

**PROFILES OF SELECTED NATIONAL PARKS AND
SANCTUARIES OF INDIA**

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ANDAMAN AND NICOBAR ISLANDS

CAMPBELL BAY NATIONAL PARK

Introduction

Set in the north of Great Nicobar island, the Campbell Bay National park encompasses the northern and north-western coast of the island and a portion of the forested mountains in the interior. The gently undulating mountains are mist-covered and carpeted with closed canopy hill forests. Mount Thullier, the highest mountain in G. Nicobar reaching the height of 670m, is the special feature of the Campbell Bay NP. Mangroves and littoral forests line the sea shore which is mostly rocky, intercepted with small patches of sandy beach. Extensive coral reefs stretch into the sea all along the coastline.

Description

The Campbell Bay NP which is 426.23 sq. km. in area, located between 7° N and 7° 20'N latitude and 93° 37'E and 93° 56'E longitude, was demarcated by the notification of 8.11.1989 and forms the core zone of the northern portion of the Great Nicobar Biosphere Reserve. A buffer zone* stretches to the east of the NP up to the coast, and to the south of the NP where the East-West road separates it from the Galathea national park. The PA area also excludes the peripheral limits of the villages Kuchac, Reumong, Rechong, Pulobed and Pulokonji on the western coast (Saldanha 1991). Four rivers, Jubilee, Amrit Kaur, Dogmar and Alexandra flow through the NP.

* While this constitutes the buffer zone of the Biosphere Reserve, its status vis-a vis the two national parks is not clear.

BIOLOGICAL PROFILE

Coasts

The sea coast of the NP has excellent coral formation which is clearly visible through the transparent turquoise blue water, which is perfectly still and glass-like before the monsoon. Huge flat corals of *Acropora* species, *Tridactna* sp. giant clams, *Holothuria* sp. sea cucumbers, star fishes and colourful coral fishes can be seen while travelling by boat on the east coast, all the way from Laxman beach north of Campbell Bay up to the forest camp in Navy Dera and much further north. Good sea grass beds and coral formations are found around the mouth of Alexandra River and Casuarina Bay on the west coast, however there are indications that the sea grass habitat on the west coast is disturbed on account of over-exploitation (Das 1996). Conservation of these sea grass beds is of utmost importance as they are grazing grounds for dugongs (*Dugong dugon*) the highly endangered marine mammals, and for marine turtles. The mouths of Alexandra and Dogmar rivers also have well developed mangroves with *Casuarina equisetifolia* found in natural pure stands or associated with *Pandanus* sp. This is a remarkable feature of the Nicobar islands as this tree species does not occur naturally anywhere else in India, though it is planted extensively on the mainland.

Rocky caves are found all along the coast of the PA from the east upto the northern portions and the western coast north of Koppenheat. The endangered Edible nest Swiftlet *Collocalia fuciphaga* nests in these caves which are very difficult to access as there are few landing spots for boats. The caves are located in deep cracks in the rocks, needing good rock climbing skills to get to. Viewing the nests involves walking carefully over slippery boulders

that are constantly being dashed by sea waves or climbing over sharp, barnacle - covered rocks on the shore.

Vegetation and Fauna

Please refer to the BIOLOGICAL PROFILE of Galathea NP. The vegetation and fauna of both the PAs are similar, therefore have not been described separately.

SOCIO-ECONOMIC PROFILE

Please refer to SOCIO-ECONOMIC PROFILE of Galathea NP. Barring the names of the villages, the profile is similar for both the PAs.

Impacts on the PA and other issues

Pollution

- The beautiful, wild beaches of G.Nicobar island are littered with every kind of junk produced by modern civilisation. Plastic bottles, aluminium cans, rubber slippers, broken toys, pieces of thermocole, torn fishing nets, and other such rubbish is washed ashore from the sea and strewn all over, even in the most remote beaches of Campbell Bay NP. Most of this is from garbage callously thrown overboard from Indian as well as foreign ships. A collection made by a beachcomber included shampoo bottles, beer cans and even cosmetics made in Singapore and Australia!
- This is clearly a hazard as such non-degradable waste causes unhygienic conditions, for example by accumulating stagnant water which in turn breeds insect pests. Empty plastic cans and bottles which may have originally contained toxic chemicals like pesticides and disinfectants, are a real threat to the Shompen tribals as they may unwittingly use them for storing food or water. We noticed several such containers near the Shompen's huts, some of which (fortunately only a Pepsi can this time) being used to collect and store hermit crabs. Wildlife could also be badly affected if they eat or lick such harmful material. The impact on delicate coral reef organisms and other marine life could be disastrous.
- Waste oil from ships and boats is constantly being poured into the sea around the islands. Equipment like booms for removing oil slicks is also not available on passenger and cargo ship regularly plying between the islands, or at the port. Though ships do have guidelines for disposal of wastes, these are not followed. Crew of passenger ships run by the A&N Administration say that they are supposed to collect all the waste material and carry it to Port Blair for disposal. However, as Port Blair does not have the required facility, they dump the waste in the sea. The crew admit that such dumping would not be allowed anywhere else in the world, and they would lose their jobs if they tried.

Roads

- The east-west road cuts like a gash right through the forest of the Great Nicobar Biosphere Reserve, for about 35 km. from the east coast up to Koppenheat on the west coast. However (as of March 1999), the road is blocked beyond 19 km on account of landslides. The fragile tropical forest soil on the hilly terrain of the central part of the island is unable to withstand the impact of the road, as a result of which the hillsides above the road keep slipping, pouring mud and rocks on the tar road. Despite continuous repair work the road is always blocked at some point or other on account of the frequency of the landslides.

- The road also appears to serve no apparent purpose as it was intended to reach Shompen Huts, a tribal welfare unit set up for Shompens, which has a dispensary, school and other facilities, but the staff posted there never actually go there and the Shompens do not make use of the facilities anyway. Repairing the road is an exercise in futility, which if completed will only lead to increased forest exploitation easier access, and consequently greater damage to the ecosystem.

Uses of Flora & Fauna

- No working plan has so far been drawn up by the forest dept, and there has been no timber extraction since 1996. There are 3 saw mills at Dingy Nala (2 private, 1 govt.)but their requirement is only 50 cu.m. per month (B.P.Yadav, DFO pers.com). Other sources of information (Daniels 1997) indicate that both legal and illegal felling takes place commonly all over the G.Nicobar island.
- A number of wildlife species are exploited by the residents of Govind Nagar for food, such as pigeons, teals, parrots, fruit bats, wild pig and monitor lizard. Fat from snakes is considered medicinal. Cowries, conch shells and sea cucumbers (*kaala keeda*) are collected from the sea, for sale.
- The Nicobarese kill turtles, wild pigs as well as megapodes for their own consumption, and Shompens subsist entirely on forest and marine produce.
- Poaching is a serious problem. The greatest threat is from foreign poachers from Burma Thailand and even as far away as Taiwan , who come to the island with sophisticated equipment and fast boats to make a quick get away. They collect sea cucumbers, valuable shells like *Trochus* , *Turbo* sp., corals, swiflet nests, reef fishes, crocodiles (including live captured ones) and many other marine fauna. Th Malayan box turtle (*Cuora amboinensis*) is also regularly poached (Daniels 1997). Local poachers are relatively less destructive as they collect shells and corals by skin-diving, whereas the foreign poachers use scuba diving gear.
- Non-timber forest produce such as firewood, cane and wild betel is collected from the NP by settlers but this is not yet a serious problem as it does not have too much impact on the natural vegetation (B.P.Yadav, DFO pers.com) .

GALATHEA NATIONAL PARK

Introduction

Dense tropical evergreen forests with towering trees forming a closed canopy, and spectacular giant tree ferns characterise Galathea National Park, in the Great Nicobar island. Being the southern most national park in India, barely 115 km away from Sumatra, the PA has a special significance. This proximity also has great biogeographic importance, because of the phenomenal number of floral and faunal species that have closer Indo-Malayan affinities than to Indian mainland species. Galathea National Park represents the last vestige of natural, luxuriant forest with extraordinary biodiversity, located in an isolated island. Every effort needs to be made to preserve this precious heritage.

Description

The Galathea national park which is located in the southern peninsula of the Great Nicobar island, was demarcated by a notification of 8.11.1989. It is bordered in the north by the East-West Road, and extends as an oblong southwards, excluding the coast all around the southern peninsula. The North-South Road runs along the eastern side of the National Park, culminating at Pygmalion Point (Indira Point) which apart from being the southern most tip of the island, is also the southern most land point in India. The National Park which is 110 sq. km. in area, situated between 6° 60'N and 7° N latitude and 93° 37'E and 93° 56' E longitude, forms one of the two core zones of the Great Nicobar Biosphere Reserve, the other being Campbell Bay National Park. Galathea National Park is located between two hill ranges, Sahni and Mani range, and includes the Galathea river (Saldanha 1991). A buffer zone* separates the two parks and fully surrounds Galathea NP. The East-West road runs through the northern part of this buffer zone.

The National Park is well supplied with fresh water by the Galathea river and several streams. The Galathea river has its source inside the national park and its mouth in South Bay, which has now become the Galathea Bay Wildlife Sanctuary. In the dry season the river appears perfectly still with almost no apparent flow. The water carries a load of floating leaf litter and is stained brown with decaying vegetation. The banks of the river are dominated by lush growth of the palm *Nypa fruticans*, and as it approaches the sea, it is interspersed with various species of mangroves. Ficus trees and the sacred "*rudraksh*" are seen all along the river, which is one of the best habitats for the formidable Saltwater Crocodile *Crocodilus porosus*. Endemic birds such as the Nicobar Pigeon *Caloenas nicobarica nicobarica*, are commonly seen.

* While this constitutes the buffer zone of the Biosphere Reserve, its status vis-a vis the two national parks is not clear.

BIOLOGICAL PROFILE

Vegetation

The three main vegetation types are Hill Forests, Littoral Forests and Mangroves. The inland forests of the NP are extraordinarily rich in floral and faunal diversity with a high degree of endemism. At least 30% of the flora has closer affinity with other countries in SE Asia, and not found anywhere else in India. The national park (and the Great Nicobar island as a whole) is a refuge for a large number of rare and endangered species, and for wild relatives of several cultivated plants. For instance, six wild relatives of the betel vine, each with a

different flavour and shape have been recorded in G. Nicobar (Sreekumar & Ellis), and during the present field visit, two of these were encountered.

Hill forests cover most of the park area, comprising dense, closed canopy evergreens with clear stratification. The strata can be divided into:

- a) emergents rising above the canopy above 45-50m in height eg. *Horsefieldia irya*, *Mangifera camptosperma*, *Terminalia catappa*, *Sterculia macrophylla*, etc.
- b) canopy which is about 35-45m comprising species like *Actinodaphne procera*, *Calophyllum soulattri*, *Pternandra coerulescens*, etc.
- c) upper layer of shade loving species (sciophytes) at a height of 25-35m. eg *Dacryodes rugosa*, *Grewia calophylla*, *Palaquium semarum*, the palm *Pinanga manii*, etc.
- d) lower layer of sciophytes comprising species like *Arthrophyllum diversifolium*, *Baccauria javanica*, *Chisocheton grandiflorus*, *Dillenia andamanica*, etc.
- e) a layer of smaller trees at the height of 5-15m. eg. *Ardesia oxyphylla*, *Croton argyratus*, *Dehaasia candolleana*, *Kibara coriacea*, *Macranga nicobarica*, etc
- f) ground layer of herbs and shrubs below 5m. eg. *Actiphela excelsa*, *Antidesma tomentosum*, *Ixora macrosiphon*, etc.
- g) lianas, canes and epiphytes are found at all levels, the most prominent being the tree fern *Cyathea albosetacea*.

Littoral forests begin from the high tide mark of sandy beaches and usually occupy a narrow belt. The buffer zone of Galathea NP has excellent littoral forests which can also be stratified closed forests if undisturbed. The typical species are *Calophyllum inophyllum*, *Heretiera littoralis*, *Pandanus tectorius*, *Thespesia populnea*, *Barringtonia asiatica*, *Pandanus lerum*, *Scaevola sericea*, *Alstonia macrophylla*, *Atalantia spinosa*, *Ardisia humilis*, *Casaria grewifolia* and *Drypetes leiocarpa*. The shrub layer has *Codiocarpus andamanica*, *Glochidion calocarpum*, *Hunteria zeylanica* and *Morinda citrifolia*. The emergent layer has *Artocarpus chaplasha*, *Magifera camptosperm*, *Terminalia bialata*, *Terminalia catappa*, *Saccopetalum tectonum* and *Syzygium samarangense* etc.

The mouth of the Galathea river has well developed mangroves with *Rhizophora mucronata*, *Bruguiera gymnorrhiza*, *Excoecaria agallocha*, *Carallia brachiata*, *Sonneratia acida*, *Timonius jambosella* and *Nypa fruticans* as the dominant species. (Rao 1996)

Note: The vegetation described above is not specific to Galathea NP only, but is common to Campbell Bay NP and other parts of the G. Nicobar Biosphere Reserve. Source: Saldanha 1991, unless otherwise indicated.

Fauna

Several endangered species such as the Crab-eating Macaque *Macaca fascicularis umbrosa*, Nicobar Megapode *Megapodius freycinet*, Nicobar Pigeon *Caleonas nicobarica nicobarica*, Saltwater Crocodile *Crocodylus porosus*, Andaman Water Monitor *Varanus salvator andamanensis*, Reticulated Python *Python reticulatis*, listed in the IUCN list of threatened species are found in the NP.

On account of the isolation of the G.Nicobar island, like the flora, the fauna is also characterised by a high degree of endemism and a large number of endemic species are found in virtually all the faunal classes. Among the mammals the largest number of endemics are bats like the Nicobar Leafnosed Bat , the Nicobar Pipistrelle and the Nicobar Flying Fox . The other endemic mammal species and suspecies are the Crab-eating Macaque, Nicobar Tree Shrew and the Nicobar Wild Pig. The total absence of naturally occuring larger carnivores and ungulates is remarkable.

Among birds, 32 species and subspecies are endemic to Great Nicobar Island alone, of which 10 are 'near threatened' (Sankaran 1995). The Nicobar Megapode a flagship species of the Nicobar Islands is one of these. Two subspecies *Megapodius megapodius abbotti* and *Megapodius megapodius nicobariensis* occur in G.Nicobar. There has been significant population decline during recent years, mostly because a large number of their nesting sites along the coast have been converted to coconut plantations, or are heavily disturbed as is the case along the road leading to Pygmalion Point. This hen-sized bird has the ability to build large mounds, over one metre high and 2 metres diameter, with rotting vegetation and forest litter, which provides the right temperature for incubation of its eggs, through the heat produced by organic decomposition.

The other species that has declined greatly is the Grey-rumped Swiftlet or Edible nest Swiftlet *Collocalia fuciphaga* that builds its nests with its saliva. The cup-shaped nests are highly valued in the export market for use in Chinese and Southeast Asian cuisine and medicine. Though the nests are located in dark caves that are very difficult to access, the caves are regularly raided by tribal and non-tribal people for large scale nest collection, giving inadequate time for the birds to breed successfully. A cave with nests is located on the south eastern coast of G. Nicobar island, but this is not within the PA.

The Giant Robber Crab *Birgus latro*, the largest crab in the world, is the most prominent among the invertebrates of G. Nicobar. Several very rare endemic butterflies such as the Nicobar Shortbanded Sailor, the Nicobar Whitebar Bushbrown and the Whitebanded Awl. (Chandra & Khatri 1995) have been recorded in G.Nicobar,

Note: Fauna described above is not specific to the Galathea NP, but common to Campbell Bay NP and other parts of the G.Nicobar island. A list of fauna recorded in the G. Nicobar biosphere reserve is appended.

SOCIO-ECONOMIC PROFILE

The human population of the G. Nicobar island comprises about 6300 settlers and officials from the mainland and a tribal population of roughly 540, of which around 200 are Shompens and the rest are Nicobarese (Daniels 1997). There are settlers' villages like Gandhinagar and Shastrinagar, as well as Nicobari tribal villages like Chinghom in the buffer zone along the N-S road and several Nicobari villages along the western coast. Some of them are forest villages.

Shompen tribals who are a forest-dwelling nomadic community live within the NP. Both the Nicobarese and Shompens are mongoloid tribes, but very different from each other. Shompens are interior forest dwellers, making a livelihood of hunting, fishing and horticulture. Their ethnobotanical knowledge is reputed to be phenomenal. They are neither aggressive or friendly with outsiders, but quietly keep to themselves, limiting their interaction with settlers or other tribals to barter of forest products like wild areca. Their impact on the natural habitats of the NP is minimal (Daniels 1997).

The Nicobarese, on the other hand have traditionally been a seafaring community, with a history of trade. Their villages are located all along the coast of G. Nicobar, both on the east and west coast. They are a much more widespread community, living not only in G. Nicobar, but also in Car Nicobar and the Nancowry islands. Nicobaris on G. Nicobar island have access to education and modernisation, and many hold government jobs. Both tribes are legally permitted to hunt wildlife and collect forest and other produce for their own consumption. This permission is exploited by unscrupulous mainland traders who use the Nicobari tribals as a front for their poaching activities.

Villages such as Gandhinagar and Shastrinagar touch the eastern boundary of the NP. They have a mixed population of mainland settlers from different language backgrounds eg. Tamil, Malayalee and Punjabi, living in them. They are mostly ex-servicemen who were settled in Great Nicobar in 1969 in order to populate this isolated territory with a strong Indian presence. About 350 such settler families were given 11-14 acres of land each in prime rainforest, which they cleared with much effort and personal struggle, to create livelihoods for themselves through cultivation. Coconut, areca and fruit crops form the majority of their cultivation.

The original settlers' families have now grown, with a result there is more pressure on the limited land and forest area. Human settlements are the greatest threat to the G. Nicobar island and the the protected areas on the island. It is estimated that 2000 years of tribal settlement has affected roughly 10% of the land in Nicobar, while just 25 years of mainlander settlement has already impacted 4% of the land (Sankaran 1997).

Impacts on the PA and other issues

Design of the PA

One of the major defects in the design of the NP is that it does not cover any part of the sea coast. It also excludes the southern-most tip of the island which is the largest uninhabited lowland forest in the Nicobar group, which has the greatest abundance of endemic avifauna, and is the primary nesting habitat of the Nicobar Megapode (Sankaran 1995).

By excluding the coast, the PA becomes vulnerable to pressures of settlement, which generally takes place along the coastline, as well as to problems of disturbance of an important feeding zone of the Crab-eating Macaque. The unprotected coast is also exposed to exploitation of precious corals, shells and reef fishes, and to sand mining which causes erosion. Sea grass beds are the feeding grounds for many species of marine turtles and form the staple diet for the Sea Cow or Dugong *Dugong dugon*, one of the most highly endangered mammals. A number of commercially important prawns, oysters and fishes are also associated with sea grass beds. Long stretches of sea grass are found along the western coast and there are smaller patches on the east coast as well (Das 1997), which are in need of conservation measures.

Great Nicobar island has one of the largest contiguous stretch of primary forest in the Nicobar group. The East-West road cuts through this forest, fragmenting it and exposing it to exploitation. The buffer zone on both sides of the road is unprotected.

Uses of Flora & Fauna

- A number of wildlife species are exploited by the residents of Gandhinagar and Shastrinagar for food, such as pigeons, teals, parrots, fruit bats, wild pig and monitor

lizard. Fat from snakes is considered medicinal. Cowries, conch shells and sea cucumbers (*kaala keeda*) are collected from the sea, for sale (BCPP report).

- Large amounts of the red coral *Tubipora sp.* are regularly broken off and carried away in sackfuls from a reef on a beach at the 35km point on the N-S road. The coral is valuable for extraction of prostaglandins and chemicals, and is also used as a decorative coral for aquariums.

Quarries

A number of stone quarries exist in G.Nicobar, including one near Shompen Hut (Daniels 1997) but these are outside the core zone. The area of one such quarry located at 11km. on the N-S road, is quite small, not more than about 50sq.metres, but the entire vegetation is cleared within that area and the soil is exposed. . Stone is broken from the soil surface using hand-held tools , and is not blasted. It is transported elsewhere for crushing for use as construction material and for road building. Another quarry at 29 km on the North-South road is located on a hillside.

Grazing

Cattle from the settlers' habitations are seen roaming freely along the N-S rd, and it is likely that they graze within the NP. They can effect the PA flora very adversely not only by destroying the ground cover and undergrowth, but also by compacting the delicate soil, and adding extraneous material through their dung.

Human/wildlife conflicts

An unfortunate situation has arisen which has made one of the rarest primates in India, the Crab-Eating Macaque into a cause of conflict with the local settler community. Settlements along the N-S Road run as a long belt parallel to the coast. These are homesteads surrounded by agricultural cultivations, mostly of coconut, which is the main income source for the settler families. The extensive coconut cultivation which has replaced mixed natural rainforest vegetation of the area now provides an easy and abundant food source for the macaques. As the habitation belt falls directly between the NP core zone and the coast, the monkeys have to routinely cross through the plantations when they move down to the beaches in search of pandanus fruits, fish, crabs and other sea food which forms part of their natural diet. The troupes therefore regularly raid the plantations. Though they are only medium-sized monkeys, not much larger than the common rhesus macaque, they have powerful forelimbs and massive teeth, which they use to skillfully pluck, dehusk and crack the coconuts to eat the flesh (Capt. Shetty, pers.com).

The farmers claim that about 35% of their crop is routinely lost to the macaques and attempts they have made to protect their plantation such as training dogs to scare them away, or wrapping barbed wire around the trees to prevent monkeys from climbing up, have not been too effective. However, the settlers do not harm the macaques, though they find them a nuisance.

Apart from the macaque problem, villagers sometimes face the threat of attack by salt water crocodiles if they venture into the creeks for fishing. Some incidences have taken place where people have been killed by crocodiles at Magar Nala at 7 Km. There is no provision for compensation for any of these losses.

Roads

The east-west road cuts like a gash right through the forest of the Great Nicobar Biosphere Reserve, for about 35 km. from the east coast up to Koppenheat on the west coast. However (as of March 1999), the road is blocked beyond 19 km on account of landslides. The fragile tropical forest soil on the hilly terrain of the central part of the island is unable to withstand the impact of the road, as a result of which the hillsides above the road keep slipping, pouring mud and rocks on the tar road. Despite continuous repair work the road is always blocked at some point or other on account of the frequency of the landslides.

The road also appears to serve no apparent purpose as it was intended to reach Shompen Huts, a tribal welfare unit set up for Shompens, which has a dispensary, school and other facilities, but the staff posted there never actually go there and the Shompens do not make use of the facilities anyway. Repairing the road is an exercise in futility, which if completed will only lead to forest exploitation and greater damage to the ecosystem.

Tourism

At present the national park is not open to tourists, and there is no infrastructure for tourism. Given the sensitivity of the area, and the small, vulnerable population of the Shompens, it would be unwise to consider any kind of tourism development in the national park.

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MOUNT HARRIET NATIONAL PARK

Introduction

The Mount Harriet range in south Andaman island has some of the highest peaks in the Andaman group and is covered with some of the best dense evergreen and semi-evergreen forests with remarkable floral and faunal diversity. The tallest peak is Mt. Koyob (459 metres), while the peak named Mt. Harriet, which lies outside the present boundaries of the park, is 422m. The park which is elongated in a N-S direction comprises the major portion of this hill range, with the steeper hills on the east. It was notified as a National Park in 1979.

The mountain range is an important catchment area for the island. Though there are no rivers, about nine perennial streams flow through the park. The British had built an elaborate water harvesting system to collect and store fresh water and to ship it out to other islands. The ruins of a dam and aqueduct are still found.

The park's extraordinary plant diversity and rich bird-life make it attractive for scientists and conservationists as well as for tourists. Its proximity to Port Blair just 15 km away gives easy access for day visitors.

Area & Location

The area of the NP is 46.62 sq km at present and a recommendation has been made by the Wildlife Institute of India, Dehra Dun and the State Wildlife Advisory Board to increase it to 72.17 sq.km. so as to include the Mt Harriet Peak as well as the marine ecosystem on the southern & eastern side of the PA.

It is located 15 km from Port Blair.

Lat: 11° 42'5" and 11° 51'45"

Long: 92° 43'41" and 92° 48'13"

History

Since the A&N islands were being used as a penal settlement by the British, suitable locations had to be found for accommodating the British administrators and their families. Ross Island was cleared, and a colony was built there. Mount Harriet which is adjacent to Ross Island, was a particularly congenial spot for spending the hot summer months since its elevation makes it cooler than the surrounding areas. It was also intended to be a sanatorium for the British settlement.

The national park is named after the then Chief Commissioner Col. R.C.Tyler's wife, Harriet, who was responsible for clearing a beautiful hilltop to construct the Chief Commissioner's summer house. The ruins of this house can still be seen near the Guest House.

Biological Profile

Flora

The forest types are giant evergreen forest, semi-evergreen forest and moist deciduous.

Giant evergreen forest and semi-evergreen forest are intermixed and the areas covered by each cannot be clearly separated. The top canopy is formed by species such as

Dipterocarpus alatus (the tallest tree in the Andamans), *Artocarpus chaplasha*, *Artocarpus gomeziana*, *Dipterocarpus gracilis*, *Callophyllum soulattri*, *Sideroxylon longipetiolatum*, etc. with a greater percentage of *Dipterocarpus* sp. The next layer near the top are *Amoora wallichii*, *Pterocymbium tinctorium*, etc. The lower storey has *Pometia pinnata*, *Mesua ferrea*, *Licuala peltata* etc., with climbers such as *Dinochloa andamanica*, *Gnetum scandens* and a variety of canes such as *Calamus palustris*. (D'Souza 1996)

Deciduous forests are found on undulating hills and slopes where the water retention is low. The tree species here are *Pterocarpus dalbergioides*, *Bombax insigne*, *Adenantha pavonia*, *Albizia lebeck*, *Lannea coromandelica*, etc. with smaller trees and shrublets such as *Glycosmis mauritiana*, *Mallotus acuminatus*, *Ixora grandiflora*, *Dracaena spicata*, etc. (Balachandran 1998)

Fauna

The proportion of endemic species is very high for the fauna of the NP. 13 species of mammals have been recorded of which 9 are endemic. The most spectacular fauna are the birds. Out of the 88 species recorded in the PA, 48 are endemic. 30 species of herpetological fauna have been recorded so far, of which 14 show a high degree of endemism. Among insects, a large number of lepidoptera found in the NP are also endemic to the islands. (D'Souza 1996).

Socio-economic profile

The perennial freshwater streams and the fertile valleys of the mountain range have attracted many settlements around the PA. Its proximity to Port Blair and to the Hope Town jetty has also been a contributing factor.

The settlements began at the time of India's independence. Refugees and prisoners were settled by allocating 5 acres of flatland and 5 acres of hilly land for agriculture. The original settlers were Bengalis, Burmese, Mapilahs and a few Tamilians. Subsequently there has been a huge population influx with thousands of immigrants, mainly relatives of the settlers coming in to the area. Initially they lived with the settlers, but later began to encroach on government forest land. The maximum influx of migrants was between 1980 - 1990. Many of the unauthorised encroachments were later regularised.

The main crop cultivated by village inhabitants around the NP is rice and each family has an average of 2 cattle. The registered settlers are expected to meet their timber and fuel requirement from their own land. The average family size per household is between 6-8. (Singh 1997).

Tourism

Mount Harriet NP is a popular spot for day visitors who generally come to enjoy the beautiful views of the sea and neighbouring islands from the hilltop viewing points. Apart from a two-roomed forest guest house there are no other accommodation facilities. The guest house, the viewpoints, a children's play area and a small deer enclosure are all located together outside the boundary of the NP. From here it is a roughly 2 km walk along the forest nature trail to the park boundary at Kalapathar.

Two trekking routes lead into the forest; one is short route upto Kalapathar through the forest, returning along the same route, while the other is about 16 km long going downhill

beyond Kalapathar till it reaches Madhuban beach, and uphill once again by a different forest path. The motorable road from the check post at sea level upto the guest house is a popular walk since it passes through a good forest and also passes by an ancient spreading ficus tree which is a picturesque resting spot.

Management

The headquarters of the NP is located within the park limits for the purpose of closer proximity to the forest area as well as in order to ensure better protection. A management plan has been prepared for the period 1977 -2002 (D'Souza 1996) outlining strategies for a variety of actions ranging from research on flora & fauna of the PA, to ecodevelopment programmes for the villages in the periphery.

At present no census work has been carried out for the animals in the PA, and there are no information documents or A-V material available at the park.

Impacts

The following activities in the immediate vicinity of the NP have an adverse impact on the natural ecosystem of the PA:

- The immediate surrounds of the PA have a number of industries including quarries, plantations and plywood factories.
- A fishing community of about 200 families who are immigrants from coastal Andhra Pradesh have settled in the Shore Point area since the mid '90s . They collect corals from the reefs in the area and have depleted the fish resources on account of dynamite fishing (Singh 1997).
- The unregistered settlers use the reserve forest illegally for timber and other forest produce. They occupy and clear the land.
- Both the registered and unregistered settlers and are constantly extending the boundaries of their occupied areas and encroach into forest land without respect to forest markers.
- Since coconut and arecanut plantations are lucrative, land on the hill slopes bordering the park is also being encroached to plant these trees. As a result the NP has no buffer zone.
- Two beautiful beaches in Shoal bay which once used to be the nesting ground for 4 species of marine turtles - Leatherback, Green, Hawksbill and Olive Ridley are now being mined for sand since the early '90s. This has caused serious problems of erosion. Large trees including valuable Gurjans have fallen on account of removal of sand at their base. Salt water intrusion has started in the paddy fields because of the widening of the mouth of the mangrove creeks, and as a result paddy yield had gone down (Singh 1997).
- Hundreds of cement polythelene bags litter the beaches, posing a potential threat to marine life (Singh 1997).
- There is illegal hunting of wild boar, monitor lizard and deer from the forest.
- Illegal harvesting of marine fauna such as shells, corals and sea cucumbers will reduce the biodiversity of the proposed marine extension area of the NP.

- Though the nature trail path is well maintained, it occasionally littered with plastic and foil wrappers of sweets and supari, particularly towards the beginning of the trail which is outside the park boundary. Some of these are likely to have been dropped by wood poachers who operate in the area.
- Grazing and illicit tree felling are problem in the PA. The targeted trees are padauk, gurjan, chuglam , taunpeng, etc.

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Fauna of Mt. Harriet National Park

Scientific Name	Common English Name	Status
Phylum : Chordata		
Class : MAMMALIA		
Order : INSECTIVORA		
<i>Crocidura hispida</i> (Thomas)	Andaman Island Spiny Shrew	E
<i>Crocidura andamanensis</i> (Miller)	Miller's Andaman Spiny Shrew	E
Order : CHIROPTERA		
<i>Pteropus melanotus</i> (Blyth)	Andaman Flying Fox	
<i>Pteropus giganteus</i> (Brunnich)	Indian Flying Fox	
<i>Cynopterus brachyotis brachysoma</i> (Dobson)	Andaman Lesser Shortnosed Fruit Bat	E
<i>Rhinolophus affinis andamanensis</i> (Dobson)	Dobson's Horseshoe Bat	E
<i>Rhinolophus cognatus cognatus</i> (Andersen)	South Andaman Horseshoe	E

Scientific Name	Common English Name	Status
	Bat	
<i>Myotis dryas</i> (Andersen)	Insular Mouseeared Bat	E
Order : CARNIVORA		
<i>Paguma larvata tytleri</i> (Tytler)	Andaman Masked Palm Civet	E
Order : ARTIODACTYLA		
<i>Sus scrofa andamanensis</i> (Blyth)	Andaman Wild Pig	E
<i>Axis axis</i> (Erxleben)	Chital or Spotted Deer	
<i>Muntiacus muntjak</i> (Zimmermann)	Barking Deer	
Order : RODENTIA		
<i>Rattus rattus andamanensis</i> (Blyth)	House Rat	E
Class : AVES		
Order : CICONIIFORMES		
Family : ARDEIDAE		
<i>Ardeola grayii grayii</i> (Sykes)	Indian Pond Heron or Paddybird	
<i>Bubulcus ibis coromandus</i> (Boddaert)	Cattle Egret	
<i>Egretta sacra</i> (Gmelin)	Eastern Reef Heron	
<i>Ixobrychus sinensis</i> (Gmelin)	Yellow Bittern	
Order : FALCONIFORMES		
Family : ACCIPITRIDAE		
<i>Aviceda leuphotes andamanica</i> (Abdulali & Grubh)	Andaman Blackcrested Baza	E
<i>Accipiter virgatus gularis</i> (Temminck & Schlegel)	Eastern Sparrow Hawk	
<i>Spizaetus cirrhatus andamanensis</i> (Tytler)	Andaman Crested Hawk - Eagle	E
<i>Haliaeetus leucogaster</i> (Gmelin)	Whitebellied Sea Eagle	
<i>Circus macrourus</i> (S.G.Gmelin)	Pale Harrier	
<i>Spilornis cheela davisoni</i> (Hume)	Andaman Pale Serpent Eagle	E
<i>Spilornis elgini</i> (Blyth)	Andaman Dark Serpent Eagle	E
Order : GRUIFORMES		
Family : RALLIDAE		
<i>Rallina canningi</i> (Blyth)	Andaman Banded Crake	
<i>Amauornis phoenicurus insularis</i> (Sharpe)	Andaman Whitebreasted Waterhen	
<i>Gallicrex cinerea</i> (Gmelin)	Water Cock	
<i>Gallinula chloropus orientalis</i> (Horsfield)	Malay Moorhen	
Order : CHARADRIIFORMES		
Family : DROMADIDAE		
<i>Dromas ardeola</i> (Paykull)	Crab Plover	
Family : BURHINIDAE		
<i>Esacus magnirostris magnirostris</i> (Vieillot)	Australlian Stone Plover	
Family : CHARADRIIDAE		
<i>Pluvialis squatarola</i> (Linnaeus)	Grey Plover	
<i>Pluvialis dominica fulva</i> (Gmelin)	Eastern Golden Plover	
<i>Charadrius leschenaultii leschenaultii</i> (Lesson)	Large Sand Plover	
<i>Charadrius asiaticus veredus</i> (Gould)	Eastern Sand Plover	
<i>Charadrius dubius curonicus</i> (Gmelin)	Euopean Little Ringed Plover	

Scientific Name	Common English Name	Status
<i>Charadrius mongolus atrifrons</i> (Wagler)	Pamir's Lesser Sand Plover	
<i>Tringa totanus totanus</i> (Linnaeus)	Common Redshank	
<i>Tringa Hypoleucos hypoleucos</i> (Linnaeus)	Common Sandpiper	
Family : LARIDAE		
<i>Sterna sumatrana sumatrana</i> (Reffles)	Eastern Blacknaped Tern	
Order : COLUMBIFORMES		
Family : COLUMBIDAE		
<i>Ducula aenea andamanica</i> (Abdulali)	Andaman Green Imperial Pigeon	E
<i>Columba palumbodes</i> (Hume)	Andaman Wood Pigeon	E
<i>Macropygia rufipennis andamanica</i> (Abdulali)	Andaman Cuckoo - Dove	E
<i>Streptopelia tranquebarica humilis</i> (Temminck)	Burmese Red Turtle Dove	
<i>Chalcophaps indica maxima</i> (Hartert)	Andaman Emerald Dove	E
Order : PSITTACIFORMES		
Family : PSITTACIDAE		
<i>Psittacula eupatria magnirostris</i> (Ball)	Large Andaman Parakeet	
<i>Psittacula alexandri abbotti</i> (Oberholser)	Andaman Redbreasted Parakeet	E
<i>Psittacula longicauda tytleri</i> (Hume)	Andaman Redcheeked Parakeet	
<i>Loriculus vernalis vernalis</i> (Sparrman)	Indian Lorikeet	
Order : CUCULIFORMES		
Family : CUCULIDAE		
<i>Cuculus micropterus</i> (Gould)	Indian Cuckoo	
<i>Eudynamys scolopacea dolosa</i> (Repley)	Andaman Koel	E
<i>Centropus andamanensis</i> (Beavan)	Andaman Crow-Pheasant	E
Order : STRIGIFORMES		
Family : STRIGIDAE		
<i>Tyto alba deroepstorffii</i> (Hume)	Andaman Barn Owl	E
<i>Otus balli</i> (Hume)	Andaman Scops Owl	E
<i>Otus scops modestus</i> (Walden)	Andaman Lesser Scops Owl	E
<i>Ninox scutulata obscura</i> (Hume)	Hume's Brown Hawk-Owl	E
<i>Ninox affinis affinis</i> (Beavan)	Andaman Brown Hawk-Owl	E
Order : CAPRIMULGIFORMES		
Family : CAPRIMULGIDAE		
<i>Caprimulgus macrurus andamanicus</i> (Hume)	Andaman Longtailed Night jar	E
Order: APODIFORMES		
Family: APODIDAE		
<i>Collocalia brevirostris innominata</i> (Hume)	Hume's Swiftlet	
<i>Collocalia fuciphaga inexpectata</i> (Hume)	Andaman Greyrumped Swiftlet	E
<i>Collocalia esculenta affinis</i> (Beavan)	Whitebellied Swiftlet	E
<i>Chaetura gigantea indica</i> (Hume)	Brownthroated Spinetail Swift	
Order : CORACIIFORMES		
Family : ALCEDINIDAE		
<i>Alcedo atthis bengalensis</i> (Gmelin)	Indian Small Blue Kingfisher	
<i>Alcedo meninting rufigaster</i> (Walden)	Andaman Blue-eared	E

Scientific Name	Common English Name	Status
	Kingfisher	
<i>Ceyx erithacus macrocarus</i> (Oberholser)	Andaman Threetoed Forest Kingfisher	E
<i>Halcyon smyrnensis saturator</i> (Hume)	Andaman Whitebreasted Kingfisher	E
<i>Halcyon chloris davisoni</i> (Sharpe)	Andaman Whitecollared Kingfisher	
Family : MEROPIDAE		
<i>Merops leschenaulti andamanensis</i> (Mariet)	Andaman Chestnut-headed Bee-eater	E
<i>Merops philippinus</i> (Linnaeus)	Blueteiled Bee-eater	
Family : CORACIIDAE		
<i>Eurystomus orientalis</i> (Stressmann)	Andaman Broadbilled Roller	E
Order : PICIFORMES		
Family : PICIDAE		
<i>Dryocopus javensis hodgei</i> (Blyth)	Andaman Black Woodpecker	E
<i>Picoides macei andamanensis</i> (Blyth)	Andaman Fulvous-breasted Pied Woodpecker	E
Order : PASSERIFORMES		
Family : HIRUNDINIDAE		
<i>Hirundo tahitica javanica</i> (Sparrman)	Javan House Swallow	
Family : LANIIDAE		
<i>Lanius cristatus lucionensis</i> (Linnaeus)	Philippine Shrike	
Family : ORIOLIDAE		
<i>Oriolus chinensis andamanensis</i> (Tytler)	Andaman Blacknaped Oriole	E
<i>Oriolus xanthornus reubeni reubeni</i> (Abdulali)	Andaman Blackheaded Oriole	E
Family : DICRURIDAE		
<i>Dicrurus andamanensis andamanensis</i>	Small Andaman Drongo	E
Family : ARTAMIDAE		
<i>Artamus leucorhynchus humei</i> (Stresemann)	Whitebreasted Swallow Shrike	E
<i>Sturnus erythropygius andamanensis</i> (Tytler)	Andaman Whiteheaded Myna	E
<i>Acridotheres tristis tristis</i> (Linnaeus)	Common Myna	
<i>Gracula religiosa andamanensis</i> (Beavan)	Andaman Hill Myna	E
Family : CORVIDAE		
<i>Dendrocitta bayleyi</i> Tytler	Andaman Tree Pie	E
<i>Corvus macrorhynchus vaillanti</i> (Lesson)	Eastern Jungle Crow	
Family : CAMPEPHAGIDAE		
<i>Coracina novaehollandiae andamana</i> (Neumann)	Andaman Large Cuckoo-Shrike	E
<i>Coracina nigra davisoni</i> (Kloss)	Nicobar Pied Cuckoo Shrike	E
<i>Pericrocotus flammeus andamanensis</i> (Beavan)	Andaman Scarlet Minivet	E
<i>Pericrocotus cinnamomeus</i> (Baker)	Eastern Small Minivet	
Family : IRENIDAE		
<i>Irena puella puella</i> (Latham)	Fairy Bluebird	
Family : PYCNONOTIDAE		
<i>Pyenonotus atriceps fusco flavescens</i> (Hume)	Andaman Blackheaded Bulbul	E

Scientific Name	Common English Name	Status
<i>Pycnonotus jocosus whistleri</i> (Deignan)	Andaman Redwhiskered Bulbul	E
Family : MUSCICAPIDAE		
<i>Muscicapa latirostris</i> (Raffles)	Brown Flycatcher	
<i>Hypothymis azurea tytleri</i> (Beavan)	Andaman Blacknaped Flycatcher	E
<i>Cettia pallidipes</i> (Blandford)	Andaman Palefooted Bush Warbler	E
<i>Phylloscopus trochiloides trochiloides</i> (Sundevall)	Eastern Greenish Leaf Warbler	
<i>Copsychus saularis andamanensis</i> (Hume)	Andaman Magpie Robin	E
<i>Copsychus malabaricus albiventris</i> (Walden)	Andaman Shama	E
<i>Zoothera citrina andamanensis</i> (Walden)	Andaman Ground Thrush	E
Family : DICAIEIDAE		
<i>Dicaeum concolor virescens</i> (Hume)	Andaman Plaincoloured Flowerpecker	E
Family : NECTARINIIDAE		
<i>Nectarinia jugularis andamanica</i> (Hume)	Andaman Olivebacked Sunbird	E
Family : ZOSTEROPIDAE		
<i>Zosterops palpebrosa nicobarica</i> (Blyth)	Nicobar White-eye	E
Family : EMBERIZIDAE		
<i>Emberiza pusilla</i> (Pallas)	Little Bunting	E
Class : REPTILIA		
Family : GEKKONIDAE		
<i>Cnemaspis kandianus</i> (Kelaart)	Forest Day Gecko	
<i>Gehyra mutilata</i> (Wiegmann)	Spotted Gecko	
<i>Gecko smithi</i> (Gray)	Smith's Gecko	E
<i>Gecko gecko gecko</i> (Linnaeus)	Asian Tokay	
<i>Gecko verreauxi</i> (Tytler)	Gecko	E
<i>Genydactylus rubida</i> (Blyth)	Curltailed Gecko	E
<i>Hemidactylus frenatus</i> (Dumeril & Bibron)	House Gecko	
<i>Phelsuma andamanense</i> (Blyth)	Andaman Day Gecko	E
Family : AGAMIDAE		
<i>Calotes andamanensis</i> (Boulenger)	Andaman Garden Lizard	E
<i>Calotes emma alticristatus</i> (Schmidt)	Green Lizard	
<i>Calotes mystaceus</i> (Dumeril & Bibron)	Whitelipped Garden Lizard	
<i>Calotes versicolor versicolor</i> (Daudin)	Common Garden Lizard	
<i>Corphophylax subcristatus</i> (Blyth)	Green Forest Lizard	E
Family : SCINCIDAE		
<i>Dasia olivacea</i> (Gray)	Tree Skink	
<i>Mybuya andamanensis</i> (Smith)	Andaman Skink	E
Family : VARANIDAE		
<i>Varanus salvator andamanensis</i> (Deraniyagala)	Andaman Water Monitor	E
Family : TYPHLOPIDAE		
<i>Ramphotyphlops braminus</i> (Daudin)	Common Blind Snake	E
Family : COLUBRIDAE		

Scientific Name	Common English Name	Status
<i>Boiga andamanensis</i> (Wall)	Andaman Cat Snake	E
<i>Cerberus rhynchops rhynchops</i> (Schneider)	Dogfaced Water Snake	
<i>Coluber mucosus mucosus</i> (Linnaeus)	Indian Rat Snake	
<i>Dendrelaphis cyanochloris</i> (Wall)	Green Tree Snake	
<i>Dendrelaphis pictus andamanensis</i> (Smith)	Smith's Bronze Back	E
<i>Ophites capucinus</i> (Boie)	Brown Wolf Snake	
Family : ELAPIDAE		
<i>Bungarus andamanensis</i> (Biswas & Sanyal)	Andaman Banded Krait	E
<i>Ophiophagus hannah</i> (Cantor)	King cobra	
Family : VIPERIDAE		
<i>Trimeresurus purpureomaculatus andersoni</i> (Theobald)	Andaman Pit Viper	E
Class : AMPHIBIA		
Family : BUFONIDAE		
<i>Bufo melanostictus</i> (Schneider)	Common Indian Toad	
Family : MICROHYLIDAE		
<i>Microphyla ornata</i> (Dumeril & Sibron)	Ornate Microhylid	
Family : RANIDAE		
<i>Limnonectes andamanensis</i> (Stoliczka)	Andaman Paddy Frog	E
<i>Limnonectes cancrivora</i> (Gravenhorst)	Crab Eating Frog	
<i>Limnonectes doriae</i> (Boulenger)	Brown Frog	
PISCES		
Class : OSTEICHTHYES		
Order : ELOPIFORMES		
Family : MEGALOPIDAE		
<i>Megalops cyprinoides</i> (Brous)	Tarpon	
Order : ANGUILLIFORMES		
Family : ANGUILLIDAE		
<i>Anguilla bicolor bicolor</i> (Macclle)	Short fin eel	
<i>Anguilla nebulosa nebulosa</i> (Mocclle)	Long fin eel	
<i>Anguilla bengalensis</i> (Gray)	Indian long fin eel	
Order : CYPRINIFORMES		
Family : CYPRINIDAE		
<i>Rasbora daniconius</i> (Ham)	Rasbora	
Order : SILURIFORMES		
Family : CLARIIDAE		
<i>Clarias batrachus</i> (Linn.)	Teysman's spotted cat fish	
Family : HETEROPNEUSTIDAE		
<i>Heteropneustes fossilis</i> (Bloch)	Stinging cat fish	
Order : CYPRINODONTIFORMES		
Family : APLOCHEILIDAE		
<i>Aplocheilus panchax</i> (Ham.)	Lesser top rivuline	
Order : PERCIFORMES		
Family : ELEOTEIDIDAE		
<i>Butis butis</i> (Ham-Bach)	Duckbill sleeper	
<i>Ophiocara aporas</i> (Bleek)	Aporos sleeper	
<i>Ophiocara porocaphala</i> (Cuv. & Val.)	Pore headed sleeper	
Family : GOBIIDAE		

Scientific Name	Common English Name	Status
<i>Awaous stamineus</i> (Val.)	Fresh water goby	
<i>Bathygobius fuscus</i> (Rupp.)	Frill goby	
<i>Sicyopterus microcephalus</i> (Bleek)	Naked headed goby	
<i>Mana bicirrhosus</i> (Weber)	Goby	
Family : ANABANTIDAE		
<i>Anabas testudineus</i> (Bloch)	Climbing perch	
Family : CHANNIDAE		
<i>Channa orientalis</i> (Schn.)	Green Snakehead	
<i>Channa punctatus</i> (Bloch)	Spotted Snakehead	
Phylum : MOLLUSCA		
Class : GASTROPODA		
<i>Pleuropoma scrupula</i> (Benson)	Land Mollusc	E
<i>Lagochilus warnefordi</i> (Nevill)	Land Mollusc	E
<i>Quickia graveleyi andamanensis</i> (Rao)	Land Mollusc	E
<i>Macrochlamys choinix</i> (Benson)	Land Mollusc	E
<i>Macrochlamys stephus</i> (Benson)	Land Mollusc	E
<i>Macrochlamys aulopsis</i> (Benson)	Land Mollusc	E
Class : BIVALVIA	Wood – Boring Molluscs	E
<i>Bactronophorus thoracites</i> (Gould)	Wood – Boring Mollusc	-
<i>Dicyathifer manni</i> (Wright)	Wood – Boring Mollusc	-
<i>Nausitora hedleyi</i> (Schepman)	Wood - Boring Mollusc	-
<i>Martesia (Martesia) striata</i> (Linnaeus)	Wood - Boring Mollusc	-
Phylum : ARTHROPODA		
Class : INSECTA		
Order : ODONATA		
Family : CHLOROCYPHIDAE		
<i>Labellago lineata andamanensis</i> (Fraser)		E
Family : CALOPTERYGIDAE		
<i>Vestalis gracilis gracilis</i> (Rampur)		-
Family : LESTIDAE		-
<i>Lestes praemorsa praemorsa</i> (Selys)		
Family : PROTONEURIDAE		E
<i>Prodasineura verticalis andamanensis</i> (Fraser)		
Family : PLATYCNEMIDIDAE		-
<i>Copera marginipes</i> (Rampur)		
Family : PLATYSTICTIDAE		E
<i>Drepanosticta annandalei</i> (Fraser)		
Family : COENAGRIONIDAE		E
<i>Pseudagrion andamanicum</i> (Fraser)		
<i>Agriocnemis femina oryzae</i> (Liefelinck)		
Family : LIBELLULIDAE		-
<i>Diplacodes trivialis</i> (Rampur)		
<i>Lathrecista asiatica asiatica</i> (Fabricius)		
<i>Orthetrum pruinosim neglectum</i> (Rampur)		
<i>Orthetrum sabina sabina</i> (Drury)		
<i>Orthetrum chrysis</i> (Selys)		
<i>Trithemis aurora</i> (Burmeister)		-
<i>Trithemis festiva</i> (Rampur)		-

Scientific Name	Common English Name	Status
Order : ORTHOPTERA	Grasshoppers, crickets, mole crickets	
Family : ACRIDIDAE		
<i>Gesonula punctifrons</i> (Stal)		-
<i>Spathosternum prasiniferum prasiniferum</i> (Walker)		-
<i>Oxya hyla hyla</i> (Serville)		-
<i>Carynda diminuta</i> (Walker)		-
<i>Stenocatantops splendens</i> (Thunberg)		-
<i>Aulacobothrus luteipes</i> (Walker)		-
<i>Aiolopus thalassinus tamulus</i> (Fabricius)		
Family : PYRGOMORPHIDAE		
<i>Atractomorpha crenulata crenulata</i> (Fabricius)		-
Family : TETTIGONIDAE		
<i>Holochlora indica</i> (Kirby)		-
Family : GRYLLIDAE		
<i>Teleogryllum testaceus</i> (Walker)		-
<i>Modicogryllus clarellus</i> (Saussure)		-
<i>Pteronemobius indicus</i> (Walker)		-
Family : OECANTHIDAE		
<i>Oecanthus indicus</i> (Saussure)		-
Family : ENEOTERRIDAE		
<i>Heterotrypus pictus</i>		-
<i>Heterotrypus vicinus</i> (Chopard)		-
Family : GRYLLOTALPIDAE		
<i>Gryllotalpa africana</i> (Beauvois)		-
Order : PHASMIDA	Leaf and Stick Insects	
<i>Phyllium crucifolium</i> (Chopard)		-
<i>Bacillus westwoodi</i> (Wood Mason)		-
<i>Lonchodes verrucifer</i> (Wood Mason)		-
Order : DERMAPTERA	Earwigs	
<i>Hypurgus humeralis</i> (Kirby)		-
Order : DICTYOPTERA		
Family : BLATELLIDAE		
<i>Blatella germanica</i> (Linnaeus)		-
Family : PYCNOSCELIDAE		
<i>Pycnoscelus surinamensis</i> (Linnaeus)		-
Order : ISOPTERA	Termites	
Family : KALOTERMIDAE		
<i>Neotermes andamanensis</i> (Synder)		E
Family : RHINOTERMITIDAE		
<i>Coptotermes heimi</i> (Wasmann)		-
<i>Schedorhinotermes medioobscurus</i> (Holmgren)		
Family : TERMITIDAE		
<i>Odontotermes latigula</i> (Synder)		-
<i>Odontotermes paralatigula</i> (Chatterjee and		-

Scientific Name	Common English Name	Status
Sensarma)		
<i>Nasutitermes matangensis</i> <i>metangensiformes</i> (Holmgren)		E
<i>Hospitalitermes blairi</i> (Roonwal & Sensarma)		E
<i>Microcerotermes danieli</i> (Roonwal & Bose)		E
Order : HEMIPTERA		
Family : CICADIDAE		
<i>Dundubia intemerata</i> (Walker)		-
Family : RICANIDAE		
<i>Ricanula stigma</i> (Walker)		-
<i>Ricanoptera polita</i> (Melich)		E
Family : FLATIDAE		
<i>Phyllophanta andamanensis</i> (Distant)		E
Family : APHROPHORIDAE		
<i>Callitettix versicolor</i> (Feb.)		-
<i>Clovia andamanensis</i> (Distant)		E
Family : CICADELLIDAE		
<i>Nephotetix nigropicta</i> (Stal)		-
<i>Recilia dorsalis</i> (Motschulsky)		-
Family : CAPSIDAE		
<i>Poeciloscystes longicornis</i> (Reuter)		-
<i>Cyrtorrhinus lividipennis</i> (Reuter)		-
Family : RADUVIIDAE		
<i>Polidius armatissimus</i> (Stal)		
<i>Triatima rubrifasciatus</i> (de Geer)		
Family : PYRRHOCOREIDAE		
<i>Antilochus coqueberti</i> (Fabricius)		-
<i>Dindymus rubiginosus</i> (Fabricius)		-
<i>Dysdercus rubiginosus</i> (Fabricius)		-
Family : LYGAEIDAE		
<i>Dieuches femoralis</i> (Dohrn)		-
<i>Metochus uniguttatus</i> (Thunberg)		-
Family : COREIDAE		
<i>Homoeocerus striicornis</i> (Scott)		-
<i>Leptocorisa acuta</i> (Thumb.)		-
<i>Riptortus pedestris</i> (Fabricius)		-
Family : PENTATOMIDAE		
<i>Axiagastus rosmarus</i> (Dall)		-
<i>Catacanthus incarnatus</i> (Drury)		-
<i>Eusarcocoris ventralis</i> (Westwood)		-
<i>Halys dentatus</i> (Fabricius)		-
<i>Plautia fimbriata</i> (Fabricius)		
Family : SCUTELLENIDAE		
<i>Chrysocoris andamanesis</i> (Atkinson)		-
Family : CYDNIDAE		-
<i>Cydnus indicus</i> (Westwood)		-
<i>Geotomus pygmaeus</i> (Dallas)		-
Order : COLEOPTERA		

