>

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
	<p><i>ursinus</i>), in southern Thailand and into Malaysia it is replaced by the sun bear (<i>Helarctos malayanus</i>) and north and west of the Russian Far East it is replaced by the brown bear (<i>Ursus arctos</i>). However, the Asiatic black bear overlaps the ranges of each of these species, especially the sun bear in a large portion of Southeast Asia.</p>		<p>Harris 2006, Vinitpornawan <i>et al.</i> 2006).</p>
 <p>Asian elephant <i>Elephas maximus</i></p> <p>Kingdom:<u>Animalia</u> Phylum:<u>Chordata</u> Class:<u>Mammalia</u> Order:<u>Proboscidea</u> Family:<u>Elephantidae</u> Genus :<u><i>Elephas</i></u> Species: <i>maximus</i></p>	<p>Asian elephants formerly ranged from West Asia along the Iranian coast into the Indian subcontinent, eastwards into South-east Asia including Sumatra, Java, and Borneo, and into China at least as far as the Yangtze-Kiang. Asian elephants still occur in isolated populations in 13 states, with a very approximate total range area of 486,800 km² (Sukumar 2003; but see Blake and Hedges 2004). The species occurs in Bangladesh, Bhutan,</p>	<p>Asian elephants are generalists and they occur in grassland, tropical evergreen forest, semi-evergreen forest, moist deciduous forest, dry deciduous forested and dry thorn forest, in addition to cultivated and secondary forests and scrublands. Over this range of habitat types elephants are seen from sea level to over 3,000 m asl. In the Eastern Himalaya in northeast India, they regularly move up above 3,000 m asl in summer at a few</p>	<p>The Asian elephant is one of the last few mega-herbivores (i.e. plant-eating mammals that reach an adult body weight in excess of 1,000 kg) still extant on earth (Owen-Smith, 1988). Given their physiology and energy requirements, elephants need to consume large quantities of food per day. They are generalists and browse and graze on a variety of plants. The proportions of the different plant types in their diet vary depending upon the habitat and season. During dry season</p>


Scientific Name	Distribution pattern	Habitat requirement	Food requirement
	<p>India, Nepal, and Sri Lanka in South Asia and Cambodia, China, Indonesia (Kalimantan and Sumatra) Lao PDR, Malaysia (Peninsular Malaysia and Sabah), Myanmar, Thailand, and Viet Nam in South-east Asia. Feral populations occur on some of the Andaman Islands (India).</p> <p>Once widespread in India, the species is now restricted to four general areas: northeastern India, central India, northwestern India, and southern India. In northeastern India, the elephant range extends from the eastern border of Nepal in northern West Bengal through western Assam along the Himalaya foothills as far as the Mishmi Hills. From here it extends into eastern Arunachal Pradesh, the plains of upper Assam, and the foothills of Nagaland. Further west, it extends to the Garo Hills of Meghalaya through the</p>	<p>sites (Choudhury, 1999).</p>	<p>in southern India, Sukumar (1992) observed that 70% of the elephant's diet was browse, while in wet season, grasses make up about 55%. However, in an adjoining area, Baskaran (2002) observed that browse formed only 15% of the diet in dry deciduous forest and 47% of the diet in the thorn forest in the dry season, while the annual diet was dominated by grass (84%). In Sri Lanka, elephants may feed on more than 60 species of plants belonging to 30 families (McKay, 1973). In southern India, Baskaran (2002) recorded that elephants fed on 82 species of plants (59 woody plant species and 23 grass species). Elephants may spend up to 14–19 hrs a day feeding, during which they may consume up to 150 kg of wet weight (Vancuylenberg, 1977). They defecate about 16–18 times a day, producing about 100 kg of dung. Dung also helps disperse</p>

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
	Khasi Hills, to parts of the lower Brahmaputra plains and Karbi Plateau. Elsewhere in the south in Tripura, Mizoram, Manipur, and the Barak valley districts of Assam, isolated herds occur (Choudhury, 1999).		germinating seeds.
 <p>Mainland Serow <i>Nemorhaedus sumatraensis</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Mammalia</u> Order: <u>Artiodactyla</u> Family: <u>Bovidae</u> Subfamily: <u>Caprinae</u> Genus: <u>Capricornis</u> Species: <i>sumatraensi</i></p>	The Mainland Serow can be found in <u>Indonesia</u> , <u>Malaysia</u> , <u>India</u> , southern <u>China</u> , and southeast <u>Asia</u> .	<p>The Mainland Serow is a terrestrial dwelling animal often inhabiting forest, tropical and mountainous environments. The animal generally lives alone or in small groups and is territorial. The territory of the Mainland Serow usually extends a few square miles. The Serow generally does not stray from this territory and feeds across this area. The Mainland Serow eats grass, shoots and leaves.</p> <p>The serow lives alone or in small groups. It is attached to its territory, which usually covers just a few miles square, and does not move far when feeding. It is most</p>	It grazes on grass and also eats shoots and leaves.