Scientific Name	Common English Name	Status
Family : SCARABAEIDAE		
<i>Aphodius crenatus</i> (Harold)		-
<i>Aphodius moestus</i> (F.)		-
<i>Phaeochrous intermedius intermedius</i> (Pic)		-
<i>Copros spinator</i> (Harold)		-
<i>Onthophagus cervus</i> (Fabricius)		-
<i>Apogonia andamana</i> (Moser)		E
<i>Holotrichia andamana</i> (Brenska)		E
<i>Lepidiota insularis</i> (Arrow)		-
<i>Parastasia andamanica</i> (Ohaus)		E
<i>Parastasia bimaculata</i> (Guerin)		-
<i>Anomala andamanica</i> (Arrow)		E
<i>Anomala rhodomela</i> (Arrow)		-
<i>Callistethus isolatus</i> (Arrow)		-
<i>Adoretus castopilosus</i> (Ohaus)		-
<i>Adoretus versutus</i> (Harold)		-
<i>Thaumastopeus pullus</i> (Bilberg)		-
Family : COCCINELLIDAE		
<i>Epilachna septima</i> (Dieke)		
<i>Scymnus andamanesis</i> (Kapur)		E
<i>Chilocorus nigrinus</i> (Feb.)		-
<i>Brumus lineatus</i> (Weise)		-
<i>Menochilus sexmaculatus</i> (Fabricius)		-
<i>Verania discolor</i> (Feb.)		-
<i>Coccinella transversalis</i> (Fabricius)		-
<i>Harmonia arcuata</i> (Feb.)		-
Family : CARABIDAE		
<i>Itamis castaneus</i> (Schm-Goeb)		E
<i>Hexagonia terminata</i> (Kirby)		E
<i>Brachinus orientalis</i> (Chaudoir)		-
<i>Catascopus andamanensis</i> (Choud)		E
Family : BUPRESTIDAE		
<i>Chrysochroa ocellata</i> (F.)		-
<i>Chrysochroa gratiosa</i> (Deyr)		-
Family : DYTISCIDAE	Water beetles	
<i>Laccophilus parvulus</i> (Aube)		-
<i>Eretes sticticus</i> (Linnaeus)		-
<i>Hydaticus fabricii</i> (Macleay)		-
<i>Cybister tripunctatus asiaticus</i> (Sharp)		-
Family : CHRYSOMELIDAE		
<i>Aulacophora andamanica</i> (Duv.)		E
Family : CERAMBYCIDAE	Longicorn beetles	
<i>Xystrocera globosa</i> (Olivier)		-
<i>Stromatius barbatus</i> (Fabricius)		-
<i>Plocae dreus obesus</i> (Gahan)		-
<i>Ceresium andamanicum</i> (Gahan)		E
<i>Xylotrechus buqueti</i>		-
<i>Halme caerulescens</i> (Gahan)		E
<i>Clyzomedus annularis</i> (Pascoe)		-

Scientific Name	Common English Name	Status
<i>Coptops rufa</i> (Thomson)		E
<i>Ropica honesta m. rufescens</i> (Pic)		-
<i>Pterolophia (Pterolophia) andamanica</i> (Breuning)		-
<i>Pterolophia (P.) pallidifrons</i> (Breuning)		E
<i>Pharsalia (Cycos) subgemmata</i> (Thomson)		-
<i>Acalolepta andamanica</i> (Breuning)		E
<i>Batocerra rufomocolata</i> var. (Thomson)		E
<i>Olenecamptus bilobus</i> (Fabricius)		-
<i>Exocentrus (Camptomyme) alboscuteellaris</i> (Breuning)		E
<i>Glenea (Stiroglenea) andamanica</i> (Breuning)		E
Family: SCOLYTIDAE	Bark and timber beetles	
<i>Cocotrypes cyperi</i> (Beeson)		-
<i>Cocotrypes opacifrons</i> (Beeson)		-
<i>Euwallacea andamanensis</i> (Blandford)		-
<i>Xyleborinus exiguus</i> (Walkar)		-
<i>Xyleborinus bidentatus</i> (Motschulsky)		-
<i>Xyleborus cognatus</i> (Blandford)		-
<i>Xyleborurs perforans</i> (Wollaston)		-
<i>Xyleborurs similis</i> (Ferrari)		-
Order: DIPTERA	Flies	
Family: MUSCIDAE		
<i>Musca sorbens</i> (Wied)		-
<i>Musca (Eumasca) lusoria</i> (Wied)		-
Family: STRATIOMYIDAE		
<i>Negritomia meculipennis</i> (Mecq.)		-
<i>Sargus metallinus</i> (Fab.)		-
Family: TABANIDAE		
<i>Tabanus (Tabanus) immanis</i> (Wied)		-
<i>Tabanus (T.) indianus</i> (Ricardo)		-
<i>Tabanus (T.) leucohirrtus</i> (Ricardo)		-
<i>Tabanus (T.) brumipennis</i> (Ricardo)		-
Family: BOMBYLIIDAE		
<i>Ligyra flaviventris</i> (Doleschall)		-
Order: LEPIDOPTERA		
Section: RHOPALOECA	Butterflies	
Family: PAPILIONIDAE		
<i>Troides helena helinocoides</i> (Moore)	The Andaman Birdwing	E
<i>Pachiliopta aristolochiae goniopeltis</i> (Rothschild)	The Andaman Rose	-
<i>Papilio mayo</i> (Atkinson)	The Andaman Mormon	E
<i>Pubilio fuscus andamanicus</i> (Rothschild)	The Andaman Helen	E
<i>Papilio polytes stichoides</i> (Evans)	The Andaman Common Mormon	E
<i>Graphium antipathes epaminodas</i> (Oberthur)	The Andaman Fivebar Swordtail	E

Scientific Name	Common English Name	Status
<i>Graphium agamemnon andamanica</i> (Lathy)	The Andaman Tailed Jay	E
<i>Graphium euryplus macronius</i> (Jordon)	The Andaman Great Jay	E
<i>Appias albina darada</i> (Felder)	The Albatross	-
<i>Axias pyrene andamana</i> (Moore)	The Andaman Orange Tips	E
<i>Hebomoia glaucippe roestofii</i> (WM)	The Andaman Great Orange Tip	E
<i>Pareronia ceylanica naraka</i> (Moore)	The Andaman Dark Wanderer	E
<i>Catopsilia florella gnoma</i> (F.)	The African Imigrant	-
<i>Gandaca harina andamana</i> (Moore)	The Andaman Tree Yellow	E
<i>Eurema hecabe blairnna</i> (Swinhoe)	The Grass Yellow	-
Family: LYCAENIDAE		
<i>Iraota timoleon timoleon</i> (Stoll)	The Silverstreak Blue	-
<i>Amblypodia anita andamanica</i> (Riley)	The Andaman Leaf Blue	E
<i>Arhopala alea constranceae</i> (De N)	The Andaman Rosy Oakblue	E
<i>Arhopala fulla andamanica</i> (WM & De N)	The Andaman Spotless Oakblue	E
<i>Loxura atymnus prabha</i> (Moore)	The Andaman Yamfly	E
<i>Pratapa deva lila</i> (Moore)	The White Royal	-
<i>Tajuria jungala andamanica</i> (WM)	The Andaman Chocolate Royal	E
<i>Tajuria cippus cippus</i> (F.)	The Peacock Royal	-
<i>Charana jalindra tarpina</i> (Hew.)	The Andaman Banded Royal	E
<i>Chliaria athona</i> (Hew.)	The Orchid Tit	-
<i>Rapala suffusa rubicunda</i> (Evans)	The Andaman Suffwed Flash	E
<i>Rapala varuna orseis</i> (Hew.)	The Andaman Indigo Flash	-
<i>Rapala schistocea</i> (M.)	The Slate Flash	-
<i>Rapala dienece intermedia</i> (stg.)	The Andaman Scarlet Flash	E
<i>Lycaenopsis puspa telis</i> (Fr.)	The Andaman Hedge Blue	E
<i>Euchrysops cnejus</i> (F.)	The Gram Blue	-
<i>Jamides celeno blariana</i> (Evans)	Andaman Common Cerulean	E
<i>Jamides alecto fusca</i> (Evans)	The Andaman Metallic Cerulean	E
<i>Nacaduba kurrava euplea</i> (fruh.)	The Transparent 6 Line Blue	-
<i>Ionolyce helicon brunnea</i> (Evans)	The Andaman Pointed Line Blue	E
<i>Prosotas aluta coelestis</i> (De. N.)	The Banded Lineblue	-
<i>Prosotas nora nora</i> (Felder)	Common Line Blue	-
<i>Anthene emolus andamicus</i> (Fruh.)	Andaman Ciliate Blue	E
<i>Anthene lycaenina lycambles</i> (Hew.)	Pointed Ciliate Blue	-
Family: NYMPHALIDAE		
<i>Euthalia cibaritis</i> (Hew)	The Andaman Viscount	E
<i>Laringa horsfieldii andamanensis</i> (De. N.)	The Andaman Banded Dandy	E
<i>Parthenos sylvia roepstorffii</i> (M.)	The Andaman Clipper	E
<i>Anthima nefte rufula</i> (De., N.)	The Andaman Colour Sergeant	E
<i>Moduza procris anarta</i> (Moore)	The Andaman Commander	E
<i>Neptis hylas andamana</i> (Moore)	The Andaman Common Sailor	E
<i>Neptis soma mananda</i> (Moore)	The Andaman Sullied Sailor	E
<i>Pantoporia hosdonia cnacalis</i> (Hew)	The Andaman Lascar	E
<i>Cyretis cocles formosa</i> (Felder)	The Andaman Marbled Map	E
<i>Hypolimnas misippus</i> (L.)	The Danaid Eggfly	-

Scientific Name	Common English Name	Status
<i>Hypolimnas bolina jacintha</i> (Drury)	The Great Eggfly	-
<i>Precis hierta magna</i> (Evans)	The Yellow Pansy	-
<i>Precis atlites</i> (L.)	The Grey Pansy	-
<i>Atella alcippe andamana</i> (Fruh.)	The Andaman Small Leopard	E
<i>Vindula erota pallida</i> (Stg.)	The Andaman Cruiser	E
<i>Cirrochroa fasciata</i> (Felder)	The Branded Yeoman	-
<i>Cethosia biblis andamana</i> (stich.)	The Andaman Lacewing	E
Family :DANAIDAE		
<i>Idea agarmarschana cadelli</i> (WM & De. N.)	The Andaman Tree-Nymph	E
<i>Parantica aglea melanoleuca</i> (Moore)	The Andaman Glassy Tiger	E
<i>Euploea core andamanensis</i> (Atk.)	The Andaman Crow	E
<i>Euploea mulciber mulciber</i> (Cramer)	The Striped Blue Crow	-
Family: AMATHUSIDAE		
<i>Amathusia phidippus andamanensis</i> (Fruh.)	The Andaman Palm King	E
Family: SATYRRIDAE		
<i>Elymnias cottonis cottonis</i> (Hew.)	The Andaman Chestnut Palmfly	E
<i>Melanitis leda ismene</i> (Cramer)	The Common Evening Brown	-
<i>Mycalesis visala andamana</i> (Moore)	The Andaman Longbrand Brush Brown	E
<i>Lethe europa nudgara</i> (Fruh.)	The Andaman Bamboo Treebrown	E
Family: HESPERIDAE		
<i>Badamia exclamationis</i> (F.)	The Brown Awl	-
<i>Daimio bhagava andamanica</i> (WM & De. N.)	The Andaman Yellowbreast Flat	E
<i>Erionata thrax acroleuca</i> (WM & De. N.)	The Andaman Palm Redeye	E
Section: HETEROcera		
Family : LIMACODIDAE		
<i>Birhamoides junctura</i> (Walker)		-
<i>Scopelodes unicolor</i> (Westwood)		-
Family: PYRALIDAE		
<i>Aetholix flavibasalis</i> (Guenee)		-
<i>Agrotera scissulis</i> (Walks)		-
<i>Antigastra catataunalis</i> (Duponchel)		-
<i>Cnaphalocrocis medinalis</i> (Guenee)		-
<i>Dausarra talliusalis</i> (Walker)		-
<i>Diaphania actorionalis</i> (Walker)		-
<i>Diaphania bivitalis</i> (Guenee)		-
<i>Diaphania indica</i> (Saunders)		-
<i>Diaphania marinata</i> (Fabricius)		-
<i>Diaphania marginata</i> (Hampson)		-
<i>Diaphania vertumnalis</i> (Guenee)		-
<i>Eurrhparodes tricoloralis</i> (Zeller)		-
<i>Glyphodes caesalis</i> (Walker)		-
<i>Glyphodes canthusalis</i> (Walker)		-
<i>Maruca testulalis</i> (Geyes)		-
<i>Nosophora incomitata</i> (Swinhoe)		-
<i>Nymphyla diminutalis</i> (Snell)		-

Scientific Name	Common English Name	Status
<i>Pagyda salvalis</i> (Walker)		-
<i>Pagyda discolor</i> (Swinhoe)		-
<i>Phostria imbecilis</i> (Moore)		-
<i>Phostria maculicostalis</i> (Hampson)		-
<i>Prophantis octoguttale</i> (Felder)		-
<i>Psara licarsisalis</i> (Walker)		-
<i>Psara phacoptealis</i> (Guenee)		-
<i>Rhimphalea ochalis</i> (Walker)		-
<i>Rhimphalea trogusalis</i> (Walker)		-
<i>Rhimphaleades macrostigma</i> (Hampson)		-
<i>Samea castoralis</i> (Walker)		-
<i>Sameodes cancelalis</i> (Zeller)		-
<i>Scirpophaga incertulus</i> (Walker)		-
<i>Sylepta crotonalis</i> (Walker)		-
<i>Syngamia abruptalis</i> (Walker)		-
<i>Syngamia latimaginalis</i> (Walker)		-
<i>Talanga sexpunctalis</i> (Moore)		-
<i>Tetridia caletorolis</i> (Walker)		-
<i>Thliptoceras cascale</i> (Swainhoe)		-
<i>Tyspanodes linealis</i> (Moore)		-
<i>Vjtessa suradeva</i> (Moore)		E
<i>Xanthomelaena schimatias</i> (Meyrick)		-
Family: THYRIDIDAE		
<i>Striglina scitaria thermesioides</i> (Snellen)		-
Family: LASIOCAMPIDAE		
<i>Arguda bheroba</i> (Moore)		-
<i>Estigena pardalis</i> (Walker)		-
<i>Trabala vishnu</i> (Lefroy)		-
Family: SATURNIIDAE		
<i>Antheraca andamana</i> (Moore)		E
<i>Antheraea frithi</i> (Moore)		-
<i>Cricula tifenestrata</i> (Helfer)		-
<i>Samia cynthia</i> (Drury)		-
<i>Sonthonnaxia maenas</i> (Daubleday)		-
Family: GEOMETRIDAE		
<i>Aporandia speculaia</i> (Guenee)		-
<i>Archaeobalbis subtepens</i> (Walker)		-
<i>Bolonga schitacearia</i> (Walker)		-
<i>Cambogia pictaria</i> (Moore)		-
<i>Celerana andamana</i> (Felder)		E
<i>Comostola cedilla</i> (Prout)		-
<i>Godonela eleonora</i> (Cramer)		-
<i>Godonela translineata</i> (Walker)		-
<i>Heterostegane substessellata</i> (Walker)		-
<i>Hyposidra talaca</i> (Walker)		-
<i>Hyposidra violescens</i> (Hampson)		-
<i>Lomographa inamata</i> (Walker)		-
<i>Nadagara compensata</i> (Walker)		-
<i>Oxymacaria temeraria</i> (Swinhoe)		-

Scientific Name	Common English Name	Status
<i>Phrrhorachis pyrrogana</i> (Walker)		-
<i>Ruttellerona pallicostaria</i> (Moore)		-
<i>Trygodes divisaria</i> (Walker)		-
<i>Xythos turbata</i> (Walker)		-
Family: URANIIDAE		
<i>Nyctalemon patroclus</i> (Linnaeus)		-
<i>Pseudomicronia aculeata</i> (Guenee)		-
<i>Pseudomicronia simplifascia</i> (Swinhoe)		E
Family: SPHINGIDAE		
<i>Angonyx testacea</i> (Walker)		-
<i>Compsogene panopus panopus</i> (Cramer)		-
<i>Marumba dyras dyras</i> (Walker)		-
<i>Oxyambulyx canescens canescens</i> (Walker)		-
<i>Theretra clotho clotho</i> (Drury)		-
<i>Theretra nessus</i> (Drury)		-
Family: LYMANTRIDAE		
<i>Carriola ecnomoda</i> (Swinhoe)		-
<i>Euproctis aripunctata</i> (Hampson)		-
<i>Perina nuda</i> (F.)		-
Family: NOTODONTIDAE		
<i>Allata argentifera</i> (Walker)		-
Family: AGARISTIDAE		
<i>Sarbanissa albifascia</i> (Walker)		-
Family: HYPSIDAE		
<i>Euplocia memblitaria</i> (Cramer)		-
Family: AMATIDAE		
<i>Amata (Amata) cingutala</i> (Weber)		-
<i>Amata phaenicozona</i> (Hampson)		E
<i>Amata (Symomis) wimberleyi</i> (Swainhoe)		E
<i>Eressa affinis</i> (Moore)		E
Family: ARCTIIDAE		
<i>Cretonotus gangis</i> (Linnaeus)		-
<i>Cyana amabilis</i> (Moore)		E
<i>Cyana coccinea</i> (Moore)		
<i>Diduga albicosta</i> (Hampson)		
<i>Miltochrista andamana</i> (Moore)		E
<i>Miltochrista exclusa</i> (Butler)		-
<i>Padenia transversa</i> (Walker)		-
<i>Paracrama saturata</i> (Walker)		-
<i>Pelochyta astreus</i> (Drury)		-
<i>Utetheisa pulcheloides</i> (Hampson)		-
Family: NOCTUIDAE		
<i>Anomis revocans</i> (Walker)		-
<i>Azazia rubricans</i> (Baisduval)		-
<i>Bamra albicola</i> (Walker)		-
<i>Blenina donans</i> (Walker)		-
<i>Callyna jugaria</i> (Walker)		-
<i>Chasmina candica</i> (Walker)		-
<i>Chilkasa fulcata</i> (Swinhoe)		-

Scientific Name	Common English Name	Status
<i>Erygia apicalis</i> (Guenee)		-
<i>Erebes ephesperis</i> (Hubner)		-
<i>Hulodes caraena</i> (Cramer)		-
<i>Hypocaea violacea</i> (Butler)		-
<i>Ischyja manlia</i> (Cramer)		-
<i>Lopherthrum compimens</i> (Walker)		-
<i>Ophiusa coronata</i> (Fabricius)		-
<i>Oxyodes scrobiculata</i> (Fabricius)		-
<i>Parallelia palumba</i> (Guenee)		-
<i>Psimada quadripennis</i> (Walker)		-
<i>Risoba prominens</i> (Moore)		-
<i>Sasunaga leucorina</i> (Hampson)		-
<i>Spodoptera litura</i> (Fabricius)		-
<i>Trigonodes hyppasis</i> (Cramer)		-
<i>Westermannia triangularis</i> (Moore)		-
<i>Xurobata vacillans</i> (Walker)		
Order : HYMENOPTEA	Wasps, Bees etc.	
Family : APIDAE		
<i>Apis cerana indica</i> (Fab)	Honey Bee	
Family : XYLOCOPIDAE		
<i>Xylocopa auripennis</i> (Lepel)		
<i>Xylocopa rufescens</i> (Smith)		
Family : EUMENIDAE		
<i>Eumenes petiolata</i> (Fab.)		
Family : VESPIDAE		
<i>Vespa cincta</i> (Fab.)		
Family : SCOLLIDAE		
<i>Elis annulata</i> (Feb.)		
<i>Scolia rubiginosa</i> (Fab.)		
Class : CRUSTACEA		
Chilopoda	Centipedes	
<i>Cormocephalus dentipes</i> (Pocock)	Centipede	
<i>Otostigmus (Otostigmus) insularis</i> (Haase)	Centipede	E
<i>Otostigmus (Otostigmus) rugulosus</i> (Porat)	Centipede	
<i>Scolopendra morsitans</i> (L)	Centipede	
<i>Scolopendra subspinipes</i> (Leach)	Centipede	
Diplopoda	Millipedes	
<i>Anoplodesmus tanjoricus</i> (Sausse)	Millipede	
Phylum : ANNELIDA		
<i>Pontoscolex corethrurus</i> (Fr. Muller)	Earthworm	
<i>Haemadyspa zeylanica</i> (Moore)	Leech	
<i>Haemadyspa sylvestris</i> (Blanchard)	Leech	

E- Endemic

Source : Management plan for Mt. Harriet National Park, (1st April 1997 to 31st March 2002)
by Richard D'Souza IFS, Chief Wildlife Warden

List of Plants of South Andaman including Mt. Harriet National Park

Scientific Name and Family	Description	Status
AGAVACEAE		
<i>Dracaena brachyphylla</i> Kurz.		
ARACEAE		
<i>Amorphophallus carnosus</i> engl.		Rare and threatened
A. longistylus Kurzex Hook		
<i>A. oncophyllus</i> Prain ex Hook		Rare and threatened
ARECACEAE		
<i>Calamus andamanicus</i> Kurz	Liana	
<i>C. dilaceratus</i> Becc.	Liana	Rare and threatened
<i>C. pseudorivalis</i> Becc.	Liana	
<i>C. viminalis</i> Wild. var. <i>fasciculatus</i> (Roxb.) Becc.	Liana	
<i>Corypha macropoda</i> Lindel ex Kurz		Rare and threatened
<i>Daemonorops kurzianus</i> Hook . f.	Liana	
<i>D. manii</i> Becc.	Liana	
<i>Korthalsia rogersii</i> Becc.		
<i>Pinanga manii</i> Becc.		
CYPERACEAE		
<i>Cyperus kurzii</i> Clarke		Rare and threatened
DIOSCOREACEAE		
<i>Dioscorea rogersii</i> Prain & Burk		Rare
D. vexans Prain & Burk		
MARANTACEAE		
<i>Stachyphrynium cadellianum</i>		
ORCHIDACEAE		
<i>Bulbophyllum protractum</i> Hook		Rare and threatend
<i>Eria andamanica</i> Hook		
<i>E. braclescens</i> Lindl. var. <i>Kurzii</i> Hook		
<i>Habenaria andamanica</i> Hook.		Rare and threatened
<i>Malaxis andamanica</i> (King & Pantl.) Balakr. & Vasud.		
<i>Malleola andamanica</i> Balakr. & Bhargava		Rare and threatened
<i>Phalaenopsis speciosa</i> Reichb. F.	Epiphytic herb with beautiful large flowers; Andaman Islands	
<i>Pomatocalpa andamanicum</i> (I look. F.) J.J. Smith		
<i>Pteroceras muriculatum</i> (Reichb. F.) Hunt.		
Smitinandia helferi (I look.f.) Garay		
<i>Vanilla andamanica</i> Rolfe.		

Scientific Name and Family	Description	Status
<i>Zeuxine andamanica</i> King & Pantl		Rare and threatened
<i>Z. rolfiana</i> King & Pantl		Rare and threatened
ZINGIBERACEAE		
<i>Boesenbergia albo lutea</i> (Baker) Schlect		
<i>Globba pauciflora</i> Baker		Rare
<i>Kaempferia siphonantha</i> Baker		Rare and threatened
ACANTHACEAE		
<i>Strobilanthes andamanensis</i> Bor		Rare and threatened
ANACARDIADCEAE		
<i>Buchanania platyneura</i> Kurz.		
<i>Mangifera andamanica</i> King		Rare and threatened
<i>Semecarpus kurzii</i> Engl.		
ANNONACEAE		
<i>Miliusa tectona</i>		
<i>Polyalthia parkinsonii</i>		
<i>Psendovaria prainii</i>		
<i>Sagaraea listeri</i>		
APOCYNACEAE		
<i>Alstonia kurzii</i>		
CLUSIACEAE		
<i>Garcinia cadelliana</i> king		Rare
<i>G. kingii</i> Pierre ex Verque		Rare
<i>Mesua manii</i> (King) Kosterm		Rare
CONNARACEAE		
<i>Ellipanthus colophyllum</i> Kurz.		
DICHAPETALACEAE		
<i>Dichapetalum gelonoides</i> (Roxb.) Engl. spp. <i>andamanica</i> (King) Leenh.		
DILLENACEAE		
<i>Dillenia andamanica</i> Parkins.		
EUPHORBIACEAE		
<i>Antidesma andamanicum</i> Hook		Rare
<i>Bridelia kurzii</i> Hook		Rare
<i>Cnesmone javanica</i> Bl. var. <i>globriuscula</i> Balakr, & N.G. Nair		Rare
<i>Dimorphoculyx balakrishnanii</i> T. Chakrab. & Premanath		Rare

Scientific Name and Family	Description	Status
<i>D. dilipianus</i> Balakr. & T. Chakrab		Rare
<i>Drypetes andamanic</i> (Kurz) Pax & Hoffm.		
<i>D. leiocarpa</i> (Kurz) Pax & Hoffm.		
<i>G. andamanicum</i> Kurz		
<i>G. brunneum</i> Hook. F: ssp. <i>andamanicum</i> Balakr. & T. Chakrab.		
<i>G. calocarpum</i> Kurz.		
<i>G. calocarpum</i> Kurz var. <i>subsessile</i> T. Chakrab. & Balakr.		
<i>G. subsessile</i> Balakr. & T. Chakrab.		
<i>Trigonostemon aurantiacus</i> (Kurz ex Teijsm. & Binn.) Boeri. var. <i>Rubriflorus</i> Balakr. & T. Chakrab.		
<i>T. viridissimus</i> (Kurz) Airy Shaw.		
HYPOCREATEACEAE		
<i>Hippocratea andamanica</i> King		Rare
ICACINACEAE		
<i>Codiocarpus andamanicus</i> (Kurz) Howard.		
<i>Gomphandra comosa</i> King		Rare
LAMIACEAE		
<i>Scutellaria andamanica</i> Prain		Rare
LAURACEAE		
<i>L. leiantha</i> (Kurz) Hook.		Rare
<i>Neolitsea andamanica</i> Kosterm		Rare
LORANTHACEAE		
<i>Ginaloa andamanica</i> Kurz		Rare and threatened
MELASTOMATACEAE		
<i>Memecylon andamanicum</i> King.		
MELIACEAE		
<i>Aglaia fusca</i> King		Rare
<i>Amoora manii</i> King ex Brandis		Rare
MENISPERMACEAE		
<i>Stephania andamanica</i> Diels		Rare
<i>Tinospora andamanica</i> Diels		Rare
MORACEAE		
<i>Ficus andamanica</i> Corner		Rare

Scientific Name and Family	Description	Status
MYRISTICACEAE		
<i>Horsfieldia macrocarpa</i> var. <i>connaroides</i> (King) Sinclair		Rare
<i>Knema andamanica</i> (Warb.) de Wilde ssp. <i>andamanica</i>		
MYRSINACEAE		
<i>Ardisia andamanica</i> Kurz. Var. <i>effusa</i> Clarke.		
<i>Maesa andamanica</i> Kurz		Rare
MYRTACEAE		
<i>Syzygium andamanicum</i> (King) Balakr		Rare
<i>S. kurzii</i> (Duthie) Balakr. Var. <i>andamanica</i> (King) Balakr		Rare
OLEACEAE		
<i>Jasminum andamanicum</i> Balakr. & N.G. Nair		Rare
<i>J. cordifolium</i> Wall. ex G. Don ssp. <i>andamanicum</i> Srivast. & Kapoor.		
RUBIACEAE		
<i>Hedyotis andamanica</i> Kurz.		
<i>Ixora andamanica</i> Bremek		Rare
<i>I. barbata</i> Roxb. Ex Sm.		
<i>I. brunnescens</i> Kurz.		
<i>I. capituliflora</i> Bremek		Rare
<i>I. hymenophylla</i> Bremek		Rare
<i>Nauclea gageana</i> King		Rare
<i>Prismalomeria andamanica</i> Ridley		Rare
<i>P. helferi</i> Kurz var. <i>angustifolia</i> King		Rare
<i>P. pendula</i> Hook		Rare
<i>P. platyneura</i> Kurz.		
<i>P. polyneura</i> Kurz var. <i>longipetiolata</i> King		Rare
<i>Pubistylis andamanensis</i> Thoth.: Herb; Andaman Islands	Monotypic endemic genus	
<i>Tarenna weberaefolia</i> (Kurz) Balakr.		
<i>Urophyllum andamanicum</i> King & Gamble.		
SAPOTACEAE		
<i>Mimusops andamanensis</i> King & Gamble.		
SCROPHULARIACEAE		
<i>Cyrtandromoea nicobarica</i> Balakr.		

Scientific Name and Family	Description	Status
VERBENACEAE		
<i>Clerodendron lankawiense</i> King & Gamble var. <i>andamanense</i> Moldenke		Rare
<i>Vitex wimberleyi</i> kurz.		
VITACEAE		
<i>Tetrastigma andamanicum</i> (King) Susseng		Rare

Source : Management plan for Mt. Harriet National Park, (1st April 1997 to 31st March 2002)
by Richard D'Souza IFS, Chief Wildlife Warden

**NORTH BUTTON ISLAND NATIONAL PARK
MIDDLE BUTTON ISLAND NATIONAL PARK
SOUTH BUTTON ISLAND NATIONAL PARK**

Introduction

These three national parks are tiny islands only a few hectares each in size but their biodiversity value, particularly of the marine area surrounding them, is very high (Das 1997). The islands are uninhabited and out of bounds to tourists. Located off the south eastern coast of Middle Andaman Island they form an arc over the north of Ritchie's Archipelago*.

There is a proposal to extend the boundaries of the Rani Jhansi Marine National Park to the north and northwest to include the three Button Islands, and also to the east to include Inglis (East Island) Sanctuary. As the territorial water surrounding all these islands will form a part of the realigned national park, it will afford greater protection to the rich and varied marine life of this area. Given their very small size and similarity of habitat, the three Button island national parks are being described together.

*see map of Rani Jhansi Marine National Park

Description

The area of North Button Island is 44 ha, Middle Button Island is 64 ha, and South Button Island is just 3 ha. Their location is as follows:

North Button Island Latitude 12^o18'46"-12^o18'58"N; Longitude 93^o03'52"-93^o04'25"E

Middle Button Island Latitude 12^o16'19"-12^o06'39"N; Longitude 93^o01'25"-93^o01'54"E

South Button Island Latitude 12^o13'23"-12^o13'26"N; Longitude 93^o01'19"-93^o01'23"E

Cliffs rise directly from sea level upto between 20 -50 m.high.

BIOLOGICAL PROFILE

The main forest types of the Button Islands are Andaman Tropical Evergreen, Semi-Evergreen, Littoral Forest and Mangrove forest (source: Pande et al). The shores have very little beach area, and are mostly rocky. There are deep caves opening out to the sea where the highly endangered Andaman Greyrumped Swiftlets nest. Sea snakes (*Laticauda* sp.) are seen in the caves and the water around the islands. Sea turtles are reported to nest on the islands.

The waters around the islands are extraordinarily rich in coral diversity with several varieties of staghorn corals *Acropora* sp., reef building corals *Porites* sp., brain corals, soft corals *Sinularia* sp., and sea fans, as well as giant clams, starfish, sea cucumbers and other typical coral reef fauna including a remarkable diversity of coral fishes. This area is also known to be one of the few good habitats for the sea cow or dugong *Dugong dugon*, one of the most threatened animals in India which is getting increasingly rare in the Andaman & Nicobar islands as well.

Very little work has been done by way of documenting and identifying the flora & fauna of these islands. The forest department intended (in April '99) to send out a team of scientists from Botanical Survey of India and Zoological Survey of India to survey the islands and the surrounding waters as a documentation exercise.

Trees and other vegetation recorded so far are trees such as *Dipterocarpus* sp., *Ficus* sp., *Terminalia* sp., and *Sterculia* sp., littoral species such as *Manilkara littoralis*, *Hibiscus tillaceus*, *Barringtonia asiatica*, *Pandanus* sp., *Thespesia populnea* and *Ipomea pes-caprae*, and mangroves such as *Bruguera* sp., and *Rhizophora apiculata* (Pande et al 1991).

Fauna recorded include the wild pig, civet and flying fox, water monitor and marine turtles. Birds recorded are raptors such as the Crested Serpent eagle, Whitebellied Sea Eagle (*Haliaeetus leucogaster*) and Shikra, frugivores such as the Green Imperial Pigeon (*Ducula aenea*), Andaman Wood Pigeon, Emerald Dove and Redbreasted Parakeet, insectivores such as Whitebellied Swiftlet (*Collacalia esculanta*) and Andaman Greyrumped Swiftlet (*Collacalia fuciphaga*), shore birds such as Reef Heron (*Egretta sacra*), Intermediate Egret (*Mesophoyx intermedia*), and Whimbrel, and the sea bird Blacknaped Tern (*Sterna sumatrana*) have been recorded on the islands. (Sources: Pande et al 1991, Das 1998).

Impacts on the PA and other issues

- At present, though all three islands are national parks, and supposed to be completely out of bounds for any kind of human activity, it is clear that there is continuous exploitation of swiftlets nests, as well as marine resources. The swiftlets' nests in the caves are now considerably depleted. Though the islands are very difficult to land on, and the nests are built in deep, dark recesses of the caves which require considerable stamina and rock-climbing skills to access. Once inside the caves, the nests can be reached only by squeezing between narrow crevices like a contortionist, or crawling on hands and knees on the cave floor under rocky outcrops in total darkness. Apart from the risk of getting lost in the caverns, there is danger from sea snakes.
- The high value of the nests provide enough motivation for poachers to make the effort. Poachers could be residents of the inhabited islands - Havelock and Neil in the archipelago, or could be foreign poachers. During the present visit (April 1999) one of the boatmen said he had been employed 12 years ago to build the lighthouse on South Button, and at that time was able to collect large quantities of nests. Dr Ravi Shankaran who has carried out a thorough investigation of the status of edible nest swiftlets, pointed out a number of marks on the cave walls where nests had clearly been plucked off, and said there were many more intact nests in the same cave in South Button at the time of his study two years ago.
- Good patches of coral were observed through snorkelling off South Button, however, there was also clear evidence of disturbance as many areas of dead coral were seen. This could be attributed to damage caused during illegal collection of corals, shells and sea cucumbers. Chartered launches from Thailand and Australia regularly organise scuba diving expeditions off the shores of this island (Das1998, and Andrews, pers.com.). Neither the forest department or the administration were fully aware of this activity, and certainly receive no benefit by way of entry fee or diving charges, from the use of the waters near the national park made by the foreign visitors. If the proposal to club the three Button Islands along with a portion of the sea around them with the Rani Jhansi Marine National Park is accepted, it would help protect these beautiful reefs from damage caused by such uncontrolled tourism. In any other country, such specialist tourists would be required to pay large amounts for the privilege of diving in a protected marine area.

RANI JHANSI MARINE NATIONAL PARK

Introduction

This national park encompasses John Lawrence, Henry Lawrence and Outram islands, situated in the Ritchie's Archipelago. The territorial waters around these islands is included in the protected area, thereby designating it as a Marine National Park. All three islands are uninhabited. John Lawrence and Henry Lawrence are among the largest islands in the archipelago and are endowed with dense forest cover. Located 15-25 km to the east of Middle and South Andaman Islands, the national park covers an area of about 256sq.km including the marine area, and is situated between the latitudes 12^o 16' - 12^o 02'N and longitudes 93^o 07'E - 93^o 00'E.

Out of over 105 protected areas in The Andaman & Nicobar islands, only two are marine parks. Rani Jhansi is one, and the other is the Wandoor Marine National Park (Mahatma Gandhi Marine National Park). There is a proposal to rearrange the boundaries of the Rani Jhansi Marine National Park to include four neighbouring islands, namely the three tiny Button Islands (South, Middle and North Button) all of which already have existing national park status, and Inglis (East) Island Sanctuary along with the territorial waters around them. This arrangement would give greater protection to the sea around the islands in order to conserve the coral reefs, sea grass beds and marine fauna, particularly dugongs which are known to occur there.

The proposal also suggests the removal of John Lawrence island from the PA. The reason for this is to allow for timber extraction already marked in the forest working plan.

Description

Outram which is the smallest (7.72 sq.km.) of the three islands comprising the present Rani Jhansi Marine NP has extensive mangroves in the south, and evergreen forests with 90% canopy cover (Das 1998). Epiphytes, tree ferns and large trees with massive buttresses are found. Evidence of tree felling is visible in the middle of the island and there is also evidence of fires, probably accidentally started at fishing camps.

Henry Lawrence, the largest (25.34 sq.km.) of the three islands is heavily forested and relatively undisturbed. This could be attributed to the rugged terrain and absence of fresh water which deter long term human encroachment. However, small temporary fishing camps are frequently set up to catch fish in the strait between Outram and Henry Lawrence to supply the Port Blair market.

John Lawrence (16.21 sq.km.) is an elongated island with undulating landscape covered with moist deciduous forests and mangroves. It has and no littoral forest. The fresh water sources found on this island provide a good habitat for crustaceans, fishes, crabs, and frogs. The lowlying areas of primary forest have been cleared and replaced by plantations of commercial timber species.

BIOLOGICAL PROFILE

On these biodiversity -rich islands, the plant diversity is directly proportionate to the area. There is an exponential increase in the number of species with an increase in area (Maheswaran 1998). This means that there is no particular dominance of any of the species.

Larger islands like John Lawrence and Henry Lawrence have very high biological value, therefore protecting these islands would offer much greater chances of survival of a larger variety of plants, which would in turn conserve the associated animal, bird and insect life. Of the 104 breeding bird species in the Bay Islands, 47 are known to be predominantly forest birds. Several among these, such as *Coracina striata*, *Oriolus xanthornis*, *Chalcites xanthorhynchus* and *Terpsiphone paradisi* are never seen in islands with an area less than 35 sq. km. (Davidar). This adds greater weight to the necessity of setting aside larger reserves for the purpose of conservation.

Vegetation

The forest types include the Andaman moist deciduous forest, tropical semi- evergreen forest, littoral vegetation and mangroves. The inland forests harbour the greatest plant diversity of trees, lianas, shrubs, and dense cane brakes. Evergreen and semi-evergreen species such as dhup, gurjan, jaiphal, chuklam and padauk are commonly found. A large number of liana and climber species such as *Daemonorops* sp. and *Calamus* sp., and bamboos (*Dinochloa andamanica*) occur in the forests (Deb 1998).

The shores and creeks are bordered by mangroves, and the species recorded in mangrove habitats are: *Acanthus ilicifolius*, *Avicennia marina*, *A.offcinalis*, *Bruguiera gymnorrhiza*, *Ceriops tagal*, *Rhizophora apiculata*, *R.lamarckii*, *R.mucronata*, *R.stylosa*, *Exoecaria agallocha*, *Heretiera littoralis*, *Lumnitzera litteria*, *Nypa fruticans*, *Sonneratia alba*, *S.apetala*, and *Xylocarpus moluccensis* (Mall et.al 1987).

A recent plant list of each of the islands (Maheswaran 1998) is appended.

Fauna

The Andaman Wild Pig *Sus scrofa andamanensis*, Andaman Palm Civet *Paguma larvata*, and several species of bats, such as *Cynopterus brachyotis*, *Pteropus melanotus tyleri*, *Rhinolophus affinis* are the only naturally occurring mammals in the three islands. A *Cynopterus* species and *Rhinolophus refulgens* (both from Outram) that are new additions to the fauna of India (Das 1998). Many of the bat species need semi-evergreen forest habitat, and the remarkable number of fruit-eating bat species is indicative of their role as seed dispersers and pollinators, so important for the survival of this forest-island ecosystem. Chital or Spotted Deer *Axis axis*, an introduced species is naturalised in all these islands, and is proving to be a threat to the natural vegetation. Some *Rattus* species described nearly a hundred years ago on Henry Lawrence, have not been recorded since. This could also be because of the fact that very few systematic biological studies have been done on these islands, so data are very inadequate.

Birds on the islands range from raptors like the Andaman Dark Serpent Eagle and Whitebellied Sea Eagle; frugivores such as the Green Imperial Pigeon and Redcheeked Parakeet; insectivores like the Racket -tailed Drongo, Grey rumped and White-bellied Swiftlets, Forest Wagtail, Andaman Fulvousbreasted Woodpecker and Large tailed Nightjar; kingfishers, shore birds and terns. Among these are several endemic and endangered species, particularly the Grey rumped or edible nest swiftlet which is suffering a tremendous population decline because of excessive nest collection. Caves with these birds' nests are found in Henry Lawrence and Outram.

The Hawksbill Turtle *Eretmochelys imbricata*, which is associated with coral reefs seen in the NP, and Saltwater Crocodiles are found in creeks in many islands. Endemic reptiles recorded in the archipelago include the Andamans bent-toed gecko *Coryphophylax*

subcristatus, Bay islands forest lizard *Mabuya andamanensis* and Andaman Islands grass skink *Gekko verreauxi*. The terrestrial snake fauna is not very diverse and sea snakes are also rare, though *Laticauda colubrina* and *L. laticauda* have been recorded off the coast of Henry Lawrence. (Das 1999).

Amphibians are also few in these islands as there are hardly any permanent fresh water sources. Perennial stream water is found only in John Lawrence, where *Bufo* sp., *Micryletta inornata*, and *Limnonectes* sp. have been recorded.

A list of vertebrate fauna recorded on the islands is appended.

Marine flora & fauna

The marine biodiversity of the NP is of great significance as there are extensive coral reefs and good sea grass meadows in the national park. Sea grass beds are the feeding grounds for many species of marine turtles and form the staple diet for the Sea Cow or Dugong *Dugong dugon*, one of the most highly endangered mammals. The seaward sides of Henry Lawrence island and Havelock island (which is outside the PA) have sea grass beds (Das 1996), and this area is one of the few locations where dugongs have been reported in the Andamans during recent years. A number of commercially important prawns, oysters and fishes are also associated with sea grass beds.

The coral reefs have an abundance of *Acropora* sp. staghorn corals, *Porites* sp. reef building corals, *Lobophylla* sp. brain corals, and all the associated marine life such as jelly fishes, several species of sea cucumbers including the commercially valuable species *Holothuria scabra*, brittle stars, starfishes, a wide variety of coral fishes, sea urchins, *Tridactna* sp. giant clams and molluscan shells. These are only a few examples of the extraordinary diversity of the coral reef ecosystem with which these islands are endowed.

Impacts on the PA and other issues

- A recent report on anthropogenic impacts on the Rani Jhansi Marine National Park (Debal Deb 1998) reveals that terrestrial and marine resources of the NP are continuously exploited by the settler communities in the inhabited islands of Havelock and Neil in the Ritchie's archipelago. Timber and non-timber items like fruits, leaves and other products are used for household consumption, and turtles, fish, crabs, shrimps, etc. are caught for food. Timber is also commercially exploited and shells like *Trochus*, *Turbo* and conches are collected for sale. Sharks are also caught in large numbers for sale of shark fin, causing much damage to the marine ecosystem. As shark flesh is not eaten here unlike on the mainland, the fins are cut off, and the shark bodies are dumped into the sea to decay. Fruit bats are also hunted for food from Outram, and Inglis by Bengali and Karen communities. Edible nests of swiftlets and sea cucumbers are also collected for sale.
- Wild pig has apparently been hunted to extinction in Outram, and the introduced chital is also heavily hunted.
- The settlers use small boats to move between all the islands including the uninhabited ones within the PA to collect the resources. Outsiders from foreign countries (Burma, Thailand and Taiwan) come in faster boats and use more sophisticated fishing and hunting equipment including scuba diving gear. Boats ferrying sand from the islands seas, and outboard motors of fishing boats could be heard throughout the night while

camping in a mangrove creek in Nicholson island in the archipelago during the present visit (April 1999).

- The littoral forests of Outram and Henry Lawrence are highly disturbed, particularly because *Manilkara littoralis* trees are felled for construction of wooden houses. Despite this, the species is abundant and regenerating well because of the deep, litter-rich soil (Maheswaran 1998)
- The impact of converting good primary forest to commercial timber plantations is very detrimental to the endemic flora and fauna of the island, reducing the biodiversity. Forest felling in these ecologically sensitive islands have far reaching consequences, including on coral reefs. The exposed forest soil gets washed down to the sea with the rain and chokes the corals with silt. Coral organisms require good light penetration, for which clear water is essential. Silt causes turbidity , effecting the survival of live corals.
- Havelock island which lies immediately to the south of John Lawrence has been developed as a tourist destination for Indian and foreign tourists. While this has to some extent benefited the local inhabitants, by enabling better sale of their cultivated products, it has increased the pressure on the natural resources of the island group in general, including on those of the national park. On account of an increased demand for sea foods including exotic items like *beche de mer* (sea cucumber), there is more collection to supply the market. It is reported that the demand for sea fish in Havelock has doubled in the past five years (Deb 1998).

Tourists promote sales of sea shells and corals which would otherwise have not been used by the islanders, and also tend break off corals and collect shells, though this is not permitted. Reefwalking and diving are popular activities which can cause physical damage to coral reefs. During the present visit (April 1999) we observed tourists punting on a boat over a coral patch off Havelock. The punting pole can damage live corals if it is not used carefully.

- Plastic litter is one of the most evident forms of pollution on the islands and the coasts. Plastic wrappers, containers, bottles and other non-biodegradable litter clogs up drains and is washed up on the beautiful beaches. At present the spread of this garbage seems uncontrolled.

FLORA

Plant diversity in Outram Island

Sl. No.	Plant Name	Family
1	<i>Artocarpus gomezianana</i>	<i>Moraceae</i>
2	<i>A. lakoocha</i>	<i>Moraceae</i>
3	<i>Abrus precatorius</i>	<i>Fabaceae</i>
4	<i>Actephila excelsa</i>	<i>Euphorbiaceae</i>
5	<i>Adenantha pavonina</i>	<i>Mimosaceae</i>
6	<i>Aglaia andamanica</i>	<i>Meliaceae</i>
7	<i>Albizia lebbeck</i>	<i>Mimosaceae</i>
8	<i>Allophyllus serratus</i>	<i>Sapindaceae</i>
9	<i>Alstonia kurzii</i>	<i>Apocynaceae</i>
10	<i>Artocarpus chapalasha</i>	<i>Moraceae</i>
11	<i>Atalantia spinosa</i>	<i>Rutaceae</i>
12	<i>Baccaurea ramiflora</i>	<i>Euphorbiaceae</i>

13	<i>Barringtonia asiatica</i>	Lecythidaceae
14	<i>Bombax insigne</i>	Bombacaceae
15	<i>Bridelia glauca</i>	Euphorbiaceae
16	<i>Bruguiera gymnorrhiza</i>	Rhizophoraceae
17	<i>Caesalpinia crista</i>	Fabaceae
18	<i>Calamus longisetus</i>	Arecaceae
19	<i>C. manii</i>	Burseraceae
20	<i>C. palustris</i>	Arecaceae
21	<i>C. pseudo-rivalis</i>	Arecaceae
22	<i>Calophyllum soulattri</i>	Clusiaceae
23	<i>Caesalpinia bonduc</i>	Fabaceae
24	<i>Calamus andamanicus</i>	Arecaceae
25	<i>Calophyllum inophyllum</i>	Clusiaceae
26	<i>Canarium euphyllum</i>	Burseraceae
27	<i>Cansjera rheedii</i>	Opiliaceae
28	<i>Canthium dicoccum</i>	Rubiaceae
29	<i>Capparis zeylanica</i>	Capparaceae
30	<i>Carissa spinarum</i>	Apocynaceae
31	<i>Caryota mitis</i>	Arecaceae
32	<i>Ceriops tagal</i>	Rhizophoraceae
33	<i>Champereia mainillana</i>	Opiliaceae
34	<i>Colubrina asiatica</i>	Rhamnaceae
35	<i>Combretum chinense</i>	Combretaceae
36	<i>Dipterocarpus incanus</i>	Dipterocarpaceae
37	<i>Diospyros montana</i>	Ebenaceae
38	<i>D. pilosiuscula</i>	Ebenaceae
39	<i>D. pyrrocarpa</i>	Ebenaceae
40	<i>Daedalacanthus suffruticosus</i>	Acanthaceae
41	<i>Derns scandens</i>	Fabaceae
42	<i>Diospyros marmorata</i>	Ebenaceae
43	<i>Dipterocarpus griffithii</i>	Dipterocarpaceae
44	<i>Dischidia major</i>	Asclepiadaceae
45	<i>Dracaena angustifolia</i>	Agavaceae
46	<i>Elaegnus conferta</i>	Elaegnaceae
47	<i>Entada pusaetha</i>	Mimosaceae
48	<i>Erythrina variegata</i>	Fabaceae
49	<i>Ficus hispida</i>	Moraceae
50	<i>Ganophyllum falcatum</i>	Sapindaceae
51	<i>Garcinia microstigma</i>	Clusiaceae
52	<i>Glycosmis mauritiana</i>	Rutaceae
53	<i>Guettarda speciosa</i>	Rubiaceae
54	<i>Halophila ovalis</i>	Hydrocharitaceae
55	<i>Heritiera littoralis</i>	Sterculiaceae
56	<i>Hibiscus tiliaceous</i>	Malvaceae
57	<i>Hopea odorata</i>	Dipterocarpaceae
58	<i>Hoya parasitica</i>	Asclepiadaceae
59	<i>Ipomoea aquatica</i>	Convolvulaceae
60	<i>Korthalsia laciniosa</i>	Arecaceae
61	<i>Lagerstroemia hypoleuca</i>	Lythraceae
62	<i>Lannea coromandelica</i>	Anacardiaceae

63	<i>Licuala peltata</i>	<i>Areaceae</i>
64	<i>Macaranga tanarius</i>	<i>Euphorbiaceae</i>
65	<i>Manilkara littoralis</i>	<i>Sapotaceae</i>
66	<i>Miliusa tectona</i>	<i>Annonaceae</i>
67	<i>Morinda citrifolia</i>	<i>Rubiaceae</i>
68	<i>Murraya paniculata</i>	<i>Rutaceae</i>
69	<i>Myristica andamanica</i>	<i>Myristicaceae</i>
70	<i>Neonauclea gageana</i>	<i>Rubiaceae</i>
71	<i>Pandanus tectorius</i>	<i>Pandanaceae</i>
72	<i>Pemphis acidula</i>	<i>Lythraceae</i>
73	<i>Pisonia umbellifera</i>	<i>Nyctaginaceae</i>
74	<i>Planchonella longipetiolatum</i>	<i>Sapotaceae</i>
75	<i>Planchonia valida</i>	<i>Lecythidaceae</i>
76	<i>Plecosperrum andamanicum</i>	<i>Moraceae</i>
77	<i>Pongamia pinnata</i>	<i>Fabaceae</i>
78	<i>Pterocarpus dalbergiodes</i>	<i>Fabaceae</i>
79	<i>Pterocymbium tinctorium</i>	<i>Sterculiaceae</i>
80	<i>Pterygota alata</i>	<i>Sterculiaceae</i>
81	<i>Rhaphidophora laciniata</i>	<i>Araceae</i>
82	<i>Rhizophora lamarckii</i>	<i>Rhizophoraceae</i>
83	<i>Syzigium cumini</i>	<i>Myrtaceae</i>
84	<i>S. samarangense</i>	<i>Myrtaceae</i>
85	<i>Sageraea elliptica</i>	<i>Annonaceae</i>
86	<i>Scaevola koenigii</i>	<i>Goodeniaceae</i>
87	<i>Semecarpus kurzii</i>	<i>Anacardiaceae</i>
88	<i>Sonneratia alba</i>	<i>Sonneratiaceae</i>

89	<i>Spondias pinnata</i>	<i>Anacardiaceae</i>
90	<i>Sterculia villosa</i>	<i>Sterculiaceae</i>
91	<i>Syzigium andamanicum</i>	<i>Myrtaceae</i>
92	<i>Terminalia manii</i>	<i>Combretaceae</i>
93	<i>Terminalia bialata</i>	<i>Combretaceae</i>
94	<i>Tetrameles nudiflora</i>	<i>Datisceae</i>
95	<i>Thespesia populnea</i>	<i>Malvaceae</i>
96	<i>Tinospora cordifolia</i>	<i>Menispermaceae</i>
97	<i>Tremma tomentosa</i>	<i>Ulmaceae</i>
98	<i>Xanthophyllum andamanicum</i>	<i>Xanthophyllaceae</i>
99	<i>Xylocarpus moluccensis</i>	<i>Meliaceae</i>

Source : Maheswaran 1998

PLANT DIVERSITY OF HENRY LAWRENCE ISLAND

Sl. No.	Plant Name	Family
1	<i>Artocarpus gomezianana</i>	Moraceae
2	<i>A. lakoocha</i>	Moraceae
3	<i>Abrus precatorius</i>	Fabaceae
4	<i>Actephila excelsa</i>	Euphorbiaceae
5	<i>Adenanthera pavonina</i>	Mimosaceae
6	<i>Aglaiia andamanica</i>	Meliaceae
7	<i>Aglaiia andamanica</i>	Meliaceae
8	<i>Albizzia lebeck</i>	Mimosaceae
9	<i>Allophyllus serratus</i>	Sapindaceae
10	<i>Alstonia kurzii</i>	Apocynaceae
11	<i>Ancistrocladus extensus</i>	Ancistrocladaceae
12	<i>Artocarpus chapalasha</i>	Moraceae
13	<i>Atlantia spinosa</i>	Rutaceae
14	<i>Baccaurea ramiflora</i>	Euphorbiaceae
15	<i>Barringtonia asiatica</i>	Lecythidaceae
16	<i>Bombax insigne</i>	Bombacaceae
17	<i>Bridelia glauca</i>	Euphorbiaceae
18	<i>Bruguiera gymnorhiza</i>	Rhizophoraceae
19	<i>Caesalpinia crista</i>	Fabaceae
20	<i>Calamus longisetus</i>	Arecaceae
21	<i>Canarium manii</i>	Burseraceae
22	<i>Calamus palustris</i>	Arecaceae
23	<i>C. pseudo-ravalis</i>	Arecaceae
24	<i>Calophyllum soulattri</i>	Clusiaceae
25	<i>Caesalpinia bonduc</i>	Fabaceae
26	<i>Calamus andamanicus</i>	Arecaceae
27	<i>Calophyllum inophyllum</i>	Clusiaceae
28	<i>Canarium euphyllum</i>	Burseraceae
29	<i>Cansjera rheedii</i>	Opiliaceae
30	<i>Canthium dicoccum</i>	Rubiaceae
31	<i>Capparis zeylancia</i>	Capparaceae
32	<i>Carissa spinarum</i>	Apocynaceae
33	<i>Caryota mitis</i>	Arecaceae
34	<i>Ceriops tagal</i>	Rhizophoraceae
35	<i>Champereia mainillana</i>	Opiliaceae
36	<i>Chukrasia tabularis</i>	Meliaceae
37	<i>Colubrina asiatica</i>	Rhamnaceae
38	<i>Combretum chinese Roxb.</i>	Combretaceae
39	<i>Dipterocarpus incanus</i>	Dipterocarpaceae
40	<i>Diospyros montana</i>	Ebenaceae
41	<i>D. pilosiuscula</i>	Ebenaceae
42	<i>D. pyrrhocarpa</i>	Ebenaceae
43	<i>Daedalacanthus suffruticosus</i>	Acanthaceae
44	<i>Dalbergia latifolia</i>	Fabaceae
45	<i>Derris scandens</i>	Fabaceae
46	<i>Diospyros marmorata</i>	Ebenaceae
47	<i>Dipterocarpus griffithii</i>	Dipterocarpaceae

48	<i>Dipterocarpus turbinatus</i>	Dipterocarpaceae
49	<i>Dischidia major</i>	Asclepiadaceae
50	<i>Dracaena angustifolia</i>	Agavaceae
51	<i>Elaeagnus conferta</i>	Elaeagnaceae
52	<i>Entada pusaetha</i>	Mimosaceae
53	<i>Erythrina variegata</i>	Fabaceae
54	<i>Ficus hispida</i>	Moraceae
55	<i>Ganophyllum falcatum</i>	Sapindaceae
56	<i>Garcinia microstigma</i>	Clusiaceae
57	<i>Garcinia speciosa</i>	Clusiaceae
58	<i>Glycosmis mauritiana</i>	Rutaceae
59	<i>Guettarda speciosa</i>	Rubiaceae
60	<i>Halophila ovalis</i>	Hydrocharitaceae
61	<i>Heritiera littoralis</i>	Sterculiaceae
62	<i>Hibiscus tiliaceous</i>	Malvaceae
63	<i>Hopea odorata</i>	Dipterocarpaceae
64	<i>Hoya parasitica</i>	Asclepiadaceae
65	<i>Ipomoea aquatica</i>	Convolvulaceae
66	<i>Korthalsia laciniosa</i>	Arecaceae
67	<i>Lagerstroemia hypoleuca</i>	Lythraceae
68	<i>Lannea coromandelica</i>	Anacardiaceae
69	<i>Licuala peltata</i>	Arecaceae
70	<i>Macaranga tanarius</i>	Euphorbiaceae
71	<i>Mangifera camptosperma</i>	Anacardiaceae
72	<i>Manilkara littoralis</i>	Sapotaceae
73	<i>Miliusa tectona</i>	Annonaceae
74	<i>Morinda citrifolia</i>	Rubiaceae
75	<i>Murraya paniculata</i>	Rutaceae
76	<i>Myristica andamanica</i>	Myristicaceae
77	<i>Neonuclea gageana</i>	Rubiaceae
78	<i>Pandanus tectorius</i>	Pandanaceae
79	<i>Paramignya armata</i>	Rutaceae
80	<i>Pemphis acidula</i>	Lythraceae
81	<i>Pisonia umbellifera</i>	Nyctaginaceae
82	<i>Planchonella longipetiolatum</i>	Sapotaceae
83	<i>Planchonia valida</i>	Lecythidaceae
84	<i>Plecospermum andamanicum</i>	Moraceae
85	<i>Pongamia pinnata</i>	Fabaceae
86	<i>Pterocarpus dalbergiodes</i>	Fabaceae
87	<i>Pterocymbium tinctorium</i>	Sterculiaceae
88	<i>Pterygota alata</i>	Sterculiaceae
89	<i>Rhaphidophora laciniata</i>	Araceae
90	<i>Rhizophora lamarckii</i>	Rhizophoraceae
91	<i>Syzigium cumini</i>	Myrtaceae
92	<i>S. samarangense</i>	Myrtaceae
93	<i>Sageraea elliptica</i>	Annonaceae
94	<i>Scaevola koenigii</i>	Goodeniaceae
95	<i>Semecarpus kurzii</i>	Anacardiaceae
96	<i>Sida acuta</i>	Malvaceae
97	<i>Sonneratia alba</i>	Sonneratiaceae

98	<i>Spondias pinnata</i>	<i>Anacardiaceae</i>
99	<i>Sterculia villosa</i>	<i>Sterculiaceae</i>
100	<i>Syzigium andamanicum</i>	<i>Myrtaceae</i>
101	<i>Terminalia manii</i>	<i>Combretaceae</i>
102	<i>Terminalia bialata</i>	<i>Combretaceae</i>
103	<i>Tetrameles nudiflora</i>	<i>Datisceae</i>
104	<i>Thespesia populnea</i>	<i>Malvaceae</i>
105	<i>Tinospora cordifolia</i>	<i>Menispermaceae</i>
106	<i>Tremma tomentosa</i>	<i>Ulmaceae</i>
107	<i>Xanthophyllum andamanicum</i>	<i>Xanthophyllaceae</i>
108	<i>Xylocarpus moluccensis</i>	<i>Meliaceae</i>

Source : Maheswaran 1998

Plant diversity of John Lawrence Island

Sl. No.	Plant Name	Family
1	<i>Artocarpus gomezianana</i>	Moraceae
2	<i>A. lakoocha</i>	Moraceae
3	<i>Abrus precatorius</i>	Fabaceae
4	<i>Actephila excelsa</i>	Euphorbiaceae
5	<i>Adenantha pavonina</i>	Mimosaceae
6	<i>Aglaiia andamanica</i>	Meliaceae
7	<i>Albizzia lebeck</i>	Mimosaceae
8	<i>Allophyllus serratus</i>	Sapindaceae
9	<i>Alstonia kurzii</i>	Apocynaceae
10	<i>Ancistrocladus extensus</i>	Ancistriladaceae
11	<i>Artocarpus chapalasha</i>	Moraceae
12	<i>Atalantia spinosa</i>	Rutaceae
13	<i>Baccaurea ramiflora</i>	Euphorbiaceae
14	<i>Bombax insigne</i>	Bombacaceae
15	<i>Bouea oppositifolia</i>	Anacardiaceae
16	<i>Bruguiera gymnorrhiza</i>	Rhizophoraceae
17	<i>Caesalpinia crista</i>	Fabaceae
18	<i>Calamus longisetus</i>	Arecaceae
19	<i>Canarium manii</i>	Burseraceae
20	<i>Calamus palustris</i>	Arecaceae
21	<i>C. pseudo-rivalis</i>	Arecaceae
22	<i>Calophyllum soulattri</i>	Clusiaceae
23	<i>Caesalpinia bonduc</i>	Fabaceae
24	<i>Calamus andamanicus</i>	Arecaceae
25	<i>Calophyllum inophyllum</i>	Clusiaceae
26	<i>Canarium euphyllum</i>	Burseraceae
27	<i>Cansjera rheedii</i>	Opiliaceae
28	<i>Canthium dicoccum</i>	Rubiaceae
29	<i>Capparis zeylanica</i>	Capparaceae
30	<i>Carissa spinarum</i>	Apocynaceae
31	<i>Caryota mitis</i>	Arecaceae
32	<i>Ceriops tagal</i>	Rhizophoraceae
33	<i>Champereia mainillana</i>	Opiliaceae
34	<i>Chukrasia tabularis</i>	Meliaceae
35	<i>Colubrina asiatica</i>	Rhamnaceae
36	<i>Combretum chinense</i>	Combretaceae
37	<i>Dipterocarpus incanus</i>	Dipterocarpaceae
38	<i>Diospyros montana</i>	Ebenaceae
39	<i>D. pilosiuscula</i>	Ebenaceae
40	<i>D. pyrrhocarpa</i>	Ebenaceae
41	<i>Daedalacanthus suffruticosus</i>	Acanthaceae
42	<i>Derris scandens</i>	Fabaceae
43	<i>Diospyros marmorata</i>	Ebenaceae
44	<i>Dipterocarpus griffithii</i>	Dipterocarpaceae
45	<i>Dischidia major</i>	Asclepiadaceae
46	<i>Elaegnus conferta</i>	Elaegnaceae
47	<i>Entada pusaetha</i>	Mimosaceae

Sl. No.	Plant Name	Family
48	<i>Erythrina variegata</i>	Fabaceae
49	<i>Ficus hispida</i>	Moraceae
50	<i>Ganophyllum falcatum</i>	Sapindaceae
51	<i>Garcinia microstigma</i>	Clusiaceae
52	<i>Glycosmis mauritiana</i>	Rutaceae
53	<i>Hopea odorata</i>	Dipterocarpaceae
54	<i>Hoya parasitica</i>	Asclepiadaceae
55	<i>Korthalsia laciniosa</i>	Arecaceae
56	<i>Lagerstroemia hypoleuca</i>	Lythraceae
57	<i>Lannea coromandelica</i>	Anacardiaceae
58	<i>Licuala peltata</i>	Arecaceae
59	<i>Macaranga tanarius</i>	Euphorbiaceae
60	<i>Miliusa tectona</i>	Annonaceae
61	<i>Morinda citrifolia</i>	Rubiaceae
62	<i>Murraya paniculata</i>	Rutaceae
63	<i>Myristica andamanica</i>	Myristicaceae
64	<i>Neolamarckia cadamba</i>	Rubiaceae
65	<i>Neonauclea gageana</i>	Rubiaceae
66	<i>Pemphis acidula</i>	Lythraceae
67	<i>Pisonia umbellifera</i>	Nyctaginaceae
68	<i>Planchonella longipetiolatum</i>	Sapotaceae
69	<i>Planchonia valida</i>	Lecythidaceae
70	<i>Plecosperrum andamanicum</i>	Moraceae
71	<i>Pometia pinnata</i>	Sapindaceae
72	<i>Pongamia pinnata</i>	Fabaceae
73	<i>Pterocarpus dalbergioides</i>	Fabaceae
74	<i>Pterocymbium tinctorium</i>	Sterculiaceae
75	<i>Pterolobium macropterum</i>	Fabaceae
76	<i>Pterygota alata</i>	Sterculiaceae
77	<i>Rhaphidophora laciniata</i>	Araceae
78	<i>Rhizophora lamarckii</i>	Rhizophoraceae
79	<i>Syzigium cumini</i>	Myrtaceae
80	<i>S. samarangense</i>	Myrtaceae
81	<i>Sageraea elliptica</i>	Annonaceae
82	<i>Semecarpus kurzii</i>	Anacardiaceae
83	<i>Smythea calpicarpa</i>	Rhamnaceae
84	<i>Sonneratia alba</i>	Sonneratiaceae
85	<i>Spondias pinnata</i>	Anacardiaceae
86	<i>Sterculia villosa</i>	Sterculiaceae
87	<i>Syzigium andamanicum</i>	Myrtaceae
88	<i>Terminalia bialata</i>	Combretaceae
89	<i>T. manii</i>	Combretaceae
90	<i>Tetrameles nudiflora</i>	Datisceae
91	<i>Tinospora cordifolia</i>	Menispermaceae
92	<i>Tremma tomentosa</i>	Ulmaceae
93	<i>Vantilago maderaspatana</i>	Rhamnaceae
94	<i>Xanthophyllum andamanicum</i>	Xanthophyllaceae

Source : Maheswaran 1998

FAUNA

Checklist of mammalian species of the Andaman Islands. Those occurring in the Ritchie's Archipelago have been indicated with an asterisk. Species marked † are suspected to have been introduced through human agencies.

CHIROPTERA PTEROPODIDAE

1. *Cynopterus brachyotis* * (Andamans short-nosed fruit bat)
2. *Cynopterus sphinx* (Common short-nosed fruit bat)
3. *Cynopterus sp.* * (unidentified)
4. *Eonycteris spelaea* (Cave fruit bat)
5. *Pteropus faunulus* (Nicobarese flying fox)
6. *Pteropus giganteus* (Indian flying fox)
7. *Pteropus melanotus* * (Black flying fox)

EMBALLONURIDAE

8. *Tophazous melanopogon* (Black-bearded tomb bat)
9. *Saccolaimus saccolaimus* (Pouch-bearing bat)

MEGADERMATIDAE

10. *Megaderma Spasma* (Lesser false vampire bat)

RHINOLOPHIDAE

11. *Rhinolophus affinis* * (Intermediate horseshoe bat)
12. *Rhinolophus cognatus* (Andamans horseshoe bat)
13. *Rhinolophus refulgens* * (Andersen's horseshoe bat)
14. *Hipposideros ater* (Dusky leaf-nosed bat)
15. *Hipposideros cinereus* * (Grey leaf-nosed bat)
16. *Hipposideros diadema* (Diadem leaf-nosed bat)

VESPERTILIONIDAE

17. *Hesperoptenus tickelli* (Tickell's bat)
18. *Myotis horsfieldii* (Horsfield's myotis bat)
19. *Pipistrellus camortae* * (Kamorta pipistrelle)
20. *Scotophilus kuhlii* (Asiatic lesser yellow bat)
21. *Tylonycteris pachypus* (Bamboo bat)

CARNIVORA FELIDAE

22. *Felis chaus* * (Jungle cat)

VIVERRIDAE

23. *Paguma larvata* * (Andamans palm civet)

RODENTIA
SCIURIDAE

24. *Funambulus pennantii* † (Five-striped palm squirrel)

MURIDAE

25. *Mus musculus* † (House mouse)
26. *Rattus stoicus* * (Muller's rat)
27. *Rattus rattus* (Black rat)
28. *Rattus muelleri* (Muller's rat)
29. *Rattus rogersi* (Rogers' rat)
30. *Rattus domanicus* (Malayan rat)

INSECTIVORA SORICIDAE

31. *Crocidura andamanensis* (Andamans ground shrew)
32. *C. hispida*
33. *C. jenkinsi* (Jenkin's ground shrew)

Checklist of reptile species of the Andaman Islands. Those occurring in the Ritchie's Archipelago have been indicated with an asterisk. Species marked † are suspected to have been introduced through human agencies.

CROCODYLIDAE

1. *Crocodylus porosus* * (Saltwater crocodile)

TESTUDINES

DERMOCHELYIDAE

2. *Dermochelys coriacea* (Leatherback turtle)

CHELONIIDAE

3. *Chelonia mydas* (Green turtle)
4. *Eretmochelys imbricata* * (Hawksbill turtle)
5. *Lepidochelys olivacea* (Olive Ridley turtle)

TRIONYCHIDAE

6. *Lissemys punctata* † (Indian flapshell turtle)

SAURIA

GEKKONIDAE

7. *Cnemaspis* sp. *
8. *Coxymobotus platyurus* * (Flat-tailed gecko)
9. *Gehyra mutilata* (Four-clawed gecko)
10. *Gekko verreauxi* * (Andaman giant gecko)
11. *Cyrtodactylus rubidus* * (Andamans bent-toed gecko)

12. *Hemidactylus rubidus* * (Asian house gecko)
13. *Lepidodactylus lugubris* (Mourning gecko)
14. *Phelsuma andamanense* * (Andaman day gecko)

AGAMIDAE

15. *Coryphophylax subcristatus* (Bay Islands forest lizard)

SCINCIDAE

16. *Liptnia macrotympanam* (Small-eared island skink)
17. *Lygasoma* sp.* (Supple skink)
18. *Mabuya andamanensis* (Andaman Islands grass skink)
19. *Mabuya tytleri* (Tyter's grass skink)

VARANIDAE

20. *Varanus salvator* * (Water monitor)

SERPENTES

TYPHLOPIDAE

21. *Ramphotyphlops braminus* † (Brahminy worm snake)
22. *Typhlops andamanensis* (Andaman worm snake)
23. *Typhlops oatesi* (Oates' worm snake)

ACROCHORDIDAE

24. *Acrochordus granularus* (Western wart snake)

COLUBRIDAE

25. *Amphiesma stolata* (Buff-striped keelback)
26. *Boiga andamanensis* (Andamans cat snake)
27. *Boiga ochracea* (Tawny cat snake)
28. *Cantoria violacea* (Yellow-banded mangrove snake)
29. *Cerberus rynchops* * (Dog-faced water snake)
30. *Chrysopelea paradisi* (Red-spotted flying snake)
31. *Dendrelaphis cyanochloris* * (Blue bronzeback tree snake)
32. *Elaphe flavolineata* (Yellow-striped trinket snake)
33. *Gonyosoma oxycephalum* (Red-tailed trinket snake)
34. *Lycodon capucinus* * (Island wolf snake)
35. *Lycodon tiwarii* (Tiwari's wolf snake)
36. *Oligodon woodmasoni* (Yellow-striped wolf snake)
37. *Ptyas mucosus* (Western rat snake)
38. *Xenochrophis melanostus* (Checkered keelback water snake)

ELAPIDAE

39. *Bangarus andamanensis* (Andamans krait)
40. *Naja sagittifera* (Andamans cobra)
41. *Ophiophagus hannah* (King cobra)

HYDROPHIIDAE

42. *Laticauda colubrina* (Yellow-lipped sea krait)
43. *Laticauda laticaudata* (Common sea krait)
44. *Microcephalophis cantoris* (Cantor's narrow-headed sea snake)
45. *Pelamus platyurus* (Pelagic sea snake)

VIPERIDAE

46. *Trimeresurus andersoni* (Anderson's pit viper)

Checklist of amphibian species of the Andaman Islands. Those occurring in Ritchie's Archipelago have been indicated with an asterisk.

BUFONIDAE

1. *Bufo melanostictus* * (Common Asian toad)
2. *Bufo* sp. (A new record for the Andaman Islands)

MICROHYLIDAE

3. *Kaloula baleata ghoshi* (Andamans bull frog)
4. *Microhyla ornata* (Ornate narrow-mouthed frog)
5. *Microhyla chakrapani* (Chakrapani's narrow-mouthed frog)
6. *Micriletta inornata* (False narrow-mouthed frog)*

RANIDAE

7. *Limnonectes andamanensis* (Andamans paddyfield frog)
8. *Limnonectes doriae* (Doria's frog)
9. *Limnonectes hascheana* (Hasche's frog)
10. *Limnonectes limnocharis species complex species 1** (Paddyfield frog)
11. *Limnonectes limnocharis species complex species 2* (Paddyfield frog)
12. *Rana charlesdarwini* (Charles Darwin's frog)

Source : Das 1998

An Inventory of Birds Sighted in Ritchies Archipelago (Havelock, Henry Lawrence, Inglis, John Lawrence and Outram Islands)

Order Apodiformes	
<i>Apus apus</i>	Swift
<i>Collocalia fuciphaga</i>	Andaman Greyrumped Swiftlet
Order Cuculiformes	
<i>Centropus andamanensis</i>	Andaman Crow Pheasant
<i>Chalcites maculatus</i>	Violet Cuckoo
<i>Cuculus micropterus</i>	Indian Cuckoo
Order Psittaciformes	
<i>Loriculus vernalis</i>	Lorikeet
<i>Psittacula longicauda</i>	Redcheeked Parakeet
Order Columbiformes	
<i>Ducula aenea</i>	Green Imperial Pigeon
<i>Macropygia rufipennis</i>	Andaman Cuckoo Dove
Order Charadriiformes	
<i>Calidris subminuta</i>	Long-toed Stint
<i>Charadrius asiaticus</i>	Sand Plover
<i>Charadrius mongolus</i>	Lesser Sand Plover
<i>Gallinago stenura</i>	Fantail Snipe
<i>Sterna fuscata</i>	Sooty Tern
<i>Sterna bengalensis</i>	Indian Lesser Crested Tern
Order Gruiformes	
<i>Rallina cannigi</i>	Andaman Banded Crake
Order Falconiformes	
<i>Haliaetus leucogaster</i>	White-bellied Sea Eagle
<i>Haliastur indus</i>	Brahminy Kite
<i>Pandion haliaetus</i>	Osprey
Order Piciformes	
<i>Picoides macci</i>	Spottedbreasted Pied Woodpecker
Order Ciconiiformes	
<i>Ardea cinerea</i>	Grey Heron
<i>Ardeola grayii</i>	Pond Heron
<i>Bubulcus ibis</i>	Cattle Egret
<i>Egretta garzetta</i>	Little Egret
<i>Ixobrychus sinensis</i>	Yellow Bittern
<i>Nycticorax nycticorax</i>	Night Heron
Order Coraciiformes	
<i>Halcyon smyrnensis</i>	Whitebreasted Kingfisher

<i>Halcyon chloris</i>	Whitecollared Kingfisher
<i>Merops leschenaulti</i>	Chestnutheaded Bea Eater
Order Strigiformes	
<i>Ninox sp.</i>	Brown Hawk Owl
Order Passeriformes	
<i>Anthus novaeseelandiae</i>	Paddyfield Pipit
<i>Copsychus malabaricus</i>	Shama
<i>Corvus macrorrhynchos</i>	Jungle Crow
<i>Dicrurus andamanensis</i>	Andaman Drongo
<i>Dicrurus paradiseus</i>	Great Racket-tailed Drongo
<i>Lanius cristatus</i>	Brown Shrike
<i>Motacilla alba</i>	Gray Wagtail
<i>Motacilla flava</i>	Yellow Wagtail
<i>Nectarinia jugularis</i>	Olivebacked Sunbird
<i>Oriolus chinensis</i>	Blacknaped Oriole
<i>Pericrocotus flammeus</i>	Scarlet Minivet
<i>Pycnonotus jacosus</i>	Redwhiskered Bulbul

Source : Deb, 1998

WANDOOR MARINE NATIONAL PARK

Introduction

The Wandoor Marine National Park (now renamed Mahatma Gandhi Marine National Park), the first marine national park to be established in the Bay Islands, is an area of spectacular natural beauty, and is a fine example of the phenomenal diversity of terrestrial and marine life the Andamans. The purpose of establishing this national park was to protect and preserve the biodiversity of the different habitats such as coral reefs, sea grass meadows, mud flats, estuaries, as well as several vegetation types such as tropical forests and mangroves that are found in this area.

Set in the Labyrinth group of islands to the south-west of South Andaman island, the national park comprises fifteen islands of different sizes scattered over a total area 281.50 sq. km. Of this area, 220 sq.km.encompasses the territorial water around the islands. Most of the islands are densely forested, with perennial streams flowing through. Many are edged by beautiful beaches set against clear lagoons displaying the underwater world of coral reefs. The larger islands like Alexandra, Tarmugli and Redskin have gently undulating hills, while some of the smaller ones like Belle are nothing more than little outcrops of vegetation surrounded by a thin strip of white sand.

The Wandoor marine NP is one of the main tourist attractions of the Andaman and Nicobar Islands, and on account of being located near to Port Blair (about 25 km.), it has a large influx of Indian and foreign tourists. Jolly Buoy island and Redskin island are part of the buffer zone exclusively for tourism and recreation use.

Description

The preliminary notification for this PA which is located between latitude 11^o 22' N to 11^o 36'N and longitude 90^o 40'E to 92^o 30'E was issued in 1983. The names of the islands are Alexandra, Boat, Belle, Chester, Grub, Hobday, Jolly Buoy, Malay, Pluto, Redskin, Rifleman, Snob, Tarmugli, Twins and Rutland. Of these, Rutland is the largest, but only serves to form the eastern boundary of the PA, as the land mass of the island is not included in the national park. Tarmugli (2333 ha.) is the largest island within the park, while Belle and Rifleman both 8 ha. each are the smallest (D'Souza 1996).

BIOLOGICAL PROFILE

Among the protected areas in the Andaman & Nicobar islands, this national park is relatively better studied. Particularly during the past ten years, a number of surveys have been carried out by individual scientists and various government and non-government organisations to record the terrestrial and marine biodiversity of the area. Impacts of human pressures on the PA's ecosystems have also been documented to some extent.

Vegetation

The main vegetation types are Andaman Tropical Evergreen Forest, Littoral Forest and Mangrove Forest (Source: Pande et al 1991). A number of endemic, rare and threatened species occur in these islands. The main tropical forest plants are towering trees such as *Dipterocarpus sp.*, *Artocarpus chaplasha*, *Pterocarpus dalbergoides*, *Myristica andamanica*, *Hopea odorata*, etc., along with other vegetation such as several *Ficus* species *F.benjamina*, *F. callosa*, etc., cycads like *Cycas rumphii*, bamboos, canes and other climbers. This type of vegetation is found to occur in the interior of the islands. Littoral forests are found along the coast and comprise of species like *Manilkara littoralis*, *Pongamia pinnata*, *Callophyllum inophyllum*, *Thespesia populnea*, *Hibiscus tiliaceous*, *Pandanus* and *Ipomea* sp. Creeks in

the indented coastline of the islands are thickly lined with mangrove forests with typical species like *Rhizophora*, *Bruguiera* and *Avicennia* sp., *Ceriops tagal*, *Kandelia candel*, *Exoecaria* sp., and *Sonneratia alba*.

Sea grasses are found in the waters of the NP, particularly in the area between Tarmugli and Redskin islands. Three species of sea grasses have been recorded here (Das 1996). This habitat has a wide range of faunal associations such as corals, molluscs, echinoderms and fish, and is an important grazing area for endangered marine animals such as sea turtles and dugongs.

NOTE: A LIST OF FLORA RECORDED IN THE WANDOOR MARINE NATIONAL PARK IS APPENDED

Fauna

Like the flora, the fauna too is characterised by a high degree of endemism and the national park also supports a number of rare and endangered species. The naturally occurring terrestrial mammals of the islands are limited to the Wild Pig belonging to the endemic sub-species *Sus scrofa andamanensis*, Palm Civet *Paguma larvata*, and several species of bats, particularly fruit bats. The introduced Spotted Deer *Axis axis* is now naturalised in the islands. Dolphins are seen in the water, but the most endangered marine mammal, the Dugong which has been reported in the past is unlikely to be found here any longer because the sea grass meadow in the marine park is disturbed.

The endangered Saltwater Crocodile *Crocodylus porosus*, the Water Monitor *Varanus salvator* and marine turtles are the prominent reptiles in the PA. Five species of marine turtles have been recorded in India, all of which are endangered. Three of these, the Green Sea Turtle, Leatherback Turtle and Hawksbill Turtle are known to nest on beaches in the PA. The Hawksbill Turtle is associated with coral reefs.

The bird life of the marine national park is rich and varied ranging from raptors like the Andaman Serpent Eagle and Whitebellied Sea Eagle; forest birds like the frugivorous Green Imperial Pigeon and Redcheeked Parakeet; insectivores like the Racket-tailed Drongo, and other birds like kingfishers, migratory and resident shore birds and terns. Among these are several endemic and endangered species, particularly the Andaman Teal *Anas gibberifrons albogularis* a globally threatened waterbird endemic to the Andaman islands. The Andaman teal inhabits wetland habitats such as swamps, marshes, creeks, forest streams, or coastal beaches and reefs and has suffered a marked population decline during recent years (Vijayan 1997). A rocky outcrop off Boat island is reported to be a breeding site for Noddy Terns *Anous stolidus* during the monsoon season. These pelagic birds, though not threatened in an international scale, are very rare in India, and seen only on a few remote oceanic islands.

By far the most important fauna of the Wandoor Marine National Park are the marine and coral reef fauna. The reefs surrounding the islands are fringing reefs with an abundance of *Acropora* sp. staghorn corals, *Porites* sp. reef building corals, *Lobophylla* sp. brain corals, *Fungia*, *Montipora*, *Hydnophora*, *Tubipora* sp. and many other different species of corals and all their associated marine life such as jelly fishes, sea cucumbers, brittle stars, starfishes, sea lillies, sea urchins, *Tridactna* sp. giant clams, *Trochus* shells, cowries, featherstars eg. *Himmerometra robustispinna*, and sea -fans eg. *Subergorgia mollis*. Coral fishes of different colours and sizes are abundant. Some varieties such as the groupers, clupeids, snappers, etc. are valuable food fish, while others like butterfly fishes, angels, wrasses, damsels and clown fishes are beautiful ornamentals.

NOTE: A LIST OF FAUNA (INCLUDING FISHES AND CORALS) RECORDED IN THE WANDOOD MARINE NATIONAL PARK IS APPENDED

SOCIO-ECONOMIC PROFILE

There are eleven villages surrounding the national park with totally more than 700 families (D'Souza 1996). The main occupation of the village inhabitants is agriculture and fishing which is restricted to the monsoon months. To supplement their income they cultivate areca, coconut and banana, and keep poultry and livestock. They are largely dependent on the natural resources of the land and sea areas surrounding the marine NP for their livelihood, and it is estimated that the monetary income of nearly 70% of the population comes from fishing, hunting wild pigs and other animals, and sand collecting (D'Souza 1996).

Fuelwood is the only source of cooking fuel used by the village inhabitants, and this comes entirely from the surrounding forests. Permits are issued per family, but the quantity is rarely sufficient, therefore there is illegal fuelwood collection for domestic consumption and for sale. Cattle and goats graze freely within the forests causing great damage to forest vegetation and hampering natural regeneration of forest tree saplings.

Shark fishing for harvesting shark- fins which are a delicacy in South-East Asian cuisine is a lucrative business and primary economic activity though it is banned. There is no local consumption, but the shark fins are for illegal sale abroad. Though the fishing is done outside the park boundaries, it is unregulated, so the impact on the shark population of the area is not known. It is also a highly wasteful activity since, unlike on the mainland, shark meat is not eaten on the islands, and the sharks' bodies are thrown away into the sea.

Collecting sea cucumbers is another major occupation to supply a long-standing *beche-de-mer* industry. Though there are regulations specifying the minimum size (9 cm) of the holothurians, they are still overexploited. Collecting valuable shells like *Trochus*, *Turbo sp.* cowries, chank shells, etc, and sea fans and other decorative corals for the Port Blair market is also a source of income. As live shells are collected by diving underwater, this causes serious depletion.

Sand collection is another illegal source of income. After the Coastal Regulation Zone has been imposed, all sand collection is banned in the islands, yet as there is tremendous demand for construction purposes, sand is collected in large quantities from areas surrounding the PA.

Impacts on the PA, and other issues

Tourism

An interpretation centre has been set up at the park entrance. Information on coral reefs and on the marine ecosystem is displayed, and there are exhibits of corals and fishes, including some preserved specimens. The interpretation centre has greater potential, and can be used for education purposes and to create awareness among tourists, so that they can learn about the special qualities of the marine park, and not cause damage during their visit. At present, tourists can visit the centre if they wish to, however, as it is conveniently located, it could be made compulsory for all visitors to go through it before entering the PA, to collect information and guidelines.

Tourism does benefit the local population through more sale of their horticulture products and of fish and other sea food. However, this increased demand puts a pressure on the natural resources of the islands in general, and therefore of the marine national park as well.

Tourists promote sales of sea shells and corals which would otherwise have not been used by the islanders, and also tend break off corals and collect shells, though this is not permitted.

30 -35 % of the coral reefs are lost on account of tourism (Andrews, pers. com.). Tourists damage corals while reef-walking and when boats drop their anchors on to the reefs so that tourists can snorkel or dive. Though these activities need not necessarily be destructive, carelessness or lack of awareness can cause considerable physical damage to the delicate corals. The sea grass bed located between Tarmugli and Redskin has been identified to be under pressure on account of overexploitation and tourism, though this is still on a moderate scale (Das 1996).

Pollution

Diesel and oil spilling from motorised tourist boats belonging to private tour operators causes marine pollution in the PA. Garbage and litter, particularly non-biodegradable plastics have become a serious pollution problem all over the A&N islands, including in the protected areas. During recent years, there has been a tremendous proliferation of consumer goods, especially packaged foods and mineral water packed in disposable polythene, plastic or foil wrappers. In the absence of a regulated waste collection and disposal system, this litter finds its way into drains that open out into the sea, and eventually reach the islands in the national park.

Sedimentation

Coral reefs around Jolly Buoy are getting covered with deposits of sand from the tourist beach (Andrews pers.com.). Corals in this area are also smothered by soil washed down from neighbouring Rutland island, where timber logging is exposing the soil and causing erosion. One such area in Rutland where mud was pouring down directly from the forest on the coast to the sea was observed during the present field visit (April 1999).

Agriculture, clearing of land for housing, clearing or cutting mangroves, and other land use in village settlements on the outskirts of the national park cause heavy sedimentation which chokes live corals or causes turbidity which prevents light penetration through the water. Clear water is essential for photosynthesis by symbiotic algae (zooxanthellae) associated with coral polyps, that give the corals their colour, and facilitate reef building. Dead corals appear bleached because of the loss of these organisms.

Overexploitation and poaching

Excessive fuelwood collection and overgrazing in forest areas bordering the NP are damaging the vegetation, particularly the mangroves. Poaching of marine resources such as sea cucumbers, corals and valuable shells like *Trochus* and *Turbo* is a serious problem. On account of over-collection, all these species have now become highly endangered. The greatest threat is from poachers from Myanmar and Thailand who are equipped with arms and fast boats, and are therefore able to make a quick getaway.

Coral mortality

Mortality of corals was reported about ten years ago in some sites particularly near Grub and Twins islands and an outbreak of the destructive "Crown -of -Thorns" starfish *Acanthaster planci* was evaluated (Wood 1989). "White Band" disease of corals was also recorded earlier (Pande et al), and in the recent past , in 1998, extensive coral bleaching attributed to the 'El-Nino effect', all over the A&N islands, was reported in several newspaper articles and accounts of surveys or observations. In the absence of a continuous coral reef monitoring system, it is difficult to assess the current situation with regard to all these problems.

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**LIST OF PLANTS IDENTIFIED IN THE
MAHATMA GANDHI MARINE NATIONAL
PARK**

BOTANICAL NAME	COMMON NAME
<i>Acanthus ilicifolius</i>	Khaya
<i>Acrostichum aureum</i>	
<i>Actephila excelsa</i>	
<i>Adenanthera pavonina</i>	Ywegi
<i>Aglaia andamanica</i>	Latauk
<i>Aglaia gangoo</i>	Lallatuuk
<i>Albizzia lebbeck</i>	Koko
<i>Allophylus cobbe</i>	
<i>Alstonia kurzii</i>	Chatium
<i>Amoora wallichii</i>	Lalchini
<i>Anaxa gorea luzoniensis</i>	
<i>Ancistrocladus tectorius</i>	Jungli coffee
<i>Anthocephalus cadamba</i>	Kadam
<i>Areca triandra</i>	Jungli supari
<i>Artocarpus chaplasha</i>	Toung peinne
<i>Artocarpus gomeziana</i>	Bara lakhuch
<i>Artocarpus lalootha</i>	Barhal
<i>Avicennia officinalis</i>	White mangrove
<i>Baccaurea ramiflora</i>	Khata Phal
<i>Barringtonia asiatica</i>	The queen of the sea shores
<i>Bassia butyracea</i>	Hill mohwa
<i>Bischofia javanica</i>	Yellow padauk
<i>Bombax insigne</i>	Didu
<i>Bouea burmanica</i>	Marian
<i>Bruguiera gymnorhiza</i>	Mangrove (Red mangrove)
<i>Bruguiera parviflora</i>	Mangrove
<i>Caesalpinia bonducella</i>	Kath karanj
<i>Caesalpinia crista</i>	Billi kanta
<i>Calamus andamanicus</i>	Mota bet
<i>Calamus longisetus</i>	Jungli bet
<i>Calamus palustris</i>	Yamata
<i>Calophyllum soulatri</i>	Poon
<i>Canarium euphyllum</i>	White dhup
<i>Caryota mitis</i>	Mari supari
<i>Cassia fistula</i>	Amaltas
<i>Celtis philippensis</i>	Tej pathi
<i>Ceriops tagal</i>	Mangrove
<i>Champereia mainillana</i>	Mitha bhajee
<i>Cissus repens</i>	Climber
<i>Clerodendron inerme</i>	Thorn less chance tree of Australia
<i>Clinogyne grandise</i>	Kala pathi
<i>Codiocarpus andamanicus</i>	Codiocarpus
<i>Corapa moluteensis</i>	

BOTANICAL NAME	COMMON NAME
<i>Cordia subcordata</i>	
<i>Corypha umbraculifera</i>	
<i>Crinum asiaticum</i>	
<i>Croton argyratus</i>	
<i>Cryptocarya andamanica</i>	
<i>Cycas rumphii</i>	
<i>Cynometra Iripa</i>	
<i>Daemenorops kurzianus</i>	Jat beth pathi
<i>Dalbergia pinnata</i>	
<i>Dalbergia volubilis</i>	
<i>Dendrobium aphyllum</i>	Orchid
<i>Dendrobium crumenatum</i>	Orchid
<i>Derris indica</i>	Karanj
<i>Desmodium spp.</i>	
<i>Desmodium umbellatum</i>	
<i>Dillenia andamanica</i>	Jungli chalta
<i>Dinochloa andamanica</i>	Bel bamboo
<i>Diospyros kurzii</i>	Tendu
<i>Diospyros pilosula</i>	Tendu
<i>Diospyros pyrrocarpa</i>	Largeleaf tendu
<i>Diospyros undulata</i>	Tendu yellow
<i>Dipterocarpus costatus</i>	Gurjan
<i>Dipterocarpus grandiflorus</i>	Gurjan
<i>Dipterocarpus griffithii</i>	Gurjan
<i>Dipterocarpus incanus</i>	Gurjan
<i>Dipterocarpus turbinatus</i>	Gurjan
<i>Dischidia nummularia</i>	Epiphyte
<i>Dodonaea viscosa</i>	
<i>Dracaena brachyphylla</i>	Surmai
<i>Drymoglossum pilosellioides</i>	Hanging fern
<i>Drynaria guercifolia</i>	Binrdest fern
<i>Endospermum chinense</i>	Bakota
<i>Entada scandens</i>	Hathi bel
<i>Erya bractescens</i>	Orchid
<i>Erythrina variegata</i>	Khathit
<i>Eugenia grata</i>	Jamun
<i>Excoecaria agallocha</i>	Blinding tree
<i>Fagraea racemosa</i>	Thit balu
<i>Ficus callesia</i>	Bargath
<i>Ficus glomerata</i>	Lalgular
<i>Ficus hispida</i>	Gular
<i>Ficus indica</i>	Bargad
<i>Ficus religiosa</i>	Peepal
<i>Ficus scandens</i>	Bargular
<i>Flagellaria indica</i>	
<i>Ganophyllum falcatum</i>	Jungli neem

BOTANICAL NAME	COMMON NAME
<i>Ganophyllum fucalium</i>	
<i>Garcinia cowa</i>	Kota phal
<i>Gnetum contractum</i>	Subrut
<i>Gnetum scandens</i>	Climber
<i>Guettarda speciosa</i>	Domdamah
<i>Gyrocaipus americanus</i>	Thit kauk
<i>Heritiera littoralis</i>	Sundri
<i>Hibiscus tiliaceus</i>	Safad chilka
<i>Hopea odorata</i>	White thingam
<i>Hoya parasitica</i>	Orchid
<i>Hydnophyllum formicarum</i>	Anthouse plant
<i>Ipomea palaloidea</i>	Creeper
<i>Ipomea pescaprae</i>	Goats foot creeper
<i>Ixora grandifolia</i>	Rosella
<i>Kandelia candel</i>	
<i>Korthalsia laciniosa</i>	Lal bet
<i>Kuema andamanica</i>	Jaiphal
<i>Lagerstroemia hypoleuca</i>	Pyinma
<i>Lanea coromandelica</i>	Nabbe
<i>Leea indica/Leea sambusena</i>	Basora balli
<i>Leea longifolia</i>	
<i>Licuala peltata</i>	Selai pathi
<i>Licuala spinosa</i>	Jungli selai
<i>Lumnitzera rucemosa</i>	
<i>Macaranga tanarius</i>	Goal papita
<i>Mallotus peltatus</i>	Kamela dye plant
<i>Mangifera andamanica</i>	Jungli am
<i>Manilkara littoralis</i>	Sea mahwa
<i>Memecylon pauciflorum</i>	
<i>Mesua ferrea</i>	Gangaw
<i>Morinda citrifolia</i>	Nibase
<i>Mucuna gigantea</i>	Cowitch bean
<i>Myristica andamanica</i>	Jaiphal
<i>Myristica trya</i>	Jaiphal
<i>Nephrolepis hirsutula</i>	
<i>Oroxylum indicum</i>	Hathi panja(Burma phali)
<i>Pajanelia rheedii</i>	Jhingam
<i>Pandanus andamonensium</i>	Keora
<i>Pandanus odoratissimus</i>	Screwpine
<i>Pandanus tectorius</i>	Khari Keora
<i>Parishla insignis</i>	Red dhup
<i>Phoenix paludosa</i>	Khari Khajur
<i>Pinanga kuhlii</i>	Kampah
<i>Pisonia excelsa</i>	Banya
<i>Planchonella longipotiolata</i>	Lamba pathi
<i>Planchonia valida</i>	Red bombway
<i>Plecosipermum andamanicus</i>	Kadmash kahta

BOTANICAL NAME	COMMON NAME
<i>Pometia pinnata</i>	Thikandu
<i>Prunus martabanica</i>	Red thingan
<i>Pterocarpus dalbergioides</i>	Padauk
<i>Pterocymbium tinctorium</i>	Papita
<i>Pterospermuin acesifolium</i>	Hathipaila
<i>Pterospermum accroides</i>	Machchoon
<i>Rathos rhoxburigi</i>	Climber
<i>Rhaphidophora laciniata</i>	Climber
<i>Rhizophora apiculata</i>	Black mangrove
<i>Rhizophora mucronata</i>	Black mangrove
<i>Rhynchostylis retusa</i>	Fox tail orchid
<i>Salacia chinensis</i>	
<i>Scaevola frutescens</i>	The fan flower
<i>Scyphiphora hydrophyllacca</i>	
<i>Secamone andamanica</i>	
<i>Semicarpus prainii</i>	Jungli kaju
<i>Smilax aspericaulis</i>	Ram datun
<i>Sonneratia apetala</i>	
<i>Sonneratia caseolaris</i>	
<i>Sophora tomentosa</i>	
<i>Spondias mangifera</i>	Ambara
<i>Sterculia colorata</i>	Papita
<i>Streblus asper</i>	Bakri pathi
<i>Tabernaemontana crispa</i>	Coraya
<i>Terminalia bialata</i>	White chuglam
<i>Terminalia catappa</i>	Khari badam
<i>Terminalia manii</i>	Black chuglum
<i>Terminalia procera</i>	White bombwe (Radam)
<i>Tetracesa sarmentosa</i>	Agi bel
<i>Tetrameles nudiflora</i>	Thitpok
<i>Thespesia populnea</i>	Portia tree
<i>Thunbergia laurifolia</i>	Panibel
<i>Tinospora cordifolia</i>	Climber
<i>Unona dasymaschala</i>	
<i>Vigna marina</i>	Pinle-pe
<i>Wadelia disflora</i>	
<i>Xanthophyllum andamanicum</i>	Let Phew
<i>Xylocarpus granatum</i>	Puzzle fruit tree
<i>Xylocarpus moluceensis</i>	
<i>Xylocarpus ameri cana</i>	Pinle-pe

Source : D'Souza (1996)

LIST OF FAUNA IN THE MAHATMA GANDHI MARINE NATIONAL PARK

MAMMALS :

COMMON NAME	SCIENTIFIC NAME
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Bat, Andaman Lesser Shortnosed Fruit	<i>Cynopterus brachyotis brachysoma</i>
Bat, Dobson's Longtongued Fruit	<i>Eonycteris spelaea</i>
Bat, Shortnosed Fruit	<i>Cynopterus sphinx</i>
Bat, South Andaman	<i>Rhinolophus cognatus</i>
Horseshoe	<i>Cognatus</i>
Cat, Jungle	<i>Felis chaus</i>
Civet, Andaman Masked	<i>Paguma larvata tytleri</i>
Palm ²	
Deer, Barking	<i>Muntiacus muntjak</i>
(Deer, Spotted) or Chital	<i>Axis axis</i>
Dolphin, Common	<i>Delphinus delphis</i>
Dugong	<i>Dugong dugon</i>
Pig, Andaman Wild ³	<i>Sus Scrofa andamanensis</i>
Shrew, Andaman Island Spiny	<i>Crocidura hispida</i>

REPTILES :

COMMON NAME	SCIENTIFIC NAME
Crocodile, Estuarine or Salt-Water Crocodile	<i>Crocodylus porosus</i>
Gecko, Emerald	<i>Phelsuma andamanense</i>
Monitor, Water	<i>Varanus salvator</i>
Snake, Amphibious Sea	<i>Laticauda laticauda</i>
Snake, Colubrine Amphibious Sea	<i>Liticauda colubrina</i>
Turtle, Green Sea	<i>Chelonia mydas</i>
Turtle, Hawkbill	<i>Eretmochelys imbricata</i>
Turtle, Leathery	<i>Dermochelys coriacea</i>
Turtle, Olive Ridley	<i>Lepidochelys olivacea</i>

BIRDS :

COMMON NAME	SCIENTIFIC NAME
Bee-eater, chestnutheaded	<i>Merops leschenaulti</i>
Bittern, yellow	<i>Ixobrychus sinensis</i>
Bulbul, redvented	<i>Pycnonotus cafer</i>
Bluebird, fairy	<i>Irena puella</i>
Bulbul, red whiskered	<i>Pyenonotus jacosus</i>
Brown, noddy	<i>Anous stolidus</i>
Crow, jungle	<i>Corvus macrorhynchos</i>
Crow-pheasant	<i>Centropus sinensis</i>
Cuckoo, Emerald	<i>Chalcites maculatus</i>
Cuckoo, Himalayan	<i>Cuculus saturatus saturatus</i>
Cuckoo, Indian	<i>Cuculus micropterus</i>
Cuckoo, Small	<i>Cuculus poliocephalus</i>
Cuckoo, Violet	<i>Chalcites xanthorhynchus</i>
Cuckoo-dove, Andaman	<i>Macropygia rufipennis</i>
Curlew, Eurasian	<i>Nunrnius avguata</i>
Dove, Emerald	<i>Chalcophaps indica</i>
Dove, Red turtle	<i>Streptopelia tranquebarica</i>

COMMON NAME	SCIENTIFIC NAME
Drongo, Andaman	<i>Dicrurus andamanensis</i>
Eagle, Andaman Dark serpent	<i>Spilornis elgini</i>
Eagle, Crested serpent	<i>Spilornis cheela</i>
Eagle, White-bellied sea	<i>Haliaeetus leucogaster</i>
Egred, cattle	<i>Bubulcus ibis</i>
Harrier, Marsh	<i>Circus aeruginosus</i>
Heron, Grey	<i>Ardea cinerea</i>
Heron, Reef	<i>Egretta sacra</i>
Kingfisher, Black-capped	<i>Halcyon pileata</i>
Kingfisher, storkbilled	<i>Pelargopsis capensis</i>
Kingfisher, Blue-eared	<i>Alcedo meninting</i>
Kingfisher, White-collared	<i>Halcyon chloris</i>
Kite, pariah	<i>Milvus migrans</i>
Lorikeet, Indian	<i>Loriculus vernalis</i>
Minivet, Scarlet	<i>Pericrocotus flammeus</i>
Myna, White-headed	<i>Sturnus erythropygius</i>
Nightjar, Large tailed	<i>Caprimulgus macrurus</i>
Oriole, Blacknaped	<i>Oriolus chinensis</i>
Owl, Barn	<i>Tyto alba</i>
Parakeet, Alexandrine	<i>Psittacula eupatria</i>
Parakeet, Redcheeked	<i>Psittacula longicauda</i>
Parakeet, Redbreasted	<i>Psittacula alexandri</i>
Pigeon, Andaman wood	<i>Columba palumbiodes</i>
Pigeon, Green Imperial	<i>Ducula aenea</i>
Monarch, black naped	<i>Hypothymis isazurea</i>
Osprey	<i>Pandion haliaetus</i>
Parakeet, Bernal Hanging	<i>Loriculus vernalis</i>
Dish Barn Hawk	<i>Ninox scutulata</i>
Pigeon, Greyfronted green	<i>Treron pompadora</i>
Pigeon, pied Imperial	<i>Ducula bicolor</i>
Pipit, Redthroated	<i>Anthus cervinus</i>
Redshank, common	<i>Tringa totonus</i>
Roller, Broadbilled	<i>Eurystomus orientalis</i>
Robin, Magpie	<i>Copsychus saularis</i>
Sandpiper, commom	<i>Tringa hypoleucos</i>
Sunbird, Olive-backed	<i>Nectarinia jugularis</i>
Swallow-shrike, whiterumped	<i>Artamus leucorhynchus</i>
Swift, Large Brown throated Spinetail	<i>Chaetura gigantea</i>
Swift, The	<i>Apus apus</i>
Swiftlet, White-bellied	<i>Collocalia esculenta</i>
Teal, Cotton	<i>Nettapus coromandelianus</i>
Teal, Grey Andaman	<i>Anas Gibberifrons</i>
Teal, Lesser whistling	<i>Dendrocygna javanica</i>
Tern, Black-naped	<i>Sterna sumatrana</i>
Tern, Black winged Bridled	<i>Sterna anaethetus</i>
Thrush, siberian Ground	<i>Zoothera sibirica</i>
Tree pie, Andaman	<i>Dendrocitta bayleyi</i>
Tern, Lesser crested	<i>Sterna bengalensis</i>
Tern, Roseate	<i>Sterna dougallii</i>

COMMON NAME	SCIENTIFIC NAME
Tern, chinese crested	<i>Sterna zimmermanni</i>
Tern, Little	<i>Sterna alvifrons</i>
Tern, Bridled	<i>Sterna anactheetus</i>
Wagtail, Grey	<i>Motacilla cinerea</i>
Waterhen, White-breasted	<i>Amaurornis phoenicurus</i>
Whimberel	<i>Numenius phaeopus</i>
Whistler, Mangrove	<i>Pachycephala grisola</i>
Woodpecker, Fulvous-breasted pied	<i>Picoides macei</i>
Woodpecker, Indian Great Black	<i>Dryocopus javensis</i>
Terek Sandpiper	<i>Xenus clnerous</i>
Curlew Sanspiper	<i>Calidris ferruginea</i>

Butterflies

Common Name	Scientific Name
Birdwing, Common	<i>Troides helena ferrari</i> <i>T.h. heliconoides</i>
Clubtail, Andaman	<i>Atrophaneura rhodifer</i>
Clubtail, Common	<i>Atrophaneura coon sambilanga</i>
Helen, Andaman	<i>Papilio fuscus andamanicus</i>
Mime, Common	<i>Papilio clytia flavolimbatus</i>
Mormon, Andaman	<i>Papilio mayo</i>
Mormon, Common	<i>Papilio polytes nikobarus P.p.stichioides</i>
Sapphire, Purple	<i>Heliophorus epicles indicus</i>
Sunbeam, Burmese	<i>Curepis saronis saronis</i>
Sworditail, Fivebar	<i>Graphium antiphates epaminondas</i>

Crabs:

Calappa hepatica	<i>Thalamita Crenata</i>
Etisus laevimanus	<i>Thalamita prymna</i>
Grapsus spp.	<i>Thalamita spp.</i>
Leptodius sanguineus	<i>Uca dussumieri</i>
Maluta vistor	<i>Uca annulipes</i>
Mictyris longicarpus	<i>Uca vocens</i>
Searma bidens	<i>Uca spp.</i>
Tetragonon spp.	