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
		active at dawn and dusk, and spends the rest of the day in thick vegetation. It has paths along which it moves, and traditional spots where it marks its territory and deposits its droppings.	
 <p>Indian pangolin <i>Manis crassicaudata</i></p> <p>Kingdom:<u>Animalia</u> Phylum:<u>Chordata</u> Class:<u>Mammalia</u> Order:<u>Pholidota</u> Family:<u>Manidae</u> Genus:<u>Manis</u> Species: <i>crassicauda</i></p>	<p>This species occurs in South Asia from parts of eastern Pakistan through much of India (excluding northeastern portions of the country) south of the Himalayas, Bangladesh and Sri Lanka (CITES 2000; Schlitter 2005). There have been dubious records in Myanmar (sources quoted in Allen 1938) and southern China (Yunnan) which almost certainly refer to <i>Manis javanica</i> (WCMC <i>et al.</i> 1999).</p> <p>In India, this species is widely distributed from the plains and lower hills south of the Himalayas to extreme southern India (Tikader 1983). There have been recent records from Kerala and Kanyakumari; Tamil</p>	<p>There is little known about the natural history of this species, but records are from various types of tropical forests, open land, grasslands, in addition to in close proximity to villages (Zoological Survey of India, 1994). The species is thought to adapt well to modified habitats, provided their termites and ants that are their primary food source remains abundant and they are not hunted.</p>	<p>The species is a specialist feeder on termites and ants (Prater 1971; Roberts 1977; Tikader 1983). It is generally solitary and nocturnal (Roberts, 1977). Animals live in burrows often under large rocks, with the entrance to the burrow often hidden with dirt (Roberts, 1977). The species is mainly terrestrial, but in some habitats is arboreal, using its prehensile tail and claws to climb trees.</p>

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
	Naidu; Delhi; Gwalior and Achanakur Wildlife Sanctuaries (Madhya Pradesh); Bandipur, Bhadra, Dalma and Dandeli Wildlife Sanctuaries; Bandipur Tiger Reserve (Karnataka); Buxa Tiger Reserve (West Bengal); Catugao Wildlife Sanctuary (Goa); Chambal National Park (Madhya Pradesh); Gir National Park (Gujarat); Keolodeo Ghana Wildlife Sanctuary (Rajasthan); Kotgarh and Kuldiha Wildlife Sanctuaries and the Sunabedh Plateau (Orissa); Singalila Wildlife Sanctuary (West Bengal); Achanakuar Wildlife Sanctuary (Madhya Pradesh); and the Himalayan foothills of Uttar Pradesh (CITES 2000).		
 Indian porcupine <i>Hystrix indica</i>	Recorded in Turkey and the eastern Mediterranean through southwest and central Asia (including Afghanistan and Turkmenistan) to Pakistan, India, Nepal,	This species has a broad habitat tolerance, occupying rocky hillsides, tropical and temperate shrubland, grasslands, forests, arable land, plantations, and gardens.	pests


Scientific Name	Distribution pattern	Habitat requirement	Food requirement
Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Mammalia</u> Order: <u>Rodentia</u> Family: <u>Hystricidae</u> Genus: <u>Hystrix</u> Subgenus : <u>Hystrix</u> Species: indica	China and Sri Lanka. In the Himalayan mountains they reach altitudes of up to 2400 meters (Gurung and Singh 1996).		