Sea Pens:

Cavernularia obesa	<i>Pteroeides chinense</i>
Dendronephthya booleyi	<i>Pteroeides crassum</i>
Pennatula pendula	

Sea Stars and Brittles Stars:

Acanthaster planci	<i>Ogmaster capella</i>
Archeaster typicus	<i>Ophiocoma scolopendrina</i>
Astropecten monacanthus	<i>Ophioleis cincta</i>
Astropecten polyacanthus	<i>Ophiomatrix annulosa</i>
Craspidaster hesperus	<i>Ophioplocus imbricatus</i>
Culcita novaeguineae	<i>Patiriella pseudoexigue</i>
Echinothrix calamaris	<i>Ophiarthrum pictum</i>
Enchinaster lunonicus	<i>Ophiowma eninacens</i>

**List of species of Corals recorded in A&N Islands
and Mahatma Gandhi Marine National Park**

FAMILY - Pocilloporidae

Siylophora pistillata (Esper)
Seriatopora crassa (Quelch)
S. hystrix (Dana)
S. stellate (Quelch)
Pocillopora ankeli (Scheer and Pillai)
P. brevicornis (Lamarck)
P. damicornis (Linnaeus)
P. eydouxii (Milne Edwards and Haime)
P. meandrina var. *nobili* (Verrill)
P. verrucosa (Ellis and Solander)

FAMILY - Acroporidae

Acropora armata (Brook)
A. botryoides (Brook)
A. brueggemanni (Brook)
A. calamaria (Brook)
A. canalis (Quelch)
A. cancellata (Brook)
A. clathrata (Brook)
A. clavigera (Brook)
A. conigera (Dana)
A. corymbosa (Lamarck)
A. digitifera (Dana)
A. diversa (Brook)
A. dumosa (Brook)
A. echinata (Dana)
A. efflorescens (Dana)
A. formosa (Dana)
A. grandis (Brook)
A. gravide (Dana)
A. humilis (Dana)
A. hyacinthus (Dana)
A. intermedia (Brook)
A. irregularis (Brook)
A. millepora (Enrenberg)
A. monticulosa (Bruggemann)
A. multiacuta (Namenzo)
A. nobillii (Dana)
A. pacifica (Brook)
A. nasuta (Dana)
A. palifera (Lamarck)
A. palmerae Wells
A. pinguis Wells

A. pulchra (Brook)
A. secale (Studer)
A. squarrosa (Ehrenberg)
A. surculosa (Dana)
A. variabilis (Klunzinger)
A. virgate (Dana)
A. astreopora listeri (Bernard)
Montipora cocosensis (Vaughan)
M. composita crossland
M. digitata (Dana)
M. florida (Nomenzo)
M. foliosa (Pallas)
M. fruiticosa (Bernard)
M. hispida (Dana)
M. peltiformis (Bernard)
M. tortuosa (Dana)
M. turgescens (Dana)

FAMILY - Agariciidae

Coelosseris mayeri (Vaughan)
Leptosseris fragilis (Milne Edwards and Haime)
L. papyracea (Dana)
Pachyseris gemmae (Nomenzo)
P. rugosa (Lamarck)
P. speciosa (Dana)
Pavona clavus (Dana)
P. decussata (Dana)
P. duerdeni (Vaughan)
P. explanulata (Lamarck)
P. obtusa (Quelch)
P. praetorta (Dana)
P. varians (Verrill)
P. xarifae (Scheer and Pillai)

FAMILY - Siderasteridae

Pseudosiderastrea tayami (Yabe and Sugiyama)

Family - Fungiidae

Cycloseris costulata (Ortmann)
C. cyclolites (Lamarck)
C. distorta (Michelin)
C. hexagonalis (Milne Edwards and Haime)
C. sinensis (Milne Edwards and Haime)
Fungia denai (Milne Edwards and Haime)
F. echinata (Pallas)
F. fungites (Linnaeus)
F. horrida (Dana)
F. repanda (Dana)
F. scutaria (Lamarck)

F. somerville (Gardiner)
Fungiacyathus symmetrica (Pourtales)
Herpitogloss simplex (Gardiner)
Herpolitha limax (Esper)
Polyphyllia talpina (Lamarck)

Family - Poritidae

Alveopora daedalea (Forsk.)
Goniopora columna (Dana)
G. peteolata (Bernard)
G. planulata (Ehrenberg)
G. stokesi (Milne Edwards and Haime)
G. tenuidens (Quelch)
Porites eridani (Umbgrove)
P. lobata (Dana)
P. lutea (Milne Edwards and Haime)
P. nigrescens (Dana)
P. porites (Pallas)
P. soida (Forsk.)
P. ternuis (Verrill)

FAMILY - Faviidae

Coelaseris magiri (Vaughan)
Cyphastrea microphthalma (Lamarck)
Diploastrea helipora (Lamarck)
Echinopora horrida (Dana)
E. lamellosa (Esper)
F. speciosa (Dana)
F. stelligera (Dana)
F. valenciennesi (Milne Edwards and Haime)
Favites abdita (Ellis and Solander)
F. complanata (Ehrenberg)
F. flexuosa (Dana)
F. halicora (Ehrenberg)
Goniastrea benhami (Vaughan)
G. pectinata (Ehrenberg)
G. planulata (Milne Edwards and Haime)
G. retiformis (Lamarck)
Hydnophora exesa (Pallas)
H. laxa (Dana)
H. microconos (Lamarck)
Leptastrea purpurea (Dana)
Leptoria phrygia (Ellis and Solander)
Oulastrea crispata (Lamarck)
Oulophyllia aspere (Quelch)
Platygyra daedalea (Ellis & Solander)
P. lamellina (Ehrenberg)
P. sinensis (Milne Edwards & Haime)
Plesiastrea versipora (Lamarck)
Prachphyllia geoffroyi (Auduin)

Family - Rhizangiidae

Culicia rubeola (Quoy and Gaimard)

Source : D'Souza (1996)

FISHES FOUND IN THE MAHATMA GANDHI MARINE NATIONAL PARK

SCIENTIFIC NAME	COMMON NAME
FAMILY : Dasyatidae	Stingrays
FAMILY : Synodontidae	Lizardfishes
<i>Synodus variegatus</i>	
FAMILY : Atherinidae	Silversides
FAMILY : Belonidae	Needlefishes
FAMILY : Syngnathidae	Pipefishes
FAMILY : Scorpaenidae	Scorpionfishes
<i>Pterois miles</i>	Lionfish
<i>Pterois radiata</i>	Clearfin Lionfish
FAMILY : Serranidae, SUB	Groupers
FAMILY : Epinephelinae	
<i>Aethaloperca rogae</i>	Redmouth Grouper
<i>Anyperodon leucogrammicus</i>	White Lined Grouper
<i>Cephalopholis argus</i>	Leopard Grouper
<i>Cephalopholis miniata</i>	Coral Grouper
<i>Cromileptes altivelis</i>	Polkadot Grouper
<i>Epinephelus fasciatus</i>	Black Tipper Grouper
<i>Epinephelus fuscoguttatus</i>	Brownmarbled Grouper
<i>Epinephelus merra</i>	Honeycomb Grouper
<i>Epinephelus tauvina</i>	Greasy Grouper
<i>Plectropomus maculatus</i>	Coral Cod
<i>Variola louti</i>	Lyretail Grouper
FAMILY : Serranidae / SUB	Diploprion bifasciatum-Double
FAMILY : Diploprioninae placed with Grammistidae, Soapfishes, by some authors	Banded Perch
FAMILY : Serranidae / SUB	Fairy Basslets
FAMILY : Anthiinae	Lyretail Fairy Basslet
<i>Pseudanthias squammipinnis</i>	
FAMILY : Cirrhitidae	Hawkfishes
<i>Cirrhitichthys oxycephalus</i>	
<i>Paracirrhites forsteri</i>	Blackside Hawkfish
FAMILY : Apogonidae	Cardinalfishes
<i>Apogon sp.</i>	
<i>Cheilodipterus quinquelineata</i>	Five Lined Cardinalfish
<i>Cheilodipterus sp.</i>	
FAMILY : Carangidae	Jacks / Trevallies
<i>Caranx sp.</i>	
<i>Elegatis bipinnulatus</i>	Rainbow Runner
FAMILY : Lutjanidae	Snappers
<i>Lutjanus biguttatus</i>	Twospot Snapper
<i>Lutjanus bohar</i>	Twinspot Snapper
<i>Lutjanus decussatus</i>	Chequered Snapper
<i>Lutjanus of fulviflamma</i>	
<i>Lutjanus of fulvus</i>	
<i>Lutjanus kasmira</i>	Bluelined Snapper
<i>Lutjanus of monostigmus</i>	
<i>Lutjanus of waigensis</i>	
FAMILY : Caesionidae	Fusiliers
<i>Caesio caerulaurea</i>	Scissortail Fusilier

	<i>Caesio cuning</i>	Yellowtail Fusilier
	<i>Caesio lunaris</i>	Lunar Fusilier
	<i>Pterocresio marri</i>	Twinstripe Fusilier
	<i>Pterocresio pisang</i>	Ruddy Fusilier
FAMILY :	Haemulidae	Sweetlips
	<i>Plectorhinchus picus</i>	Spotted Sweetlips
	<i>Plectorhinchus orientalis</i>	Oriental Sweetlips
FAMILY :	Nemipteriadae	Monocle Breems or Spinecheeks
	<i>Scolopsis bilineatus</i>	Twoline Monocle Bream
	<i>Scolopsis ciliatus</i>	Ciliate Monocle Bream
		Emperors
	<i>Montaxis grandoculus</i>	Big Eye Emperor
	Other Emperors (3 species)	
FAMILY –	Mullidae	Cod Fishes
	<i>Parupeneus barberinus</i>	Dash and Dot Goatfish
	<i>Parupeneus cyclostomus</i>	Yellow Goatfish
	<i>Upeneus of vittatus</i>	
FAMILY –	Pempheridae	Sweepers
	<i>Pempheris oualensis</i>	Bronze Sweeper
FAMILY :	Kyphosidae	Sea Chubs
	<i>Kyphosus sp.</i>	
FAMILY –	Ephippidae	Batfishes
	<i>Platax pinnatus</i>	
FAMILY :	Chaetodontidae	Butterflyfishes
	<i>Chaetodon auriga</i>	Threadfin Butterflyfish
	<i>Chaetodon collare</i>	
	<i>Chaetodon decussatus</i>	Indian Vagabond Butterflyfish
	<i>Chaetodon falcula</i>	Saddleback Butterflyfish
	<i>Chaetodon guttatissimus</i>	Spotted Butterflyfish
	<i>Chaetodon lineolatus</i>	Lind Butterflyfish
	<i>Chaetodon lunula</i>	Racoon Butterflyfish
	<i>Chaetodon menlannotus</i>	Black Backed Butterflyfish
	<i>Chaetodon octofasciatus</i>	Eight Banded Butterflyfish
	<i>Chaetodon plebeius</i>	Blue Spot Butterflyfish
	<i>Chaetodon rafflesi</i>	Raffles's Butterflyfish
	<i>Chaetodon triangulum</i>	Triangular Butterflyfish
	<i>Chaetodon trifascialis</i>	Chevron Butterflyfish
	<i>Chaetodon vagabundus</i>	Vagabond Butterflyfish
	<i>Forcipiger flavissimus</i>	Long Nosed Butterflyfish
		Masked Bannerfish
	<i>Heniochus pleurotaenia</i>	Indian Bannerfish
FAMILY :	Pomacanthidae	Angelfishes
	<i>Apolemichthys xanthurus</i>	Indian Yellow Angel
	<i>Centropyge eibli</i>	
	<i>Centropyge sp.</i>	
	<i>Pygoplites diacanthus</i>	Regal Angel
	<i>Pomacanthus annularis</i>	Blue Ringed Angel
	<i>Pomacanthus imperator</i>	Emperor Angel
	<i>P. semicirculatus</i>	Semicircle Angel
	<i>Pomacanthus xanthometopon</i>	
FAMILY :	Pomacentridae	Damselfishes
	<i>Amphiprion akallopison</i>	Skunk Anemonefish
	<i>Ampuiprion clarkii</i>	Clark's Anemonefish

<i>Amphiprion ephippium</i>	Red Saddleback Anemonefish
<i>Amphiprion ocellaris</i>	False clown Anemonefish
<i>Premnas blaculeatus</i>	Spine Cheeked Anemonefish
<i>Chromis dimidiata</i>	Half and Half Chromis
<i>Chromis ternatensis</i>	Ternate Chromis
<i>Chromis viridis</i>	Blue-green Chromis
<i>Chromis weberi</i>	Weber's Chromis
<i>Other Chromis spp. 5 unidentified species</i>	
<i>Dascyllus aruanus</i>	Humbug or Footballer
<i>Dascyllus reticulatus</i>	
<i>Dascyllus trimaculatus</i>	Domino Damsel
<i>Abudefduf saxatilis</i>	Sergeant Major
<i>Abudefduf septemfasciatus</i>	Banded Sergeant Major
<i>Amblyglyphidodon leucogaster</i>	White Belly Damsel
<i>Dischistodus spp. 4 unidentified species</i>	
<i>Paraglyphidodon melas</i>	Black Damsel
FAMILY : Labridae	Wrasses
<i>Bodianus axillaris</i>	Axil Spot Hogfish
<i>Choerodon anchorago</i>	Yellow cheeked Tuskfish
<i>Pseudolax moluccanus</i>	Chieltooth Wrasse
<i>Cheilinus fasciatus</i>	Red-breasted Wrasse
<i>Epibulus insidiator</i>	Slingjaw Wrasse
<i>Anampses of lineatus</i>	
<i>Anampses meleagrides</i>	Yellowtail Wrasse
<i>Coris aygula</i>	Clown Coris
<i>Gomphosus caeruleus</i>	Bird Wrasse
<i>Halichoeres hortulanus</i>	Chequerboard Wrasse
<i>Hemigymnus fasciatus</i>	Five barred Wrasse
<i>Hemigymnus melapterus</i>	Half and Half Wrasse
<i>Hologymnosus annulatus</i>	
<i>Stethojulis of bandanensis</i>	
<i>Stethojulis strigiventor</i>	Three ribbon Wrasse
<i>Thalassoma hardwickii</i>	Six barred Wrasse
<i>Thalassoma sp.</i>	Moon Wrasse
<i>Labroides dimidiatus</i>	Bluestreak Cleaner Wrasse
FAMILY : Scaridae	Parrotfishes
<i>Bolbemetopon muricatum</i>	Humphead Parrot
<i>Cetoscarus bicolor</i>	Bicolour Parrot
<i>Hipposcarus harid</i>	Longnose Parrot
<i>Scarus frenatus</i>	Vermiculate Parrot
<i>Scarus ghobban</i>	Blue-barred Parrot
<i>Scarus gibbus</i>	
<i>Scarus niger</i>	Black Parrot
<i>Scarus prasiognathos</i>	Green Throat Parrot
<i>Scarus rhoduropterus</i>	
<i>Scarus sordidus</i>	Bullethead Parrot
FAMILY : Pinguipedidae	Sandperches
<i>Parapercis hexopthalma</i>	Spotted Sandperch
FAMILY : Blennidae	Blennys
<i>Ecsenius bicolor</i>	Bicolour Blenny
<i>Plagiotremus rhyriorhynchus</i>	Bluestripe Blenny

FAMILY : Microdesmidae	Hovergobies
<i>Ptereleotris microlepis</i>	Small Scale Hovergoby
FAMILY : Gobiidae	Gobies
<i>Cryptocentrus sp. (3 species)</i>	
<i>Valenciennea sexguttata</i>	Six Spot Goby
FAMILY : Acanthuridae	Surgeonfishes and Unicornfishes
<i>Acanthurus leucosternon</i>	Powder-blue Tang
<i>Acanthurus lineatus</i>	Bluelined Surgeon
<i>Acanthurus mata</i>	
<i>Acanthurus triostegus</i>	Convict Tang
<i>Ctenochaetus striatus</i>	Striped Bristletooth
<i>Zebrasoma scopas</i>	Brown Sailfin Tang
<i>Zebrasoma veliferum</i> Sailfin	
Tang	
<i>Naso brevirostris</i>	Spotted Unicornfish
<i>Naso hexacanthus</i>	Sleek Unicornfish
<i>Naso lituratus</i>	Orangespined Unicornfish
<i>Naso rigoletto</i>	
FAMILY : Zanclidae	Moorish Idol
<i>Zanclus canescens</i>	Moorish Idol
FAMILY : Siganidae	Rabbitfishes
<i>Siganus concatenatus</i>	
<i>Siganus corallinus</i>	Coral Rabbitfish
<i>Siganus magnificus</i>	
<i>Siganus vermiculatus</i>	Vermiculated Rabbitfish
<i>Siganus virgatus</i>	
FAMILY : Balistidae	Triggerfishes
<i>Balistopus undulatus</i>	Orangestripe Trigger
<i>Balistoides viridescens</i>	Titan Triggerfish
<i>Melichthys niger</i>	Black Triggerfish
<i>Odonus niger</i>	Redtooth Triggerfish
<i>Rhinecanthus aculeatus</i>	Picasso Triggerfish
<i>Sufflamen chysiptera</i>	Halfmoon Triggerfish
FAMILY : Monacanthidae	Filefish and Leatherjackets
<i>Oxymonacanthus longirostris</i>	Longnose Filefish
FAMILY : Ostraciidae	Trunkfishes
<i>Ostracion cubicus</i>	Cube Boxfish
FAMILY : Tetradontidae	Pufferfish
<i>Arothron stellatus</i>	

Source : D'Souza 1996 , from Christopher Wood, 1991

CUTHBERT BAY WILDLIFE SANCTUARY

Introduction

The Cuthbert Bay Sanctuary is one of the newest protected areas in the Andamans. It was established in 1997 specifically to protect the endangered marine turtles that come up from the sea every year to nest on the Cuthbert Bay beach.

The sanctuary is a long stretch of sandy beach located on the eastern coast of the Middle Andaman island. It forms a gently curved bay, opening out to the Andaman sea. The beach abuts a reserve forest which is also a part of the sanctuary. The forest plants and trees bordering the beach are typical littoral species such as *Pandanus*, *Barringtonia* and *Thespesia* sp. Interspersed among these are cycad trees which are rare and valuable and known as living fossils since prehistoric times. Planted casuarina trees grow in clumps or as

long strips along the shore. A freshwater stream called Dhani Nallah runs through the PA. This serves as a convenient watercourse for fisherfolk living further inland to take their boats down to the sea.

History

The PA has been carved out of the coastal zone Cuthbert Bay extraction area comprising giant evergreen forest which was part of a felling series. Block felling was done in 1970s to 1980s. Giant evergreen trees such as gurjan *Dipterocarpus* sp. were removed by selection felling and the logged area was intended to be converted into a regeneration area. However gurjan regeneration failed despite efforts to plant seedlings, since gurjan does not regenerate once disturbed and there was no technology available to reintroduce the species (pers comm. Mr Chatterjee, former DCF Mayabundar). Casuarina was planted along the beach to reclothe the land and also to serve as a wind break.

Subsequently the area became heavily encroached . The encroachers clearfelled the land for their cultivations and habitations. Though the encroachment is not regularised, schools and other facilities have been built by the revenue dept, which in effect encourage the settlers to stay.

Notification

Notified as sanctuary w.e.f. 24.4.1997. There is some discrepancy regarding the exact boundaries of the PA. According to the DCFs – both former and present, the sanctuary boundary begins to the north of Dhani Nalla , or in other words, the nallah demarcates the southern boundary of the sanctuary. However according to the ranger, Mr. Robert, the beach south of the nallah which largely resembles the sanctuary beach is also part of the sanctuary area. This needs to be verified and confirmed since there is evidence of turtle nesting there too.

Area & location.

The sanctuary area is 5.82 sq km..Located between Rangat and Mayabundar, the sanctuary is approached through a non-motorable lane off the main Andaman Trunk Road. Strict demarcation has not yet been done of core & buffer zones.

Flora & Fauna

There are no comprehensive records of the flora and fauna of this PA. The forest types present here are Littoral forest and Andaman 1A/C1 Tropical Giant Evergreen forest, which occur as a linear strip about 40 m wide along the beach. Mangrove forests are present in the estuaries. Dense clumps of planted casuarina (though casuarina occurs naturally elsewhere in the A&N islands, it not indigenous to this area) trees which are now about 15 years old also line the beach. The vegetation includes a good number of pandanus trees and valuable prehistoric cycads along with typical littoral species eg *Barringtonia*, *Pandanus*, *Thespesia*, *Ipomoea pes-caprae*, etc.

Fauna include spotted deer, wild pig, monitor lizard, sea turtles (Olive Ridley, Hawksbill, Green Sea and Leatherback).

Management

A permanent turtle hatchery as well as a temporary hatchery have been established by the forest dept. Eggs are collected from the beach and placed in pits in the hatchery for incubation. Hatchlings are then released into the sea.

A forest camp is located near the nallah, however forest staff are unable to prevent settlers and their livestock from using the beach and the forest land.

Status & Impacts

- The anthropogenic pressure on the PA is high as there are about 30 families living in the encroachment(1997 questionnaire).
- A forest extraction path through the PA causes disturbances.
- Undisciplined tourists who even come at night tend to disturb the turtle nesting process.
- Dogs and cattle (approx 60 cows, 30 buffaloes & 40 goats - 1997 questionnaire) belonging to the settlers roam freely on the beach. The dogs dig up turtle nests and destroy the eggs, while the cattle trample the sand.
- Natural predators such as monitor lizards and wild pig are also responsible for egg destruction.
- Effectively only the turtle nesting beach can be considered as a protected area since the forest regeneration area is completely encroached.
- Trawlers plying along the coast effect the biodiversity of the marine wetland since they indiscriminately catch all species of marine fauna including turtles. They specially target sharks for the shark fin trade.
- Settlers continuously disturb the beach with their presence and also use the beach for fishing. They fish for anchovies, mullets, sardines , etc.
- Forestry works disturb the forest area (1997 questionnaire)
- Deer, monitor lizards and turtles and their eggs are poached.

GALATHEA BAY WILDLIFE SANCTUARY

Introduction

The deeply curved bay called South Bay located on the south-eastern coast of the Great Nicobar island, and the sea enclosed by the bay, forms the Galathea Bay Wildlife Sanctuary. The Galathea River meets the sea in this bay. Littoral vegetation* found along the coastline to the east of the Galathea NP extends into this sanctuary as well. The mouth of the Galathea river has well developed mangroves with *Rhizophora mucronata*, *Bruguiera gymnorrhiza*, *Excoecaria agallocha*, *Carallia brachiata*, *Sonneratia acida*, *Timonius jambosella* and *Nypa fruticans* as the dominant species. (Rao 1996)

This 11 sq. km. protected area has been created specifically to protect the Leatherback Turtle *Dermochelys coriacea*. These highly endangered giant turtles come ashore every year to nest on this beach and lay their eggs during the season between the months of January and April. The huge Leatherback Turtle which can measure up to 12 ft does not nest anywhere else in India apart from Andaman & Nicobar islands, and even here have very few selected sites . Of these, the Galathea Wildlife Sanctuary is one of the most important.

* Please see BIOLOGICAL PROFILE of Galathea NP for a description of the littoral vegetation of Great Nicobar island.

Impacts on the PA and other issues

- This is the only protected area in Great Nicobar where there is some tourism. Until recently , large numbers of tourists - mostly local residents from Campbell Bay town , used to congregate on the beach to watch the egg-laying phenomenon, causing much disturbance and noise, and even behaving irresponsibly, like “riding” on the turtles. The Wildlife Department has now ordered patrolling of the beach during the season.
- As there is danger of predation by monitor lizards, a hatchery for the eggs has now been established to protect the eggs and to release the hatchlings safely into the sea .
- ***Marine pollution can have an adverse effect on this sanctuary. As the sea south of Pygmalion Point (which is only about 10 km. south of this PA) is a regular shipping route between the far east and the middle east, waste oil from the ships accumulates in the deep sea and can reach the shores of the sanctuary. Tar balls formed by wave action were seen deposited on beaches near this PA..***

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LIST OF INLAND VERTEBRATES HITHERTO RECORDED ON GREAT NICOBAR ISLAND

	FISH
1	<i>Megalops cyprinoides</i>
2	<i>Anguilla bicolor</i>
3	<i>Heteropneustes fossilis</i>
4	<i>Oryzias melastigma</i>
5	<i>Syngnathus spicifer</i>
6	<i>Platycephalus indicus</i>
7	<i>Apogon thermalis</i>
8	<i>Ambassis commersoni</i>
9	<i>Ambassis gymnocephalus</i>
10	<i>Terapon theraps</i>
11	<i>Gazza minuta</i>
12	<i>Leiognathus equulus</i>
13	<i>Lutjanus argentimaculatus</i>
14	<i>Gerres oblongus</i>
15	<i>Monodactylus argenteus</i>
16	<i>Toxotes jaculator</i>
17	<i>Liza macrolepis</i>
18	<i>Liza melinoptera</i>
19	<i>Valamugil buchanani</i>
20	<i>Valamugil cunnesius</i>
21	<i>Salarius fasciatus</i>
22	<i>Callogobius hasselti</i>
23	<i>Stigmatogobius romeri</i>
24	<i>Periophthalmus koelreuteri</i>
25	<i>Butis gymnopomus</i>
26	<i>Eleotris fusca</i>
27	<i>Eleotris andamanensis</i>
28	<i>Bunaka gyrinoides</i>
29	<i>Karamericus smithi</i> ¹
30	<i>Ophieleotris aporos</i>
31	<i>Ophiocara porocephala</i>
32	<i>Quisquilius eugenius</i>
33	<i>Channa sp</i>
34	<i>Chelonodon fluviatilis</i>
	AMPHIBIANS
35	<i>Bufo melanostictus</i>
36	<i>Bufo camortensis</i> ¹
37	<i>Microhyla heymonsi</i>
38	<i>Limnonectes cancrivora</i>
39	<i>Limnonectes doriae</i>

¹ Endemic to A&N Islands.

Source : Daniels 1997

AMPHIBIANS	
40	<i>Limnonectes limnocharis</i>
41	<i>Limnonectes shompenorum</i> ¹
42	<i>Limnonectes macrodon</i>
43	<i>Rana erythraea</i>
44	<i>Rana nicobariensis</i>
45	<i>Rana chalconota</i>
46	<i>Polypedates leucomystax</i>
47	<i>Polypedates insularis</i> ¹
REPTILES	
48	<i>Crocodylus porosus</i>
49	<i>Cuora amboinensis</i>
50	<i>Cnemaspis kandiana</i>
51	<i>Hemiphyllodactylus typus</i>
52	<i>Platyurus platyurus</i>
53	<i>Gecko gecko</i>
54	<i>Cyrtodactylus sp</i> ¹
55	<i>Hemidactylus frenatus</i>
56	<i>Phelsuma andamanense</i> ¹²
57	<i>Bronchocela cristatella</i>
58	<i>Bronchocela danieli</i> ¹
59	<i>Dasia nicobariensis</i> ¹
60	<i>Dasia olivacea</i>
61	<i>Mabuya rudis</i>
62	<i>Mabuya rugifera</i>
63	<i>Scincella macrotis</i> ¹
64	<i>Lipinia macrotympanum</i> ¹
65	<i>Dibamus lencurus</i>
66	<i>Varanus salvator</i>
67	<i>Xenopeltis unicolor</i>
68	<i>Python reticulatus</i>
69	<i>Boiga dendrophila</i>
70	<i>Boiga ochracea</i>
71	<i>Cerberus rhynchops</i>
72	<i>Dendrelaphis humayuni</i> ¹
73	<i>Dendrelaphis pictus</i>
74	<i>Elaphe flavolineata</i>
75	<i>Xenochropis melanzostus</i> ¹
76	<i>Xenochropis trianguligerus</i>
77	<i>Bungarus sp</i>
78	<i>Laticauda sp</i>
79	<i>Trimeresurus sp</i>

¹ Endemic to A&N Islands.

Source : Daniels 1997

BIRDS	
80	<i>Ardea purpurea</i>

81	<i>Butorides striatus</i>
82	<i>Ardeola grayii</i>
83	<i>Bubulcus ibis</i>
84	<i>Egretta alba</i>
85	<i>Egretta intermedia</i>
86	<i>Egretta sacra</i>
87	<i>Gorsachius melanolophus</i>
88	<i>Ixobrychus cinnamomeus</i>
89	<i>Ixobrychus sinensis</i>
90	<i>Accipiter butleri</i> ¹
91	<i>Accipiter soloensis</i>
92	<i>Haliaeetus leucogaster</i>
93	<i>Spilornis minimus</i> ¹
94	<i>Megapodius nicobariensis</i> ¹
95	<i>Amaurornis phoenicurus</i>
96	<i>Pluvialis squatarola</i>
97	<i>Pluvialis dominica</i>
98	<i>Charadrius mongolus</i>
99	<i>Numenius phaeopus</i>
100	<i>Tringa totanus</i>
101	<i>Tringa ochropus</i>
102	<i>Tringa terek</i>
103	<i>Tringa hypoleucos</i>
104	<i>Arenaria interpres</i>
105	<i>Capella stenura</i>
106	<i>Scolopax rusticola</i>
107	<i>Calidris minutus</i>
108	<i>Dromas ardeola</i>
109	<i>Sterna sumatrana</i>
110	<i>Anous stolidus</i>
111	<i>Treron pompadora</i>
112	<i>Ducula acnea</i>
113	<i>Ducula bicolor</i>
114	<i>Columba livia</i>
115	<i>Columba palumboides</i> ¹
116	<i>Macropygia rufipennis</i> ¹
117	<i>Chalcophaps indica</i>
118	<i>Caloenas nicobarica</i>
119	<i>Psittacula caniceps</i> ¹
120	<i>Psittacula longicauda</i>
121	<i>Loriculus vernalis</i>

¹ Endemic to A&N Islands.

Source : Daniels 1997

	BIRDS
122	<i>Cuculus sparverioides</i>
123	<i>Cuculus saturatus</i>
124	<i>Edynamys scolopacea</i>
125	<i>Centropus sp</i>
126	<i>Otus scops</i>
127	<i>Ninox affinis</i> ¹
128	<i>Collocalia fuciphaga</i>
129	<i>Collocalia esculenta</i>
130	<i>Alcedo atthis</i>
131	<i>Ceyx erithacus</i>
132	<i>Pelargopsis capensis</i>
133	<i>Halcyon chloris</i>
134	<i>Halcyon pileata</i>
135	<i>Merops philippinus</i>
136	<i>Pitta sordida</i>
137	<i>Hirundo rustica</i>
138	<i>Lanius cristatus</i>
139	<i>Oriolus chinensis</i>
140	<i>Dicrurus paradiseus</i>
141	<i>Dicrurus andamanensis</i> ¹
142	<i>Aplonis panayensis</i>
143	<i>Gracula religiosa</i>
144	<i>Coracina nigra</i>
145	<i>Rhinomyias brunneata</i>
146	<i>Muscicapa latirostris</i>
147	<i>Terpsiphone paradisi</i>
148	<i>Monarcha azurea</i>
149	<i>Phylloscopus tenellipes</i>
150	<i>Anthus cervinus</i>
151	<i>Motacilla flava</i>
152	<i>Motacilla caspica</i>
153	<i>Nectarinia jugularis</i>
154	<i>Aethopyga siparaja</i>
155	<i>Zosterops palpebrosa</i>

¹ Endemic to A&N Islands.

Source : Daniels 1997

	MAMMALS
156	<i>Macaca umbrosa</i> ¹
157	<i>Tupaia nicobarica</i> ¹
158	<i>Crocidura nicobarica</i> ¹
159	<i>Felis spp</i>
160	<i>Sus scrofa</i>
161	<i>Pteropus melanotus</i>
162	<i>Pteropus faunulus</i> ¹
163	<i>Taphozous saccolaimus</i>
164	<i>Hipposideros ater</i>
165	<i>Pipistrellus camortae</i> ¹
166	<i>Pipistrellus coromandra</i>
167	<i>Pipistrellus sp</i>
168	<i>Rattus rattus</i>
169	<i>Rattus pulliventer</i> ¹
170	<i>Rattus burrescens</i> ¹

¹ Endemic to A&N Islands.

Source : Daniels 1997

BUTTERFLIES OF GREAT NICOBAR ISLAND

Zoological Name	Common Name	Distribution	Status
PAPILIONIDAE			
<i>Troides helena ferrari</i> Tytler	The Nicobar Birdwing	Endemic	Common
<i>Atrophaneura coon samblinga</i> Doherty	The Nicobar Clubtail	Endemic	Very rare
<i>Atrophaneura aristolochiae kondulana</i> Evans	The Nicobar Rose	Endemic	Common
<i>Papilio memnon agenor</i> Linnaeus	The Great Normon		Rare
<i>Papilio polytes nikobarus</i> Felder	The Nicobar Normon	Endemic	Common
<i>Graphium agamemnon pulo</i> Evans	The Nicobar Tailed Jay	Endemic	Common
PIERIDAE			
<i>Leptosia nina nicobarica</i> Doherty	The Nicobar Psyche	Endemic	Very common
<i>Cepora nerissa lichenosa</i> Moore	The Common Gull	-	Common
<i>Cepora nadina andamana</i> Swinhoe	The Andaman Lesser Gull	Endemic	Common
<i>Anapheis aurota aurota</i> Fabricius	The Pioneer	-	Straggler
<i>Apias lynxida nicobarica</i> Moore	The Nicobar Chocolate Albatross	Endemic	Common
<i>Appias paulina galathea</i> Felder	The Galathea Lesser Albatross	Endemic	Common
<i>Saletara panda chrysea</i> Fruhstorfer	The Nicobar Albatross	Endemic	Rare
<i>Gandaca harina nicobarica</i> Evans	The Nicobar Tree Yellow	Endemic	Rare
<i>Eurema blanda grisea</i> Evans	The Nicobar Tree Grass Yellow	Endemic	Common
<i>Eurema hecabe nicobariensis</i> Felder	The Nicobar Grass Yellow	Endemic	Very rare
LYCAENIDAE			
<i>Spalgis epius epius</i> Westwood	The Apefly	-	Rare
<i>Spalgis epius nubilus</i> Moore	The Bay Apefly	Endemic	Rare
<i>Loxura atymnus nicobarica</i> Evans	The Nicobar Yamfly	Endemic	Common
Zoological Name	Common Name	Distribution	Status
<i>Hypolycaena thecloides</i>	The Nicobar Tit	Endemic	Rare

<i>nicobarica</i> Evans			
<i>Deudoryx epijarbus amatius</i> Fruhstorfer	The Cornelian	-	Very rare
<i>Bindahara phocides areca</i> Felder	The Nicobar Plane	Endemic	Common
<i>Castalius rosimon alarbus</i> Fruhstorfer	The Common Bay Pierrot	Endemic	Very rare
<i>Castalius ethion airavati</i> Doherty	The Nicobar Branded Blue Pierrot	Endemic	Common
<i>Magisba malaya presbyter</i> Fruhstorfer	The Nicobar Malayan	Endemic	Rare
<i>Lycaenopsis puspa prominens</i> de Niceville	The Nicobar Blue Hedge	Endemic	Very rare
<i>Everes parrhasius pila</i> Evans	The Nicobar Small Cupid	Endemic	Rare
<i>Euchrysops cnejus</i> Fabricius	The Blue Gram	-	Common
<i>Jamides bochus nicobaricus</i> WM & de Niceville	The Nicobar Dark Cerulean	Endemic	Common
<i>Jamides celeno nicevillei</i> Evans	The Nicobar Common Cerulean	Endemic	Common
<i>Jamides alecto kondulana</i> Felder	The Kondul Cerulean	Endemic	Rare
<i>Jamides kankena kankena</i> Felder	The Nicobar Cerulean	Endemic	Rare
<i>Nacaduba pactolus macropthalma</i> Felder	The Large Four Lineblue	Endemic	Rare
<i>Nacaduba hermus major</i> Evans	The Nicobar Pale Four Lineblue	Endemic	Rare
<i>Nacaduba vajuna varia</i> Evans	The Nicobar Lineblue	Endemic	Rare
<i>Nacaduba kurava nicobarica</i> Toxopeus	The Nicobar Transparent Six Lineblue	Endemic	Rare
<i>Nacaduba nora dilata</i> Evans	The Nicobar Lineblue	Endemic	Common
<i>Curetis saronis nicobarica</i> Swinhoe	The Nicobar Sunbeam	Endemic	Rare

NYMPHALIDAE

<i>Parthenos sylvia nila</i> Evans	The Nicobar Clipper	Endemic	Very rare
<i>Neptis columella kankena</i> Evans	The Nicobar Shortbanded Sailor	Endemic	Very rare
<i>Neptis hylas nicobarica</i> Moore	The Nicobar Common Sailor	Endemic	Very common
Zoological Name	Common Name	Distribution	Status
<i>Cyrestis tabula</i> de niceville	The Nicobar Map Butterfly	Endemic	Rare
<i>Hypolimnas antilope anomala</i> Wallace	The Malayan Eggfly	-	Rare
<i>Precis almana</i>	The Nicobar Peacock	Endemic	Common

<i>nicobarensis</i> Felder	Pancy		
<i>Precis atlites</i> Linnaeus	The Grey Pancy	-	Common
<i>Cupha erymanthis nicobarica</i> Felder	The Nicobar Rustic	Endemic	Common
<i>Atella alcippe fraterna</i> Moore	The Nicobar Small Leopard	Endemic	Rare
<i>Cirrochroa nicobarica</i> WM & Niceville	The Nicobar Yeomen	Endemic	Common
<i>Cethosis biblis nicobarica</i> Felder	The Nicobar Lace-wing	Endemic	Common

DANAIDAE

<i>Danaus plexippus plexippus</i> Linnaeus	The Plain Tiger	-	Common
<i>Danaus melanipus nesippus</i> C. Felder	The Nicobar White Tiger	Endemic	Common
<i>Danaus gautama gautamoides</i> Doherty	The Tiger	Endemic	Rare
<i>Danaus aglea agleoides</i> Felder	The Glassy Tiger	-	Common
<i>Danaus nilgiriensis</i> Moore	The Nilgiri Tiger	-	Common
<i>Danaus similis nicobarica</i> WM & de Niceville	The Nicobar Tiger	Endemic	Common
<i>Euploea core simulatrix</i> WM & de Niceville	The Nicobar Crow	Endemic	Very Common
<i>Euploea crameri frauanfeldii</i> C. Felder	The Nicobar Black Crow	Endemic	Common
<i>Tirumala limniace limniace</i> Cramer	The Blue Tiger	-	Rare

SATYRIDAE

<i>Elymnias panthera mimus</i> WM & de Niceville	The Nicobar Palmfly	Endemic	Common
<i>Melanitis leda ismene</i> Cramer	The Common Evening Brown	-	Very rare
<i>Mycalesis anaxias manii</i> Doherty	The Nicobar White-bar Bushbrown	Endemic	Common
<i>Lethe europa tamuna</i> de Niceville	The Nicobar Bamboo Treebrown	Endemic	Very common

Zoological Name	Common Name	Distribution	Status
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HESPERIDAE

<i>Hasora badra badra</i> Moore	The Common Awl	-	Common
<i>Hasora taminatus almea</i> Swinhoe	The White-banded Awl	-	Very rare
<i>Tagiades atticus helferi</i> Felder	The Nicobar Snow Flat	Endemic	Common

<i>Gangara thrysis yasodara</i> Fruhstorfer	The Bay Giant Redeye	Endemic	Common
<i>Cephrenes palmarum</i> <i>nicobarica</i> Evans	The Nicobar Plain Palmdart	Endemic	Very rare

Source : Chandra & Khatri 1995

INGLIS or EAST ISLAND SANCTUARY

Located to the east of Henry Lawrence island, this island is 355 ha in area and situated between latitudes 12°07'45" - 12°08'54" and longitudes 93°06'45" - 93°07'35". It was notified as a sanctuary in 1987. The local name of Inglis island is Sial-ereme (Pande et al 1991).

Very little documentation has been done separately for the flora and fauna of this island. However on account of its proximity to Henry Lawrence, some similarity could be expected between the vegetation of the two islands. The bird list appended to the report on Rani Jhansi Marine National Park included the birds recorded in Inglis, though they are not indicated separately.

A sea grass meadow located south east of Inglis towards Henry Lawrence island has been assessed to have high biological value, though it is disturbed by human interference (Das 1997). Sea turtles and dugongs are reported to be common in this area and are hunted using deisel-fired torches. A limestone cave on the west coast has a colony of insectivorous bats *Hipposideros cinerus*, a species reported for the first time on these islands (Indraneil Das 1998). Nests of the endangered Edible nest Swiftlet *Collacalia fuciphaga* used to be found in caves in this island a few years ago, but there was a 100% decline by 1998 (Sankaran 1998).

The present visit (April 1999) also found evidence of extensive damage to corals near Inglis island, where corals were found to be broken and scattered in the sea bed when observed through snorkelling. This could be attributed to dragging of anchors while fishing for coral reef fish and other marine fauna.

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INTERVIEW ISLAND SANCTUARY

Interview is one of the largest islands in the Andaman group barring the main land masses of North, Middle, South and Little Andaman islands. The island is long and narrow, only about 5 km at its widest, and is located to the west of the island chain, lying parallel to the junction between North and Middle Andamans. The entire island was notified in 1985 as a sanctuary. With an area of 133 sq.km., it is the largest protected area in the A&N Union Territory.

The eastern length is lined by mangroves, except for the southernmost portion which is rocky all the way up to the south tip. The western side is dominated by cliffs and rocks with some mangrove to the north. The trees in the forest to the north-west of the island have been shaped and slanted by strong winds blowing in the area.

Thickly vegetated with valuable timber, the island was given on logging contract during the 1950s. The island is known for its population of feral elephants, which originated from the team of domesticated elephants that were brought from the mainland for the logging work. These were then abandoned on the island once the forestry operations ceased. There are several natural waterholes and streams scattered over the island which are a source of freshwater. Coral patches fringe the shallow waters around the island.

Location

Interview is located in the Andaman District 20 km from Mayabundar between Lat. 12°46'56" to 12°59'02" and Long. 92°39'04" to 92°43'23".

Vegetation

The main forest types are Andaman Tropical Evergreen Forest, Andaman Semi-Evergreen Forest, Littoral Forest and Mangrove (Tidal Swamp) Forest. The vegetation of the interior of the island is uniform with tropical evergreen forest species, except for the portions that had been logged earlier. About 36 ha of teak was planted in the period 1956 – 63, and 4 - 5 ha. were converted into plantations of *Lagerstroemia hypoleuca* a deciduous tree species in the early 1970's. Mangrove trees line the eastern shore with smaller patches on the northern portion of the western shore.

Fauna

Terrestrial: Among mammals, apart from the naturally occurring Indian Wild Boar, the island's main fauna are the introduced species – elephants and spotted deer. The elephant population is estimated to be around 70 - 80 (DCF pers. com.). No new census records have been made, but they appear to be breeding since forest watchers have seen elephant calves. During the present field visit, several heaps of elephant dung were seen in the forest interior. Other signs of elephant presence were debarked trees and fresh footprints around water ponds. The forest watchers who live in a forest camp on the island say that the elephants move in groups, and generally restrict themselves to the deep forest interior and only occasionally come around the camp.

The island however provides an excellent habitat for birds particularly the endemic Andaman Teal which is seen in the sheltered interior swamps, streams and freshwater ponds. A flock of over a hundred has been reported in one of the ponds near a swiftlet cave (DCF Mr Graham Dorai, quoting Dr Ravi Sankaran). A large nesting cave of the Edible-nest Swiftlet is located to the south of the island (Pande et.al. 1991).

Marine: Patches of coral occur around the island. The portion surveyed during the present field visit was located off the eastern shore to the middle of the island a few metres north of

the forest camp. The coral varieties are mainly porites, fungia, staghorn and brain coral, along with giant clams of different sizes, some of which were over 2 ft. long with lips striped yellow-and-brown. Parrot fish, snappers and other typical reef fishes are seen.

Status and Impacts

- ❖ Spotted deer have proliferated considerably and are causing damage to the vegetation since they prevent regeneration of forest tree saplings. The DCF was of the opinion that the island's ecosystem would be able to withstand the pressure of the feral elephant population as they feed at a greater height and take only leaves and branches of tall, well established trees. However the combination of the feeding pressure of deer and elephants is destructive. As the deer have no natural predators there are no checks for their population growth.
- ❖ Translocation of the elephant population is virtually impossible for practical reasons. On account of the heavy shrubbery it would be very difficult to shoot tranquilliser darts to immobilise the elephants. Furthermore it would be a daunting task to lift and transport out an animal of that size through the dense forest, even if domesticated elephants are used. So far no natural deaths have been recorded, though some of the elephants are likely to have reached the end of their normal life span since they have been here for about 50 years (pers. com. DCF Graham Dorai).
- ❖ The coral patches were a combination of dead and live coral, with most of the sea floor covered with broken coral pieces, and live corals here and there nearer the surface. Associated reef fauna such as fishes, sea cucumbers, etc were present but not abundant. The deeper portions had good growth of staghorn coral along the slope.
- ❖ Eupatorium weed has encroached along forest paths and is abundant in the more open areas around the plantations of deciduous trees.
- ❖ Poaching of shells, sea cucumbers and other marine fauna is a problem. Poaching of deer, wild pigs and even elephants have been reported.

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LOHABARRACK or SALTWATER CROCODILE SANCTUARY

Description

The sanctuary mainly comprises an area of the sea immediately to the north of Wandoor Marine National Park at the mouth of a bay in South Andaman island, and includes the coastal strip upto the high tide line (Prashanth pers.com.). Most of the land portion is lined with mangroves and is deeply indented into creeks and inlets. The dominant mangrove species is *Rhizophora*. The total area of the sanctuary is 22.21 sq.km¹, located between latitude 11°35' to 11°40'N and longitude 92°35' to 92°39'E., about 21 km from Port Blair.

The sanctuary was established specifically to protect the Saltwater Crocodile *Crocodylus porosus*, a highly endangered species that is included in the IUCN list of threatened species. Crocodiles bred in the mini zoo in Port Blair were released here. Their present status is not known (Prashanth pers com). Crocodiles are rarely seen on account of the overhanging branches of mangroves that cover the mud banks. The wildlife department carries out night – time crocodile surveys.

BIOLOGICAL PROFILE

Flora : Thick mangrove (tidal swamp) Forest lines the creeks and marine waters which comprise this sanctuary. Other forest types include Andaman Tropical Evergreen Forest , Andaman Semi-Evergreen Forest , and Littoral Forest .

Trees

Avicennia spp.

Dipterocarpus spp.

Bruguiera spp.

Rhizophora spp.

Ceriops spp.

Terminalia spp.

Fauna :

Mammals

Boar, Indian Wild

Civet, Himalayan Palm

Deer, Spotted

Dolphin, Common

Flying Fox

Rat, Brown

¹ NOTE: THIS NEEDS TO BE VERIFIED AS THE ORIGINAL NOTIFICATION GIVES THE AREA AS 10,000 ha. (Pande et al 1991)

Birds

Crow, Jungle	CuckooViolet
Crow-pheasant	Cuckoo-dove, Andaman
Cuckoo, Emerald	Dove, Red Turtle
Cuckoo, Himalayan	Eagle, Andaman Dark Serpent
Cuckoo, Indian	Eagle, Crested Serpent
Cuckoo, Small	Eagle, Whitebellied Sea
Falcon, Peregrine	Owl, Barn
Harrier, Marsh	Parakeet, Alexandrine
Harrier, Pale	Parakeet, Redbreasted
Hawk-eagle, Crested	Parakeet, Redcheeked
Hawk-owl, Andaman Brown	Pigeon, Andaman Wood
Kingfisher, Blue-eared	Pigeon, Green Imperial
Kingfisher, Common	Pigeon, Greyfronted Green
Kingfisher, Storkbilled	Swiftlet, Andaman Greyrumped
Kingfisher, Threetoed	Swiftlet, Whitebellied
Kingfisher, Whitecollared	Teal, Cotton
Kite, Pariah	Teal, Grey
Koel	Teal, Lesser Whistling
Lorikeet, Indian	Tree Pie, Andaman
Myna, Hill	Woodpecker, Fulvousbreasted Pied
Owl, Andaman Scops	Woodpecker, Indian Great Black

Reptiles

Crocodile, Estuarine	Turtle, Hawksbill
Monitor, Water	Turtle, Leathery
Turtle, Green	Turtle, Olive Ridley

SOURCE: PANDE ET AL (1991)

Impacts on the PA

There are nine villages in the outskirts of the sanctuary (Pande et al 1991). Some portions of the land beyond the sanctuary boundary is leased out for coconut plantation. Line fishing is permitted in the sanctuary waters. Mangroves are quite intact, though relatively less dense than in other protected areas in Andamans, and are not cut by village inhabitants (Prashanth pers.com.), however the forest outside the PA is disturbed.

ANDHRA PRADESH

ETURUNAGARAM SANCTUARY

Eturunagaram Sanctuary, P.O. Tadwai Eturunagaram taluka, Warangal district AP. DFO wildlife management sits at Warangal. Filled on 15.12.1984 Notified a sanctuary through G.O. Rt. no 1289 of 30.01. 1953 of Rural

- Reconstruction Department under section 79(c) and (d) read with 24 (4) of Hyderabad Forest Act 1355 fash.
- Original area of PA 81,259 ha (812.59 sq. km)
- No alterations were made to the area till 1984. 500 ha of area under habitation in the Core zone.
- Villagers carry on illicit cultivation in certain area as of the PA, which leads to degradation of the habitat.
- Labour Camps occupy some area cause disturbance and competition at water holes.
- 200 ha of are occupied by irrigation depart in PA, it reduces the water sources, 200 ha of water source occupied by Panchayat for the fisheries which spoils water ecosystem and 150 ha occupied by PWD for roads. 75 ha area are occupied by tramission lines.
- Villager graze cattle over the entire Sanctuary, local fishermen's Co-operative use 200 ha of BZ, Girijan Co-operatives collect NTFP from the entire sanctuary Girdhing and Felling of trees is one result of that villagers cultivate over 400 ha of area, this results in man animal conflict.
- Beedi leaf cultivation by villagers in both CZ and BZ leads to ground fires.
- Bamboo working is allowed for paper mills causing much disturbance.
- Sundra working (what is a sundra tree??) by private agency in 5200 ha of BZ leads to degradation of habitat.
- Crop protection guns exist but the PA authorities have not got them baet.
- Illegal hunting offences have been registered and a case has been won.
- New Management plan was being drawn up in 1984.
- Area if CZ is 28,807 ha, area of BZ 52,452 ha
- PA has three binoculars 1,16 mm projector and 1 slide projector but more equipment are under production (wireless sets and walkie-talkie).
- 1 Forest ranges officer and 3 forest guards are assigned mobile protection duty. 1 deputy range officer and 6 forest guards are on check post duty. 1 forester and 3 forest guards are special beat duty. 1 Dy Ro and 2 Fbs are on vigilance duty .
- Total length of firelines are 30 km. Beedi leaf collection is the mai9n cause of ground fire. About 20,000 ha of CZ and 50 ,000 ha of BZ are affected by fire. Floods are not reported and 1980-85 there were no droughts.
- Ground fire grazing and laborer camps are three major problems in this Sanctuary .

- In 1980-81 Rinder pest affected Gaur, Sambar Blur bull, Cheetal. 215 animals were affected, the disease spread from local cattle. Casualties had been buried and sprayed. Local cattle were vaccinated Teak seemed to have had defoliation and skeltonisation in the entire sanctuary. QAI reports that there is an “ecological explosion of Mahaseer”. QAI has reported 13 tigers 300 black bucks and unspecified number of wolf and pangolin.
- Collection of NTFP is allowed from the entire Sanctuary and cutting of trees for pulp and for other industrial purposes is permissible in BZ and had yielded 10,05,00/-Rs in revenue in 1984. Beedi leaf collection by Girijan Co-operative had given Rs 40,00,000/- in the year 1984.
- From 1980-82 1029 ha of Sanctuary had been planted with commercial species. Out of which 95 ha were in CZ (commercial species in CZ check). More than 739 ha seems to be more culture ecalyptus plantation (check this). Fodder is not allowed to be cut from the Sanctuary.
- 12450 livestock from PA villages and 43,200 livestock from adjacent villages graze in the PA it is tree grazing all through the year. Out of the total of 55,650 livestock 8550 are goats.
- Some time tourists visit the sanctuary but there are no organized tourism conducted in the Sanctuary. Total of 2520 tourists visited the PA in 1984.
- Madaram is a place of historical value for the PA.
- “It is proposed to have conducted tours and also run catering services. One environmental education center to educate visitors is now coming up. March to May is a good time to visit, as animal siting will be more.

Eturunagaram Sanctuary is located in Warangal district of Andra Pradesh. The latitudinal extent is from 18⁰10' N to 18⁰40 N. Longitudinal extent is from 80⁰05' E to 80⁰30' E. Nearest town is Eturunagaram. The nearest railway station is Warangal about 90 Km and airport is at Hyderabad 230 km away.

The average elevation of the place is 130 m. The highest point measures 291 m and lowest 92 m. There are 2 perennial and 6 non-perennial streams and 4 springs. Besides these there are 9 man made tanks and 2 water holes are there to provide water for wild animals.

Summer months are March to June and mean summer temperature is 36⁰c. Hottest days generally occur in the month of May and Temperatures rise to 46⁰c. Winter months are from November to February with the mean temperature at 28⁰c. The coldest days occur generally in the month of December when temperatures fall to 12⁰c. The monsoon occurs between July and October with a rainfall of 1100 mm.

- The forest types are 5-A, 5-ACI, 5-A/G?, 5-AC3.
- This Sanctuary is connected with Pakhal Wildlife Sanctuary by a forest block called Bandal.
- Artificial Salt licks are being provided to attract wild animal for better siting.
- Encroachment is a recurring problem.

- Total number of villages in the CZ is 3 and their population is 1100. There are 18 villages in the BZ with a population of 11,000 people. 80% of the people are dependent on the forest from CZ villages and 65% of the BZ villages are dependent on the forests for livelihood. The surrounding area has 42 villages with 30,000 people about 40% of whom are dependent on the PA for livelihood.
- 3 core zone villages are proposed to be relocated (see management plan for details).
- In 1983 two bear attacks on people from inside the Sanctuary has been reported. There are proposals for payment of compensation to tiger and panther kills at present (1984). In 1983, 43 cases had been registered fore compensation and accepted.
- A vegetation map had been prepared by working plan division in 1959. Soil and geological maps have been done in 1971.
- The research proposals recommended by the PA authority is one, causes for occurrence of R.P and F.M.D, two; population dynamics of Gaur, three; seasonal behaviors pattern of Sloth bear with reference to man.
- The PA should be having a vehicle available on rent from 1-1-85. There was a visitors center under construction.

KAWAL WILDLIFE SANCTUARY

1. Introduction

1.1 History : Kawal is one of the oldest sanctuaries in Andhra Pradesh. Earlier it was a game Reserve of the erstwhile Hyderabad State. The area was rich in plant and animal life that made the government declare it as a game sanctuary. It was declared as `Qawal Wildlife Sanctuary under Andhra Pradesh (Telangana Area) Forest Act 1355 F (Act-II of 1355 F) on 1st June 1964. A new notification was issued on 18th Nov. 1965 (vide G.O. Ms. No. 2753 Food and Agriculture (For II) Dept), with a set of new rules to regulate the hunting shooting, fishing, mixing of poison in water and setting traps or snares in specified areas. Besides being a repository of biodiversity, the Kawal Sanctuary forests are also home to the tribes like Gonds Nayakpods Kolams and others.

1.2 Significance: Kawal Sanctuary is situated almost at the center of peninsular India and is the home of most of the faunal types of the peninsula. Many endangered species of fauna such as the tiger, sloth bear and gaur listed in Schedule I of wildlife (Protection) Act of 1972 are found here. The sanctuary comprises of Dry Deciduous Forest with more than 30% of the composition under teak . Teak is one of the valuable timber species and this tract of land adjoining the Godavari River is the home of some of the best stands of teak trees in India. In the surrounding areas of Adilabad district besides the distribution of valuable floral species and endangered fauna there are also old tree fossils which need to be preserved. Such fossil areas are still in the process of being identified.

1.3 Current Status: Kawal has been a sanctuary for more than three decades now, yet the area is under various threats and pressures. The right to continue to reside in the forest area has been given to the tribals under the 1965 notifications, `Not withstanding anything in these rules to the contrary the Gonds, Kolams and members of other aboriginal tribes residing in the Sanctuary shall have the right to continue to reside therein' [Gazette Notification].

The original villages located inside the forests were subsequently declared as enclosures under the jurisdiction of the Revenue Department. Presently there is an increase in population and the villagers' demand for agricultural land has led to encroachment of forestlands. The increase in human and cattle population is exerting a great pressure on the forestland. Under the rights and concessions given to the tribals; free grazing, collection of Minor Forest Produce by Girijan Co-operative societies and free collection of different forest produce to meet their daily bonafide needs have put a pressure on forest lands and created a competition with wildlife for forest resources. The presence and activities of naxalites and other extremists have greatly hindered the work of the protection staff [QAI-1987].

The habitats around some of the villages are degraded. There is rampant grazing of cattle in the Sanctuary. There are 38 villages and more than 66,000 livestock are taken into the forest for grazing every day [Nagulu.V.1999]. The total dependence of the villagers for most of their livelihood on the forest has resulted in the present degradation.

Many of the forest compartments of Kawal Sanctuary are in good condition. Where the area is hilly and highly undulating and inaccessible the forests are in

pristine condition. The Divisional Forest Officer's opinion was that Rampur-Maisempet and Birsaipet ranges had some undisturbed forests, but the forest around Kadam canal was heavily disturbed because of encroachment.

The PWD road from Mancherial to Nirmal Passes through Janaram, the headquarters of the PA situated in the South. Near the village of Indanpalli another road branches off to the north from the Mancherial-Nirmal road to Utnur just outside the PA. These roads cause disturbance to the PA [Working Plan 1999]

Andhra Pradesh Forestry Project started in late 1994 has been able to halt the degradation to some extent. Apart from reforms in overall wildlife management, the introduction of ecodevelopment programmes in sanctuary villagers had reversed the trend to a certain extent. Earlier some of the fringe villages were covered by Joint Forest Management (JFM) programme. Now all the 90 hamlets of the 38 villages have either Ecodevelopment programme or JFM. The positive changes brought about by this will be discussed under subsequent sections. Currently these interventions have saved these forests, ensured regeneration and have protected wildlife.

2. Description of Kawal Sanctuary

2.1 Geographic Profile :

2.1.1 Location and Area: Kawal Sanctuary is a part of the Janaram Forest Division of Adilabad district. It is 45 Kms. from Mancherial town, which is also the nearest railway station. It is about 160 Kms. from Hyderabad, the State Capital. The nearest airport is at Hyderabad. The office of DFO in charge of wildlife is located in Janaram town, which is located inside the Sanctuary boundary. The latitudinal extent of the PA is 18° 52' N to 19°27'N and 78°28'E to 79°26'E approximately. The geographical area of Adilabad district is 16,210 Sq.km out of which 43% or 7,034 Sq. kms are covered by forests, out of which 892.28 Sq.Km are declared as Kawal Sanctuary.

2.1.2 Physical Features:

The sanctuary consists of three Reserve Forests (RF) namely Itkiyal R.F., Kadam R.F. and Kawal R.F. The forest patches continue unto Nirmal to the west and there are patches of discontinuous forests towards the Chinnur Reserve Forest in the south and east. The northern boundary of the sanctuary has many hill ranges clothed in good forests. There are six natural waterholes and three perennial streams inside the Sanctuary [QAI]. River Godavari flows along the southern boundary. Kadam Reservoir forms a part of the southern boundary and kadam canal passes through the South of Sanctuary. The land towards the South has smaller hills with gentle slopes interspersed by many small streams most of them are non perennial . Among the hills, Mysem gutta to the north of Kadam reservoir rises to a height of 553m and Mamidepalle Gutta on the Satmala hills is 664m in height. Such undulations have many ecological niches, which are good for the floral and faunal diversity.

2.1.3 Climate: The Sanctuary has three distinct seasons; winter months are from November to January with a mean temperature of 12° C. Coldest days occur in January with temperatures dipping to 7°C. Summer months are from February to June with temperatures rising to 44° C in May. Rains are brought in by South West monsoons in June and they continue intermittently till September. The average

rainfall is about 1000 mm. Hot surface winds are common in the summer months and large-scale ground fires occur during that time.

This Sanctuary is not subject to any major natural calamity except on one occasion when the newly built Kadam reservoir developed a leak and the flood water spread over large area. Though there are no records of it in the Forest Department office in Janaram, eyewitness accounts reported that some adjoining parts of forests and villages were affected for many days. The only other natural disaster is occurrence of ground fires in summer.

2.2 Biological Profile :

2.2.1 Flora : The forests of Adilabad can be classified as tropical dry deciduous forests group 5 (Champion and Seth 1968), and subtype B- dry teak forest- The subtype B is again divided into local sub types: (a) Teak forests with 30% or more teak, (b) mixed teak forest 10-30% teak and (c) miscellaneous with less than 10% teak.

Teak is found in plenty in Kawal Sanctuary forests, and occupies the top canopy occurring gregariously or in varying proportions under changing soil conditions. The main associates of *Tectona grandis* are : Anogeissus latifolia (Tirman), Terminalia tomentosa (Maddi), Pterocarpus marsupium (Bijasal) and Diospyros melanoxylon (Tuniki) etc. Other trees occurring in the forest are Lagerstroemia parviflora, Chloroxylon swietenia, Boswellia serrata, Cleistanthus collinus, Butea monosperma, Embelica officinalis, Aegle marmelos, Dalbergia paniculata and Sterculia urens. There are few patches pure teak plantations in the Sanctuary area. They are not being worked since the last ten to twelve years. Some thinning operations do take place inside these plantations. Besides teak, which is the dominant tree species, Terminalia tomentosa and Hardwickia bionata occur in Saline tracks. Among the weeds *Ocimum* (Mahavira) occurs along agricultural lands.

According Prof. Nagulu (Nagulu 1999) the major vegetation composition found in these Reserve Forests are Teak mixed Forest (TMF) and Teak mixed Bamboo Forest (TMBF). (See enclosed map)

The working plan of Adilabad circle indicates that the Kawal and Kawal extension blocks of Janaram Forest Division have more than 30% teak. The foothills, which have a number of nallahs and streams, have dense bamboo growths along the banks. The common species of bamboo is Dendrocalamus strictus. On the hill slopes where the soil is shallow Boswellia serrata is the prominent species forming 20% or more of the total crop. The common associates of *Boswellia* species are Anogeissus latifolia, Cochlospermum religiosum, Tectona grandis and Cleistanthus collinus. The forest department felt that the damage to the forest especially the flora, is more by human agencies rather than environmental factors like droughts and cyclones. More information on the anthropogenic impact is given under socio economic issues in section No. 2.3.

2.2.2 Fauna : Many of the animals found in the Indian sub continent are present in the Sanctuary. The habitat varies from teak forest to mixed dry deciduous forests and bamboo breaks along the nallah. The hilly forests with a good cover supports Tigers (*Panthera tigris*), Leopard (*Panthera Pardus*), Leopard cat (*Felis bengalensis*) Jungle cat (*Felis chaus*), Rhesus macaque (*Mecaca Mulatta*) Palm civet (*Paradoxurus hermaphroditus*), wolf (*Canis lupus*), Jackal (*Canis aureus*), Indian fox

(Valpurs bengalensis) sloth bear (*Melursus ursines*), Indian giant squirrel (*Rutufa Indica*), the gaur or Indian Bison (*Bos Gaurus*), Nilgai (*Boselaphus trago camalus*), Four horned antelope (*Tetracerus quadricornis*), Sambar (*Cervus unicolor*), Chital (*Axis axis*), Barking deer (*Muntiacus muntajak*), wild boar (*Susscrofha*).

A special study on the 'Identification of factors affecting the population and distribution of tigers in Kawal wildlife Sanctuary Andra Pradesh' by Dr V Nagulu and his team from the wildlife biology section of the Department of zoology; Osmania university Hyderabad has just concluded. The findings given in the interim status report has been widely quoted here. According to the study the tigers in Kawal Sanctuary preferred habitats with lush bamboo growth. The analyses of tiger scat in certain compartments showed that the tigers preferred more wild prey (73%) as compared to livestock. Chital was the most-prominent prey species, followed by Sambar, Nilgai, Four horned Antelope (*Tetracerus Quadricornis*) and Chinkara (*Gazella bennetti*). The report also mentions the impact of heavy grazing and the night traffic on the roads to Nirmal and Utnur. Many animals get killed while crossing the roads at night. Besides those poaching of animals for local consumption has also been recorded. In conclusion the report says that "resident tigers are doing well" but those that migrate from neighbouring areas to be sanctuary in winter are under tremendous pressure especially due to poaching. Recently the tree shrew has been sighted in Dongapalli block. This is a rare and endangered species. Nilgai and wildboar are in large numbers and spill over to agricultural lands.

There are more than 120 species of birds in the Sanctuary. The main species are peacocks, Partridges, Quails, Vultures, Eagles kites, Owls, Mynas, Pigeon, Tree pies, Kingfishers etc. The reptiles found in the Sanctuary are Python, Crocodiles (Mugger) star tortoise, Cobra, Kites, Monitor Lizard etc.

3. Socio Economic profile : There are 30 villages, which are divided into 90 hamlets spread all over the sanctuary. They are mainly tribal villages with only a small percentage of scheduled and other castes. The three main tribes present in this forest are the *Gonds* the *Nayakpods* and the *Kolams*. They are agricultural tribes. Nayakpods specialise in bamboo work and they depend on collection of bamboo reeds from the forest. Kolams are classified as primitive tribes and they are largely dependent on collection of minor forest produce for their sustenance. The gazette notification has confirmed the rights of the tribals to continue to live inside the forest. Though the working plan states that 'all the Reserve Forest in the district are the absolute property of the state government and are not burdened with any noteworthy rights. Such rights that have been admitted at the time of settlement like right of way for people and cattle as shown in the respective section 19 of the Hyderabad Forest Act or section 15 of the A.P Forest Act only are permitted' [Working Plan 1991]. However in addition the government has given certain concessions to the local people from time to time.

3.1.Rights:

(I) Free grazing by the tribals : In G.O. Ms. No. 1057 Agricultural Department dated 11-5-1962, concession was given to the tribals in Telangana Region to cut and remove the grass to graze the cattle and to collect Mohuva flowers in the reserved, unreserved and protected forests in tribal areas under the control of forest Department.

- (II) Free Grazing and fodder removal has been allowed in the forest since 1966 (vide G.O. Ms. No. 387 Food and Agriculture (For III) Department dated 14-3-1968, which is extended every year.
- (III) Girijan co operative is given monopoly rights even the collection of M.F.P. vide G.O. Ms. No. 487 Food and Agriculture (For III) Department dated 20-10-1983. Government extends the Government Order from time to time.
- (IV) Local tribals residing in enclosures are allowed free collection of different forest produce to meet their day to day bonafide requirements as per G.O. Ms. No. 97, Food and Agriculture (For III) Department, dated 19-1-1967.

After the Wildlife (Protection) Act of 1972 was passed the core zone of the protected areas were exempt from grazing and collection of MFP by a new G.O. issued by the Chief Wildlife Warden. Under the prevailing disturbed condition order has not been strictly implemented. The hilly regions of the Sanctuary are the only undisturbed areas where cattle do not graze.

3.2.1 Grazing : The local population fell trees like Pterocarpus marsupium (Bijasal), Anogeissus latifolia (Tirman) in summer months to feed their cattle. Browsing by goats, in the forests near the villages cause immense damage as tender shoots and growing tips are nibbled by goats. In addition graziers from the state of Rajasthan bring their sheep and camels in large numbers to Adilabad district to graze in the forests during summer months. It was observed that heavy grazing has resulted in the replacement of palatable ground fodder species by hardy herbaceous Cassia sp. Tephrosia purpurea and Anisomeles Malabaricum. The common grasses growing in sanctuary are Saccharum spontaneum, Andropogon contortus, Andropogon martise and Aristida setaceas. Free grazing is allowed in the sanctuary. Cow-dung is visible on the forest floor upto the hills along the cattle track. During summer, due to shortage of fodder, the local population fell trees like Bijasal (Pterocarpus marsupium), Hardwickia binata and Tirman (Anogeissus latifolia) to feed their livestock. Cymbopogon species of grass occur in BirsaiPET range. The ungulates in Kawal did not suffer from any major outbreak of disease. Livestock spreads no disease as the animal husbandry department regularly vaccinates cattle of villagers inside and around the PA. Migratory graziers at present, especially this year, have not come. The local villagers have started protecting the forest and they no longer allow them to camp in the forest.

3.2 The migratory herds of camel and sheep from Rajasthan graze in the Sanctuary during summer. The migratory herds also carry host of diseases and pests. The diseases like rinderpest and foot and mouth are often fatal to the local livestock. The animal husbandry department carries out vaccination of cattle.

3.2.2 Fires : Ground fires are very common in summer months. The trees of the dry deciduous forests shed their leaves in summer resulting in forest litter. The ground litter is highly inflammable. Ground fires are therefore common features. All young regeneration of microfauna and flora are killed. Very little regeneration was observed on the ground in Kawal wherever such ground fires had ravaged the forest floor. Villagers set fire to leaf litter to clean the space under Mahuva trees to collect mahuva flowers. They also set fire near tendu (Diospyros melanxylon) plants to start a fresh flush of leaves, as this is very lucrative minor forest produce. There are also accidental fires caused by throwing lit beedis on such leaf litter. One of the opinions is that this ground fire helped teak seed germination, the ash of the fire and the

treatment fire gives to teak seeds help in faster germination, though fire scorches the regeneration of many other species.

3.2.3 Collection of M.F.P. : Collection of M.F.P. does not pose such a great problem as grazing and fire. The villagers collect M.F.P. mostly for self-consumption (A list of MFP is given as Annexure). However the collection of beedi or Tendu leaf is a more organized affair. Manufacture of `Katha' and `cutch' from Acacia sundra is another commercially profitable activity. The forest-department has taken up the manufacture of katha under its direct supervision to stall over-exploitation. `Katha is manufactured from Acacia sundra (locally called Sundra tree) by distilling its heartwood. Sundra is found in varying proportions in the lower storey in all types and qualities of forests of the district. Besides utilizing the tree for katha manufacture the timber and poles of the tree have got ready market for agricultural implements and house and hut construction. Katha and cutch are valuable products useful for tanning and dyeing. The extraction of katha is proposed to be leased out to the Integrated Tribal Development Agency (ITDA). The district of Adilabad is to be divided into 16 coupes, and will be worked at the rate of one coupe per year. [Working Plan]. According to the working Plan, the Indanpalli Range and Kistanpalli beat of Janaram Range will be worked in the year 2002-2003 and Birasaipet range of Kawal Sanctuary will be worked in the year 2003-2004. The government has dispensed with the system of leasing out of Sundra trees to private contractors. The sundra trees were being marked and handed over to ITDA from 1988-89 onwards for organizing training camps for extraction and manufacture of Katha. Since the tribals are getting more monetary benefits this system is being continued. At present it is unclear as to what the recommendations will be made regarding exploitation of sundra trees in the sanctuary in their new management plan.

Tendu leaf collection becomes activated in April each year. The villagers are allowed to collect tendu leaves in the buffer zone. However the villagers collect tendu leaves even from core zone. The Forest Department (FD) felt that if they are not allowed to collect, then outsiders might start collecting from the core zone illegally. The whole process has come under the strict supervision of the forest-department because of the enormous amount of revenue involved (the forest from the entire district was likely to earn Rs 20 crores this year). The Forest Department has started a new system of advance auctioning of tendu leaves. Those who get the contract come to lift the leaves, pay a royalty to FD and pay the villagers collection charges, which is determined by FD in advance. They also pay the villagers the charges for curing the leaves, and have to undertake the responsibility of transporting stocks and selling it to beedi manufacturers. The villager with his entire family goes in cart to the forest for collecting tendu leaves, makes a `katta' or bundle of good quality leaves and sells it at the `Kalla' the curing ground. This year their collection charges would be paid at the rate of one paise per leaf. This amount is paid by the FD to the villager and recovered from the contractor. The landholder on whose `patta' land the kalla is established gets a rent and the villagers who help in sorting and curing the leaves get wages for their labour. The FD personnel are present at the Kalla and supervise the whole process. The tribals are very keen to collect tendu leaves as it gives them a substantial income during the lean summer months.

3.2.4 : Bamboo and other timber : Some tribes like Nayakpods work on bamboo therefore they collect bamboo from the forests. All tribals collect thatch grass and bamboo for making huts and timber for making agricultural implements. All the

villagers living in the enclosures and the periphery of the PA collect firewood. Head loading is not a serious problem. It is mostly for self-consumption. Hunting also for self-consumption cannot be ruled out.

4. Management Activities

4.1 Objectives : Objectives of the PA, as enumerated in the working plan are;

1. To preserve the existing flora and fauna for ecological balance.
2. To conserve the flora and fauna in its natural state for the posterity.
3. To improve the wildlife habitat in order to create congenial conditions for proper growth and development of wildlife population.
4. To cater to the aesthetic and recreational needs of the people.

At present there is no management plan of the sanctuary. A plan is currently being written. All prescriptions are taken from the working plan. Currently only Birsai pet range is under wildlife wing. This also the core zone. Under the new restructuring the entire Kawal Sanctuary is to be managed as four ranges, with more officers and more guards. The management structure in Kawal Sanctuary earlier, had placed the core area under the DFO (Divisional Forest Officer) wildlife and the buffer zone under the DFO territorial but there were wildlife Conservators to whom the DFO wildlife reported. Currently there is no separate conservator wildlife. After the reorganization takes place the core and buffer zones will be both managed by the DFO Wildlife who will report to the Conservator of the Circle

4.2 Habitat Improvement : Protection work is being intensified. Grazing and fire are the two major impediments for proper wildlife management. Water resources have been improved by building check dams. Presently some of the check dams and saucer pits are being dug in the nallah beds for creating water sources. The existing ones were being deepened. Dongapalli block is a tiger and bison habitat where habitat improvement work has been done. Saucer pits have been dug on the nallah bed and existing water holes have been deepened, One particular water hole which was deeper and had more water, had pug marks of a tigress and her cubs and hoof marks of different ungulates besides that of gaur. The pugmarks could be followed up to a rocky crag where the tigress and her cubs had jumped down to walk along the mud path to the water hole. The teak tree barks were stripped in a few places and there were some deep marks on the trunk, These were apparently made by gaurs. Another feature noticed was that one water hole was intensively used by domestic cattle as revealed by dung dropping and hoof marks, and there was very little evidence or tracks of wild animals here. Another water hole further upstream was almost entirely used by wild animals, There were some palatable grasses around this water hole, which is perhaps another attraction for the domestic cattle during this dry season.

Four years back the bamboo flowered gregariously and thereafter dried up. Now regeneration of bamboo is taking place in most-area. The work of supporting the base with soil mound is going on. Some thinning and cleaning work is being carried out. Silvicultural operations are in progress in Birsai pet range and in the core zone at Dongapalli. Number of compartments in these blocks has been assigned to various Van Samrakshan Samities (VSS) for protection. Cattle have been kept out of these regeneration compartments under the protection of various V.S.S. The FD

have not assigned all compartments for protection they have left a few open for grazing.

Fire is a major limiting factor in forest regeneration but there are no evidences of large-scale fire tracing. The wildlife wing of the FD does not have sufficient funds for engaging firewatchers or to even employ them seasonally. The visible fire lines are few and far spaced. The thick carpet of dry leaves is highly inflammable. Summer is also the season when there are more fruits and flowers in the forest, that can be collected. The tendu leaf contractors move around the villages paying the residents some amount of money for pruning the tendu plants and setting of fire around them to bring a flush of new leaves that would be ready for collection in May. The FD have started some awareness campaigns presently informing the people about the harm caused by ground fire and persuading them not to do it. They are suggesting that the space around a Mahuva tree should be swept every day rather than be burnt.

4.3 Awareness : The PA has a separate tourism zone towards the south east along the Mancherial road. There is a Deer Park and an interpretation center near the park head quarters at Janaram. A library is being built up and audiovisual material is kept there. There are regular video shows on wildlife. The machans (watch towers) which were once built inside the forest have been removed because of the problems created by the extremists.

4.4 Personnel: At present the sanctuary is being managed with limited staff for protection duties. Four Ranges are being created with a Range Officer in charge of each range and sixteen forest guards to assist them in protection duties for all the four ranges.

4.5 Equipment: Kawal Sanctuary does not have any equipment such as guns for protection purposes. Wireless sets have been supplied that is being installed. The FD personnel are apprehensive about installing the wireless sets, as they fear the reactions of the extremists groups to presence of wireless sets. The Interpretation Center has audiovisual equipment for conducting awareness campaigns.

4.6 Funds: Wildlife wing had only the core zones of Kawal Sanctuary in its jurisdiction therefore the fund allocation was very meager. Under A.P. Forestry Programme funds have been allotted for Awareness programmes and for Ecodevelopment Programmes.

4.7 Eco development to meet people's needs : "Further to reduce the dependence of the people living in and around the forest areas of their fuelwood requirements, it is proposed to provide alternate energy resources such as biogas plants, smokeless chullahs and solar energy etc. [working plan 1999-2000].

The FD had introduced Joint Forest Management earlier and had tried to bring as many tribal forest dependent villages as possible under JFM initiatives. The villagers had to form Van Samrakshan Samitis (VSS) and enter into an agreement with the FD that they would protect the patch of forest given to them in return for the harvested biomass from that patch. There was also some additional input for the benefit of the whole community like the building of a community hall or school building or bus shelter etc. Under this scheme many hamlets in Kawal Sanctuary were covered. Funding came from many departments of the government like ITDA and Rural Development. With the commencement of Andhra Pradesh Forestry

Project (APFP) in 1994 ten protected areas in AP were taken up for ecodevelopment. Kawal is one such PA. The wildlife wing of FD has now covered the remaining hamlets under eco development. There are no non governmental organisations (NGOs) around Kawal who are executing conservation projects. The FD had done the motivation and execution. Under ecodevelopment the target villagers are asked to form an ecodevelopment committee (EDC) and sign an agreement with the FD. The difference between VSS and EDC is that the agreement of EDCs with FD has no clause on usufruct sharing but there are individual beneficiaries besides common benefits accruing to the whole community. All the villages located inside the Sanctuary can only have an EDC agreement, as harvesting of usufruct is not permissible inside the sanctuary. But many villages have already signed a JFM agreement so this is posing a problem as the new order has to be carefully explained to people and new agreement have to be drawn up.

The village of Lakshmipur in Kadam forest block has an EDC. Here the FD had built a community hall and had arranged training in leaf plate making (Bahunia leaves were stitched into a circular shape and pressed in to a shape of a plate in a pressing machine). A few women were trained in sewing clothes. The FD had helped the villagers in building a check dam on a seepage channel. The stored water was being used by wild animals, domestic animals and for raising a second crop. Though this village consisted of heterogeneous communities the EDC has united them into one functional unit. The EDC had allowed one of the villagers to draw water from the check dam using his own pump because the water in his well had reduced and his crops were withering. The chairperson of the EDC said that it was possible only because it was collective decision now, whereas earlier they never had a forum at which they could meet and come to an agreement. They were happy with the new system. With a better water management system their agricultural production had increased. They were entitled to get all the available employment in the forest patch they protected. There were many mandays of work to be done for habitat improvement in the forest. Besides the improved agricultural situation generated more employment for the villagers.

The FD has so far been successful in the eco development activities. In Kawal and elsewhere the FD personnel were of the opinion that creation of EDCs and VSS was very helpful because it had slowly changed the attitude of people towards FD. It has also weaned the people away from the extremists. Number of group discussions was held with many EDCs. The people appreciated the new initiatives. It gave them employment in the forest. Any silvicultural or habitat improvement work was given to the nearest EDC members. The cost of the work was estimated and deposited in the bank. When the work was completed it was the duty of the EDC to distribute the wages. This system works well now, there are no allegations against FD. The soil moisture conservation work had raised the watertable. Many benefited from increase in well water. The bigger land lords in surrounding villages now complain that they no longer get cheap labour, as the FD pays government wages which is more than the

local rate. Migration of the tribals to surrounding towns in search of employment has also reduced. They are happy that the compensation for cattle kills and the compensation for crop damages are paid promptly. They act as informants about poachers coming from outside. They protect their patch of forest with great zeal. The EDCs are also assiduously building up the village common funds that will enable them to be self-reliant in the future. Except for some teething trouble the eco-development scheme is working well.

5. Issues

5.1 Management Issues : Grazing and ground fire are two major habitat related issues :

- Free grazing has been allowed all over the state, with the present political activism by extremists. Protection work is suffering.
- There is no visible damage done to the standing forests by ground fire, so scant attention has been paid to ground fire.
- The forests were being used as hide out by extremists. Either by choice or by coercion they had the tribals/ villagers act in their favour. They targeted all government functionaries. The FD personnel were afraid of them and could not carry out their duties. The interaction between FD personnel and villagers was non-existent till at present.
- Due to the change from traditional life style the villagers no longer pay any attention to the traditional concerns for conservation. The Nayakpods had their shrine in Dongapalli block and the hills were a sacred site to them. The gond had a sacred site near Rampur village called 'Bhokondi'. Though it was situated on the highway, the nearly nallah was teeming with birdlife. Hoof marks of ungulates and wild boar were in large numbers. Currently these sacred sites are not being protected with such reverence as was done earlier.
- Awareness education has began. It needs to be linked to the tribals and their culture.
- The restructuring of wildlife wing of FD has created some problems. Though it was aimed at freeing the sanctuary from dual control of territorial and wildlife it has not completely succeeded in it. The DFO in charge of the Sanctuary functions under the territorial Conservator and therefore his subordinates are selected from within the circle and it is not necessary that only trained wildlife managers are posted in the sanctuaries.
- Withdrawal of JFM agreement and replacement with new eco development agreement is creating confusion. The fringe villagers have the benefit of harvesting usufruct but villagers inside the Sanctuary are not given such benefits. This anomaly has led to the dissatisfaction of NGOs and villagers in other areas, it may soon become an issue here. The villagers with restricted agricultural land can only have a sustainable life style with a marginal surplus, if the scheme continues to work well. There is no provision for marked economic improvement or absorption of an expanding population. This limitation should be placed up front in all interactions regarding the eco development schemes.

Recommendations :

Grazing can be tackled by animal improvement schemes such as replacement of many scrub cattle by few stall-fed milch animals. This scheme has just been introduced.

Introduction of rotational closures in forest and Absolute Closed Areas, where regeneration is taking place, may be considered. More firelines are to be created and firewatchers should be appointed.

The interaction between the FD and villagers has begun with the introduction of the ecodevelopment scheme. The success of the scheme depends on further contacts. The personnel who are posted for duty in these areas should be especially trained in the philosophy and execution of eco development. Such training should be given to officers at all levels.

Visit to interpretation center should be made mandatory before entering the PA. Apart from imparting information on wildlife and wildlife biology, the link between the tribals and their environment has to be highlighted. Sense of pride in their culture of conservation should be cultivated.

As a part of the restructuring programme it is important to post people with special wildlife training.

NGOs are the instruments through whom much of the forestry sector schemes for the tribals and other villagers living inside the forest are being carried out. All concepts should be clarified to them. Make them contribute to the planning process. Train them on site. Facilitate cross visits. The villagers of Korkutpalli situated between Kadam Canal and Godavari River to the south of Janaram had resorted tree felling in 1977. Thereby forcibly encroaching forests, now they have formed a VSS, protect their forest patch and have even apprehended timber smugglers. This positive trend should be strengthened further. There are many such instances all over the state.

The Nayakpod tribals living in Dongapalli hamlet near the core zone want to move out of such a remote area. The FD has drawn up a plan for resettlement. If such resettlement can be done voluntarily and with success many problem for both parties can be solved. However there should be an undertaking that if people are not satisfied they have the option to go back to their old site.

References

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ANNEXURE 1.

MINOR FOREST PRODUCE

3.1 The following are the items of Minor Forest Produce that are available in this district.

- i) Beedi leaves (Thunki aku, Barge abnus or leaves of **Diospyros melanoxylon**)
- ii) Katha and catch (product of **Acacia Sundra**)
- iii) Gums (Tapsi gum - **Sterculia urens**)
- iv) Tadwad (barks of **Cassica auriculata** and Cassia fistula)
- v) Mohwa flower and fruit (**madhuca latifolia**)
- vi) Rusa grass (Cymbopogan martini)
- vii) Dikamali (gum resin of **Gardinia lucida**)
- viii) Grasses useful for broom sticks and thatching
- ix) Nirmali (fruit of **Strychnos potatorum**)
- x) Chironji (fruit of **Buchanania latifolia**)
- xi) Haleela (fruits of **Terminalia chebula**)
- xii) Honey and Wax
- xiii) Floss of Burugu (**Salmalia malabaricum**)
- xiv) Neem seed (**Azadirachata indica**)
- xv) Marking nut (**Semecarpus anacardium**)
- xvi) Amla seed (**Emblica officinalis**)
- xvii) Nux vomica (**Strychnos nuxvomica**)
- xviii) Pungam seed (**Derris indica**)

3.2 In addition to the above, the following items of medicinal importance are also included under the Minor Forest Produce.

MEDICINAL FLOWERS

1. Calotropis gigantia
2. Wood fordia floribanda
3. Sphaeranthus indicus

MEDICINAL ROOTS

1. Hemidesmus indicus
2. Clerodendron phlomidis

3. *Clerodendron secratum*
4. *Andrapogon muricatum*
5. *Trianthema portulacastum*

MEDICINAL FRUITS

1. *Citrallus colocynthis*
2. *Caesalpinea bonducella*
3. *Margnifera indica*
4. *Sygigium cumini*
5. *Mallotus phillippensis*
6. *Helictis isora*
7. *Ricinus communis*
8. *Moringa Oleifera*
9. *Acacia nilotica*

MEDICINAL SEEDS

1. *Cassia tora*
2. *Mucuna sps*
3. *Datura alba*
4. *Vitex negundo*

MEDICINAL LEAVES

1. *Adhatoda vasica*
2. *Calatropis procera*
3. *Aloe indica*
4. *Mentha sylvestris*
5. *Coleus aromaticus*

MEDICINAL PLANTS : (whole plants)

1. *Pedaliium murex*
2. *Boerhavia diffusa*
3. *Tephrosia purpurea*
4. *Desomodium gangetium*
5. *Achyranthus aspera*
6. *Euphorbia microphilla*

KINNERSANI SANCTUARY

Declared a sanctuary on 24th January 1977 Area 63540.78 ha (635.4078 sq.km.). No other procedure completed .

- No information on occupation of the PA by other departments or of illegal occupation.
- Crop protection guns exist in the surrounding villages.
- All offences are registered
- No management plan but there is a separate budget
- The PA has been divided into CZ and BZ with CZ being 22,220.00 ha.
- No equipment
- There was a mobile squad and a jeep.
- There are check posts at the entrance and exit and four manned entry points.
- 100 % Cattle in the surrounding villages are vaccinated, They are not checked for vaccination when they pass through the PA.
- Bamboo is harvested in the BZ. NTFP is collected by brijan cooperative societies.
- 2000 cattle from PA villages and 10,000 cattle from adjacent villages graze inside the PA.
- November to March is the time to visit the PA as roads will be ready for use and there will be water.

Kinnersani sanctuary is situated in Khammam district of Andhra Pradesh. Latitudinal extent is 17^o 38'N to 17^o 54'N and Longitudinal extent is 80^o 32'E to 80^o 43'E. The nearest town is Paloncha 12 km away. The railhead is at Badrachalam road 24 km. The airport is at vijayawada 170 Km away.

The average elevation 95 m, The highest point being 559.6 m and lowest 108 m. the kinnersani river has a dam across it. There is also a natural lake.

March to June is the summer period with temperatures around a mean of 21.3^o C (??). May is the hottest month touching 49^o C. November to February is the winter season with an average temperature of 16^o C. In December, January sometimes the temperature dips to 10^o C. June to October are the rainy months. The average rainfall amounts to 1033.22 mm. Hot winds blow in April and May.

- Herbivore breeding programme has taken place been started spotted deer had increased in population.
- There are 2 villages in the CZ with a population of 210. There are 30 villages in the BZ with a population of 11000. 80% of these depend on the forest for livelihood 100% of the population of CZ villages are dependent on the forest.
- Compensation is payable for livestock killed by tiger or panther.
- There was a wildlife distribution map done in 1984 for this PA.

NAGARJUNASAGAR-SRISAILAM TIGER RESERVE

- #Declared a sanctuary by notification of 5th July 1978
- #Total area 3,56,890ha
- # District in which the park falls are Nalgonda, Praasam, Guntur,& Mahbubnagar.
- # A part of the area was part of the Shikargah of the erstwhile Nizam of Hyderabad.
- #Area of core zone is 1,20,000 ha
- # Area of buffer zone is 2,36,890 ha
- #Villages inside park in the core area are 30 (all revenue), with a total population of 134. The entire population is that of tribals who are dependant on forests
- # Villages inside the buffer area area 29 (all revenue). 70% of the population is tribal
- # Statistics on the villages in the surrounding area is not given
- # Villagers residing inside the sanctuary are permitted to graze their cattle and sheep inside the entire sanctuary.
- # Villagers residing inside the park are permitted to gaze their livestock only in the buffer area of the park .
- # The final settlement of rights have not been affected
- #An estimated one lakh cattle and an equal no. of sheep graze inside the park. The exact no. Of livestock coming from inside the park and outside the park is not available. The exact no. Of authorized and unauthorized grazers is not known.
- # Fodder collection is permitted inside the park. 40% ofthe park is affected by this activity.
- # Free grazing and fodder collection is ruining regeneration in the area and the herbivores are at a great strees near waterholes. Plans to introduce rotational grazing were on the anvil according to the last questionnaire.
- # Extraction of MFP : Fruits, Roots, Seeds, Flowers and grasses are reported
- # Fuelwood collection is not reported.
- # One village in the core one was proposed to be relocated by March 1986
- #.Compensation is paid for death or injuy to livestock by wild animals. The following were the rates Cow : Rs 200, Buffalo Rs 300 ,SheepRs 25.
- # No compensation is paid for crop damage.
- # Local people kill hares and wild boars as these animals cause a lot of crop damage.
- # There are many temples in Srisailam and an estimated three lakh pilgrims pass through the park annually.
- # Dimond mines exist inside the sanctuary at Ippapally.
- # Problem of lantana and Parthenium was reported.
- # Vaccination was not done.
- # Quarantine facilities exist at the park.

PAKHAL SANCTUARY

Notified as a Sanctuary through no 2257 d 4.3.1952 of land construction Department under sec.79 (c) (d) and 32 (5) read with 24 (1) of Hyderabad act 55F (check with wildlife wing of AP forest Department). No other procedure has been completed. Original area of the PA was 89205 ha and it is the same now (as of 5.12.1984). This sanctuary was a part of Nizame State Forests known for game.

300 ha of the Sanctuary has not yet been acquired but it has to be acquired now since it is in the core zone. Illicit cultivation goes on in the forest by local villagers area of such cultivation is not known. It is degrading the habitat and for territorial wing of the forest department is dealing with it. There are labour camps controlled by lessees (who are they and why do they need a labour camp inside the PA?). This causes disturbance and competition for water. These camps are being dealt with by territorial staff. Irrigation (what? canals? from lake?) by Pachayat is carried on inside the PA and this degrades the water ecosystem (where?). Fisheries department are using 600 ha which affects crocodile population. Roads controlled by PWD use 100 ha causing disturbance. Tourism department uses 20 ha and transmission..

Grazing by villagers in the whole PA, local fishermen societies use 150 ha of BZ, Girijan (adivasis) collect NTFP all over the PA, villagers practice agriculture on 6000 ha of CZ and BZ causing severe impact. There are habitation over 400 ha of PA. There is also an archaeological movement inside the PA (what & where??). Beedi leaf collection by villagers and bamboo working by private paper mills cause maximum disturbance.

There is no system of issuing entry permits to people going into the PA. There are crop protection guns with people around the PA. The offense registered is for destruction of habitat and not for anything else. A management plan from 1985-90 was being drawn in 1984. Area of the core zone is 23,827 ha and area of BZ is 65378 ha. Total area of PA 89205 ha. Except 3 binoculars the PA does not have any other equipment. There are 6 forest guards posted on 8ha rotation at check point. One forester and 6 forest guard are on vigilance duty. There is a road passing through the PA and there are check posts at the entry and exit. There are 3 manned entries and 20 unmanned entries. Forest fires are annual features and destroy much of the PA. This is caused mainly by beedi leaf collection.

The recurring problems listed in the QAI are;

(i) *ground fire* - occurs annually and affects 80% of the PA. Remedy is either prohibit beedi leaf collection or execute the work departmentally!

(ii) *grazing* - is round the year and affects almost all the area. Efforts are being made to prohibit it in the core area. Remedy suggested is to introduce grazing passer and restrict it to productive cattle.

(iii) *labour camps* - for forestry operation cause disturbance. Remedy is to prohibit operations during pinch period.

Approximate percentage cattle vaccinated in sanctuary villages is 23 and cattle vaccinated in villages adjacent to the PA is 14%. Occasionally PA staff check the cattle passing through for signs of vaccination.

Two diseases in teak & other species are mentioned one is defoliation and the other is (skelto.....?)

The QAI states that there are only 2 tigers apart from panthers. Indian wolf and Anteater. The suspected cause is reduction in prey base.

Felling of trees collection of fallen tree for timber, cutting of trees for pulp and other industrial purposes, cutting of trees for fire wood all these are allowed only in BZ. MFP and beedi leaf are collected from all over the PA.

Between 1980 and 83 330ha of BZ has been planted with teak. There is no practice of cutting and taking away of grasses among the local villagers. A total of 72,500 cattle and 6000 sheep graze in this PA. No grazing fee is levied on the livestock grazing inside the PA, since free grazing is permitted throughout AP except for goats.

There is no organized or conducted tourism inside the sanctuary. There is a temple near Pakhal lake. March, April and May visibility in clean and water sources are reduced and animals congregate near artificial water holes. The PA authorities have named the district Collector and Superintendent of Police Warangal as honorary wildlife warden, and are actively involved with the PA (In 1984).

The Pakhal Sanctuary is situated in Warangal district of Andhra Pradesh. The latitudinal extent of the PA is from 17°40' to 18°10' and longitudinal extent is from 79°55' E to 80°15'E. The nearest town is Narsampet, the distance being 10 km. Nearest railhead is Warangal at a distance of 45 kms. The nearest airport is Hyderabad at 180 kms.

The average elevation of the area is 300m above mean sea level. The highest point 560m and lowest point is 240m. There are 10 perennial artificial tanks and 11 non perennial artificial tanks. There is one made water hole which is perennial and one man made water hole which is non perennial. There are two natural water holes and four streams.

March to June are the summer months with a mean temperature of 36°C, the hottest month being May with temperatures rising to 46°C. Winter months are November to February with an average temperature of 28°C. The coldest month is December with temperatures falling to 14°C. Raining months are July to October with 1000 mm of rainfall. Hot winds occur in May about 4 times.

Forest types are 5A, 5AC, 5A/??, 5AC₃. Eucalyptus has been introduced to the PA. This sanctuary is connected to Eturunagaram Sanctuary by a forest block called Bandal. There are special breeding programmes for *Axis axis* initiated in 1972, *Cervus unicolor*, *Boselphus tragocamelus*. Salt licks are provided near water holes to ensure sighting success. The nearest vet is at Kothagndem 12 Km away.

There are 2 villages in the core zone with an estimated population of 100 people. About 80% of them are totally dependent on the forest. Total number of villages in the BZ are 38 with an estimated population 16000, 70% of whom are totally dependent on forest. Surround the PA there are 49 villages with a population of 25,000 of whom 40% depend totally on the forest for livelihood.

The relocation of the core zone villages are being proposed in the management plan. Breeding form employs people for 1500 man days all through the year. No alternatives to the biomars extraction from PA has even been suggested or implemented. Compensation is paid for the livestock killed or injured by wild animal. In, 1975 a PA map was prepared from the toposheets.

Areas for research suggested are;

- (i) Factors inhibiting the birds from visiting Pakhal
- (ii) Factors causing spread of foot and mouth disease even in the wild animals which are not in connect with the live stock. 4000 students and about 5 researchers visit the PA. The field director says that the area where research ought to be done is to find the cause for degradation of habitat and ways to improve it. The changes he would reconsmend are to reconstitute the PA excluding non potential area and include adjacent undisturbed are as.

PAPIKONDA SANCTUARY

Declared a sanctuary on 5th July, 1998. No other process completed. Total area of the sanctuary 590.68 sq.km. No details of legal or illegal occupation of the PA has available as the entire area was under the control of the territorial staff.

- Grazing in the BZ takes place. The livestock belong to the BZ villages. Local tribals collect MFP. There are habitations in the BZ. Paper mills harvest the bamboo from the entire BZ which has caused severe damage to the sanctuary.
- The proposed core zone is 22159 ha and buffer zone 36909 ha the total area being 59068 ha. "On phase I of setting up of locrelers net work 5 fixed stations are proposed and equipment ordered from ECIL Hyderabad. It was as yet (1984) not ready.
- Six forest guards are on special beat duty. They had one motor launch and 1 boat with outboard motor. Five foresters and deputy rangers were on vigilance duty
- There were 5 unmanned entry points to the PA.
- In 1984 there were floods in the hill streams because of which 2 artificial water holes for the animals 1 in the CZ and 1 in the BZ got washed away. No other natural Calamity has been recorded.
- There are no arrangements for vaccinating the cattle in the surrounding villages and there is no check on them.
- No information on the rights and leases
- No information on plantations
- 3168 cattle and sheep from adjoining villages graze in the PA
- About 60% of the PA is being grazed. "grazing is a privilege enjoyed by the villagers except browsing by goats is prohibited".
- In 1984 the sanctuary was not yet open to tourists
- Perantapali Ashram on the bank of river godavari is a place of religious interest in the PA.
- Koruthuru rest house in the BZ is under the control of DFO Eluru.
- Nov. to February is a good time to visit as all forest roads are open and climate is good

The Papikonda Sanctuary in Andhra Pradesh sits across the trijunction of three districts; East godavari, west godavari and Khammam. Latitudinal extent is 17⁰ 18'N to 17⁰ 35'N and Longitudinal extent is 81⁰ 20'E to 81⁰ 42'E. Nearest railhead is at Rajamundry and the nearest airport is at vijaywada 200 km away.

The average elevation of the area is 456 mt, the highest point is at 825 m and lowest point is at 20 m. River godavari flows through this sanctuary apart from that there 6 streams | natural spring, 3 artificial tanks and 1 man made water hole.

Summer months in this sanctuary are from March to June mean temperature of 38.5⁰ C. June is the hottest month with temperatures rising to 42.5⁰ C. Winter months are from December to February with mean December temperature being 12⁰ C. December is the coldest month with temperature dropping down to 11⁰ C. Rains occur between June and September. On an average 15.68 mm of rainfalls at this time. Once a cyclone struck in the month of March.

- 100 salt licks are provided in the sanctuary as natural salt licks are less in the sanctuary. The nearest vet is located at Devipatnam.
- There 27 villages in the BZ having a population of 6023 people. Ad are totally dependent on forests for livelihood.
- No alternate livelihood schemes have been undertaken by the sanctuary authorities.
- In 1983 two attacks on persons by tigers took place outside the PA. But there was no loss of life.
- Compensation is payable for livestock injured by tiger only.
- There were instances livestock injured or killed by wild animals. The information on claims for compensation and its settlement was with territorial staff as they dealt with these.

The researches recommended were

- # Aspects of release of Gharial in Godavari river Gaur ecology.
- # According to the DCF the habitat is good for the elephants and they could be released here !!!

The then DFO Hitesh Malhotra (1984) has frankly admitted that he does not welcome a wildlife posting !

PRANHITA WILDLIFE SANCTUARY

Declaration: Declared a sanctuary under the Wildlife (Protection) Act 1972 on 18.03.1980.

Rights: There is no record of proclamation having been done or the acquisition of rights.

Total Area: 13602.660 hectares.

Activities by other departments: Tassar sericulture is going on in the PA with the permission of the PA authorities but it disturbs wildlife. Negligible area is utilised for roads and electric and telephone lines.

Rights and leases of villagers and other industries in the park: MFP is collected by the Girijam Co-op society in the whole PA. Tribals graze cattle and do beedi leaf collection. They also take grass for thatching, mhowa seed, hutting materials and tassar leaves from the PA. All this disturbs the wildlife in the PA.

Permits: There is no record of any permit being granted.

Management plan: There is no record of any management plan but some schemes were to be submitted to the government for implementation according to the questionnaire.'

Zonation: No zonation of the PA has been done.

Problems for the park: Some extremist groups are hampering vigilance work.

Disease: Teak Skeletoniza and Defoliator have been carried by insects and have effected the teak.

Monoculture plantations: Teak plantations had been taken up between 1979-84.

Grazing: Free grazing is permitted for 1000 cattle from villages inside and 10,000 cattle from villages adjacent to the PA. It is also permitted for 100 sheep from villagers inside and 1500 sheep from villages adjacent to the PA. Grazing takes place in 100% of the park.

Tourism: The sanctuary was not open to tourism according to Q-1.

Future plans: An environmental education centre is proposed. Also propose to do film slide shows and build rest houses and machans.

Nearest town: Chunnur which is 5 km away. Manchaigal is the nearest rail head which is Manchaiyal which is 50 km away.

Latitude: 18° 59' to 25" North. **Longitude:** 78° 45' to 79° 14' east.

Lowest point: 500 mts. **Highest point:** 2180 mts. **Average elevation:** 770 mts to 1800 mts.

Water bodies: There are three perennial natural water holes used by humans, cattle and wildlife. There are also 2 perennial springs that are used by all. River Pranhita is a perennial river.

Species: See attached list.

Settlements: There are 26 villages inside the sanctuary with a population of 6000 of which 40% are tribals. There are 40 villages in the 10 km radius with a population of 25,000 of which 20% are tribals.

Relocaion: There is no record of relocation or proposed relocation.

Compensation: Compensation is payable for tiger kills outside the sanctuary areas.

Maps: Sanctuary maps are available for the entire area.

ASSAM

MANAS NATIONAL PARK

The Manas Conservation Area, referred to as the Manas Tiger Reserve (2837 sq.km.), comprises of the Manas National Park (519 sq.km.) and 18 RF's. The TR has also been declared a biosphere reserve while the national park enjoys the status of a World Heritage Site as well. The Field Director has control over the National Park while territorial DFO's control the RF's. All decisions pertaining to the Tiger Reserve are however taken in consultation with the Field Director.

The Manas National Park comprises of extensive rangelands, covering approximately 370 sq.km. Apart from rangelands, the forests in Manas are of the following types: low alluvial savannah woodland, Assam valley evergreen forests and Sub-Himalayan high alluvial semi-evergreen forests.

The following issues emerged from discussions with forest department staff and officials:

1. Poaching: During the peak of insurgency (mid 1990's) there was considerable rhino poaching. Rhino numbers fell from approximately 70 to about 10.

Reportedly, the poachers are not too interested in elephants and tigers, and their populations have not declined like the Rhino. Although we can not confirm or deny the above, we did not see any direct or indirect evidences of elephants or tigers in the park. It should, however, be mentioned that we only traveled along the Bansbari-Mathangudi road.

The PA staff reported to us that in Barpeta as well as other areas around Manas, there is a great demand for bushmeat. This has encouraged poachers to kill a large number of deer in Maans and now they are even targeting wild buffaloes and other animals and supplying their meet as deer meat. It may be noted here that Mans being mostly a grassland should have a high density of deer, but we only saw five Hog deer in the PA. RFO Brahma reported that in his opinion 80% of the poaching is for meat and 10-20% for the purpose of trade in animal parts.

According to the RFO, just about all the fringe villages, particularly on outskirts of Bhuyanpara range contribute to the poaching pressure on the PA. It is not possible to identify any particular village(s) that are involved in poaching.

Currently poaching by professional poachers (for purpose of wildlife trade), not insurgents.

Trade route for rhino horn- Manas to Bhutan (Thimpu), possibly through Siliguri.

The field Director admitted that poaching exists, albiet at reduced levels when compared to the early 1990s, and can not be stopped completely.

2. Management: Manas is a PA that has no villages within it. However, the so called fringe villages situated on its southern periphery exert pressure on it. Most villagers in the immediate periphery are *bodo* tribals. Even under ordinary circumstances, it would be difficult to keep people out of the PA given that the level of development of the fringe area is low when compared with the rest of Assam.

However, the insurgency in the area, in which the *bodos* are also participating has compounded the problem further. In fact the dependence of fringe villages

has been reported to have, increased since the insurgency as a consequence of destruction of communication links by insurgents.

As mentioned earlier, a series of devastating attacks on forest establishments in the PA have dampened the overall morale of the staff. Patrolling and protection work is minimal. There was a time when most of the field staff had, abandoned their beats and the NP had been rendered defenseless.

However the current Field Director has taken a few measures that have at least restored the presence of the staff inside the park. He has initiated contact programs with the *bodo* committees and at the same time has taken a decision to withdraw all arms from the field staff, except in the Bansbari Range Office. This has resulted in cooling of tempers and the local communities as well as the militants don't feel threatened anymore, and therefore desist from attacking the field staff.

At the same time the field Director claims to have given a free hand to his field staff and is letting them operate on their own initiative by giving them measureable objectives to achieve like setting up of village committees or "*Manas bandhu*" groups, re-establishing forest camps or posts etc.

He is also motivating his staff by listening to and helping out with their personal problems. At present the approach seems to be waking.

- Mention history of PA mgt. -> Lahan, D Roy, Agariwal. – backlash of tough measures.
- The current PA director has taken up a no. Of initiatives (greater decentralisation of power and decision making to lower staff, extensive outreach to the fringe village which would traditionally be considered too radical. However it is perhaps these very measures which have contributed to "turning the tide" in Manas.
- Not much evidence of pressure on park (in the Bansbari range where we were able to go) in terms of grazing, firewood collection etc. Brahma opines that habitat fairly good (also evident visually) and sustained protection can help animals to bounce back.
- The assistance received from NGOs (predominantly in kind)- TCP care for the wild international, UNESCO Considerably added to the capacity of the park management.
- Flow of funds from the state govt. Remains the biggest constraint as for as funding is concerned. It is not so much the amount of funds, as their timely availability with the park office, that is proving to be a problem.
- Bhutanese Manas contiguous to Indian Manas. Panbang township, 14 kms. From Mathangiri inside Bhutanese Manas. Population approx. 1500 grow oranges. Road connecting Banbang to Mathorngiri and onwards to Barpeta Road 8-15 vehicles-during orange season.
4- 7 vehicles at other times.

Impact of this road/vehicles unclear.

- A company of AFPF placed with park director. Does not seem to have been of much use- Indisciplined/untrained staff.
Lack of clearly defined power of this force.

Encroachment as a result of increasing in Bodo numbers in this area.

- MAB & WHS useful in awareness building
- TR 2.837 sq. Km = BR.
- WHS – 520 sq.km
- Informer network required.
- Manas Bandhu groups-imp! 30 groups, 500 people
- All hunting by villagers only. Therefore of agitation they have become more dependent on forest.
- Research by gautam Narayan and Rahmani
- Villagers attack on PA camps. Not specifically targetted towards Field Director.
- Meet in Barpetta
- Erosion on Bhutanese road.