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
 <i>Lophophorus sclateri</i> Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Aves</u> Order: <u>Galliformes</u> Family: <u>Phasianidae</u> Genus: <u>Lophophorus</u> Species: sclateri Remarks : not present in Lohit division forest working plan and also in Kamlang WL sanctuary	Global: Two sub-species are known - <i>Lophophorus sclateri sclateri</i> and <i>Lophophorus sclateri orientalis</i> - distributed in India, Tibet, China and Myanmar. India: <i>Lophophorus sclateri sclateri</i> (also known as the Mishmi Monal) alone is reported from parts of Arunachal Pradesh. Not found elsewhere	Sclater's monal occurs in coniferous forest with a bamboo understorey, subalpine rhododendron scrub, azalea forest, and areas of juniper, cotoneaster, open grass and rocky precipitous slopes. Found between 3,000 and 4,200 metres above sea level, descending to as low as 2,000 metres in winter	Very little is known about this species' feeding habits, other than that <i>Polygonum</i> seeds and flower-heads have been found in the diet. In China, rhizomes of ferns, bamboo leaves and other unspecified leaves are all reportedly consumed, while the newly discovered race in Arunachal Pradesh, India, was observed feeding on the underground tubers of the cobra lily (<i>Arisaema</i>)

	in India.		
 <i>Lophura leucomelanos</i> Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Aves</u> Order: <u>Galliformes</u> Family: <u>Phasianidae</u> Genus: <u>Lophura</u> Species: <i>leucomelanos</i> Remarks: Present in kamlang WL Sanctuary	Global: Pakistan, India, Nepal, Bhutan, Bangladesh, Myanmar and Thailand. India: Five sub-species distributed from Jammu and Kashmir, Himachal Pradesh, Uttaranchal, North Bengal, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Assam, Meghalaya, Tripura and Nagaland.	The bird dwells in dense undergrowth within the forest showing preference for moist ravines upto an altitude of 2,600 m (higher in Western Himalaya) These birds keep in pairs or small groups and feed in open areas early in the mornings. They are very shy and scuttle for cover at the slightest hint of alarm. This is one of the more adaptable pheasant species found in many habitat types.	The food is a mixture of plant and animal food, chief among them are bamboo seeds, fruits of <i>Ficus</i> spp. and white ants.
 <i>Buceros bicornis</i> Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Aves</u> Order: <u>Coraciiformes</u> Family: <u>Bucerotidae</u> Genus: <u>Buceros</u> Species: <i>bicornis</i>	Great hornbills are found in India, Southwestern China, Bangladesh, Western Ghats of India, Thailand, Mainland Southeastern Asia, Malaya, and Sumatra.	The habitat is primarily the canopy of tall evergreen diptocarp and moist deciduous forests, ranging from elevations of 600 meters to 2000 meters. Deforestation is the main threat to the survival of the great hornbill as it eliminates both food sources and sites for breeding	In the wild, the Great Hornbill's diet consists mainly of fruit. It will also eat small mammals, birds, small reptiles and insects

Remarks: present in the project area as per Lohit forest division working plan and also in Kamlang WL sanctuary			
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C. Avifauna

Scientific Name	Distribution pattern	Habitat requirement	Food requirement
 <p>Grey peacock pheasant <i>Polyplectron bicalcaratum</i> Kingdom:<u>Animalia</u> Phylum:<u>Chordata</u> Class:<u>Aves</u> Subclass:<u>Neornithes</u> Infraclass:<u>Galloanserae</u> Order:<u>Galliformes</u> Family:<u>Phasianidae</u> Subfamily:<u>Phasianinae</u> Genus:<u>Polyplectron</u> Species:<i>bicalcaratum</i></p>	<p>This species has a large range, with an estimated global Extent of Occurrence of 1,000,000-10,000,000 km². The global population size has not been quantified, but it is believed to be large as the species is described as 'frequent' in at least parts of its range (del Hoyo et al. 1994). Global population trends have not been quantified; there is evidence of a population decline (del Hoyo et al. 1994), but the species is not believed to approach the thresholds for the population decline criterion of the IUCN Red List (i.e. declining more than 30% in ten years or three generations). For these reasons, the species is evaluated as Least Concern.</p>		
	<p>North-east India, south Bhutan, Myanmar, Thailand, Cambodia. Vietnam, Laos,</p>	<p>Wreathed Hornbill lives in evergreen and mixed deciduous forests from plain to</p>	<p>Frugivorous, mainly berries, drupes, capsular fruits of primary belonging to <i>Lauraceae</i>, <i>Meliaceae</i>,</p>