Insurgency: Most of the people living in the fringe villages around Manas are *bodos*.

The active militant organizations in those villages are: (i)ULFA (ii) NDFB (iii) BLT

We got mixed responses about coordination or lack of it among these organisations. At present, all the three organisation are operating in tandem. They seem to have decides, according to the R.O.Bansbari Range, Mr. A.K.Brahma, to not use the resources of Manas for financing their operations. Therefore there is not much impact on the PA at present. However, in the past 10-12 years, a lot of poaching is reported to have accord, especially of the Rhino. The current, preparation of the animal is pagged at around 7-8 individuals. We also did not see many dears/ungulates. Reportedly, there are 89 tigers and around 250 elephants in the NP.

The habitat along the road from Bansbari to Mathangiri seems in good shape, but the rest of the PA especially the Parbare and the Bhuiryanpara Ranges, is not as undisturbed as Bansburi. However, since Manas is mostly a grassland with very few species of commercial interest, it would seem unlikely that the insurgents would target the habitat of the PA.

There have, however, been several instances of PA staff being Killed or kidnapped by militants because of which, protection or patrolling may have suffered.

It is pertinent to note that the attacks did not target forest staff per se, but were intended against any institution/individual representing the state. During discussions, it also emerged that during Debroy's tenure as field director policing was extremely harsh. This would have generated/added to animosity amongst people towards forest staff/ park. Following categories of attacks on forest staff:

- (i) attacks by large groups of villagers
- (ii) attacks by gangs comprising of a mix of poachers, insurgents, disgruntled villagers – primarily for looting arms, money, confiscated horns etc.
- (iii) attacks (including kidnappings) by well organised insurgent gangs.

(i) & (ii) were aimed at govt. Infrastructure and personnel in general, though villagers incensed by harsh policing may have used the opportunity to vent their anger.

- We were unable to pinpoint the factors which have catalysed the decline of insurgent activity inside the park and against the forest staff, though this seems to coincide with S.P. Singhs taking over as Field director.
- Wildlife trade, particularly the trade in rhino horn seems to have been a significant source of funding for the insurgent movement particularly during its peak.

GUJARAT

BANSDA NATIONAL PARK

Objective

Bansda National Park (BNP) was created to preserve bio-diversity of the PA, to re-introduce and rehabilitate locally extinct species, to support threatened/ endangered species through breeding programmes and to improve the habitat of the PA. One of the other objectives behind the creation of this NP was to introduce ecologically acceptable bio-technologies to enable economic development of the villages, so that their dependence on forest is minimal. Also, to develop regulated and controlled tourism and to promote awareness among the visitors and local population.

Legal Status

BNP was notified on April 9, 1979, under the Wildlife (Protection) Act of 1972, with an initial area of 6.08 sq.km. However, 17.91 sq. km was added to the park in 1986. Hence, the total area of the NP is 23.99 sq.km.

Geographical Profile

Bansda National Park extends over 23.99 sq.km in Navsari district of Gujarat. It falls between 20° 51' 16" N – 21° 31' 22" N and 73° 20' 30" E – 73° 31' 20" E. The nearest town Bansda, which is seven km away, is connected to the PA by road. Waghai and Unai, the nearest railheads, both are seven km from the PA. The nearest airport is at Surat at a distance of 100 km.

The PA was formed to correspond to the RF boundaries.

Ambabari is the highest point of the PA 330 m above msl and the lowest is 175 m above msl (name of the lowest point not given in the Questionnaire).

Water sources: The water sources in the PA include a few artificial tanks/ holes (the exact number is not known), one perennial river (River Ambika), and 10 seasonal streams.

Climate: The nearest meteorological station is located in Bansda, from where the data regarding temperature and rainfall is collected. The temperature is generally uniform all through the year, with the maximum temperature varying from 32° – 39° C, and the minimum between 18° – 25° C. April is the hottest month. The park experiences water scarcity from February-June, and receives rainfall during the months of June and October. July is the rainiest month with 800 mm of rainfall.

Biological Profile

Flora – Locally threatened species include teak, sisam, khair and charoli. The cause for their decline, as reported in the questionnaire is proliferation of commercial timber species. Weed infestation has never been a problem in the PA.

Fauna: [Note: The figures in brackets indicate the population of that species according to the 1997 census.]

According to the 1997 census, leopard, jackal, palm civet, wild boar, gray langoor and rhesus macaque are found occasionally in the PA, but are widely distributed.

However, black rapped hare is common. Panther (5), spotted deer (22), barking deer (3), hyena (3), and jungle cat (1) are locally threatened species. Flying squirrel, whose population is declining (personal estimate), is of cultural importance.

Pressures on the PA

Habitation – There are two revenue villages inside the PA, Sadad Devi and Keliapada, occupying 15.02 sq.km. The total population of both the villages is 575. People in both these villages belong to Scheduled Tribes, most of whom practice agriculture and some are wage laborers. Their livestock include cows, buffaloes and goats (the figures for cattle population are not available).

Besides these, there are eight villages within a 10 km radius of the PA, with a population of 9908, most of whom are tribals.

No attempt towards relocation has been made till now.

Grazing - 5227 animals graze inside the PA throughout the year. Whether the number of animals grazing in the PA has increased or decreased has not been assessed.

NTFP- Currently, there is no collection of timber and NTFP from the PA.

Management Issues

One plan was prepared in 1994 by Mr. G.K.Sinha, IFS, which was not approved.

M.P.Joshi is the local in-charge stationed at Navlad Tal -Bansda, District Navsari.

The park has been receiving funds (plan funds as well as non-plan funds). In 1998-99, it was allocated Rs 42,51015 as plan funds and Rs 10,05194 as non-plan funds.

There are 12 entry-points to the PA on foot, none of which are manned. However, the three entry-points by vehicle are manned. Permits are not issued for entry of visitors into the PA. The PA is open to tourists all through the year.

Death of livestock due to leopard attacks was compensated. However there was no incident of attack on human beings or crop damage by wild animals.

There is a FRH at Waghai, three km away from the PA, a PWD Guesthouse at Bansda seven km away, and private lodges at Bansda and Hanumanbari (also seven km away).

Purna Wildlife Sanctuary

Introduction

Purna Wildlife Sanctuary (PWLS) is situated in the Dangs district in south Gujarat, which falls in biotic province 5A-Western Ghats as per Roger and Panwar's classification of biogeographic zones. The PA covers an area of 160.80 sq.km. The sanctuary was carved out of a Reserve Forest (RF) (Wildlife of Gujarat- H.S.Singh, 1998) on 21st July 1990.

Significance

PWLS is a part of dense moist deciduous forests in the Western Ghats of Gujarat and is home to varied species of fauna and flora. The important faunal elements of the PA include- tiger, leopard, giant squirrels, flying squirrels, sambar, four horned antelope as well a number of reptilian and bird species. The sanctuary is also significant in the sense that it provides for the material as well as cultural needs of the local tribals and is an important factor in maintaining the ecological balance in the area.

Geographical Profile

The PA lies between latitude 20°15' 15" W- 21° 31' 22" W and longitude 73° 32' 20" E- 73° 48' 30" E. Ahwa town is the nearest town to the PA, situated at a distance of 20 km from it. In Surat lies the nearest railhead at a distance of 135 km. The PA is thus, best approachable from Surat to Ahwa via road and from Ahwa to the PA by road.

Drainage

The PA has 2 perennial and 3 seasonal rivers or streams. Water scarcity is reported during the months of November to May.

Climate

The temperatures remain more or less moderate throughout the year. The maximum temperature reaches about 37° C in June and the minimum reaches 11° C in January.

The area receives about 2146.7 mm of rainfall annually.

Biological Profile

The entire PA is under a good forest cover. The forest subtypes as per the classification given by champion and Seth are [source – Wildlife of Gujarat by H.S.Singh 1998]

3 B/ C ₂	–	Southern moist mixed deciduous forest
3 B/C _{1b}	-	Slightly moist teak forest
3 B / C _{1c}	-	Moist teak forest
5 / E ₉	-	Bamboo brakes
3B/2S ₁	-	Southern secondary moist deciduous forest

Bamboo forms thick middle story in large areas with tree cover having canopy density of above 40%.

Bamboo (*Dendrocalamus strictus*), teak (*Tectona grandis*), and dudhalo (*Hirtia tinctoria*), are the main species found here along with other important species such as sisoo (*Dalbergia latifolia*), Khair (*Acacia catechu*), Haldu (*Adina cordifolia*), Sadad (*T. tomentosa*) etc.

The area was subjected to teak, khair and bamboo plantations in the year 1990. These plantations were to help control soil erosion, provide fodder facilities for wildlife and help in soil and moisture conservation. The teak plantations covered an area of 9.77 sq.km. (Information about other plantations is not available) (Distribution and status of flora has not been mentioned in the questionnaire) No new species of flora have been deliberately or accidentally introduced in the PA. It was reported that teak, khair and bamboo are locally threatened due to bird pressure. No weed infestation is reported from the area.

Corridor

A forest corridor connects PWLS to Dhamandevi forest (the status of Dhamandevi forest is not mentioned).

Fauna

The PA has rich faunal diversity. A large number of mammals, reptiles and birds have found a home here. Tiger, leopard, rusty spotted cat, four horned antelope, giant squirrel and python are the threatened species recorded in the sanctuary (source: wildlife of Gujarat – H.S.Singh). Sambar, baring deer, chital, common palm civet, flying squirrel, Russell's viper, Indian krait, cobra, crested serpent eagle, hornbills, emerald dove, great horned owl, griffin vulture, great racket-tailed drongo, jungle bush quail and scarlet minivet are among the other important species found here. [Data on distribution and population/abundance is not available]

Tiger, sambar and spotted deer have completely died out in the sanctuary. Population of other mammals is also very low. Four horned antelope and barking deer can now be only occasionally sighted. Giant squirrel has not been spotted in the recent past. [Source: Wildlife of Gujarat – H.S.Singh, 1998]

Pressures on biodiversity

Occasional ground fires, felling and grazing are reported from the PA but all these activities reportedly affect small patches of forest and have a negligible impact. The occasional forest fires are reportedly of small magnitude and have little impact on the habitat. The work on fire lines and other fire prevention and protection activities is still underway.

Occasional flooding due to natural cause is also reported. It causes soil erosion. In order to control floods and check soil erosion check dams have been built on small streams.

Despite the fact that the PA is not located in a drought prone region, droughts are reported in the month of February – May affecting the entire sanctuary. These droughts are reportedly related to the kind of terrain found here [this point needs explanation]. These droughts however have little impact on the PA as whatever impact is produced is recovered soon with the onset of monsoon. In order to prevent and control such droughts soil and moisture conservation is being carried out by making check dams, pools etc.

Tree felling and extraction has not been reported in the questionnaire. No disease of flora and or fauna has affected the PA in the last decade. [No survey has been carried out but no incidents/reports have been brought to notice either]

The forest department in order to reduce pressure on the PA, carries out activities like nature education camps and fodder plantations (no other information is available)

on these fodder plantations- what species of flora is planted and where and when etc.)

The livestock within the PA and in its surrounding areas is regularly vaccinated. Checking of livestock passing through the PA is undertaken occasionally. No quarantine facilities exist at or near the PA.

Socio-Economic Profile

The questionnaire reports no habitation inside the sanctuary. But according of the book 'Wildlife of Gujarat' – H.S.Singh [1998], the PA houses one tribal village inside it and 28 villages right on its periphery.

[There is no list of villages attached to the questionnaire]

No migratory graziers are reported to be using the PA.

Timber and NTFP collection is not reported either.

[The 'Wildlife of Gujarat' states that the PA is under use for collection of wood, NTFP as well as grazing)

No sites of religious or cultural importance are situated in the PA.

Impact of PA on people

There are reports of panther attacks in the area adjacent to the PA. All attacks have resulted in injuries to the people for which they have been compensated.

No information is available on the death/injury to livestock by wild animals. Crop depredation by wild animals is not a major concern.

The questionnaire reports no confrontation between the local people and the PA authorities.

Impact on the PA

No information is available on the nature of resource use and activities degrading the PA. [Wildlife of Gujarat - the hunting and food gathering habits of the tribals are a threat to the wildlife]

Eco development has been introduced around the PA under which only training given through nature education camp has been reported for the last 3 years.

Management Profile

Legal status

The area was declared a wildlife sanctuary on 27 July 1990 under the WL (P) Act, 1972, vide notification number GVN-7 -90/WLP/1076/3057/V2.

Prior to it being declared a sanctuary, the area was a part of Reserve Forest, Protected Forest and Revenue land. (The exact area of these categories is given in the questionnaire RF – 31.49 sq.km., RL – 66.69 but it needs to be verified as it does not add up to the present area of the PA).

Zones and boundaries

The PA has been divided into Core (49.85) and Buffer (127.06 sq.km) zone.

The size and shape of the PA is to be contained within some natural boundaries. The PA has been divided into 5 ranges – Singana, Bardipada, Bheskatri, Kalibel and Ahwa (west).

Management Plan

There is a current management plan for the PA prepared in 1995 by the Deputy Conservator of Forest (W.P.Division, Surat) Shri B.S.Pathak and Shri R.L.Meena, IFS (Dangs (N) Division, Ahwa). It is valid till the year 2000.

Budgets and expenditure

The money allocated to the sanctuary seems to be adequate. The budget figures for the PA are as follows

	Provision	Achievement	Activities
1996-97	5,50,000	4,88,759	Construction of guard quarter, interpretation cum orientation center, check dam, Nala bandh
1997-98	4,50,000	3,92,458	Check dams, Fire lines (100 km), fire control equipment
1998-99	Nil		

Tourism and regulation of entry

There are 7 entry points to the PA, by vehicle out of which 2 area manned.

The CCF, Wildlife, issues permits for the entry of vehicles into the PA. Entry is prohibited after nightfall.

No details on the number of visitors to the PA are available.

The best months to visit the PA are between October to March.

There is a public thoroughfare through the PA and 25-30,000 people (approx.) use it annually.

The management carries out nature camps and conducts awareness campaigns and competitions along with eco-tourism trips in order to make tourism more eco-friendly. Accommodation for tourists is available both inside as well as outside the PA.

Anti Poaching

There are no special anti-poaching squads in the PA. However, there is provision for cash rewards under the incentive and reward scheme, which is operational in the area.

No permits are issued for hunting.

No commercial or developmental activities have been reported from the PA. No encroachments have been reported either.

Staffing and staff training

No organizational chart of the PA has been provided.

Temporary employment is given to the locals as per requirement.

The staff has received no wildlife training.

Equipment and literature

No information is available

The management carries out a five yearly census of wildlife. The PA has cheap accommodation for researchers. It also has an interpretation center.

No details on offences committed and incidences of poaching are available.

50% of the PA has been reported as undisturbed.

HARYANA

NAHAR SANCTUARY

Legal Profile

An area of 2.11 sq. k.m. was declared as a sanctuary on January 30,1987 vide notification number S.O 9/C.A 53/72/S 18/87. The entire area was a reserved forest prior to it becoming a sanctuary. There is no zoning. [Q.1A]

Geographical Profile

The sanctuary is located in tehsil Kosli in district Rewari. The best approach to the PA is by road from Delhi. The Kosli to Rewari road goes through the PA. A water canal also runs through the PA. [Q.1A]

Management Profile

- There are no villages inside the sanctuary.
- There are no grazing, NTFP etc. pressures inside the PA.
- The entire area is reportedly affected by forest fire.
- The area is also effected by drought in the summer season.
- Village Jhal and Nahar government college are located on the periphery of the PA.

KALESAR SANCTUARY

Legal Profile

An area of 100.31 sq. k.m was declared as a sanctuary on June 18,1993 vide notification number S.O.47/C A. 53/1972/S.18/93. The entire area was a reserved forest prior to it becoming a sanctuary. There is no zoning in the PA.[Q.1A]

Geographical Profile

The sanctuary is located in tehsil Chhachhraouli in district Yamuna Nagar. It's situated on Yamuna Nagar Ponta Sahib Road. Around 15 k.m of this road runs inside the sanctuary. The Simbalbara wildlife sanctuary of Himachal Pradesh is contiguous with the northern boundary of Kalesar. A Yamuna river also runs through the PA. [TTK atlas & Q.1A]

Management Profile

- There is upper chicken village with a population of 50 persons inside the PA.
- There is a Mahadev Kalesar temple, which is visited by approximately one lakh pilgrims annually.
- There were 600 visitors to the PA in 1995-96 and around 150 in the winter of 1997.
- Around ten k.m. of the area is affected by forest fire.
- The area is affected by Lantana weed also .
- The area is also affected by drought from 15 May to 15 June.
- Poaching of animals + timber especially acacia catechu is also reported from the sanctuary.

CHHICHHILA LAKE SANCTUARY

Legal Profile

An area of 0.3 sq k.m was declared as a sanctuary on November 28,1986 vide notification number S.O 96/C.A 53/72/S.16/86. There is no zoning in the PA.

Geographical Profile

The Sanctuary is located in tehsil Kaithal in district Kaithal. Earlier, the PA was located in district Kurukshetra. The entire area used to be a community land. The entire area is also a natural wetland. Village Bhensi Majra and village Panchayat and Naghta touch the boundary of the PA in eastern and western side respectively. The agricultural land of village Phoola and Lal chand touches the northern and southern boundary of the sanctuary. The PA can be approached by road from Delhi via Karnal. [Q1A & TTK Atlas]

Management Profile

No other pressures are reported from the sanctuary.

ABUBSHEHAR SANCTUARY

Legal Profile

An area of 115.35 sq k.m was declared as a sanctuary on November 12,1987 vide notification number S.O. 129/C.A. 53/72/S.18/87. There is no zoning inside the PA.

Geographical Profile

The sanctuary is located in tehsil Dabwali in district Sirsa. The entire area used to be a Community land. The Rajasthan Canal (15 k.m) and Bhakra Drain (20 k.m) run within the Sanctuary. The PA can be approached by road from Delhi via Rohtak, Hisar and Sirsa. It can also be approached from Bhatinda in Punjab by road.

[TTK atlas & Q1A]

Management Profile

- There are many villages inside the sanctuary.
- The cultivation area within the sanctuary is 115.35 sq k. m. ???
- Cows, Buffaloes ,Goats and Sheep graze in the sanctuary throughout the year.
- Nilgai has been affected by rinder pest since the last three years. This has killed ten Nilgais.
- There is a temple inside the PA which is visited by pilgrimages.

[Q1A]

BIR BARA VAN JIND SANCTUARY

Legal Profile

An area of 4.19 sq k ms was declared as a sanctuary on December 20,1991 vide notification number S.O 152/C.A 53/72/3 18/91. The entire area was a reserved forest prior to it becoming a Sanctuary. There is no zoning inside the PA.[Q1A]

Geographical Profile

The Sanctuary is located in district. Jind. The best approach to the PA's by road from city Jind.

Management Profile

- City Jind has an impact on the area of Sanctuary. ???
- The area is also affected by drought in May-June.
- The entire area is affected by forest fire.
- Total area is forest land.
- A P.W.D road of around three k ms runs through the PA.
- Canal within the sanctuary.

BIR SHIKARGAH SANCTUARY

Legal Profile

An area of 7.67 sq k. m was declared as a sanctuary on May 29,1987 vide notification number S.O. 57/C.A 53/73/S 18/87. There is no zoning in the PA. The entire area was a reserved forest prior to it becoming a sanctuary.[Q1A]

Geographical Profile

The PA is located P.O. Pinjor in tehsil Kalka in district Panchkula.

Management Profile

- There is no village inside the sanctuary.
- There are no rights and Leases inside the PA.
- Village Jodhpur is on the periphery of the PA.
- Lantana weed has affected the vegetation of the PA.
- The entire area is affected by forest fire.
- The area is affected by drought in May to June.
- There is cement TROU line which runs inside the PA.
- Pinjore to Malah highway (5 k.m)runs inside the sanctuary
- Electric cables and transmission lines are also running within the sanctuary.

HIMACHAL PRADESH

PONG LAKE SANCTUARY: A PROFILE

1. **Introduction:** The Pong Lake was created in 1976 by damming the Beas river. It was notified as a sanctuary in 1983, and is the only place in India from where the rare rednecked grebe has been recorded [dir]. However, the PA authorities do not have any control over the activities of local people or other government departments in the PA, which is a problem.
2. **Geographical Profile:** The Pong Lake is located in Kangra District of Himachal Pradesh. It is situated between latitudes 31° 80' to 31° 07' 26" North and longitudes 75° 58' to 76° 25' East. There are many towns around the periphery of the lake eg. Dehra, Jawali, Nagrota Surian, Dhameta, Dada Sibba, Sansarpur Terrace, Talwara etc. at a distance of between 5 km to 10 km. The nearest railheads are at Mukerian and Pathankot, 32 km and 30 km respectively, and the nearest airport is at Pathankot. [q1, dir]
3. **Biological Profile:** Pong Lake attracts a large number of migratory birds in winter, and has become an important wetland in North India. However, the sanctuary also contains some forests adjoining the reservoir, which support terrestrial wild fauna and flora also.

Pong Lake Sanctuary is situated in the North West Himalaya Biogeographic Province (2A) of the Himalaya Biogeographic Zone.

3.1. Flora: The forest types that occur in the PA are the following [mp (13)]:-

3.1.1 *Northern Dry Mixed Deciduous Forests (5b/C2)*: *Acacia latifolia* is reportedly the dominant species in this forest type. It is reportedly heavily impacted by human activities in the PA.

3.2. Fauna: According to a checklist of birds of Pong Lake prepared by Mr. Sanjeeva Pandey, the erstwhile DFO(WL) at Chamba, there are over 220 birds that occur in Pong Lake. In addition, in the area of the PA around the reservoir, the animals that are said to occur are the clawless otter, nilgai, sambar, barking deer, leopard etc. [mp (14)].

4. Socio-economic Profile

4.1. Impact of the people on the PA: The uses that the local people and other government departments make of the resources of the PA are discussed below:-

4.1.1. *Habitation*: There are 125 villages in the buffer zone of the PA with a population of approximately 50,000 people [q1].

4.1.2. *Grazing*: The people living inside the buffer zone of the PA also graze their livestock in it. However, the PA authorities do not have any estimates of the quantum or area affected.

4.1.3. *Agriculture*: No estimate of the revenue land contained within the PA is available.

4.1.4. *Fuelwood Collection*: No estimate.

4.1.5. *Other Government Departments*: The Bhakra Beas Management Board is the legal owner of the land under the reservoir as well as some adjoining areas that total upto about 280 sq. km. The rest of the PA is under revenue land or the territorial division of the Forest Department. In addition, the departments of Fisheries and Tourism are also active in the PA. The PA management therefore, does not control any part of the PA. [q1]

4.1.6. *Fishing*: There are 1500 licensed fishermen who fish in the lake. Fishing operations are controlled by the Fisheries Department.

5. Management Profile

5.1. Area and Zoning: Pong Lake Sanctuary has an area of 307.70 sq. km. There is a core zone that includes the reservoir that has an area of 274.36 sq. km. The buffer zone is said to have an area of 33.34 sq. km. [q1]

5.2. Legal Status: Pong Lake Sanctuary was notified vide Himachal Pradesh Government Notification No. Fts. (F) 6-5/82 dated 1.6.1983. A final notification for the PA after the process of enquiring and settling of rights was issued on 23.10.99 vide notification No. FFE-B-F8/99 [q1].

5.3. Management Plan: There is a management plan for the PA. The period of its validity is 1994-95 to 2003-4. [mp]

5.4. Budget: The budget allocation and expenditure during 1997-98 to 1999-2000 for the PA was as follows:-

	Plan Funds	Non Plan Funds
1997-98	Rs. 9,95,538.00	Rs. 6,50,472.00
1998-99	Rs. 9,25,540.00	Rs. 7,98,316.00
1999-2000	Rs. 7,10,863.00	Rs. 6,62,320.00

5.5. Staff: The sanctuary is under the overall supervision of the DFO(WL), Chamba. The staff that are engaged full time in the sanctuary are:-

Deputy Ranger – 4

Forest Guard – 6

The sanctioned posts of 1 ACF, 2 Range Officers, and 2 guards are lying vacant. There are seven people that are employed full time on daily wages in the PA.

5.6. Equipment: At present, the following equipment is reported to be in working order in the PA:-

Binoculars – 1

Telephone – 1

Electric Generator – 1

Boats – 1

5.7. Tourism: PA authorities do not have estimates of the number of tourists visiting the PA. However, given the low level of infrastructure, the number of tourists visiting the PA could not be too many.

5.8. Plantations: The PA authorities were able to give us scanty information regarding plantations in the PA. The information that was available is as follows:-

Mixed Broad Leaf Species – 152.50 ha.

Others – 45 ha.

5.9. Research and Monitoring: Mr. Sanjeeva Pandey and Dr. A.J.T. Gaston had developed a checklist of birds in Pong Lake. The PA authorities carry out an annual bird count of about 10 species in the PA.

5.10. Interpretation, Education and Extension: The PA authorities reported that nature awareness programmes were conducted from time to time. An interpretation centre has been constructed in Rancer, an island in the middle of the Pong Lake, but is not yet equipped. [q1].

5.11. Offences: In 1996-97, 4 ducks were reportedly killed accidentally by fishermen after getting entangled in a fishing net. A case has been filed against the offenders. [q1]

5.12. Encroachments: PA authorities are not aware of any encroachments.

5.13. Involvement of NGOs, Local People etc. in Management: None

6. Conclusion

RUPI BHABA SANCTUARY: A PROFILE

- 1. Introduction:** The Rupi Bhaba Sanctuary with a notified area of 269.15 sq. km. is a part of a contiguous block of wildlife protected areas that includes within it the Great Himalayan National Park and the Pin Valley National Park. In addition, the Kanawar Sanctuary, to the north of the Great Himalayan National Park in Kullu district as well as Lippa Asrang Sanctuary to the north-east of the Rupi Bhaba Sanctuary are also areas from where animal migrations possibly take place through forest or alpine pasture corridors. Rupi Bhaba Sanctuary is also the site where the Sanjay Vidyut Hydrel Power Project is located. In addition, the Nathpa-Jhakri Hydrel Power Project that is currently under construction, is located just outside the southern boundary of the PA, along the Sutlej River. Also, a road connecting the Pin Valley to Wangtu in Kinnaur is being planned through the sanctuary. However, it is not known if this particular project has been cleared under the Forest Conservation Act, 1980. [fv (1999), q1, dir]
- 2. Geographical Profile:** Rupi Bhaba Sanctuary is located in Kinnaur District of Himachal Pradesh. It is situated between latitudes 31° 30' to 31° 47' 06" North and longitudes 77° 45' 06" to 78° 09' East. The Nearest town is Rampur Bushahr, the capital of the erstwhile Princely State of Bushahr, which is situated at a distance of about 40 km. from the boundary of the PA. The nearest railhead and airport are Shimla, the state capital, which is at a distance of about 180 km. from the PA. [dir]

The PA contains within it two major valleys *viz.* Rupi valley and Bhaba Valley. The major stream in the Bhaba valley is Wangar Gad, whose waters have been tapped by the Sanjay Vidyut Hydrel Power Project near Kaphnu. The major stream in the Rupi valley is the Sorang Gad. The entire area of the PA is criss-crossed with several perennial streams. There are several glaciers in the north of the PA. [dir, fv (1999)].

- 3. Biological Profile:** As already mentioned, Rupi Bhaba Sanctuary is valuable from the point of view of forming a large and contiguous conservation unit in Himachal Pradesh along the Great Himalayan and Pin Valley national parks.

The Rupi Bhaba Sanctuary is situated in the North West Himalaya Biogeographic Province (2A) of the Himalaya Biogeographic Zone.

3.1. Flora: The forest types that occur in the PA are the following [mp (12-15)]:-

3.1.1 *Upper or Himalayan Chil Pine Forests*: Reportedly occurs in the PA along the Satluj river on its southern boundary. Its distribution is very scattered and irregular.

3.1.2 *Ban Oak Forests (12/C-1a)*: Is reportedly found only near villages in undemarcated forests. An exception, however, is the patch around Rokcharang village. The village deity is also named after the Ban oak tree.

3.1.3 *Western Mixed Coniferous Forests (12/C-1d)*: Reportedly occurs between 2000 metres and 3500 metres and can include spruce, silver fir, deodar and kail. Said to be heavily grazed and prone to forest fires.

3.1.4 *Moist Temperate Deciduous Forests (12/C-1e)*: Reportedly occurs between 1800 metres and 2750 metres in strips along streams and along the gentler slopes.

3.1.5 *Low Level Blue Pine Forests (12/C-1f)*: Reportedly, kail is mixed with deodar in all the areas where this forest type occurs.

3.1.6 *Kharsu Oak Forests (12/C-2a)*: Reportedly occurs between 2500 metres and 3300 metres, mainly on the southern aspects, along with kail.

3.1.7 *Alder Forests (12/1S1)*: These forests are reportedly found in the valleys along Salaring nala between Shorang and Chhota Kamba.

3.1.8 *West Himalayan Sub Alpine Forests (14/C1)*: Reportedly found in the Muling area along Wangar Khad.

3.1.10 *Alpine Pasture (15/C-3)*: Reportedly occur in the PA between 3600 metres and 4550 metres.

3.1.11 *Dry Alpine Scrub (16/C-1)*: Reportedly occurs along the portion of the PA that is contiguous with the Pin Valley

3.2. Fauna: The animals that are said to occur in Rupi Bhaba Sanctuary are musk deer, ghoral, bharal, serow, Himalayan tahr, Himalayan black bear, leopard, leopard cat, jungle cat, jackal, fox, rhesus macaque, langur, porcupine etc.

among mammals. The pheasants and birds that are known to occur are monal, western tragopan, chir, koklas, kalij etc [mp (16-22)]. Mr. Sanjeeva Pandey, the DFO(WL) posted in Sarahan during 1987-90, identified a total of 161 birds in Rupi Bhaba Sanctuary [mp (152-157)]

4. Socio-economic Profile

4.1. Impact of the people on the PA: According to the Bushahr Settlement Report, 1921, people were given rights for grazing, timber for house construction and lopping of coniferous trees in the forests of the PA. The uses that people make of the resources of the PA are discussed below.

4.1.1. *Habitation*: There are 28 villages in the PA with over 300 associated hamlets, with a population of 6952 [mp, q1]. People are mainly cultivators and pastoralists and depend upon the resources of the PA for their subsistence. In addition to villagers living in the PA, there is also a substantial presence of the staff of the Sanjay Vidyut Hydel Project in the PA, but their exact numbers are not known. [fv (1999)]

4.1.2. *Grazing*: The total population of domesticated animals belonging to the villages located in the PA is reported to be 21,086. Of these, 10,099 (47.89%) are sheep, 6,093 (28.89%) are goats and 2720 are cows and bulls (12.89%). These animals reportedly graze in the alpine pastures located in the PA during summer. During winter, they are fed on fodder (leaves and grasses) that has been collected and stored in the autumn [q1]. In addition, there are also migratory graziers that bring their livestock into the PA for summer grazing. An estimated 18997 sheep and goats are seasonally grazed in the PA. [mp (116-123)]

4.1.3. *Agriculture*: An estimated 8.07 sq. km. land is being cultivated inside the PA. While agriculture remains traditional in the Rupi Valley, it has become diversified in the Bhaba valley with apples and other horticultural goods being produced. [mp (109), fv (1999)]

4.1.4. *Fuelwood Collection*: While not reported during the field visit, this activity has been recorded as a pressure especially during the days when the Sanjay Vidyut Project was being constructed. At present, atleast in a large portion of the Bhaba valley, fuelwood is not being used and has

been substituted by LPG. However, the quantities that may be extracted in the Rupi valley are not known. [mp (28), fv (1999)].

4.1.5. *Timber for House Construction*: Between 1985-86 and 1989-90, 122 deodar, 625 kail, and 43 trees of spruce and fir were cut for house construction in Rupi Bhaba Sanctuary [mp (26-27)]. The timber demand or TD rights of the people living in the PA is still being fulfilled from within the area [q1, fv (1999)]. It is not clear whether this level of timber demand is sustainable or not.

4.1.6. *Collection of medicinal and aromatic herbs*: Reportedly, dhup, karu, and Patish are extracted from the PA by the local people. Between 1985-86 and 1989-90, 2058.38 quintals of Dhup was extracted from the PA. In 1999, 12.3 quintals of dhup was reportedly extracted from the PA. [mp (28-29), q1].

4.1.7. *Fodder extraction*: The extraction of fodder is done mainly in autumn to feed the domestic animals through the winter. Mainly, broadleaf trees are lopped in addition to grass. [mp (27)]

4.1.8. *Development Projects*: The Sanjay Vidyut Project of the H.P.S.E.B. is located within the PA. Reportedly, the environmental impacts of this project during construction have been massive. However, even now, the negative impact of this project continues in that it has led to the opening up of the Bhaba valley as well as the living inside the PA of the project staff, a large number of who happen to be outsiders. Another aspect of the impact of the PA is continuing movement of traffic as well as ongoing construction activities for staff quarters, extension of the Wangtu-Kafnoo road beyond Kafnoo, etc. [mp (28), fv (1999)].

4.1.9. *Forest Fires*: Local people are known to set fire to certain areas in the PA for allowing new shoots to come and graze their cattle. In 1999, 4.3 sq. km. was reportedly affected by such fires. The area affected was reported to be more than the normal average of 1 sq. km. or so due to near drought conditions in the PA in 1999 [q1].

4.1.10. *Other Impacts*: Reportedly, coniferous trees are lopped for use as fire starters and used for lining the floors of sheep pens for added

warmth during winter [mp (27)]. People are also reported to damage coniferous trees by debarking and cutting them and using the bark and lower stumps for the purpose of torchwood [mp (27)].

4.2. Impact of the PA on the People: So far, since most of the usufruct rights being enjoyed by the people have not been withdrawn or curtailed, there has not been any major impact of the PA on the people. No crop damage by wild animals has been reported by the local people but that may be because the process of compensation for crop damage is lengthy and cumbersome and the compensation levels may not be adequate. In 1998-99, death of 42 goats, 12 cows and 3 donkeys due to attack by wild animals was reported by the local people. Compensation of Rs. 13,125.00 had been paid for all these animals. [q1].

4.3. Other Issues: In case a proposed road connecting Kinnaur with the Pin Valley through the PA does come about, it will be quite disastrous, at least for the Bhaba Valley.

The IIPA field visitors were also informed that the Collector, Kinnaur District, had proposed that a large portion of the Rupi Bhaba Sanctuary should be denotified. This was being done ostensibly as a part of the process of settlement of rights in the PA. The final outcome of this process is not yet known. [fv (1999)].

5. Management Profile

5.1. Area and Zoning: Rupi Bhaba Sanctuary has an area of 269.15 sq. km. There is no zoning in the PA. [q1, mp (6)]

5.2. Legal Status: Rupi Bhaba Sanctuary was notified vide Himachal Pradesh Government Notification No. F/5/F-3-15/8 dated 28.3.1982 and renotified vide Notification No. Fts./F-3-15/8 dated June 30, 1982. All the forests that are included in the Rupi Bhaba Sanctuary are demarcated or undemarcated protected forests [mp (6, 139-140)]

5.3. Management Plan: There is a management plan for the PA. The period of its validity is 1990-91 to 2001-2. [mp]

5.4. Budget: The budget allocation and expenditure for Rupi Bhaba between 1996-97 and 1998-99 was as follows:-

1996-97	-	Rs. 7,26,500.00
1997-98	-	Rs. 8,93,800.00
1998-99	-	Rs. 17,49,850.00

5.5. Staff: The sanctuary is under the overall supervision of the DFO(WL), Sarahan Bushahr. The staff that are engaged full time in the sanctuary are:-

Range Officer – 2

Deputy Ranger – 3

Forest Guard – 11

Chowkidar – 2

While 4 posts of a Deputy Ranger have been sanctioned for the PA, only 3 were filled at the time of the field visit. Also, one post of a forest guard was lying vacant. In addition, there are seven persons employed full time on daily wages in the PA, of who five are local people.

5.6. Equipment: At present, the following equipment is reported to be in working order in the PA:-

Wireless sets (fixed) – 1

Wireless sets (handheld) – 2

Binoculars – 1

Tents – 4

5.7. Tourism: There is little or no tourism in Rupi Bhaba Sanctuary.

5.8. Plantations: The PA authorities were able to give us information regarding plantations in the PA from 1984. Information on earlier plantations, if any, was not available. The plantations that had been done were as follows:-

Deodar – 18 ha.

Mixed Broad Leaf Species – 101 ha.

- 5.9. Research and Monitoring: No research is reported to have been conducted in the PA so far. While an annual census used to be carried out until 1994-95, it had been discontinued due to a paucity of funds. [fv (1999)].
- 5.10. Interpretation, Education and Extension: None.
- 5.11. Offences: In 1998, 22 forest offences had been compounded, realising a revenue of Rs. 10,83,729.00 in the PA. No incidents of poaching had been reported.
- 5.12. Encroachments: None.
- 5.13. Crop Protection Guns: The number of people mentioned in the management plan (105) having guns, were still reportedly in possession of them.
- 5.14. Involvement of NGOs, Local People etc. in Management: None except that local people are asked to help in putting out fires in the PA

6. Conclusion

SANGLA SANCTUARY: A PROFILE

1. Introduction: The Sangla Sanctuary with a notified area of 650 sq. km. includes within it the entire Sangla Valley in the Kinnaur District of Himachal Pradesh. It is a high altitude area having vast alpine meadows, glaciers and permanently snowbound peaks. The crystal clear Baspa river, a tributary of the Sutlej, is the dominant water body in the PA. The Chitkul village, situated on the bank of the Baspa, is the last Indian village before the Tibet Border, which is 40 km from Chitkul. The Chitkul village was a major Indo-Tibetan trading post before the 1962 war with China. Reportedly, in those days, the border between India and Tibet was crossed freely each year for trade by people from both sides. At present, there is no economic or even cultural exchange between the Kinnauris in Chitkul and the Tibetans [fv (1999)].

2. Geographical Profile: As already mentioned, Sangla Sanctuary is located in Kinnaur District of Himachal Pradesh. It is situated between latitudes 31° 20' to 31° 30' North and longitudes 78° 10' to 79° East. The Nearest town is Rekong Peo, the district HQ of Kinnaur, which is situated at a distance of about 25 km. from the boundary of the PA. The nearest railhead and airport are Shimla, the state capital, which is at a distance of about 250 km. from the PA. [q1]

The major river in the PA is the Baspa. It is fed by about 15 tributaries, all of which originate within the PA. Temperatures within the PA range from -15°C to 18°C. Average rainfall is about 55mm while average snowfall is almost three times, about 192mm. [q1, mp (8,9)].

3. Biological Profile: Sangla is the biggest sanctuary in Himachal Pradesh and harbours populations of several species that are mentioned in schedule – I of the Wildlife Protection Act, 1972. These include the snow leopard, musk deer (which is the state animal of Himachal Pradesh), Himalayan brown bear, Tibetan wolf etc. among mammals and monal (state bird), western tragopan, snow cock, koklas, kalij etc. among birds. The extensive alpine pastures of the PA contain several medicinal and aromatic herbs that are also commercially valuable like dhup, karu, patish, kuth etc. [mp (2)].

Sangla Sanctuary is situated in the West Himalaya Biogeographic Province (2B) of the Himalaya Biogeographic Zone.

Although this has not yet been confirmed, the PA authorities claim that the Sangla Sanctuary is connected to the Govind Pashu Vihar National Park and Sanctuary in Uttar Pradesh [q1].

3.1. Flora: The forest types that occur in the PA are the following [mp (9-14)]:-

3.1.1 *Ban Oak Forests (12/C-1a)*: Is reportedly found only near villages in undemarcated forests between 1800 metres and 2450 metres.

3.1.2 *Moist Deodar Forests (12/C-1c)*: Is reportedly mostly pure deodar with a little kail and spruce between 1800 metres and 2450 metres.

3.1.3 *Western Mixed Coniferous Forests (12/C-1d)*: Reportedly occurs between 2000 metres and 3500 metres and can include spruce, silver fir, deodar and kail.

3.1.4 *Moist Temperate Deciduous Forests (12/C-1e)*: Reportedly occurs between 1800 metres and 2750 metres in strips along streams and along the gentler slopes.

3.1.5 *Low Level Blue Pine Forests (12/C-1f)*: Reportedly, kail is mixed with deodar in all the areas where this forest type occurs.

3.1.6 *Kharsu Oak Forests (12/C-2a)*: Reportedly occurs between 2500 metres and 3300 metres, mainly on the southern aspects, along with kail.

3.1.7 *Dry Broadleaved and Coniferous Forests (13/C-1)*: Reportedly occur between 2000 metres and 2440 metres.

3.1.8 *Neoza Pine Forest (13/C-2a)*: Reportedly a pure neoza pine forest mixed with a few deodars.

3.1.9 *Dry Deodar Forest (13/C-2b)*: Reportedly a pure coniferous forest in the PA occurring between 2100 metres and 3250 metres.

3.1.10 *Alpine Pasture (15/C-3)*: Reportedly occur in the PA between 3600 metres and 4550 metres.

3.1.11 *Dry Alpine Scrub (16/C-1)*:

3.2. Fauna: The animals that are said to occur in Sangla Sanctuary are musk deer, ghoral, bharal, serow, Himalayan tahr, Himalayan black bear, Himalayan brown bear, leopard, leopard cat, snow leopard, jungle cat, jackal,

fox, rhesus macaque, langur, porcupine etc. among mammals. The pheasants and birds that are known to occur are monal, western tragopan, chir, koklas, kalij etc. [mp (14-21)].

4. Socio-economic Profile

4.1. Impact of the people on the PA: According to the Bushahr State Settlement Report of 1921, people of the area were given usufruct rights for grazing cattle, extracting timber for house building, lopping of trees, collection of dry wood for fuel, and collection of minor forest produce [mp (23-28)]. These and other uses that people make of the resources of the PA are discussed below.

4.1.1. *Habitation*: There are 8 villages in the PA with a population of 8497. The population may now have gone up since the data given in the management plan is about a decade old. People are mainly cultivators and pastoralists and depend upon the resources of the PA for their subsistence.

4.1.2. *Grazing*: The total population of domesticated animals belonging to the villages located in the PA is reported to be 21,036. Of these, 13,098 (62.26%) are sheep, 5,133 (24.4%) are goats and 2132 are cows and oxes (10.13%). These animals reportedly graze in the alpine pastures located in the PA during summer. During winter, they are fed on fodder (leaves and grasses) that has been collected and stored in the autumn. In addition, there are also migratory graziers that bring their livestock into the PA for summer grazing. An estimated 5332 sheep and goats are seasonally grazed in the PA. [mp (79-80)]

According to another estimate given to us by the PA authorities during our field visit as per the permits issued for grazing in the Sangla sanctuary, the total number of livestock, permanent as well as migratory, grazing in the PA is 33,400. [q1]

4.1.3. *Agriculture*: No estimate of the revenue land contained within the PA is available. Apart from cultivation of cereals, reportedly, horticulture, especially growing of apples, is also being done by the people in the PA.

4.1.4. *Fuelwood Collection*: It has been estimated that over 12,350 tonnes of fuelwood is consumed by the local people each year, based on an

average per household demand of 25 kg per day for 1356 households about a decade ago. This may now have gone up since the population would have increased. Also, tourism within the Sangla valley is also increasing, and would add to the overall demand for fuelwood. [mp (27)]. It was stated in the management plan written for the Sangla Sanctuary that the pressure exerted by the local people for fuelwood in the PA was unsustainable and was resulting in degradation of the habitat.

4.1.5. Timber for House Construction: Between 1989-90 and 1993-94, 4553 deodar and 1224 kail trees were cut for house construction in Sangla Sanctuary [mp (26)]. The timber demand or TD rights of the people living in the PA is still being fulfilled from within the area [q1, fv (1999)]. It is not clear whether this level of timber demand is sustainable or not.

4.1.6. Collection of medicinal and aromatic herbs: Reportedly, dhup, karu. Patish, kuth, banafsha, kala zeera, shingli-mingli and kesar are extracted from the PA by the local people. While the PA authorities do not have any estimates of the quantity collected and/or sold, the local people reportedly supplement their income through this activity [mp (22, 28)].

4.1.7. Fodder extraction: The extraction of fodder is done mainly in autumn to feed the domestic animals through the winter. Mainly, broadleaf trees are lopped in addition to grass. [mp (26)]

4.1.8. Development Projects: M/s J.P. Industries are currently executing the Baspa Hydel Project which is located inside the PA. About 3-4 sq. km. of the PA is currently adversely impacted by this project. Blasting at the project site as well as rise of dust levels due to construction and transportation activities in connection with the project are the other problems being created by this activity [q1, fv (1999)].

4.1.9. Other Government Departments: Since the PA is situated on the border with Tibet, there is a substantial presence of the Army, BSF and ITBP. Many other departments like the PWD and Education departments also have a presence there.

4.1.10. Other Impacts: Reportedly, coniferous trees are lopped for use as fire starters and used for lining the floors of sheep pens for added

warmth during winter [mp (26)]. People are also reported to damage coniferous trees by debarking and cutting them and using the bark and lower stumps for the purpose of torchwood [mp (26)].

4.2. Impact of the PA on the People: So far, since most of the usufruct rights being enjoyed by the people have not been withdrawn or curtailed, there has not been any major impact of the PA on the people. The only problem that the people have is with the withdrawal of export permits for medicinal and aromatic herbs by the forest department, but here too, earnest enforcement of the ban on export of herbs seems to be missing. No crop damage by wild animals has been reported by the local people but that may be because the process of compensation for crop damage is lengthy and cumbersome and the compensation levels may not be adequate. In 1998-99, death of 4 cows and an ox due to attack by wild animals was reported by the local people. However, compensation had not been paid till the time of the field visit. To conclude, while there do not seem to be any major impacts of the PA on the people, they did complain to the field visitors about the withdrawal of export permits for herbs. [q1, fv (1999)].

4.3. Other Issues: During the visit to the sanctuary by the IIPA field team, it was felt that in future the maximum pressure on the resources of the PA will be exerted by tourism and its ancillary activities. Tourism is a growing industry in Himachal Pradesh in general and Kinnaur district in Particular. However, since infrastructure for supporting rising number of tourists still does not exist in the Sangla valley, the impacts of unregulated tourism could be greater than any other human activity. [fv (1999)].

The IIPA field visitors were also informed that the Collector, Kinnaur District, had proposed that a large portion of the Sangla Sanctuary should be denotified. This was being done ostensibly as a part of the process of settlement of rights in the PA. The final outcome of this process is not yet known. [fv (1999)].

5. Management Profile

5.1. Area and Zoning: Sangla Sanctuary has an area of 650 sq. km. There is no zoning in the PA. [q1, mp (5)]

5.2. Legal Status: Sangla Sanctuary was notified vide Himachal Pradesh Government Notification No. Ft. (F) 6-7/89 dated 31.5.1989. Earlier, a part of the PA, 34.11 sq. km. had been notified as Rakchham Chitkul Sanctuary on 27.3.1974. There are no reserve forests in the PA. All the forests that are included in the Sangla Sanctuary are demarcated or undemarcated protected forests [mp (65-66)]

5.3. Management Plan: There is a management plan for the PA. The period of its validity is 1994-95 to 2003-4. [mp]

5.4. Budget: The budget allocation and expenditure in 1998-99 for Sangla Sanctuary was Rs. 2,75,000.00.

5.5. Staff: The sanctuary is under the overall supervision of the DFO(WL), Sarahan Bushahr. The staff that are engaged full time in the sanctuary are:-

Range Officer – 1

Deputy Ranger – 1

Forest Guard – 4

Chowkidar – 1

While 2 posts of a Deputy Ranger have been sanctioned for the PA, only one was filled at the time of the field visit. In addition, there is one person employed full time on daily wages in the PA. Four others are employed part-time.

It may be mentioned here that the management plan for the PA had recommended 3 Deputy Rangers and 8 Forest Guards should be posted in the PA.

5.6. Equipment: At present, the following equipment is reported to be in working order in the PA:-

Wireless sets (fixed) – 1

Wireless sets (handheld) – 1

Binoculars – 2

5.7. Lack of Control Over Entire Area: Of the 650 sq. km. that has been notified, around 300 sq. km. is still under the charge of the DFO, Nichar, of the Territorial Division. [q1, fv (1999)].

5.8. Tourism: After the relaxation of the Inner Line for Kinnaur, the number of both Indian and foreign tourists visiting the PA has shot up. However, their exact numbers are not known. The IIPA field visitors even saw foreign tourists camping beyond Chitkul village on way to Nagasti. The largest establishment looking after tourists is the Lammergeir's Camp, which is located in village Batseri

5.9. Plantations: The PA authorities were able to give us information regarding plantations in the PA from 1996-97. Information on earlier plantations, if any, was not available. The plantations that had been done were as follows:-

Deodar – 15 ha.

Mixed Broad Leaf Species – 10 ha.

Grasses – Between 30 ha. and 60 ha.

5.10. Research and Monitoring: No research is reported to have been conducted in the PA so far. According to the annual census held in the PA in 1998-99, the animal count was as follows:-

Monal – 9

Ram Chukor – 4

Chukor – 44

Musk Deer – 3

Blue Sheep – 7

Black Bear – 3

Ghoral – 1

Langur – 15

5.11. Interpretation, Education and Extension: The PA authorities reported that they were holding nature awareness camps and local people were taken

to see other PAs. It was also reported that films on wildlife were also shown to people. [q1].

5.12. Ecodevelopment: During 1998-99, Rs. 4,20,000.00 was received for pasture development on 60ha. under the broad head of eco-development [fv (1999)]

5.13. Offences: In 1998, six forest offences had been compounded, realising a revenue of Rs. 2,37,358.00 in the PA. No incidents of poaching had been reported.

5.14. Encroachments: Half a bigha of encroachment was reported from the PA. The PA authorities had filed a case in the civil court to have the encroachment vacated.

5.15. Crop Protection Guns: In 1998-99, there were eight gun holders who were registered.

5.16. Involvement of NGOs, Local People etc. in Management: None

6. Conclusion

KERALA

SILENT VALLEY NATIONAL PARK

Introduction:

Silent Valley National Park, is one of the remaining pristine wilderness habitats of India having an amazing zoological and botanical diversity. Because of this, the Park was made a part of the core area of India's first biosphere reserve—the Nilgiri Biosphere Reserve, established in September 1986. Biosphere reserves are protected sites consisting of undisturbed landscapes along with their human-modified surroundings established for the purpose of:

- Conserving the existing diversity of plants, animals and microorganisms as part of natural ecosystems.
- Facilitating long term monitoring of changes in the ecosystem in relation to various levels and forms of human activities.
- Generating scientific knowledge on ecosystem dynamics and biological diversity.
- Providing facilities for research and training.

The Park is situated in Palghat District of Kerala State and located at 11°03' to 11°13'N latitude and 76° 21' to 76° 35' E longitude. The altitude varies between 658 to 2383 m. The Northern boundary is formed by the forests of Nilambur south division and the Nilgiris in Tamil Nadu. On the south is the vested forest of Palghat division. On the east the Attappadi Reserve Forests are contiguous with the Park. On the west the forests of the Nilambur division share the boundary. There are several hillocks within the forest and water drains into Kuntipuzha a tributary of Bharatapuzha. The river Kunthipuzha runs through the Silent Valley in a north-south direction. It originates at an elevation of almost 2400 metres in the outer rim of the Nilgiris (The main course of Kunthipuzha is formed by the confluence of three tributaries from the northern most point at Walakkad) and descends rapidly to 1150m on the northern edge of the plateau and then follows a gentle southwardly course for some 15 kms before cascading down the Mannarghat plains through a gorge at an elevation of 1000m on the southern edge of the plateau. All major tributaries of Kunthipuzha originate on the upper slopes of the eastern side of the valley and are perennial.

CLIMATE

Rainfall: Usually the Park has rains in all the months of the year. The rains from south-west monsoon (June to Sept) accounts for nearly 78 % of the rainfall; the north-east monsoons (Oct-Nov) account for 17% and the remaining 5% is accounted for by summer rains. Dec-May is relatively drier months. Pre-monsoon rains are also common. The average annual rainfall for the area is around 4700 mm/year.

Temperature: The mean annual temperature is 20.2 C. April and May are the hottest months. Dec-Feb is the coolest when mean temperature is around 18 C A maximum of 30 C and minimum of 8 C has been recorded. However there are variations of temperature across vegetation types. Grasslands and ecotone tend to have higher temperatures as compared to forests. Similarly the forests tend to get cooler than grasslands and ecotone.

Humidity: From June-Dec relative humidity is high, hovering around 95%. However, a comparison of the highest minimum value of relative humidity during different months

trees for railway sleepers were extracted with few other species. The limit was a maximum of 3 trees per acre and the distance between two trees marked for extraction was not to be less than 30 feet. The sleepers were sold to South Indian Railway. The possibilities of road to Silent valley for establishing permanent routes for timber extraction were investigated several times since 1928 in 1929, 1931. But due to factors such as the steepness of the ground, loose soil, prohibitive construction cost, fodder for draught animals from the plains (since the forests were deficient in fodder species), it was finally decided not to build any roads in Silent Valley.

Artificial regeneration was done in 1928-31 in the gaps created by selective felling by dibbling seeds of species such as *Acrocarpus fraxinifolius*, *Artocarpus hirsuta*, *Hopea parviflora* and teak. *Acrocarpus* and *artocarpus* germinated satisfactorily but *Hopea* was a complete failure. Introduction of *Dalbergia latifolia* in the gaps was tried in 1930 but yielded poor results. Experiments were also tried with seeds of *Mesua ferrea*, *Gluta travancoria*, *Dysoxylum malabaricum*, one-year-old stumps of *Artocarpus*. Natural regeneration in gaps created by selection felling was also enumerated in 1930. Portions of Silent valley were subjected to forestry operations between 1927-1976.