Scientific Name	Distribution pattern	Habitat requirement	Food requirement
 <p>Assam Wreathed hornbill <i>Rhyticeros undulates</i> Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Aves</u> Order: <u>Coraciiformes</u> Family: <u>Bucerotidae</u> Genus: <i>Rhyticeros</i> Species: <i>undulates</i></p>	<p>Peninsular Malaysia, Indonesia n Sumatra and Adjacent islands, Java, Bali, Sarawak. Sabha, Brunei, and other smaller islands.</p>	<p>1,800 m. and on islands.</p>	<p><i>Annonaceae</i>, <i>Myristicaceae</i> and figs (<i>Moraceae</i>). Also beetles and crabs.</p>
 <p>Rufousnecked hornbill <i>Aceros nipalensis</i> Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Aves</u> Order: <u>Coraciiformes</u> Family: <u>Bucerotidae</u> Genus: <i>Aceros</i> Species: <i>.nipalensis</i></p>	<p><i>Aceros nipalensis</i> is currently known from Bhutan, north-east India, Myanmar, southern Yunnan and south-east Tibet, China, Thailand, Laos and Vietnam. It has declined dramatically and is now very rare across much of its historical range. It is thought to be extinct in Nepal, and to be close to extinction in Vietnam; it has also disappeared from many areas in Thailand. While still widespread and fairly common in Bhutan, healthy populations elsewhere survive only in Namdapha National</p>	<p>It inhabits mature broadleaved forests, generally between 600-1,800 m (maximum altitude 2,200 m), but locally down to 150 m. It has also been recorded in dry woodland. It nests (usually March-June) in tall, wide-girthed trees. Evidence suggests that some populations make seasonal movements between forested areas in response to variations in the abundance of fruiting trees.</p>	<p>Its dependence on large trees for feeding and nesting makes it especially susceptible to deforestation and habitat degradation through logging, shifting cultivation and clearance for agriculture. Furthermore, viable populations require vast tracts of forest to survive, exacerbating its susceptibility to habitat fragmentation. These problems are compounded by widespread hunting and trapping for food, and trade in pets and casques.</p>



Scientific Name	Distribution pattern	Habitat requirement	Food requirement
	<p>Park, India, Nakai-Nam Theun National Biodiversity Conservation Area, central Laos and perhaps also Huai Kha Khaeng, west Thailand, and Xishuangbanna Nature Reserve, China. Population densities in these strongholds have led some to suppose tht the species is more widespread and common than field surveys suggest⁵. It is perhaps locally common in north Myanmar, and there are recent records from West Bengal and Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India.</p>		



Scientific Name	Distribution pattern	Habitat requirement	Food requirement
 <p>Varanus bengalensis</p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Class: <u>Reptilia</u> Order: <u>Squamata</u></p>	<p>Although called the Bengal Monitor, this species is among the most widely distributed of varanid lizards. It is found in river valleys in eastern <u>Iran</u>, <u>Afghanistan</u>, western <u>Pakistan</u>, <u>India</u>, <u>Nepal</u>, <u>Sri Lanka</u>,</p>	<p>Many different like (rain) forests, valleys, farmlands, desert areas and so on. It seen most commonly in dry areas.</p>	<p>Feed on insects such as ants, snails and beetles. They also eat animals such as ground birds, fish, frogs, snakes, other lizards and small mammals.</p>

<p>Family: <u>Varanidae</u> Genus: <u>Varanus</u> Species: <i>bengalensis</i></p> <p>Remarks: present in the project area as per Lohit forest division working plan</p>	<p><u>Bangladesh</u> and <u>Burma</u></p>		
 <p>Python molurus</p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Chordata</u> Subphylum: <u>Vertebrata</u> Class: <u>Reptilia</u> Order: <u>Squamata</u> Suborder: <u>Serpentes</u> Family: <u>Pythonidae</u> Genus: <u><i>Python</i></u> Species: <i>molurus</i></p> <p>Remarks present in project area as per Lohit forest division working plan</p>	<p>Found in <u>Pakistan</u>, <u>India</u>, <u>Sri Lanka</u>, southern <u>Nepal</u>, <u>Bangladesh</u>, <u>Myanmar</u>, southern <u>China</u>, (<u>Sichuan</u> and <u>Yunnan</u> east to <u>Fujian</u>, <u>Hainan</u>, <u>Hong Kong</u>), <u>Thailand</u>, <u>Laos</u>, <u>Vietnam</u>, <u>Cambodia</u>, <u>Peninsula Malaysia</u> and <u>Indonesia</u> (<u>Java</u>, <u>Sumbawa</u>, <u>Sulawesi</u>). The <u>type locality</u> given is "Indiis"</p>	<p>Occurs in a wide range of habitats, including grasslands, swamps, marshes, rocky foothills, woodlands, "open" jungle and river valleys. They depend on a permanent source of water. Sometimes they can be found in abandoned mammal burrows, hollow trees, dense water reeds and mangrove thickets</p>	<p>These snakes feed on mammals, birds and reptiles indiscriminately, but seem to prefer mammals. Roused to activity on sighting prey, the snake will advance with quivering tail and lunge with open mouth. Live prey is constricted and killed. One or two coils are used to hold it in a tight grip. The prey, unable to breathe, succumbs and is subsequently swallowed head first. After a heavy meal, they are disinclined to move. If forced to, hard parts of the meal may tear through the body. Therefore, if disturbed, some specimens will disgorge their meal in order to escape from potential predators. After a heavy meal, an individual may fast for weeks; the longest recorded duration being 2 years. The python can swallow prey bigger than its size because the jaw bones are not connected.</p>