Till 1921, Silent Valley was in the South Malabar division with headquarters at Nilambur. It came under the administration of Palghat division in 1921.

Environment Vs Development: The Silent Valley forests were identified as an ideal location for a hydel power project to supply electricity to power starved state of Kerala. The proposal was to construct the hydroelectric dam across Kunthipuzha in an area that now falls within the national park. Once such a decision was taken, there were protests and suggestions from eminent environmentalists, nature lovers, NGOs and the public at large. The argument was that the benefits from power generation hardly justified the costs to the society in terms of ecological damage of pristine wet evergreen forests. In other words even if the project was thought to be economically prudent, it failed to meet the test of social cost-benefit analysis. Reports and facts were presented to show that the social costs far outweighed the social benefits. Legal intervention was also sought. An historic environmental battle was won. It was indeed a milestone as far as the Indian environmental movement was concerned.

The decision to abandon the hydel project and to declare Silent Valley as a National Park may be historically profiled as given below:

- Way back in 1928-29, the location at Sairandhri on the Kunthipuzha is identified as a site for power generation.
- Inventorying and identification is carried out in 1958 and a hydel project of 120 MW costing Rs 17 crores is proposed by the Kerala State Electricity Board [KSEB].
- The National Committee on Environmental Planning and coordination [NCEPC] studies the proposal for the hydel project and suggests 17 safeguards in case the project can not be abandoned.
- In 1977 the Kerala Forestry Research Institute [KFRI] conducts an ecological impact study in Silent Valley and proposes that it be declared a biosphere reserve.
- In 1978 the then Prime Minister of India gives approval for the project on the condition that the State Government enact a legislation to ensure the necessary safeguards.

- The IUCN in 1978 passes a resolution recommending protection of LTM in Silent Valley and Kalakkad.
- In 1979, Kerala Government passes the Silent Valley Protection Area [Protection of Ecological Balance] Act, 1979. Kerala Government also issues a notification declaring exclusion of the hydel project area from the proposed Silent Valley National Park.
- Dr. Salim Ali visits silent valley and appeals that the hydel project be abandoned.
- Kerala Sasthra Sahitya Parishad publishes a techno-economic and socio-political assessment report on the Silent Valley hydel project.
- Writ petitions are filed before the Kerala High Court against clear felling of forests in the hydel project area; the Court orders stoppage of clear felling.
- Dr. MS Swaminathan visits the Silent Valley area and suggests that Silent Valley and adjoining forests be made into a national rain forest biosphere reserve.
- The Kerala High Court lifts stay on clear felling in January 1980.
- In 1980, Prime Minister Mrs Indira Gandhi requests Kerala to stop all the works connected with the hydel project till all aspects relating to the project are fully discussed.
- In December 1980, The Kerala Government declares Silent Valley as a National Park but excluding the hydel project area and site.
- A multi-disciplinary committee under the chairmanship of Prof. MGK Menon is constituted to examine the feasibility of having the hydel project but without significant ecological damage.
- This Committee submits its report in early 1983.
- Prime Minister Mrs. Indira Gandhi decides to abandon the hydel project after studying the report.
- In Nov. 1984, Silent Valley is declared as a National Park.
- On Sept.7th 1985, Prime Minister Sh. Rajiv Gandhi formally inaugurates the Silent Valley National Park.
- On Sept. 1st 1986, the Silent Valley National Park is included as a part of the core area of the Nilgiri Biosphere Reserve.

In case the project had not been abandoned, the immense damage that could have resulted can be gauged from the fact that an area of between 100-250 hectares that were burnt at different sites have still not recovered and stand severely degraded. It bears testimony to the fragile nature of the forests with very little resilience to bounce back to its original condition.

BIOLOGICAL PROFILE

The Silent Valley plateau, lying at the southwest corner of the Nilgiris, slopes towards the south and is practically ringed in by hills. The whole of the catchment forests is practically undisturbed. There are no records of any sort of historical anthropogenic degradation actions. There was an aborted attempt to plant coffee in 40ha in the middle of the Silent Valley Reserve in 1842, but it was promptly abandoned by 1843. Logging for railway sleepers was stopped in the early 1970s. Because of the topographic isolation of the plateau, cut off as it is from the east, north, west and south by steep ridges and escarpments, pressures from surrounding areas could not reach this part of the forest. Therefore, in Silent Valley one can observe the forests in a condition that prevailed before modifications set in, in the humid tropical forests of Peninsular India. Silent Valley forests exhibit the typical characteristics of tropical rainforests that we often read in books. For example, we can find:

- Multi-storied structure of vegetation with emergents jutting out of the canopy layer with drip-tip leaves.
- A profusion of woody climbers, lianas and epiphytes
- An extensive network of superficial tree root systems
- Trees with enormous buttresses like *Eleocarpus tuberculatus*, *Poeciloneuron indicum*, *Cullenia excelsa*, *Heritiera papilio*, *Palanium* & *Acroearpus frainifolium*.
- Under storey trees in waiting in the dark shade of the canopy layer
- Forests that look impenetrable from portions that are exposed to sunlight
- Not much ground vegetation in the form of grasses
- High tree density
- Many canopy trees with broad leaves.
- Emergents with slender trunks and umbrella shaped crowns
- Cauliflory type of vegetation like *Polyalthea coffeoides*, *Artocarpus integrifolia*, *Baccaurea courtallensis*, *Cullenia excelsa* & several species of *Ficus*.

Like any other rainforest in the world, the floral and faunal diversity of Silent Valley is truly amazing. Limited studies so far by BSI & ZSI have revealed several new species of fauna and flora including, fishes, bugs, beetles, scorpions, spiders, amphibians, lichens, mosses, ferns, angiosperms and grasses. Much research needs to be done as far as Silent Valley and its surrounding areas are concerned. As yet very little information is available on insects and microorganisms as compared to birds and animals. At this stage it would be hazardous to place an exact number on the types of flora and fauna. The process of enumerating the flora and fauna is being done in stages. New discoveries are constantly coming to light. But one can definitely say that the list of floral [trees, creepers, grasses, shrubs, herbs, mosses, lichens, ferns, epiphytes] and faunal [animals including mammals, birds, reptiles, fishes and amphibians, insects, microorganisms] species is going to be very long. There is no need to get into the controversy regarding the actual number. A representative list that may interest an average nature lover are given below:

Fauna:

- **Animals:** Lion-tailed macaque, Bonnet macaque, Nilgiri langur, Nilgiri marten, Nilgiri Tahr, black panther, tiger, leopard, elephant, palm civet, common mongoose, Ruddy mongoose, jungle cat, small Indian civet, Malabar giant squirrel, flying squirrel, Porcupine, sloth bear, slender loris, gaur, wild boar, Barking deer, mouse deer, Sambhar. There are no spotted deer and the four-horned antelope. The wild dogs found here are slightly bigger in size than those found in Thekkady forests.
- **Reptiles:** King cobra, Russels Viper, Pit Viper, monitor lizard
- **Birds:** Great Indian hornbill, Malabar pied hornbill, golden oriole, woodpeckers, green pigeon, Jerdon's imperial pigeon, Nilgiri wood pigeon, Spotted dove, Indian emerald dove, grey jungle fowl, blackwinged kite, greyheaded fishing eagle, crested serpent eagle, falcon sp., bluewinged parakeet, blossomheaded parakeet, Malabar lorikeet, common myna, greyheaded myna, Southern treepie, jungle crow, Malabar wood shrike, Alexandrine Parakeet, small green barbet, drongo sp., many species of owls, bulbuls, babblers, warblers, flycatchers, thrushes.
- **Insects:** Varieties of butterflies, moths, bugs, beetles, scorpions, and spiders.

The best months to visit the park are December-March. The monsoon months are June-August.

Flora: The Silent Valley in general has a preponderance of wet evergreen forests in the hills and valleys between 900-1300m elevation. These merge into semi-evergreen forests at lower altitudes, while at higher altitudes they merge into subtropical hill forests. But strictly from a biological viewpoint, the flora of Silent Valley has been classified under the following categories:

- Southern hilltop tropical evergreen forests
- West coast tropical evergreen forests
- Cane brakes
- Wet bamboo brakes
- West coast semi-evergreen forests
- West coast secondary evergreen dipterocarp forests
- Nilgiri sub-tropical hill forests
- Reed brakes
- South Indian tropical hill savannah woodland
- Southern montane wet temperate forests
- Southern montane wet scrub
- Southern montane wet grasslands

The predominant tropical wet evergreen forests are taken to be climax formations representing the farthest advance towards a hygrophilous type of vegetation that an area is capable of supporting. In such a climax rainforest, the species number is very large though the number of each species is limited. It is difficult to find a tree of the same species close to another of its kind. Thus clusters of a single dominant species are rare. But associations of more than one dominant species are found. In Silent

Valley eight distinct associations of more than one dominant species have been recorded:

1. The Cullenia-Palaquium association
2. The Palaquium-Mesua association
3. The Poceilenuron-Palaquium association
4. The Vateria-Cullenia association
5. The Mesua-Calophyllum association
6. The Mesua-Cullenia association
7. The Reed-Calophyllum association
8. The Reed-Poceilenuron association

In the following paragraphs, a description of typical flora of the wet evergreen forests shall be given instead of giving the elaborate listing of each type of flora of Silent Valley.

The giant trees in Silent Valley are tall and straight without branching, except at the top. These have enormous plank buttresses at the base that act as support system for the trees especially during tropical storms. There is a profuse presence of epiphytic vegetation like lichens, mosses, and algae on these trees. Strangling climbers taking support of the trees try to reach the top in order to get sunlight. Impenetrable bamboo and reeds are found near edges of rivers and streams. Grasses can attain a height of 1.8m near waterlogged areas.

The dominant first storey (100-150ft) trees consists of *Cullenia exarillata*, *Machilus macrantha*, *Eleocarpus munroii*, *Palaquium ellipticum*, *Mesua ferrea*, *Callophyllum elatum*, *Canarium strictum*, *Dysoxylum malabaricum*, *Vateria macrocarpa*, *Poeciloneuron indicum*, *Heritiera papillio*, *Chrysophyllum roxburghii*, *Mangifera indica*, *Artocarpus integrifolia*, *Polyalthia coffeoides*, *Cinnamomum zeylanicum*, *Hopea glabra*, *Listsea weightiana*, *Mastixia arborea*, *Hemicyclea elata*, *Cyclostemon confertiflorus*, *Strmbosia ceylancia*, *Filicium decipiens*, *Holigarna arnottiana*, *Holigarna grahamii* and eugenia species.

The second story consists of *Myristica laurifolia*, *Hydnocarpus weightiana*, *Hydnocarpus alphinia*, *Nephyllum longana*, *Lansium anamalayanum*, *Garcinia specata*, *Eleocarpus serratus*, *Adenochloena indica*, *Gomphandra polymorph*, *Gordonia robusta*, *Baccaurea courtallensis*, *Canthium didymum*, *Litsea stoksii*, *Xanthophyllum flavescens*, *Mappia foetida*, *Actinodaphne hockeri*, *Eugenia* species.

The third story is made of shrubs like *Eunoymus angulatus*, *Agrostystachys indica*, *Agrostystachys longifolia*, *Eugenia laeta*, *Paramignya armata*, *Sauropus albicans*, *Leea sambusina*, *Saprosma fragrans*, *Webera* sp., *Clerodendron infrontunatum*, *Macaranga roxburghii*, *Laportea crenulata*, *Olea dioica*, *Linocera malabarica*, *Callicarpa lanata*, *Pavetta zeylanica*, *Vernonia arborea*, *Lepisanthes deficiens*, *Tupinia malabarica*, *Orophea uniflora*, *Apama siliquosa*, *Croton scabiosus*, *Sarcocoa brevifolid*.

The climbers are represented by *Gnetum scandesa*, *Eleoganus latisolia*, *Entada scandens*, *Senecio araneosus*, *Thumergia mysorensis*, *Paramignya armata*, *Luvanga eleutherandra*, *Smilax macrophylla* *Morinda* sp, *Derris* sp., *Calamus* sp., *Fagrea obovata* (epiphyte)

Herbaceous ground flora is sparsely represented by curcuma sp., Heckeria subhellata, cardomoms.

SOCIO-ECONOMIC PROFILE

There are no human habitations within or adjacent to the Park, nor are there any activities by other Government Departments. The nearest settlement is almost 21 kms. from the Park boundary. Though cattle from this settlement never enter the park, they have all been vaccinated for foot and mouth disease only last month (March '99) as a precautionary measure.

Management Activity: According to park authorities, about 95% of the Park area are free of disturbances of any kind. There is no need for any major eco-restoration activities to be undertaken. Hence it is recognized that as far as possible, nature should be allowed to perform its functions without human interference. Even weeds are not a major problem with only 5% of the Park affected by weeds such as lantana and eupatorium. The Park authorities are not sure whether clerodendron which is generally a shrub but has almost attained tree size in the Park is a weed or not. This is because of the fact that that there is no other plant life in the vicinity of these clerodendron trees. Studies in this direction are being carried out. Incidentally the leaves are used to clean infants and babies to keep infections away.

The dilemma facing the Park authorities is whether to practice any type of actual habitat management of the Park or not. It is somewhat like a healthy person who does not need medical intervention generally. But in times of any epidemic, such a healthy person would need precautionary treatment. Similarly, in case the quality of water supplied is not according to standards, a person though healthy might require some preventive medicine. Even if everything is all right, constant monitoring of health is needed to detect problems at an early stage. Similarly in forests that are otherwise healthy, some interventions are called for in order to see that problems arising outside the forests do not slowly creep into it. In rainforests the natural interconnections are so intricate and delicate that it is difficult to decide whether any intervention would be beneficial or harmful. For example, is there any need to remove leaf litter to prevent the outbreak of fire? This is not a simple question to answer. It is well known that soils in such evergreen forests are bereft of nutrients. This is because of the quick recycling of nutrients by the superficial root systems. The nutrients are stored in the plants themselves rather than being allowed to remain in the soil for considerable length of time. When leaves and trees fall on the forest floor, the innumerable microorganisms in the soil quickly break them down in a form that can be assimilated by the tree roots. Since competition for food is immense due to high vegetation density, the plants have adapted to taking the nutrients and storing it in themselves. Therefore the windfallen trees and dead trees should not be removed, as they are an integral part of the nutrient cycle. But such fallen trees are definitely a fire hazard that might allow a ground fire to become a crown fire. The question whether dead and fallen trees be removed for fire prevention at all [and if so how much] is a dilemma facing the management. This problem is being faced in the surrounding forests where human interference has meant huge pile of such flammable materials. Inside the Park this is not a major problem because dead and fallen trees are well scattered and there is no need or justification to remove them.

Similarly the need for involving local people or NGOs in the direct management of the Park is not obvious. But surely ecodevelopment of settlements with full participation of locals is necessary to ensure that the Park remains free of anthropogenic pressures in the future.

It is a fact that there are no roads inside the Park. The authorities are quite certain that construction activity of any kind can have serious negative impacts on the fragile ecosystem. But absence of roads also mean long trekking distances for the staff even for maintaining vigil.

In spite of such dilemmas, there are many management priorities that are important to ensure that the area remains pristine. Even if the forest has to be left undisturbed, research and monitoring activities need to be carried out by specialized institutions on various aspects of forest and its ecology. For example studies on soils under different forest types at varying altitudes and terrain, soil-plant relationships, insect litter communities, predator prey relationships, hydrological studies, successional stages of grasslands and disturbed areas, monitoring changes in vegetation and animal populations, monitoring health and disease, species specific studies such as population estimation and dynamics, migration pattern and feeding habits in case of fauna. As a precautionary step park authorities do not permit collection of specimens unless special authorization is granted.

Since there are no major ecological problems facing the Park, the authorities are in a bind whether to undertake any habitat management activity like weed control, removal of biomass and such other activities.

Some minimal interventions being done by the forest department are:

- **Soil Conservation:** One of the very few habitat management activities is gully plugging and soil conservation activity. Being a hilly terrain, this assumes significance. Since the intensity of the rain is heavy, wherever soils are exposed, soil erosion can become an acute problem. Soil protection measures are undertaken whenever intervention seems essential like gully plugging and planting suitable species along steep watercourses.
- **Fire:** Fire is not a major hazard for the Park. Since every month in a year have few rainy days, this acts as a natural fire control. But occasional fires in the adjoining Nilambur and Mannarkad divisions have to be monitored carefully to ensure that the fire does not spread. Awareness and education programmes are conducted in the settlements to prevent accidental fires. During the honey collection months tribals move from their homes and stay in the nearby forests for a few days. They light fires for cooking and also to smoke the bee hives. Any carelessness on their part can start off a fire. They are told how to put out cooking fires completely before they move onto other areas.
- **Fires and grasses:** Fires do not start off in an evergreen forest by itself. When fires are lit in adjoining grasslands, there is a real danger of fires finding openings into the evergreens. This can be devastating since many trees in this habitat carry flammable resinous substances in their bark. The grasslands thus extend into the burnt evergreen patches. The recession of evergreen habitats into grasslands has been checked to a considerable extent only after the formation of the Park. Before the formation of the Park, wildfires had converted about 20% of Silent Valley area into degraded grasslands.

- Grassland management: different animals use the various parts of the grasses. While the deer species eat the tips of grasses, the gaur forages on the middle portions. Elephants eat the lower and rhizome portions. But last year a totally unpalatable elephant grass species was cleared from 50 hectares. Apart from this no other managerial intervention is contemplated for other weed control as yet. There are no plans of uprooting lantana or eupatorium because in the process of uprootment it is envisaged that more harm shall be done to the forests than the benefits arising from such an uprootment.
- Eco-development: The authorities have started activities like solar lamps, solar cooker, mushroom cultivation, driving, tailoring in settlements in Mukkali. Lack of funds was quoted as a reason for such activities being implemented only in very few settlements.
- Eradicating Ganja Cultivation: The tribal settlements have started cultivating ganja for some time now. Efforts are on to dissuade this practice. The police and narcotics wings have also been informed but so far not much success has been achieved. By adopting settlements for eco-development (provided funds are made available), the tribals may be persuaded to give up this unlawful activity by providing alternative sources of livelihood.
- Anti-poaching activities: Poaching is not a major problem. In fact the last recorded poaching was of a Nilgiri Langur way back in 1992. Yet the forest guards have to be ever alert. According to park authorities, since accessibility is a major problem, the staff tries to avoid being posted in difficult and far-flung areas under one pretext or the other. The park authorities recommend the desirability of introducing a special incentive scheme for the staff and also have some say in recruitment or atleast screening of the staff.
- Zonation: Lack of buffer and tourist zones is a major felt need. Since the entire National Park is in the core area, the tourists have to be taken atleast upto the edge of the core zone. Once buffer and tourist zones are earmarked, the core area can further be sheltered. It is however debatable whether a ropeway as suggested as a way out is desirable or not. The attraction of a ropeway itself could lead to a sharp increase in tourists who are not interested in nature tourism as such. At present, tourists can climb the watchtower at the entrance to the park and get a breathtaking aerial view of the surrounds. They can take a short trek and walk over a suspension bridge across the Kunthipuzha river (there is another suspension bridge across Kunthipuzha at Walakkad). Refreshing moments can be spent by the riverside. But the tourists should not be allowed to carry plastic bags that one finds scattered under the bridge. Tourists can visit the interpretation centre at a short distance from the watchtower.
- Awareness Campaign: Since the Park is free from many of the problems that face other Parks in the country, an intensive awareness campaign on the importance of the Park and the activities that are desirable and activities that are detrimental to the Park have to be highlighted. This has to be done at all the levels – local, State and All-India level. The Silent Valley is indeed a national heritage to be managed carefully for posterity. The Park has a full time Deputy Director of Wildlife (Education) for this very purpose. Nature camps for school and college students, involvement of NGOs in awareness and education are some of the thrust areas.

The management intervention shall be with the objective of keeping intact the evergreen habitat. The attempt shall be to create conditions that allow degraded and secondary forests to progress towards the climax type.

Conclusions:

The relatively undisturbed nature of Silent Valley needs to be preserved. The forests look very robust, capable of withstanding human interference without much negative effects. But the fact is that rainforests throughout the world represent a very fragile and unique ecosystem. The components in such a forest system are so intricately interwoven that even a slight alteration in any one component can have disastrous consequences on the entire forest ecosystem. For example, removal of a single giant tree may allow excessive sunlight to alter the soil structure there by affecting the process of quick recycling of nutrients by microorganisms. Since scientists as yet have limited understanding of the processes and interlinks that operate in such forests, it is better to leave them untouched. Otherwise we may be wiping out many species of flora and fauna even before we come to know of their presence. As we know, the insect life in such forests has not been discovered to any considerable extent. Even birds and mammals are not fully documented. New species are being continuously discovered. Let us not lose what we do not even know we are losing.

Why conserve Silent Valley?

There are several reasons for conserving Silent Valley. Foremost is the ethical consideration that this planet exists not for humans alone. Every single creation has as much a right to life as humans. Just because humans are endowed with an intellect, it does not mean that they can alter or modify their environment in any way they want. But ethical considerations apart, it is worthwhile to conserve these forests even from a selfish viewpoint.

For instance, since there are no settlements inside the Silent Valley Park, we cannot conclude that the Park has no direct bearing on humans. Firstly people in the Mannarghat plains are entirely dependent on waters from the perennial river Kunthipuzha. If the forest cover is disturbed, the flow in the river may reduce; or the river may run dry for some months.

Secondly, Silent Valley has wild relatives of cardamom, pepper, turmeric, ginger, beans, cinnamon. These wild relatives are the basis of future plant breeding programmes and are of immense economic importance too. Silent Valley is thus a natural gene pool lab.

Thirdly, the forests play a role in regulating the micro and macroclimate in the region. The rainfall is dependent on the extent of forest cover. According to locals during the last 10 years, the region has been becoming hotter and less pleasant than what it used to be as a result of depletion in the tree cover.

Fourthly, in Silent Valley there is an abundance of grassland insects, containing several pest species, potential pests and well-known vectors of plant diseases. Equally abundant are the natural enemy complexes as well as parasites. This indicates richness in terms of host/predator/parasite complexes. Many predator and parasite species complexes have been identified which would have immense potentialities for

biological control. This is very relevant in the present context of increased pesticide resistance noticed in case of many agricultural pests. A doubling of pesticide resistant species in the last 12 years is already on record and hence biocontrol, which is Nature's own way of controlling pests without the incidental environmental pollution might prove to be of great importance. The silent Valley may turn out to be a major potential reservoir for agents of biological control. These agents can be preserved only by preservation of vegetation.

Lastly Silent Valley is known to harbour many species of medical plants. These may be of crucial importance to future researches on

Silent Valley not so silent: One explanation for the origin of the name 'Silent Valley' is the relative absence of Cicada insects, which normally cause a distinctive sound in forest environs. On entering a forest, or while driving along a forested belt, one is usually greeted by a clear background sound made by cicada insects. The cacophony is quite loud at the start, and tapers off into a grinding halt before abruptly starting off again after a brief period of silence. It is also infectious in the sense that once a group of cicadas start singing, other groups in the vicinity join in. For yet unknown reasons, Silent Valley forests were relatively free from these musical insects. But recently cicadas have made their presence felt in one-third of these forests. In spite of this one can still experience the silence of these forests.

ARALAM SANCTUARY

Declared a Sanctuary on 15.10.1984 no other procedure completed as on 18.9.85 no final notification issued. Original area declared as sanctuary 5000ha. No information on legal occupation of the PA, or area of PA used by other government departments. Entry permits are not required to enter the PA. No details on offences. Management and separate budget does not exist for the PA. There are many unmanned entry points to the PA. No information on vaccination of the cattle of surrounding area. The cattle which pass through the PA are not checked for vaccination.

In 1980 210ha of commercial timber was planted in the PA another 88ha was planted for other purposes. In 1981 13ha were again planted with commercial timber and in 1982 30ha of timber was planted. PA is open for tourists but there are no records of visitors. The best months to visit the PA are from Jan to April as there will be heavy rains during the rest of the months.

Aralam Sanctuary is situated in the district of Cannanore in the state of Kerala. The nearest town is Tellicherry 70 km away and the nearest railway station is also at Tellicherry. Nearest airport is Mangalore about 140kms away.

The highest elevation is at 800 m and lowest is at 100mts. There are three streams within the Sanctuary. [QAI]

The Sanctuary is located in Western Ghats and was established in 1984. The headquarters of The Sanctuary is near Irithy a small town about 55 km from Cannanore (Kannur). The Sanctuary adjoins the central state farm at Aralam. It lies between north latitude 11°50' to 11°52' and east longitude 75°49' to 75°57'. The highest peak is Kathi Betta which is 1145m high. West Coast tropical evergreen and West Coast semi-ever green forests are predominate. There are about 490 ha of teak and eucalyptus plantations within the forest area. [Aralam wildlife Sanctuary by WL wing of Kerala Forest dept. undated].

Summer months are from February to April and summer temperature is 30°C, with the hottest days occurring in April and temperatures rise to 38°C. Rainy months are from May to October. Mean annual rainfall is 4650mm. Winter months are December and January with temperature falling to 22°C. There are no known instances of any natural phenomenon like cyclones frost hail storm etc. forest fires do occur in April.

The nearest Vet is at Kelakam, 5kms away.

This PA was part of a private forest prior to 10.5.1971. Part of the Kothiyoor reserve forest is also included in the Sanctuary.

CHIMMONY SANCTUARY

Introduction: Chimmony wildlife sanctuary is situated in Mukandapuram Taluk of Trichur Dist. of Kerala State. Thrissur, the nearest town is 39km away from the sanctuary. Established in 1984, the sanctuary is contiguous with Parambikulam wildlife sanctuary on the east and Peechi-Vazhani wildlife sanctuary on the west. The present area of the sanctuary is 90 sq kms.

Geographical Profile

Location: 10 22 N to 10 26 N latitude
76 31 E to 76 37 E longitude on the western slopes of Nelliampathi forest.

Elevation varies between 1126m to 2500m above MSL. The dam site is 40m above MSL. The topography is undulating with low land and high cliffs. The catchment of the Chimmoni river falls entirely within the sanctuary. Chimmoni river with its two main tributaries (Payampara river & Chaurala river) flows the entire length of 14km through the sanctuary. Food and water seem to be uniformly distributed all over the sanctuary.

Rainfall: The dry season is Dec-April and the wet season from May-Nov. The pre-monsoon rains start in April. The Southwest monsoon accounts for the bulk of the rainfall between June-Sept. The northeast monsoons are received during Oct-Nov. The average annual rainfall is 2980 mm.

Temperature: March-April are the hottest months, the temperature ranging between 36 to 24 C. The temperature dips to a minimum of 15 C during Dec-Jan.

Biological Profile:

The following types of natural forests are to be found in the sanctuary:

- Westcoast Tropical Evergreen Forests
- Westcoast Semi-evergreen Forests
- South Indian Moist Deciduous Forests

Moist deciduous forests represent the major portion giving way to evergreens at higher reaches of the catchment. Semi-evergreens are found where the moist deciduous forests merge into evergreens. There are no plantations inside the sanctuary. But extensive rubber plantations are there in close proximity to the sanctuary. The adjoining reserved forests also have plantations of silk cotton along with the natural forests. The sanctuary is well wooded and there is a profusion of undergrowth of shrubs, trees and grasses. This along with a network of streams and rivers makes the sanctuary an ideal habitat for a large diversity of flora and fauna. The Chimmoni reservoir is a bird watchers paradise.

The status of many species of fauna is not yet known. Without systematic research, any listing of fauna would be highly incomplete. All that can be said at this stage that

the major fauna of peninsular India is well represented in the sanctuary. A list is given below:

Fauna

Bonnet macaque, Nilgiri langur, lion-tailed macaque, slender loris, small Indian civet, palm civet, brown mongoose, ruddy mongoose, pangolin, wild dogs, jackals, sloth bears, Indian giant squirrel, three striped palm squirrel, flying squirrel, black naped hare, tiger, leopard, elephants, gaur, sambar, barking deer, mouse deer, wild boar, Indian pangolin, porcupine, monitor lizards, Indian pond terrapin, Kerala forest terrapin, Travancore tortoise, saw-scaled viper, cobra, common green whip snake.

HISTORICAL PROFILE

Teak has been exploited historically. From 1800AD onwards, the forests were leased out for fixed periods on payment of a specified lumpsum. This resulted in overexploitation by the leaseholders. In 1813, departmental exploitation of teak was started. In 1835, besides teak other junglewood trees like rosewood trees were also departmentally exploited. Firewood and MFP continued to be extracted under the contract system.

To prevent unregulated felling, a tender system was introduced in 1900 and the exploitable trees were marked for felling.

The cyclone of 1940 and the Governments 'grow more food' programme of 'hill paddy scheme' adversely affected the management of forests. Sh. MP George's working plan (1955-56 to 69-70) was the first of its kind in the Trichur division recommended selection felling in the chimmony area. 520ha of semi evergreen and 4155ha of moist deciduous forests were to be selectively felled. The felling cycle was fixed as 15 years. But the areas that were cleared as a consequence of selection felling were converted to teak and softwood plantations. These areas are now outside the sanctuary limits.

SOCIO-ECONOMIC PROFILE

The Malayans were the original inhabitants of Chimmony area. They were initially staying at Payampara; an area, which now stands, inundated. They were shifted to Kallichampara and then again to Kallichitra because of diseases like chickenpox and malaria. This was almost four generations back. Kallichitra can thus be taken as their home in the recent past. When the Government decided on a dam across the Chimmony river in the seventies these people were moved again from Kallichitra to a site very close to the dam site within the sanctuary. In 1993, they were shifted outside the sanctuary to a place called Nadampadam, which is 18kms from the sanctuary. They have been allotted 7 hectares of land. This shifting was done after much acrimony and agitation. After this relocation there are no habitations within the sanctuary. (The offices and the housing colony of the irrigation dept. have been constructed outside the sanctuary).

While the relocation was taking place, there was trouble between the Malayan tribals and the contractors entrusted to carry out the relocation. This led to violence and clashes and the forest dept. had to intervene.

While the role of the FD is quite unclear, the end result was that the Malayans and the FD were at loggerheads. This situation was used by some Marxist-Leninists (referred to in whispers by the FD personnel as “ML”) to gain a toehold in the area. Their influence has now spread to the two settlements within the Peechi-Vazhani sanctuary also.

As part of their war against the FD and the Govt., the Malayans—now organised roughly along the lines of the People’s War Group (PWG), though without weapons—have taken to indiscriminate felling of trees within the sanctuary. Inside the Peechi-Vazhani sanctuary, one could see trees felled for no reason at all, and left there.

Apart from this, there have also been several confrontations between FD personnel and the Malayans. Very recently, in Peechi-Vazhani, a Range Officer and his team went to arrest a Malayan who had been charged with illicit felling, were surrounded and threatened with physical violence, but managed to escape unhurt as the range Officer was carrying his weapon. In Chimmony, when FD personnel went to arrest a Malayan from Nadampadam, the person went into hiding in the Thamaravalachal Malayan settlement inside the Peechi-Vazhani sanctuary.

The tension continues to prevail between the Malayans tribals and the FD in Peechi-Vazhani and Chimmony sanctuaries. Conservationwise one fallout of this is the method adopted by the Malayans to protest—felling trees. Hopefully, they won’t start setting forest fires to make their point!

So far the tourism potential has not been exploited. The visitors are allowed to visit the dam and the reservoir in their own vehicles. A better idea would be to ban private vehicles and take the tourists on a guided tour in a vehicle provided by the forest department.

Land use: At present there is no cultivation inside the sanctuary. There are extensive rubber plantations on the western side of the sanctuary. The closest village, Palappilly is more than 10 km by road. The villagers cultivate Rice, cashew and vegetables.

When tribals were living inside the sanctuary, the cattle moved freely in the sanctuary. But since the number of cattle was small, Cattle Trespass Act was not enforced. Even after shifting outside, the tribals continue to visit the Sanctuary for collecting NTFP and for fishing. The Palappilly Tribal Cooperative Society is responsible for collection of MFP from Chimmony.

Eversince the Chimmony Dam was constructed, no other development project poses any threat to the Sanctuary. At present tourist facilities are almost nil. Tourism needs to be planned carefully to avoid negative impacts of indiscriminate increase in the number and frequency of tourist visitors.

MANAGEMENT PERSPECTIVES

In the perception of the management 20-25% of the sanctuary is disturbed.

Michenia weeds are a problem especially along the lake fringes. An area of 10 sqkms is affected by human activities.

After the declaration as a sanctuary, extraction of timber has been stopped. Only thinning operations are carried out in the plantations.

There has not been any vaccination programme for cattle so far by the forest department. The animal husbandry dept carries out vaccination but the extent is not known.

No fee is charged for grazing of animals. The cattle population is much less as compared to Peechi-Vazhani. No fishing rights are there but illegal fishing goes on.

Honey collection is allowed through societies.

No violent clashes reported; but the sanctuary is a nucleus of Naxalite activities.

Rights have existed in the last 10 years.

No eco-development programmes.

There are no roads or power lines passing through the sanctuary. For the first time in 1999 nature camps for awareness for school students has been planned.

Locals are employed in forestry operations.

PARAMBIKULAM SANCTUARY

Introduction

The Parambikulam Wildlife Sanctuary is situated in Chittur Taluk of Palghat District, Kerala State. Anamalai Wildlife Sanctuary in Tamil Nadu borders the eastern and southeastern side of the sanctuary while the other three sides have reserved forests of Kerala, viz. Sholayar, Vazhachal, Nelliampathy and vested forests of Nemmara. It is connected to the Eravikulam sanctuary further south via the Annamalai sanctuary. It is a part of the larger forested area starting from Peechi to Eravikulam through Anamalai and is the central unit of the Annamalai subunit of the Western Ghats. The sanctuary is the catchment of the Chalakudy river system. There are 3 reservoirs of Parambikulam Aliyar Project inside the area namely, Parambikulam, Thunacadavu and Peruvripallam. Besides there are many small and medium sized streams, water holes (some natural but many artificial), and check dams. The distribution of streams and rivers in the sanctuary is shown in a map. The availability of water to wildlife is comfortable in major portions of the sanctuary. The vegetation consists of both natural forests and plantations. All Peninsular Indian mammals are well represented in the sanctuary.

The sanctuary offers excellent scope for researchers in studying the functions of nature and the interconnections in the Western Ghat area. The plantations inside the sanctuary are being slowly converted to natural forests. This enables an understanding of the mechanics of such conversions, which are of immense use to foresters. It shall help to reconcile the objectives of production forestry in the short run versus protection forestry in the long run. Also, there are tribals who are living a well-integrated life inside the sanctuary. This offers scope for developing models of sustainable livelihoods of tribals without compromising the interests of wildlife.

The sanctuary is easily approachable, has immense natural beauty and wildlife sightings are quite frequent. It is thus a potential area for developing ecotourism, environment education and responsible environment behaviour.

HISTORICAL PROFILE

The Government of Kerala on 12th February 1973 issued a notification declaring Parambikulam as a sanctuary. The notified area of the sanctuary is 285sq.km. There is some confusion about the exact size because of different figures mentioned in Government of India notification. Though the area is now taken as 285sq.km, the division into ranges gives a slightly lesser figure.

The area under natural forests is 184.549 sq.km and the area under plantation is 89.592sq.km. The Parambikulam sanctuary was reorganised into its present shape by Government Order dated 2-11-1984 and another order dated 10-5-1985. The first management plan was finalized and came into operation from April 1988. Presently the sanctuary stands divided into four sections as given below.

RANGE	NATURAL FOREST (HECTARE)	PLANTATION AREA (HECTARE)	TOTAL AREA (HECTARE)
Sungam	6197.593	1977.507	8175.10
Orukomban	5451.412	1732.288	7183.70

RANGE	NATURAL FOREST (HECTARE)	PLANTATION AREA (HECTARE)	TOTAL AREA (HECTARE)
Parambikulam	3444.17	1773.83	5218.00
Karimala	3361.71	3475.59	6837.30
Total (Hectare)	18454.885	8959.215	27414.10

Previously the sanctuary had been viewed primarily as a source of valuable timber. Now the emphasis is on conserving the biodiversity of the forests.

Historically, two forest reserves were recognized: Sungam Forest Reserve and Parambikulam Forest Reserve. The Sungam reserve was referred as Thekkady leased forests. The existing three ranges Parambikulam, Karimala, and Orukomban have been carved out of the Parambikulam range of the Nemmara forest divisions. The forests were under the control of Chieftains before being consolidated and brought under the rule of the Cochin Maharaja. Later with the integration of the States, these went to the Travancore Cochin state and finally to Kerala state.

Contractors to whom specific areas were leased for specified time periods worked the forests. There was virtually no control over these contractors who extracted teak. Other species could be felled by anyone by paying the transit fees. Sri Alwar Chetty from the Madras Forest Department insisted on marking the trees before felling and the contract was awarded to the contractor offering the lowest bid. To ease transportation difficulties, work on a tramway commenced in 1901 and it became operational in 1907.

What was considered as an engineering marvel, was to become the main destroyer of forests of this area. The felling was not according to any ecological purpose. Instead the effort was to keep the tramway to be used to its full potential. In 1926, a Special Finance Committee recommended the abolition of tramway but it was not accepted. In order to justify the tramway, forests were felled indiscriminately that led to a total disintegration and depletion of all major-forested areas. Finally the depleted forests could not justify the capital expenditure of the tramway and a special committee recommended discontinuing of the same. This was accepted and the tramway closed down in the year 1951.

By 1960, it was found that 15000 acres [6073 hectares] of prime forested land had been overexploited and were without any valuable tree cover. A scheme to artificially regenerate 15000 acres in Parambikulam area was proposed and accepted. The target of 6073 hectares was achieved in 1967. The plantation activities continued till 1973 covering an area of 6961 hectares. Thereafter no plantation activities have been taken up.

The first management plan prepared by Sri. TP Vishwanathan found the valley to have been heavily worked and depleted (of not only teak but also rosewood and other species) during the 45 years or so. He suggested temporary halting of felling coupled with artificial regeneration.

The current management thinking is to reconvert teak plantation into natural forests by gradually creating small openings in teak plantations by resorting to selective removal of teak.

Tribals have been living in the sanctuary without any record of rights. In 1997, Government of Kerala decided to right of possession to all tribals living in the forests. This process is going on. The tribals enjoy almost all the rights of permanent settlement. There are four tribal groups dispersed in different parts of the sanctuary.

They are:

- The Malasars or Malayars
- The Kadars
- The Malamarasars
- The Muduvas

The lifestyle of the tribals has undergone a sea change due to contact with the outside world. Previously they used to practice agriculture and collect forest produce. Wild life raiding the crops has meant complete abandonment of agriculture by most tribals. Collection of forest produce is severely restricted now. They still possess few low yielding milch cattle. The milk is mostly used for self-consumption. They used to hunt game in the past. But now that is all history. Occasional hunting of hares and turtles are still reported. Though fishing inside the sanctuary is prohibited, stray cases of violations are reported. The first three categories of tribals are now totally dependent on forestry works for their livelihood. The Muduvas still practice agriculture and grow a variety of crops like rice, maize, raggi, tapioca, beans, pulses, bananas, coconut, and arecanut. They work in forestry operations only during the agricultural lean season between October-March.

There is a group of about 250 people who came as labourers during the course of dam construction work and have settled down here since then. They too depend on forestry works. The decision of the Government to allot land to tribals, mentions nothing about these non-tribals.

In addition to these settlements inside the sanctuary, the Thekkady colony situated outside the North eastern flanks of the sanctuary also put pressures on the sanctuary.

The pressure of human habitation is generally felt in the vicinity of settlements. But since all human settlements in Parambikulam sanctuary are scattered, there is no contiguous zone of degradation in the sanctuary.

The problem from settlements is mainly during the lean period of forestry works during April-July. At such times the settlers indulge in illegal fishing and excessive and indiscriminate collection of NWFP. The tribals engaged in agriculture tend to extend farming into forested areas because of low productivity. Fuelwood collection from settlements on the border is also considerable. The problem of grazing is not felt, as there are only a total of 80-100 cattle heads with these settlers.

GEOGRAPHICAL PROFILE

Location: The sanctuary is located between 76° 35´ and 76° 50´ E. Longitude and 10° 20´ and 10° 26´ N. Latitude. The elevation is about 600m above MSL. The highest peak in the sanctuary is the Karimala Gopuram (1431m). The only approach to the sanctuary is through the Annamalai sanctuary in Tamil Nadu. From Pallakkad the distance is 95 kms. and from Coimbatore the distance is 91kms. The route from Pallakkad is through Pollachi sub taluk of Coimbatore district of Tamil Nadu. Govt. of Tamil Nadu operates two bus trips daily from Pollachi to Parambikulam. No direct route is available from the Kerala side.

The sanctuary is divided into four ranges: Sungam, Parambikulam, Orukomban, and Karimala ranges. Each range is further subdivided into sections (See Map). The core zone consists of the entire natural forests with some teak plantation area. The remaining sanctuary area is the buffer zone that consists of teak, eucalyptus plantations and the leased out areas.

CLIMATE

Temperature: The maximum temperature ranges between 22° C and 38° C. and the minimum temperature from 13° C to 20° C. Feb-March are the hottest months while Dec-Jan the coolest. The relative humidity is generally medium to high.

Rainfall: The sanctuary receives both the north-east and south-west monsoon, the latter being more pronounced. The south-west monsoon sets in the first week of June and goes on till mid August. 80% of the windward side of the sanctuary receives heavy rainfall during this period. The north-east monsoon spills during November with small spillover in succeeding months. The eastern portions receive higher rainfall during this period. April-May is the time for pre-monsoon showers. The sanctuary thus gets rain for the better part of the year. The average annual rainfall is around 2000mm. Strong westerly winds sweep the sanctuary just before monsoons.

BIOLOGICAL PROFILE

There is a great biodiversity in flora and fauna in Parambikulam Sactuary. The vegetation ranges from dry deciduous, semi-evergreen to evergreen forests. High altitude grasslands are to be found in many areas within the sanctuary. Besides there are raised plantations of teak. This interspersions of different habitat types produces the edge effect that gives rise to the presence of a large diversity of animals.

Being a part of a larger forested area, the sanctuary supports viable populations of many animal species and becomes a migratory passage for them. This helps in genetic exchange which in turn lead to healthier stock of animals.

Fauna:

- Bonnet macaque, Nilgiri langur, Liontailed macaque, common langur, tiger, leopard, jungle cat, small Indian civet, Common Palm civet [Toddy cat], brown mongoose, rudy mongoose, Indian wild dog, sloth bear, Indian giant squirrel, three striped palm squirrel, flying squirrel, black naped Indian hare, Elephants, Gaur, Nilgiri Tahr, Cheetal, Sambar, barking deer, mouse deer, Wild boar.

- Common otter, mugger or marsh crocodile, black turtle, Cochin forest cane turtle, Travancore turtle, Leith's soft shell turtle.
- Brook's gecko, Termite hill gecko, South Indian forest ground gecko, common garden lizard, forest calotes, Calotes ellooti, Indian chameleon, many types of skinks, Punjab snake eyed Lacerta, common monitor lizard.
- Indian rock python, striped keel back, sand boa, common rat snake, krait, spectacled cobra, king cobra, russel's viper, pit viper are among the 33 species of snakes found here.
- 252 species of birds have been recorded in the sanctuary. Some of the rare birds are orange breasted green pigeon, malabar pied hornbill, Great Indian hornbill, Malabar bittern, lesser adjutunct stork, rufous bellied hawk eagle, grey headed fishing eagle, great black woodpecker, grey headed bulbul, Wayanad laughing thrush, great eared night jar. The most common are hill myna, small green barbet, racket tailed drongo, bronzed drongo, blue winged parakeet, lorikeet, orange minivet, greenish leaf warbler, red whiskered bulbul.
- 16 species of amphibians have so far been recorded.
- 24 species of fishes have so far been recorded.
- 600 species of insects have so far been identified,

Flora

The following forest types are found:

- West coast tropical evergreen forests
- West coast semi-evergreen forests
- South Indian moist deciduous forests
- South Indian dry deciduous forests
- Moist bamboo brakes
- Reed brakes

There are plantations of teak and eucalyptus. Teak was planted after clear felling moist deciduous forests in patches. Eucalyptus was planted in place of dry deciduous forests but most of them have been removed in the process of rotational clear fellings. The plantations stand out in the background of natural forests. Many of the teak plantations both regularly managed as well as the not managed ones are poor in the stock of natural regeneration. The portions of such failed teak plantations in the valley have come to be known as 'vayals', which support lot of palatable grasses. The vayals are the high density feeding grounds for the herbivores, and visitors can commonly see large herds foraging here. Poor drainage may be a reason for such failed plantations.

The tree genus that are commonly found are: Adina, Albizzia, Anogeissus, Artocarpus, Bahunnia, Betula, Bombax, Bucharna, Calophyllum, Cinnamum, Cullenia, Cycas, Dipterocarpus, Elaeocarpus, Ficus, Holigarna, Lagerstromia, Mesua, Olea, Pterocarpus, Pterospermum, Syzygium, Tectona, Terminalia, Ziziphus.

Management objectives: Conserving the biodiversity of flora and fauna has not been an easy task for the management. There are many vexed issues where the outcome is uncertain. For example, there are guidelines for conversion of teak plantations into natural forests. The regeneration in many cases has not been satisfactory. Similarly there are settlements in and around the sanctuary, which

create their own demands on the resources of the sanctuary. At present they do not pose any serious threat to the sanctuary. But if the population in the settlements rise, it could be a serious problem. At present many of the settlers act as informers to the forest department. The forest guards, most of whom have never lived in a forest, feel confident of entering remote parts in the forest because of the presence of settlers. Otherwise they would feel diffident in their patrolling duties. In any case the resettlement is going to be a tough job, since there are vast stretches of reserved forests surrounding the sanctuary. Infact there is a pending proposal for declaration of the entire forested area in the vicinity as a tiger reserve. The important tasks that the management has to address are

1. Conversion of teak plantations into natural forests: One of the main tasks of dealing with the plantation area is to stop raising further plantations of teak. Instead the effort is to re-convert teak plantations into a deciduous type of forest with a mix of indigenous species. The effort to convert teak plantation area covering nearly 33% of the sanctuary into moist deciduous forests is one of the most important challenges facing the management. The task has been rendered difficult because the earlier efforts in managing plantations were with the sole objective of getting good timber. But now there is a radical change where even thinning operations are done keeping in mind the requirements of natural regeneration. As and when a plantation area becomes ready for felling, around 20-25% of the trees shall be removed by selective removal in order to promote natural forest and at the same time maintain adequate forest cover. Teak trees take 60-100 years to mature [this period is referred as rotation age], attaining a girth of 145-150cm. Also trees indigenous to the area that are 80-100 years old are supposed to attain a girth equivalent to the girth of teak trees at rotation age. Starting with 1987, the teak plantations have been managed as per the new guidelines. For each block of plantations, three cycles of felling have been recommended. The first felling for each block will start at the 60th year, the next at 90th year and the final at 120th year.

Assuming these figures, for a plantation done in 1940, 25% shall be selectively felled at the 60th year i.e. year 2000. Another 25% shall be removed at the 90th year and yet another 25% felled at the 120th year. [The selective removal also provides continuous employment to local tribes. This will help in keeping the 60% of the area accounted by natural forests free of human pressures.] When majority of the plantation areas complete the forest cycle, a survey of regeneration efforts should be done. If regeneration is considered satisfactory, the second cycle can continue. If regeneration is found to be poor, this system should be given up and a new method tried.

2. Nurseries: The natural regeneration in many teak plantation areas has not been satisfactory. It has been found that eupatorium takes up the space before the natural vegetation is able to establish itself. Therefore planting of indigenous species raised in nurseries have been tried since 1996-97 but on a limited scale. It is too early to say whether these attempts would be more successful than natural regeneration. To prevent wild animals from trampling the young seedlings, some of the regeneration areas where the menace is acute may have to be solar fenced.

3. Vayal maintenance: The edges of many vayals are seen to be infested with weeds and shrubs. The task involves uprooting and removal of eupatorium, bamboo

clumps, woody species as well as unpalatable grasses. The uprootal is generally done in Oct-Nov before eupatorium comes in flowering. The clumps of shrubs have become an ideal hiding place for predators. The ungulates that depend on visibility to ward off predators find it extremely risky to now graze in the vayals. So they are avoiding feeding in vayals which traditionally was their favourite feeding grounds.

4. Weeds: Weed invasion is a serious problem especially in the moist deciduous forests that have been disturbed by timber operations or bamboo extractions. The weeds like eupatorium, lantana, michania take the first opportunity to establish themselves in the cleared patches that permits sunlight to reach the forest floor. This prevents natural regeneration. Regular cutting is of no use because the weeds stage a vigorous comeback in a matter of few months. The only option is to quickly replant artificially the gaps created so that the forest floor is occupied before the weeds can take a hold. This is indeed a daunting task.

5. Soil erosion: The timber and bamboo extractions have speeded up soil erosion in many areas. Gully plugging works have to be extended to all the areas affected by soil erosion in order to reduce silt flow and prevent widening of gullies.

6. Carrying capacity: The population of gaur, panther and bear seem to be steadily rising. Six bear attacks have been reported in two months, two attacks being fatal. Studies on carrying capacity are urgently called for. This requires co-operation from Tamil Nadu which manages the Annamalai sanctuary because most animals cross the inter state boundaries. Unfortunately it is difficult to find researchers for long term study of wildlife.

7. NWFP Collection: The collection of NWFP is prohibited from the core zone. But the buffer zone from where tribals have the right to collect NWFP, consists mostly of plantations that do not yield much NWFP like honey, damar etc. The collection of NWFP is inversely proportional to the availability of forestry wage employment works. During the rainy months of June-August, collection does take place even from the core zone. Strict implementation of laws will only increase the tension between the forest department and tribals. Since the extraction is not too much and the number of tribals taking out NWFP is small, the department does not see this as a problem. The only problem is unscientific extraction like putting fires to the beehives or smoking of the trees from the base to extract damar. The department should train the tribals in better techniques of harvesting.

8. Settlements: The tribal communities have been living inside the sanctuary without any written record of their rights. The state's policy is to assign lands to the tribals living in forests. The process of giving rights of possession is continuing. In any case tribals are having almost all the rights of permanent tenancy. But it would be advisable to legally give them this right as soon as possible. The settlements as of today are posing no problems to the sanctuary. Since there are reserved forests all around resettling them is not going to be an easy task even in the future. At present the tribals cannot be employed outside the sanctuary because they would have to trek long distance daily. At present their main source of livelihood is employment in forestry works. These include working in teak plantations, fire lines and trek path maintenance. Once the teak plantations are converted to natural forests, this source of livelihood will not be there. Combined with this if the population in the settlements

increase, there could be serious problems for the sanctuary. At present whatever NWFP collection takes place, it is done on behalf of a co-operative society located around 70 kms from the sanctuary which the right of collection. The tribals who are members of this society get wages for collection and they have no say in the marketing and processing of NWFP. The society has not made profits to date. It would be better if the tribals are trained in adding value to the NWFP. The tribals can also be employed as forest guards, tourist guides and so on. This would increase their stake in wildlife conservation.

In settlements where agriculture is being practiced, the fields need terracing to prevent soil erosion. Trenches may be built around the settlements to minimize wild life depredations. Some high yielding varieties of seeds may also be provided. Some tribal colonies have small courtyards around individual houses. Such households may be encouraged to grow coconuts, plantains and arecanut. Bee keeping can be a good source of additional income if tribals can be trained. Stall feeding of high yielding cattle given by the agriculture department should be encouraged by providing seeds of high yielding varieties of fodder species. The milk may be sold to the sanctuary, which at present buys milk from outside the sanctuary. Permission for controlled fishing by tribals in the reservoirs is being contemplated. These are the directions by which the near total dependence of the tribals on forestry works as a source of livelihood may be reduced. The forestry work s may also be scheduled in such a manner that some employment is available during the lean season of April-September.

9. Tourism: There are comfortable places for lodging and camping for tourists. Conveniently located watchtowers provide wildlife viewing to the patient observer. An interpretation centre at Anappady helps tourists to understand the sanctuary better. A reptile park is being developed in the vicinity. A massive tree called the Kannimara teak is a major tourist attraction. Boating is also a very pleasurable experience, but tourists are not taken on boating due to lack of sufficient number of boats.

10. Other objectives: Poaching and illicit removal of trees is nil or almost negligible. Grazing is not a problem because the number of cattle is very small. Yet strict vigil is kept to prevent such incidents. In the last few years, fire has been reported in March-'96, which started off from the Annamalai sanctuary in Tamil Nadu. Regular fire prevention measures like maintaining fire lines and posting of firewatchers has been meticulously done.

11. Research and monitoring: Research, monitoring and training has not received the attention they deserve. Lack of staff and funds are the major reasons. The warden has no official role to play in the ongoing research projects in the sanctuary being conducted by KFRI. It would be helpful if long-term researches are undertaken and a better liaison is maintained between the research organizations and the forest department.

PEECHI VAZHANI SANCTUARY

Introduction: The Peechi-Vazhani sanctuary falls in Trichur District in Kerala. It was formed on 6th Aug. 1958 by combining portions of Peechi, Pattikkad and Machad ranges of Trichur Forest Division. The sanctuary is located at a distance of just 20 kms. from Trichur town. The Kerala Forestry research Institute (KFRI) is within walking distance from the sanctuary.