			Moreover the prey cannot escape from its mouth because of unique arrangement of the teeth (which is reverse saw like). So far there have been no authentic cases of a human being eaten by this species
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	Distribution pattern	Habitat Requirement	Food requirement
 <p>Nigger: <i>Orsotrioena medus medus</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Arthropoda</u> Class: <u>Insecta</u> Order: <u>Lepidoptera</u> Family: <u>Nymphalidae</u> Genus: <i>Orsotrioena</i> Species: <i>medus medus</i></p>	Distributed widely in South India and from Sikkim onwards and further eastwards.	The genus is monobasic and the single species is abundant in rice growing areas at low elevations up to 1600 m, in wet seasons Flies close to the ground in the undergrowth and infact the weakest flier of all satyridae . Basks in the sun during early mornings with wings closed and keeping the body parallel to the sun rays	-
 <p>Indian fritillary <i>Argyreu hyperbius hyperbius</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Arthropoda</u> Class: <u>Insecta</u> Order: <u>Lepidoptera</u> Family: <u>Nymphalidae</u></p>	Recorded from Shillong, Mawphlang, Mawpat, Umtyngar, Umshing and Barapani during April - December.	This butterfly frequents open areas, glades, gardens etc.	-

	Distribution pattern	Habitat Requirement	Food requirement
Genus: <i>Argyreus</i> Species: <i>hyperbius</i> <i>hyperbius</i>			
 Common Sailor: <i>Neptis hylas varmona</i> Kingdom: <u>Animalia</u> Phylum: <u>Arthropoda</u> Class: <u>Insecta</u> Order: <u>Lepidoptera</u> Family: <u>Nymphalidae</u> Genus: <i>Neptis</i> Species: <i>hylas varmona</i>	Recorded from Shillong, Mawpat and Barapani during March and July – September.	Commonly found in forest and gardens.	-
 The Indian Red Admiral : <i>Vanessa indica</i> Kingdom: <u>Animalia</u> Phylum: <u>Arthropoda</u> Class: <u>Insecta</u> Order: <u>Lepidoptera</u> Family: <u>Nymphalidae</u> Genus: <i>Vanessa</i> Species: <i>indica</i>	Recorded from Shillong during June	The Indian Red Admiral is confined to elevations above 3000 feet and is found along edges of grasslands and forests, in open areas with secondary vegetation, the edges of tea fields and ravines..	-
	Oriental Region (absent from the Philippines).	Elbowed Pierrot is often found flying close to the ground and	

	Distribution pattern	Habitat Requirement	Food requirement
 <p>Elbowed Pierrot: <i>Caleta elna Elvira</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Arthropoda</u> Class: <u>Insecta</u> Order: <u>Lepidoptera</u> Family: Lycaenida Genus: <i>Caleta</i> Species: <i>elna elvira</i></p>		settled at moist spots on the forest floor.	
 <p>Large yeoman : <i>Cirrochroa aoris aoris</i></p> <p>Kingdom: <u>Animalia</u> Phylum: <u>Arthropoda</u> Class: <u>Insecta</u> Order: <u>Lepidoptera</u> Family: <u>Nymphalidae</u> Genus: <i>Cirrochroa</i> Species: <i>aoris aoris</i></p>	found in evergreen forests and on the plateau in India.	visits moist or damp patches and flowers, and males occasionally water.	