Geographical Profile:

Location: 10 28 N-10 40 N latitude
76 17 E-76 29 E longitude

The elevation in the sanctuary extends from 30m to 928m above MSL. The terrain is hilly and rugged.

The area of the sanctuary is 125 sq.kms—50 sq.kms of core zone and 75 sq.kms of buffer zone. It is contiguous with the Chimmony Sanctuary. The sanctuary provides migratory route for animals moving from South to Northern Nilgiris. Unfortunately a major portion of the sanctuary now stands degraded due to lot of biotic pressures before & after the declaration as a sanctuary. Two dams are there within the sanctuary with waterspread area of 12.95 sq.kms. and 1.843 sq.kms. respectively. These two dams were constructed in the second half of the fifties – the southeastern Peechi Dam across the Karuvannur River (Peechi river) and the northwestern Vazhani dam across the Keecheri river (Vazhani river).

The Vazhani portion in the northern zone of the sanctuary is drier than the Peechi zone. The sanctuary is a part of the Western Ghats and possesses all its complexity and diversity. The sanctuary lies in the catchment of Peechi and Vazhani reservoirs. Except for the Silent Valley National Park, catchment of dams has been the basis of declaring protected areas in Kerala.

CLIMATE:

Temperature: Temperature during March-May goes upto 38 C in the low country and 32° C in the hills. The corresponding figures during Dec-Feb are 21 C and 15 C.

Rainfall: The sanctuary experiences both the South West (May-July) and Northeast monsoon, (early Oct – Mid Nov) the average annual rainfall is 300mm.

BIOLOGICAL PROFILE

Being low hills exposed to the dry Palghat gap as well as the heavy rainfall western side, a variety of forest types and subtypes are found. West Coast tropical evergreen forests and West Coast semi-evergreen forests represent the Malabar type while South Indian moist deciduous forests represent the Deccan type elements. The moist deciduous tracts are interspersed with evergreen patches and grass lands. This is an ideal habitat for animals. 500 ha of teak-Bombax plantations are there near the Peechi reservoir and Kuthiran areas. These provide ideal shelter for wild boar and spotted deers.

The importance of Peechi-Vazhani wild life sanctuary cannot be seen in isolation. But together with Chimony WL sanctuary, the tract can be considered as an ecologically independent unit and a viable ecosystem.

Wildlife was abundant in the none too distant past. But degrading activities by humans has drastically reduced the concentration of wildlife. The tourist attractions are the two dams surrounded by pedigreed landscape and gardens rather than wildlife. But the sanctuary offers a migratory path to elephants moving from southern to northern areas of the Western Ghats.

This in itself is a reason enough to offer protection to this area. In many parts of India, elephant migratory routes have been cut off due to developmental projects. The elephants are then confined to remain in a restricted area. This does not give the vegetation enough time to recover before they are eaten once again by elephants. Faced with a scarcity of food resources, the elephants move into human settlements and damage crops.

The human-wildlife conflict starts off a chain reaction whereby elephants end up destroying dwellings and killing people due to sheer desperation and acute stress. The people angered by such event end up killing elephants. The distrust of elephants towards people increases because elephants are too sensitive to the death of their own member. The attitude of people towards wildlife becomes negative. In such a situation, any restriction enforced by the forest department on the people living in the vicinity evokes a hostile reaction from the them. Policing in such a situation becomes counterproductive. In the end, the relationship between wildlife, locals and the forest department becomes antagonistic instead of becoming cooperative. It becomes a no win situation for all the parties. Degradation of nature and natural resources as well as marginalised and impoverished people is the ultimate outcome.

The same holds true for other wild animals that migrate over long distances or animals that require large territory under their control. There is another risk in cutting off migratory routes of animals. When herds get isolated from one another, the problem of inter-breeding starts. Only free and unrestricted movement of animal populations can lead to genetic exchange and improvement. Peechi Vazhani sanctuary by providing a corridor for animal movements, plays a crucial role in the wider perspective of nature conservation in the Western Ghats. The fauna and flora of the region is well represented in the sanctuary.

Fauna

Bonnet macaque, Nilgiri langur, Common langur, slender loris, leopard, jungle cat, Indian wild dog, Indian giant squirrel, Black naped Indian hare, gaur, Nilgiri tahr, chital, sambar, barking deer, elephant, wild boar and porcupines.

Monitor lizard, cobra, king cobra, python, Russel's viper, and rat snake.

Darter, pond heron, pariah kite, grey jungle fowl, blue rock pigeon, green pigeon, palm swift, stork-billed kingfisher, white-breasted kingfisher, blue winged parakeet, common myna, tree pie, black drongo, racket tailed drongo, babbler.

Many varieties of moths, butterflies and beetles Nilgiri tahr, otter, elephant, python are the endangered species found here. Nilgiri langur and sloth bear are threatened.

Regarding endemic species information is not available. Research needs to be conducted into population of animals, their behaviour patterns, migrations, endemism and such related studies.

Flora

The West Coast tropical evergreen forests, West Coast Semi-evergreen forests and South Indian Moist deciduous forests represent the flora. Besides 500 ha. of teak-softwood plantations are there in the sanctuary. Practically no systematic studies are available on the floral status of this area. It is known that tribals use a number of plants as medicines. Many plants that are considered as endemic to the Travancore area are found in the sanctuary. The KFRI has prepared a list of endemic and rare species of plants.

The sanctuary forms an ecological and stable ecosystem in conjunction with Chimmony sanctuary and adjacent forested areas. And there is no need for alteration of the boundary

SOCIO-ECONOMIC PROFILE

There are tribes of Malayans residing inside the sanctuary. Before the sanctuary was declared, the reserve forests had many settlers and encroachers. Since the declaration of the sanctuary, all rights and concessions enjoyed by these people were extinguished except collection of MFP. The forest dept wants that the settlers to be relocated outside the sanctuary and funds have been earmarked for this purpose. Presently the tribals are engaged in farming, cattle rearing and collection of MFP. They also work for wages in forestry operations. The houses of tribals are not in a cluster. Individual households are scattered mostly in the buffer and tourists zones. Besides the tribals, there are other outsiders residing within the sanctuary limits and they are mainly farmers. The 60 tribal families and nearly 70 families of outsiders together are in the possession of about 170 hectares of forestland. The land is used mainly for cultivating paddy, tapioca, arecanut, plantains, coconut and rubber.

MFP collection is allowed as per the agreement between the Government and the cooperatives of Harijan Girijan Societies. Honey is the main item collected along with other items such as Cheenikka, Amalpari, Kadukka, and Kakkumka. People in and around the sanctuary take firewood which is not allowed.

Out of a total cattle population of 1000, 20% is goats and the rest is cows, buffaloes and bulls. Grazing is not permitted but implementation is slack because the houses are scattered. Individual household cattle wander and graze. Since the cattle do not graze collectively, there is not much evidence of degradation due to grazing pressures. But natural regeneration of many species of canopy trees has been rendered impossible by trampling, grazing and browsing.

MANAGEMENT PROFILE

The park authorities have their hands full because of many adverse factors that are operating simultaneously. The problem areas are grazing, fishing, fire, poaching, felling, firewood collection, MFP collection, movement of people. They have to take:

- Preventive measures like preventing illegal poaching, grazing, tree felling, and fire.
- Corrective measures like habitat management practices

- Developmental measures like rehabilitation and ecodevelopment schemes.
- Development of eco-tourism

Fire prevention: It has been decided to completely insulate the core zone by preparing a firemap and having firelines of 8-10mts width.

Habitat management works: Selection felling and harvesting of bamboo has now been stopped. At present only thinning operations are being carried out in teak plantations according to conventional silvicultural practices.

Planting natural species of flora in the degraded portions of the buffer zone has been planned. The plantations in the core zone are to be reconverted into natural forest. There is a well-maintained forest nursery to raise saplings of natural vegetation in order to restock degraded areas. The buffer zone also supports dense vegetation. Removing weeds and cutting of climbers have been suggested to improve the floral quality.

The sanctuary is easily accessible from Trichur. The major tourist attractions are the lake areas. In order to attract visitors from outside Trichur, facilities like lodging, boat rides, guided tours on elephant backs or jeep rides should be developed. An interpretation center, screening of films and slide shows, preparation of booklets, souvenir items can go a long way in environment education of tourists.

Management viewpoint/Perspectives:

- Almost 30% of the Sanctuary area is disturbed.
- Weeds like lantana & eupatorium infest 10% of the park area.
- 10sqkms of the park area is affected by human activities of one kind or the other.
- After declaration as a sanctuary, no extraction of bamboo or timber is permitted. Only thinning operations are carried out.
- No fee is charged for grazing. There are 300-500 cattle heads.
- The FD has so far vaccinated very few cattle.
- Fishing rights have been given to tribal society to take fishes from reservoir.
- Honey, medicinal shrubs and plants are allowed to be collected through societies.
- Wild dogs and leopard kill livestock periodically.
- There was a violent clash about 2 months back (Feb '99) when the range officer had to be released with help from armed police and forest staff.
- From 1950 onwards, rights were in existence.
- 30-40 tribal women attend sewing classes on a daily basis for which the FD has provided sewing machines.
- There are no roads or power lines inside the sanctuary.
- As a step towards awareness generation, 52 nature camps comprising 30-40 school students have been held so far.
- Local people are given employment in forestry related works.
- It is believed that 80 families who have encroached forest lands have some connection with the Naxalites.
- The relationship of the FD with the tribals is not good at all. Tribal families resort to reckless, wanton and extensive felling of trees as an act of defiance. This is evidenced by a number of giant fallen trees and burnt tree stumps. This is in

sharp contrast to the lopping and chopping of tree branches for personal use that is generally found in many other forests which have people living inside them. There is an urgent need to reduce tensions between the FD and tribals.

Conclusion: The sanctuary harbors a wide variety of flora and fauna. It offers excellent research potential especially in the area of wildlife biology. Simultaneously there are problems like people-park conflicts arising due to settlements and proximity to urban areas. The sanctuary thus offers excellent scope for inter disciplinary studies by blending science and social science.

Thattekad Bird Sanctuary

1.1 Introduction: Thattekad, presently the only notified bird sanctuary of Kerala is situated in Devicolam taluk of Idukki district. It is on the northern bank of river Periyar. The total area of the sanctuary is 25.16 sq. km. Dr. Salim Ali the famous ornithologist carried out two expeditions in this part of the Western Ghats during the thirties. One of the areas where he observed an exceptionally rich avifauna was a place known as Thattekad on the north-west corner of the High Ranges, at the base of the Ghats where river Periyar meets Idamalayar. This region has an exceptional variety of biotopes in the low country not to be found anywhere else in Kerala. Dr. Salim Ali suggested the declaration of this area as a bird sanctuary. He repeated the plea during his subsequent visits to Kerala in the sixties and the seventies. This suggestion led the state Government to declare it as a sanctuary to protect the richness of the avifauna [Nair,S.C.1991]. On the 27th of August 1983, as per Government notification No. 35743/FM3/83/AD this area was declared a sanctuary.

1.2 Significance: The important avifauna found in this sanctuary are indigenous forest birds such as large falcon, grey jungle fowl, hornbill, white breasted water hen etc. Dr. Salim Ali recorded 167 species of birds in this area. Dr. Sugathan has identified 191 species in this small area. These findings indicated this area to be an excellent habitat for a variety of birds. Subsequently, a study was conducted by Bombay Natural History Society in 1985, when 253 species of birds were identified. This area harbours a number of species of water birds, as well as arboreal birds of the semi-evergreen forests. There are a number of wetlands along the Periyar river and patches of semi-evergreen forests inland. Such varied habitat has harboured a large number of species of birds.

1.3 Current status: Thattekad Bird sanctuary is on the western fringe of Western Ghats. It has the Periyar and Edamalayar rivers flowing on either side. The sanctuary area is highly undulating, with hills rising high in the middle of the PA. Mainly, two types of forests are found namely, the semi-evergreen and moist deciduous. There are many wetlands, some of which are artificial. There are also some teak, mahogany and rosewood plantations in the PA. The road from Thattekad to Pooyamkutty, bifurcates the PA into two segments. From Kuttampuzha (see map), the settlements have spread into the PA and now extend all along the road. Apart from having patta (pattayam) lands, many settlers have also encroached on forest land. Their cattle graze in the forests. The sanctuary is surrounded by settlements on

all the three sides, except to the east, which is hilly and forested. Grazing and use of forests by people pose a great problem. Three kilometers below the confluence of the Periyar and the Edamalayar, is located the Boothathankettu dam. This has proved beneficial to the sanctuary, as there is always water in the main rivers. The sanctuary authorities have been able to maintain artificial wetlands for water birds. The moist deciduous forests harbour other species of birds. But for its uncontrolled biotic interference, this sanctuary is excellent for bird watching.

2. Description of the sanctuary:

2.1 Geographic profile:

2.1.1 Location and area: Thattekad bird sanctuary is about 15 kms. east of Kothamangalam town and about 80 kms away from Cochin, which is nearest airport and railhead. It is in the Devicolam taluk of Idukki district. The area of the sanctuary is 25.16 sq. kms. The headquarters of the sanctuary is at Kuttampuzha, which is accessible by a ferry from Thattekad.

2.1.2 Physical features: The terrain is undulating, with hillocks. Numerous seasonal streams bisect the terrain and drain into the Periyar river. The altitude varies from 60 mts. to 450 mts. above MSL [MP]. The soil depth varies according to the terrain in hill ranges. The ridges and hilltops are barren and rocky. There are some natural and artificial wetlands, along Periyar. Booththankettu reservoir helps in supplying the water requirements of the sanctuary. However, there are also some waterholes dug in some of the dry areas by the forest department.

2.1.3 Climate: The climate in Thattekad is cool and humid. The temperature varies between 20 degrees centigrade and 30 degree centigrade from December to January and 22 degrees and 32 degrees centigrade from April to May. The average rainfall is about 2500 mm. The maximum precipitation occurs in June-July. [MP]

2.2 Biological profile:

2.2.1 Flora: Thattekad bird sanctuary consists of moist deciduous, semi-evergreen forests and patches of evergreen forests, interspersed with teak, mahogany and rosewood plantations. The climax vegetation consists of lofty trees of *Vateria indica*, *Dipterocarpus indicus*, *Palaquim ellipheum*, *Machilus macarantus* etc. The forests are dense, with thick middle storey and undergrowth of herbs, cane brakes and ferns. In evergreen forests, the trees are tall, canopy is almost closed and are predominantly of softwood species. Reeds are found in wet areas. Undergrowth consists of *Strobilanthus* species, *Laportia* species and *Clerodendron* species, semi

evergreen: *Artocarpus hirsuta*, *Hopea parviflora* and *Tetramelus nudiflora* dominate this type. There are plenty of openings, where Shore, Trema (??????) etc. come up.

Moist deciduous: The main trees are *Tectona grandis*, *Dalbergia latifolia*, *Lagerstroemia lanceolata*, *Pterocarpus marsupium*, *Terminalia bellerica*, *Terminalia paniculata*, *Terminalia chebula*, *Bridelia retusa*, *Emblica officinalis*, *Grewia tilaefolia*, *Bombax species*, *Anogeisus latifolia* etc.

Plantations: There are seven teak plantations in the sanctuary, comprising an area of 217.13 ha.(2.17 sq. kms.) The oldest plantation was done in 1926. Now they are not being worked. An area of 5 ha. has been planted with rosewood. Mahogany has been planted over an area of 6.67 ha. Both plantations were planted in 1974. Fruit bearing trees have been planted over an area of 4.50 ha. during 1986.

2.2.2 Fauna: There are a wide range of fauna and avifauna. Among herbivores, elephants, sambar, barking deer, mouse deer etc. are seen. Tiger, panther, jungle cat, wild dog are the major carnivores, found in the sanctuary. There are many species of birds such as, the great Indian Hornbill, Indian darter, parakeets, hill mynahs, fly catcher, king fishers, Drongos, Brahmini kite, Golden Oriole etc. A list of birds and mammals has been appended. Endemism has not been noted so far. The rare species found in the sanctuary are tiger, panther, leopard cat, small Indian civet and small Travancore flying squirrel. Great Indian Hornbill is a rare bird species.

2.3 Socio economic profile:

2.3.1 Settlements: Thattekad sanctuary is surrounded by settlements on three sides. They are non-tribal settlements. Across Thattekad, on the right bank of Periyar, is Kuttampuzha, which is the park headquarters. It has now developed into a small township. The local people depend on the sanctuary and the adjoining forests for fuel and fodder. The settlers had agricultural land allotted on either side of Thattekad –Pooyamkutty road, but now, they have encroached on forestlands. The Forest Department has erected cairns to mark the boundary, between private land and forestland. Those who have been assigned lands are now economically stable. The normal land use practice is to grow rubber on bigger holdings and to grow other agricultural crops like coconut, pepper, banana etc. in smaller holding. Besides the landholders, there are many landless, who resort to illicit felling of trees for raising money. The settlers graze their cattle in the forest and collect their firewood from the forest.

2.3.2 Grazing: The local Panchayat office records show that presently the livestock population around the sanctuary amounts to approximately 500[MP]. In addition, about fifty herds cross Periyar river and enter into Thattekad for grazing. There is no restriction on grazing by domestic cattle. There is rampant grazing going on in all low lying areas, in the sanctuary. Luckily, due to ample rainfall the grass patches regenerate very fast.

2.3.3 Fuel and other NTFP: The surrounding villagers collect their firewood from the sanctuary. There are no tribal settlements inside the sanctuary. Therefore, there are no special rights. The settlers however, collect NTFP for their requirements. The main NTFP collected are medicinal plants.

2.2.4 Timber harvesting: Illegal collection of timber by the settlers go on in a small scale. The silvicultural operations conducted in the plantations, specially thinning, yield some poles which are auctioned to the local population.

2.2.5 Conflicts: The forest department and settlers have occasional problems in their interactions. Elephants migrate into Thattekad every year. The standing crops in the agricultural fields of the settlers attract them. This leads to human wildlife conflicts. The department has erected electrified wire fencing around the fields. It has indirectly helped the department, as shifting the boundary and encroaching on forest lands is not possible anymore. However, the settlers have filed a case against the Department, accusing them of cutting timber for constructing structures to facilitate tourism. The Department has started constructing a walk-way with hides for bird-watching, over the wetland. While it was halfway through the construction, the settlers have gone to the court, alleging the department was felling trees, for accessing the required timber. The work is kept in abeyance. The Forest Department however, say the timber used, were from plantation thinning.

2.3Management:

2.3.1 Objectives: The specific objectives of the park are as follows;

To preserve the forest ecosystem of Thattekad bird sanctuary by minimising all destructive factors.

To study the ecological aspects of birds in their natural habitat.

To study the plants and birds interactions in the evergreen forests

To promote conservation awareness among the local population through nature education programme.

The first management plan for Thattekad Bird Sanctuary (from 1990-91 to 1999-2000) was prepared by Shri R. Ramesan Wildlife Warden. Currently it is being updated.

2.3.2 Management Zones: The sanctuary has various management zones. The total area of the sanctuary is only 25.16 sq.kms. It is bifurcated into two segments by the Kothamangalam—Pooyamkutty road. The sanctuary has many indigenous avifauna. The concentration of birds is more on the higher elevations. This area should be free from disturbance; hence, should be under strict protection. The higher elevations cover about 10 sq. kms, which form the core zone, where the wildlife habitat would have an absolutely low level of human interaction. The rest of the area, which is approximately 15.16 sq. kms. is the buffer zone. Since some human interference is present, this area should be completely fire protected. Thattekad is the administrative zone of the sanctuary and has the Research Station and the Assistant Wildlife Warden's office. The tourism zone is identified to be on either side of the Thattekad-Ovankal and Thattekad-Kuttampuzha roads. The area between Kootikal and Ovankul, which is viewed from the boat, while travelling on the Periyar, will also be a part of the tourism zone(see map).

2.3.3 Habitat Management : Existing plantations are no longer worked. 4.5 ha. of fruit species, which are suitable for birds as food, have been planted. The Management plan prescribes this activity to provide food, water and cover for the birds. The vacant patches are to be planted with fruit trees and plants, to provide shelter for the birds. Besides, in the existing plantations, the gaps could also be planted with fruit trees. The evergreen habitat should be protected.

The high rainfall regime in the sanctuary, coupled with undulating terrain, leads to high water run-off. One or two check dams could be constructed at convenient spots for retaining water, during the lean period.

Silt protection measures, like gully plugging and planting soil-binding species along steep water courses are being executed. The water table is very near the ground level in this forest, because of the Boothathankettu dam and reservoirs. This source of water has enabled the creation of a number of inundated patches, which attract water birds.

Wild ungulates are not high in number in this sanctuary. Moreover, the pastures in the hills are not accessible to domestic cattle; hence pasture development work is not essential. Lack of browsing by the ungulates, has allowed

the weeds to flourish. The common weeds noticed are *Eupatoruim* and *Lantana*. Weed eradication has to be taken up.

Fire and grazing are common occurrences in the sanctuary, often caused by the villagers, entering the sanctuary. Such annual fires are detrimental to the ecosystem. Fire occurrence in a bird sanctuary is detrimental to the avifauna, as it burns away nests and chicks in the bushes. Proper fire protection measures, like fire tracing and appointment of labour for fire fighting, are being taken up. A watch-tower has been built in the tourism zone, both to serve as fire watcher-tower and for bird watching. Steps have been initiated to control grazing. Vaccinating the domestic cattle of the surrounding areas, have to be started, as they are the main carriers of diseases, which spread to wild ungulates.

2.3.4 Tourism: Thattekad is the only bird sanctuary in Kerala. It has also other larger mammals(see list in the annexure). The elephants visit the sanctuary and are found near tourism zone, but other larger mammals are rarely visible. The sanctuary is being developed for bird watchers. There is an interpretation centre at the headquarters. There are audio-visual equipments available with the centre. There are large halls for holding nature camps. The complex also has a three-bedroom rest house. The FD has one motor launch and two paddleboats to travel along the rivers. There are a few nature trails, which are used for trekking. One starts at Bharanikuzhy and extends to Sathrapaddy, over a distance of 5 kms. and the other from Ovankul to Bharanikuzhy It is essential to spread awareness among people surrounding the sanctuary, as the main anthropogenic impact on the sanctuary is by villagers from the surrounding area.

There is a road from Thattekad to Neri Mangalam and another road from Urulanthanni to Bharanikuzhi, which are maintained for patrolling purposes. Besides these roads, the trek paths inside the sanctuary serve both as firelines and as paths for patrolling.

2.3.5 Personnel: Presently, the sanctuary is under the control of an Assistant Wildlife Warden, who is assisted by two deputy rangers and two foresters and fourteen guards. The Wildlife Warden who is in overall charge of this park is stationed at Idukki. There are also employees on daily wages who work in the antipoaching squads and as fire watchers during the fire prone seasons.

2.3.6 Equipment: There is a jeep, a motor launch and paddle boats. There are two wireless sets, one at Thattekad and another at Kuttampuzha.

2.3.7 Finance: At present the staff salary amounts to Rs. 98.80 lakhs and the total amount required for various works in the sanctuary, during the plan period, amounts to Rs.119.15 lakhs[MP]. The amount sanctioned under the plan seems adequate. The amount allotted to research is very low.

3.Issues:

Encroachment: There are a few issues, which hamper the protection work of the sanctuary. Under the Grow more food schemes of 1977, the Government of Kerala had allotted lands, which were duly registered (pattah or pattayam), under the name of individuals. Some of the allotments were inside the reserve forests, which were later declared as wildlife sanctuaries. Thattekad is one such sanctuary, which has a part of the village lands inside. Subsequent population explosion and demand for agricultural lands, has encouraged the villagers to encroach on forest lands. Presently, land encroachment has become difficult, because of strict surveillance by the Forest Department. Boundary demarcation and erection of electrified wire fencing has halted this trend to a large extent.

Grazing: Grazing is a major problem, in this sanctuary. Out of 25 sq, kms of total area, only about 15 sq. kms. are level lands, with inundated patches. Approximate number of cattle grazing, has already been mentioned in section 2.3. Grazing leads to weed infestation and transmission of diseases, like Rinderpest and Foot and Mouth disease, to the wild ungulates.

Fire: The graziers take their cattle to the grass patches in the sanctuary. Three sides of the sanctuary are surrounded by settlements. The settlers enter the forests, for their various needs. Fire is more often caused by the carelessness of the people. Sometimes, fire also spreads from adjoining forest ranges. Fire poses a serious threat to the ecosystem.

Poaching and firewood collection: Timber poaching, especially of teak, is very common along the Kuttampuzha road. So far, there has not been any great threat to the birds and other fauna. Firewood collection, resulting in lopping of branches, is particularly harmful in a bird sanctuary.

4. Recommendations:

Encroachments have been halted for the present. Creating job opportunities for the unemployed through development schemes would greatly reduce the pressure on the forest. Creation of ecodevelopment committees and encouraging them to participate in forest protection would be helpful.

Persuading the villagers to reduce the number of old unproductive cattle and replacing them with fewer productive animals under animal improvement schemes are necessary. Vaccination of all cattle in the surrounding areas has to be taken up soon. So far, there has been no major outbreak of diseases among the wild ungulates, but necessary precautions have to be taken.

Fire tracing has to be taken up, especially along the existing roads and trek paths. More fire watchtowers have to be built. Unemployed youths could be engaged, to form firewatcher squads, during dry season. Greater vigilance would prevent fires.

Already, some anti-poaching squads have been employed and stationed along the riverfront. Patrolling along the two motorable roads inside the sanctuary, should be done regularly, The waterway also needs to be guarded.

The Forest department regularly holds nature education camps. It is time the villagers are trained and asked to carry the message of conservation to other outlying villages. An intensified awareness campaign, conducted jointly by the department and the local villagers, would be far more effective, in both protection and conservation of the sanctuary.

References:

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Wayanad Wildlife Sanctuary

1. Introduction

1.1. History

Wayanad Wildlife Sanctuary (WWS) forms a part of Western limits of Nilgiri Biosphere Reserve (NBR)². Wayanad is contiguous to Mudumalai Wildlife Sanctuary of Tamil Nadu and Bandipur Tiger Reserve of Karnataka. The sanctuary is carved out of the original reserve forests around Sultan Bathery and Mananthody. Wayanad was declared a sanctuary on 30th May 1973 under Section 27 and 76 of Kerala Forest Act 1961(4 of 1962). But strict protection of the area came into force only in 1985 after the formation of wildlife division of the Forest Department. The Sanctuary is in Wayanad district of Kerala State and is in two separate pockets. The northern section is the Tholpetty wildlife Range in Mananthody Taluk, adjacent to Nagarahole National Park. The Southern Section comprises of Kurichiyat, Sultan Bathery and Muthanga Wildlife ranges adjacent to Bandipur Tiger Reserve and Mudumalai Wildlife Sanctuary.

At the turn of the 20th century Wayanad with its gently undulating terrain, a variety of habitats, ecotonal areas, plentiful water and forage had a rich herbivore population supporting a large carnivore population. There were large tracts of contiguous forests in this region. Much of it was moist deciduous forest suitable for large herbivores like elephants, gaurs and sambars. Wayanad forests formed a crucial part of a complex and varied habitat range. Wayanad was the dry season habitat for large congregation of wildlife from drier parts of Bandipur, Nilgiri slopes, Moyar valley, etc.

The Wayanad forests were already worked for timber at the time of the British acquisition of the land from Tipu Sultan. The intensity of working increased thereafter. Teak plantations were introduced by the 19th century. The introduction of coffee plantations in the later half of the 19th century attracted large inflow of population. The huge tracts of forest along the edge of Mysore plateau and Kabini river were being cleared and occupied. This development affected the seasonal migration of animals. In the meanwhile the land adjoining Wayanad, on the Mysore

² The concept of Biosphere Reserve emerged from the programme on Man and Biosphere (MAB) initiated by UNESCO. The emphasis was on research and monitoring of representative or otherwise relevant ecosystems. In September 1986 the Nilgiri Biosphere Reserve was inaugurated, which included 1455sq.km. of forests of Kerala including the reserved forests in Palghat, Nilambur and Wayanad divisions.

plateau was declared as a wildlife Sanctuary (Bandipur Tiger Reserve) in 1941. The land adjoining the Coorg hills was declared as a Sanctuary in 1955(Nagarahole National Park). The area to the South East in Tamil Nadu was declared as Mudumalai Wildlife Sanctuary in 1940. The final phase of forest destruction came with the encroachment of 20,000 acres of Pulpalli forests belonging to the Pulpalli temple along the Kabini river. The otherside of Kabini had a network of protected habitats of Bandipur and Nagarahole. The congregation of large herds of elephants there became the target of poachers. In 1973 Project tiger was initiated and Bandipur became one of the first nine tiger reserves. Bandipur became vulnerable as it was exposed along the Kerala border. "As a consequence 344 sq.km of area along the eastern parts of Wayanad along the state border in two segments separated by the Pulpalli encroachments were notified as the Wayanad Wildlife Sanctuary in 1973"[Nair, S.C.1991].

1.2.Significance

Wayanad Wildlife Sanctuary a representative unit of the Western Ghats, harbours diverse floristic and faunal components of Western Ghats in general and the Nilgiri Biosphere Reserve in particular. The topography, diverse habitats and ecotones³ offer distinct habitat to various types of animals. The area is also the home of some endemic species like 'Wayanad Laughing Thrush' (*Garrulax delesserti delesserti*), and threatened animals like elephants, bison, sloth bear, tiger and leopard.

Wayanad is a part of the network of protected areas; Mudumalai, Bandipur and Nagarahole. It forms a crucial corridor for seasonal migration of large herbivores like elephants. The Sanctuary forms the catchment area for the Kabini, Bavali and Noolpuzha rivers, which drain into Cauvery.

1.3 Current Status

The southeast section of WWS (WWSI) has a large area under forest cover. It comprises of three ranges namely, Kurichiyat, Sultan Bathery and Muthanga. The forests along the interstate boundary of all three ranges are in good condition. They are mostly dense moist deciduous type with patches of semi-evergreen along watercourses and deep narrow valleys. However many patches of marshes called

'Vayals ' are under cultivation by the tribes as well as other settlers. The uncultivated marshes are also subject to heavy grazing by the livestock owned by the people living inside the Sanctuary and from the livestock of people living on the fringes of the Sanctuary. The southern extremity of Muthanga range, along the state highway has become degraded due to perhaps excessive forest use by the villagers living along the boundary of the Sanctuary. 40% of the area of all the ranges including Tholpetty in the north, adjacent to Nagarahole is under teak and eucalyptus plantations. Many of the teak plantations are very old, some have been initiated in 1921. Kurichiyat range has 209.53ha of pepper plantation initiated in 1976. This is being worked, as it is a source of employment for the tribals living inside the Sanctuary. Other hardwood plantations are no longer being worked, as the management objective is to allow regeneration in these areas. There is a good concentration of elephants and gaurs in the northern Kurichiyat range and northern Muthanga range near the interstate border. In spite of so many settlements (called enclosures as they are under revenue department) and plantations a major portion of the Sanctuary has good forest cover.

2. Description of the Sanctuary

2.1 Geographic Profile

2.1.1 Location and area

Wayanad Wildlife Sanctuary in Kerala is one of the earliest to be declared as a Sanctuary for wildlife. The Sanctuary falls in the Wayanad district of Kerala. It is in two separate pockets; the northern one is the Tholpetty range in Mananthody Taluk adjacent to Nagarahole National Park (77.67 sq.km). The southern portion comprises of Kurichiyat, Sultan Bathery and Muthanga ranges adjacent to Bandipur and Mudumalai (266.77 sq.km), they are about 70 kms apart.

The Sanctuary is connected by road to Kozhikode, Mysore and Ooty. All three cities are connected by railway and are situated about 110 km away from the Sanctuary. Nearest Airport is at Kozhikode in Kerala. The total area of the Sanctuary is 344.4 sq.km. The Park headquarters is 1 km away from the town of Sultan Bathery.

³ A transition zone between two neighbouring communities such as grasslands and forest or between two ecosystems such as land and sea.

2.1.2 Climate

The climate is moderately pleasant except in March April and May when it is hot and humid. The temperature varies from 13°C in Dec to 32°C in April. Hottest days occur in April. Rainy months are from June to November. The annual rainfall is 1819mm[QAI]. There is an increasing gradient of rainfall from east to west and from north to south. The heaviest rainfall occurs in July and August. The northeast monsoon brings some rains in October-November. Westerly winds blow during southeast monsoon, over the whole area. On the plateau a strong wind blows from the East between November and April [MP].

2.1.3 Physical features

Wayanad is an east sloping gently undulating, medium elevation plateau abruptly descending in the west to Kerala plains but merging imperceptibly with the Mysore plateau to the east [Nair, S.C. 1991]. The area is dotted with rounded hill, which are seldom steep. The altitude ranges from 650m to 1150m, the highest elevation of 1158m being the Karottimala in the Kurichiyat ranges. The soils are mostly loamy with varying proportion of sand and clay [MP].

Papanasini (Bavali) river forms the main drainage system in Tholpetty range. The river originates in Tirunelli reserve and drains into Kabini. Three main streamlets flow southwards from the upper part of the range and join Bavali river. They are perennial and meet the water requirements of animals. There is a network of streams, which provide water to the entire Tholpetty range. The Kurichiyat range is drained by Kannarampuzha and Kurichiyat rivers flowing northwards to join Kabini. Towards the southeast Manchalthodu and other streams join Nuguhole river to flow further northeast into Karnataka. Southern portion of the Sanctuary is drained by Noolpuzha and Mavinhallathodu, which combine to form Nuguhole river. There are also many swamps in Mavinhalla and Rampur reserve forest which have perennial water sources. These natural water holes attract many animals during the dry summer months [MP].

2.2 Biological Profile

2.2.1 Flora The predominant forest types is moist deciduous. A few patches of tropical semi-evergreen forests are seen in Muthanga and Tholpetty. They can be classified as

1. South Indian moist deciduous forests
2. West Coast semi-evergreen forests.

As per champion and Seth classification (1962) the moist deciduous forest is classified as 3B/C1C. Major areas of the Sanctuary is under this category. In moist areas of Sultan Bathery and Muthanga ranges bamboo breaks occur. The bamboo species is mostly *Bamboosa arundinacea*. In some patches in the western Rampur and Mavinhalla reserve forest, the vegetation tends towards dry deciduous type.

The top canopy of moist deciduous forests consists of *Terminalia tomentosa*, *Tectona grandis*, *Grewia tiliaefolia*, *Anogeissus latifolia*, *Dalbergia latifolia*, *Pterocarpous marsupium*, etc. The middle storey comprises of *Kydia calycina*, *Bridelia retusa*, *Acacia pinnata*, *Butea monosperma*, etc. The main species of ground flora are *Helecteris isora*, *Lantana camera*, *Eupatorium odoratum*, *Hibiscus furcatus*, *Zizyphus*, *Xylocarpum*, *Randia dumetorum* etc. Chief climbers are *Butea parviflora*, *Calycopteris floribunda*, etc.

The West Coast semi-evergreen forest is classified as II AC2 type according to champion and Seth's 1962 classification. It is a heterogeneous mixture of evergreen and deciduous species. The number of species is high but less than in true evergreen. Climbers are heavy and epiphytes abundant. They are seen in small patches in Kudirakode and Noolpuzha reserves. A checklist of flora is given in annexure.

2.2.2 Fauna

The Sanctuary has a rich diversity of fauna. Among the primates Bonnet Macaque (*Macaca radiata*) is seen mostly in deciduous forest and fringes of plantations. Nilgiri langur (*Presbytis johni*) was seen only once or twice in Kurichiyat. It has become threatened because of shrinking habitat. Common langur (*Presbytis entellus*) is seen in the drier parts of Rampur Mavinhalla Begur Dasancatta and Ayyappanpara. Tiger (*Panthera tigris*) and Panther (*Panthera pardus*) are present. Jungle cat (*Felis chaus*) civet, mongoose (*Herpestes species*) and seen through out the park. Wilddogs (*Cuon alpinus*) and sloth bear (*Melursus ursinus*) are more conspicuous in Mavinhalla, Rampur, Kurichiyat and Tholpetty. Other animals include common otter (*Lutra species*), Malabar Giant Squirrel (*Ratufa species*). Besides these, elephants (*Elephas maximus*) and gaur (*Bos gaurus*) are found distributed in Tholpetty,

Muthanga, Maragadda areas. They are also seen in Rampur reserve forest. Gaur is less widely distributed than elephants because they are easily disturbed by human presence. Among the cervids, spotted deer (*Axis axis*), sambar (*cervus unicolor*), and Barking deer (*Muntiacus muntjac*) are common. Mouse deer (*Tragulus meminna*) and wild boar (*Sus scrofa*), Indian pangolin (*Manis crassicaudata*) and porcupine (*Histrix indica*) are some of the other mammals. A check list of fauna and avifauna has been annexed.

2.3 Socio economic profile

2.3.1 Settlements

There are 24,000 people living in enclosures and as lessees of forestland and in settlement abutting the Sanctuary (figure given by Forest Department, personal communication 1999). Tribals living inside the forest number about 7000-8000. At present there are no records with the Forest Department to show the exact census figures. The tribals are Paniyans, Kattunayakans, Kurumbas and Uralis. A large number of Christian immigrants referred to as “settlers” have settled in the Sanctuary area from pre-independence time. Apart from these two groups, a third one, the Chettis have acquired the ‘Vayals’ on a long-term lease during the time of Second World War [Nair S.C. 1991, MP]. They are not many in number but they have been cultivating in the Vayals since a long time. They are not considered as tribals. Majority of settlement inside the Sanctuary are called ‘enclosures’ and they are administered by the revenue department. The tribals in the tribal colonies near plantations, were originally settled there to work in plantations. In the vayals the houses are built on high grounds and the cultivation is carried on in the valleys or depressions. Often, the settlers have employed Paniyans as farm labourers and given them house sites in the vayals. In some of the vayals like Manimundha, the Kattunayakan families also had agricultural land. Kurichiyat range has 26 settlements, with 77.65 acres of land under occupation. Sultan Bathery range has 18 settlements with 228.30 acres of land under occupation, Muthanga range has 18 settlements with 199.73 acres of land and Tholpetty has 7 settlements with 41 acres of land under occupation [MP]. The current land use pattern has led to fragmentation of habitat leading to serious man-wildlife conflicts.

2.3.2 Agriculture

Vayals constitute one of the best habitats for herbivores. In their natural state they contain many palatable species of forage and some of them have perennial water sources. By leasing it out for cultivation the forest has lost some of its best habitat niches. The cultivators also lose much of their crops to elephants, wildboars, Bonnet macaques and deer. Cultivators in some of the vayals, who were interviewed complained about crop raiding and the isolation of their settlements and expressed their willingness to shift out.

2.3.3 Grazing

People living inside the forests as well as those living in the periphery have large number of cattle, that are taken inside the Sanctuary for grazing. Some of the enclosures inside have herds of cattle, numbering more than 500. The cultivators claimed that they owned a large number of cattle because they needed to collect the dung for manure that is being sold. Besides occasional sale of cattle fetched them ready money. The tribal households had comparatively less number of cattle. However vaccination of cattle was not being done except in rare cases. Some of the people who were interviewed reported that in the recent past they had sold many of their cattle because of cattle lifting by carnivores. But the people in all the settlements interviewed claimed that the number of cattle has been reduced as compared to a decade back. This is adequately supported by research findings. Wayanad WS registered the maximum cases of cattle lifting [Veeramani et al 1996].

2.3.4 NTFP Collection

The tribals have been permitted to collect NTFP and sell it to the Tribal Co-operative Societies. Kattunayakans collect honey and lichens and sell it to the society. They are allowed to collect bamboo and thatch grass for personal use. However many houses have been converted to tile-roofed abodes with assistance from either the Forest Department or other welfare agencies. Collection of NTFP causes disturbance and competition for wildlife in the currently degraded forest, even though the tribals population is not large. Besides fires are started due to carelessness of the NTFP collectors. Frequent forays into the forest disturb the wild animals. Wayanad WS has many registered cases of wildlife attack and have paid the largest amount as compensation [Veeramani et al 1996].

2.3.5 Lack of employment

Plantation and other forestry operation have stopped in WWS. Many of the tribals have less opportunity for work within the forest. Some of the tribes like Kurumbas and Kattunayakans have the tradition of hunting and gathering. With the area coming under strict protection it is no longer possible to live only by gathering forest produce. Many of them are especially the Paniyans seek farm labour and other employments in the revenue lands. Livelihood issue will soon assume greater importance.

2.4 Management

2.4.1 Objectives

Specific objectives of management of Wayanad Wildlife Sanctuary are;

- To conserve the ecological integrity of the Sanctuary in the face of pressures of degradation.
- To conserve the endangered, threatened and rare species of plants and animals in their natural environment.
- To monitor ecological changes in the flora and fauna and their inter-relationship.
- To manage teak, eucalyptus and other miscellaneous plantations, aiming at inducing natural regeneration so as to restore these areas to their natural condition.
- To maintain and improve the water catchment capability of the area to ensure perennial water flow in tributaries of Kabini, Bavali, Noolpuzha, etc., for the benefit of human and wildlife preparations.
- To minimize conflict between man and wildlife
- To facilitate research in the fields of ecology, habitat, utilization and management problems.
- To develop regulated tourism for recreational purposes.
- To provide resources to the bonafide tribals of the area as far as these do not interfere with the broad objectives.
- To enhance the socio-economic development of the neighboring human population vis-a-vis with the development of the Sanctuary.
- To rehabilitate the people residing inside the Sanctuary area for effective management and development of the Sanctuary.

2.4.2 Management plan

Currently the first management plan prepared for WWS is in operation. The plan period is from 1990-1991 to 1999-2000 and was prepared by Shri Gopinath Vallil and Anil Kumar Bhardwaj. The Sanctuary area has been divided into zones for effective management. There is a core zone, which is totally protected where some habitat improvement work take place and no disturbance occurs. There is a buffer zone where some habitat manipulations take place, the buffer zone also has an area earmarked for tourism which forms the tourism zone.

Zonation has been done separately for Tholpetty and Wayanad WS south. In Tholpetty the core zone is contiguous with Nagarahole NP. The plantation areas have been excluded. The buffer zone contains the plantations, which will be selectively removed, and natural regeneration will be allowed in its place. The core zone for WWS south is along the Bandipur Mudumalai border, excluding plantations and settlements. The rest of the area is bufferzone.

2.4.3 Habitat Management

Studies conducted in WWS indicate that semi-evergreen forests and vayals are frequently used by animals. Among plantation the utility of Eucalyptus plantations, especially by elephants and cheetals was more[MP].

Moist deciduous forests dominate the landscape in WWS. Mavinhallan forests however has stunted vegetation and tends towards dry deciduous. These areas are full of Vayals and are rich in ground flora which can be used by herbivores. Bamboo is abundant in Rampur reserve forest and Mavinhalla. This habitat is ideal for ungulates and larger herbivores. Even tigers, leopards, wild dogs, and bears are seen here. There is water scarcity in dry season and a threat of fire.

The vayals are very important resource areas of the Sanctuary. They are low lying with high amount of clay in soil, and accumulation if water. They are covered by grasses sedges and mesophytic vegetation. Gaurs are often seen in the vayals. Vayals are also under threat of fire during dry season. Weeds like Lantana and Eupatorium are seen around the edges of the vayals.

Plantations cover nearly 40% of the Sanctuary. However animals often visit them. Miscellaneous species are coming up in eucalyptus plantations and this habitat is used particularly by cheetal (spotted deer). Fire, again is a major threat in this habitat. River banks have good growth of bamboo and spreading tree. It

provides a good habitat for birds and smaller mammals. Big streams contain a variety of fish, particularly Mahseer.

The hill forest have semi-evergreen moist deciduous vegetation, as well as lands with stunted vegetation. Areas of Begur Kurichiyat and Noolpuzha in Muthanga have such habitats. Semi-evergreen forest on hills are particularly rich in fauna. A variety of insects, reptiles and birds are seen here. The moist zones have leeches[MP].

Habitat management should concentrate on providing food water and cover for animals. Some of the good habitats tend to suffer from water shortage during the dry months (Jan-April). Few water holes contain water and animals tend to concentrate there. To solve this problem number of check dams have been constructed and additional waterholes have been dug. The grasses in the vayals tend to change to unpalatable species due to repeated fires. Semi-evergreen forest regress into moist deciduous due to fire. Bamboo, which is a food source of animals, is also a source of fire. To reduce fire hazard removal of weeds becomes necessary.

Since grazing and annual fires cause a great deal of degradation, 100 ha of area in each range are taken up for eco restoration. Elephants push down teak trees while stripping the bark. This creates an opening in the canopy. Weeds like Eupatorium take over as ground flora. Therefore weed eradication and regeneration of indigenous species are being taken up. Vayals are slowly drying up due to invasion of weeds. Plugging outlets to retain the water and diverting water from other perennial sources are some of the measure attempted to restore the vayals.

Some of the young teak plantations are affected by the parasite Loranthus. In extreme cases this parasite causes the drying up of the tree. Some of the eucalyptus plantations are second or third coppice. They are being completely removed and indigenous species are planted in the clearings. Silting of check dams and water holes are posing a problem in degraded areas. Therefore, soil conservation has started in a few places.

Protection is an important part of habitat management. Some sensitive areas where poaching is likely have been identified and additional patrolling by field staff has been initiated. New routes are to be opened for patrolling. Some of the fire prone areas of this Sanctuary are Mavinhalla, Rampur reserve forest, Shanamangalam reserve forest, and Edacode reserve forest. Fire lines are being cut and existing ones cleared, giving special attention to the above mentioned areas. Firelines are

being cut between plantations and natural forest and between the Sanctuary forests and Divisional forests. During fire seasons the field staff are instructed to be more vigilant.

2.4.4 Plantations

For restocking the area with natural vegetation teak will be selectively removed at the rotation age of 50 years. 25% of the tree will be removed to give space for natural species. Next selective felling will be done at the age of 75 years and 100 years. The silvi cultural treatment of Teak plantation will serve the purpose of wildlife management as well as give employment to the tribals [MP].

Silvicultural operations in Teak Plantation

There is no growth data available as far as natural species of this area are concerned, but *Terminalia tomentosa* is known to accumulate 125.5 cm girth in 80 years. In canara *T.paniculata* and *Dalbergia latifolia* accumulates a girth of 150 cm in 100 years. That is why it is proposed to selectively remove Teak in about 100 years, so that it is replaced by a good mixture of indigenous trees having a girth of 100-150 cms in this time. Removing 25% of trees will be more or less equal to C-grade thinning (which means removing some good but dominated stems as well as bad dominants)[MP].

2.4.4 Personnel and equipment

WWS is under all the overall supervision of wildlife warden who is in charge of Wayanad wildlife division. He has four range officers under him in charge of Tholpetty, Kurichiyat, Sultan Bathery and Muthanga ranges. The Range offices have foresters, forest guards and watchers assisting them apart from daily wage employees. All range headquarters are connected to the warden's office through wireless. The range officers are provided with jeeps and protection equipments like guns. There are three check posts at Muthanga, Pazhur and Kuppady.

2.4.6 Tourism WWS has infrastructure for limited number of tourists. There are rest houses at Muthanga, Sultan Bathery, Chethilayam and Tholpetty. There is a Nature Museum and interpretation center at Muthanga, in the a tourism zone. A dormitory has been constructed at Muthanga. There are vehicles to take the tourists inside the

forests. Elephant rides are also arranged. The emphasis is however on nature education camps, which are being regularly conducted by the Forest Department. Most of the visitors to the Sanctuary are day visitors who come in the morning and leave by evening. Tourist pressure is not heavy on this Sanctuary.

2.4.7 Funds

WWS gets funds of Rs.30 lakhs from state government for habitat improvement, interpretation center, installation of power fence and compensation for crop damage. The Central Government grants amounts to Rs,14.93 lakh for moisture conservation, planting of degraded areas and for alternate energy schemes. Under Nilgiri Biosphere Programme there is a budget provision for Rs. 13.17 lakhs for income generation schemes, providing drinking water, construction of elephant proof trench etc. Under Project Elephant scheme Rs.19.90 lakhs are allotted for construction of waterholes, anti poaching sheds, construction of elephant proof trench. Under Tribal Sub plan scheme Rs.4.85 lakhs are available for construction of Tribal house and providing drinking water facility. Western Ghats Development Programme grants Rs.1.50 lakhs for eco-restoration works. Conservation of biodiversity scheme has Rs.27.67 lakhs for state wildlife week celebrations and construction of elephant proof trench. Kerala Forestry Project has sanctioned Rs.47.20 lakhs for fire protection work and construction of buildings.

3. Issues

Man-animal conflict: A major issue confronting this Sanctuary is the Man-animal conflict. Damages caused by elephants are cause of concern to both the Forest Department and the people. The habitat inside the sanctuary has become disturbed and fractured. Plantations make up nearly 40% of the already reduced forest area. Elephants migrate from region to region, as they require vast quantities of herbage. Studies have shown that they never change their route. The coconut and fruit plantations of the enclosures attract them. They damage the crops and even the homestead near the fields. Forest Department has responded by putting up power fencing and digging trenches around the settlements. Where possible, crop compensation is also being paid. All these measures are not adequate, for the extent of damage caused by the wild animals. The researchers have studied this issue. Veeramani and Jayson(1995) state that maximum crop damage was recorded in

Wayanad WS. Elephants cause maximum crop damage. Veeramani, Jayson and Easa(1996) have recorded that Wayanad wild life sanctuary registered maximum number of cases of cattle lifting by panthers, tigers and wild dogs. Maximum compensation has been paid for death and injuries to humans, in Wayanad sanctuary. Earlier, after a couple of fatal attacks by elephants, the authorities had to face angry mobs, Man-animal conflict is a major problem faced by the authorities.

Fire is a recurring problem in this sanctuary. Whenever there has been successive monsoon failures, resulting dryness and leaf litter in teak forests, make the area highly inflammable. "It is seen that repeated fires in this area, for the last many years, has caused the retrogression of evergreen forests to moist deciduous ones and moist deciduous to dry deciduous, has taken place. Such dryness leads to soil erosion." [MP]

Sometimes, fire originates outside the sanctuary, from other territorial divisions and from across the State boundary. Mavinhalla and Rampur forests are prone to fires from Bandipur and Mudumalai forests. Wind plays a role in driving the fire towards the sanctuary. The plantations are prone to fire from the divisional forests. Fire also originates from inside the sanctuary. NTFP collectors, graziers and other forest users cause them. It was seen during the transect walk from Marodu, along the cattle trail, a large *Terminalia tomentosa* tree had a bole, which seemed burnt. The informant explained that the graziers must have started a fire in the natural hollow to keep themselves dry, during the rains. Such incidents may inadvertently start a forest fire. The state highways passing through the sanctuary, is another source of origin of forest fire. Vehicles carrying inflammable material and lit matchsticks thrown out from the moving vehicles could be the cause of fire.

Grazing: People living in enclosures, inside the sanctuary and those living in the villages on the periphery, both have large number of cattle, which graze inside the sanctuary. Most of the cattle are driven through the plantations and degraded forests to the productive vayals. They compete for the resources with the wild animals. There is an additional danger of spread of the cattle diseases, like Rinderpest and Foot and Mouth, to the wild ungulates. The vayals are getting infested with weeds due grazing by numerous livestock.

Plantations: Large areas of plantations have been included as part of the sanctuary, because wildlife use them, during migration. Encouraging regeneration of natural species and converting them into natural forests are the main technical challenges

faced by the Forest Department. The proposed treatment has been discussed under habitat management

4.Recommendations:

The main cause for human-animal conflict is the migration of elephants and crop raiding by these elephants. Some researchers feel that during earlier times, regular elephant capture helped to keep down their number. Current studies show that the trend is towards an increase in their population. Forest Department has started erecting power fences, which seem more effective than other methods. There is a possibility that elephants may soon learn to overcome this hurdle. This issue has to be closely monitored and studied. Forest Department should come out with viable alternatives.

Preventive measures like cutting firelines and fire tracing in vulnerable area should be implemented. More watchtowers should be constructed and firewatcher gangs should be employed, as daily labourers during the fire season. Most of the NTFP are collected during the dry season. To wean them away from excessive forest use alternate employment should be given to them, to assure them of an alternate livelihood. By giving employment to tribals and others, forest use could be reduced to some extent. This would also help in reducing fire incidents.

Most of the cattle that graze in the forest, are scrub cattle. The villagers sell the dung, as farmyard manure and sell the cattle to butchers for cash. Animal improvement schemes should be initiated, whereby scrub cattle are exchanged for stallfed milch cows. Introduction of income generation schemes like honeybee raising and land improvement schemes for their private holdings could compensate the loss of income from sale of dung. Crop protection enabling enhanced agricultural output would also compensate for loss of income from other forest use.

Proposed prescriptions for clearing the plantation would generate income for the tribals. The output can supply fuel wood for the people living inside and on the periphery. However, firewood plantations have to be taken up, along the field bunds and around homestead, as an alternative source for fulfilling the fuel wood demand.

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MEGHALAYA

BALPAKARAM NATIONAL PARK AND SIJU WILDLIFE SANCTUARY

Introduction

The Garo hills of Meghalaya, named to denote the tribe inhabiting these hills, is in characterised by an immense number of species of flora and fauna, many of which are endemic to this region. Located in the Southern part of the Garo Hills is the Balpakram National Park. The Balpakram National Park is the first National Park to be declared in Meghalaya. The national park shares a small part of its western boundary with the Siju wildlife sanctuary. This sanctuary, 5.18 sq.km. in area, was notified in 1979 and is the oldest PA in Meghalaya. Along with the national park, which stretches over 220 sq.km. and was notified in 1986, the Siju sanctuary forms a single contiguous conservation. The sanctuary shares almost all the characteristics of the national park, including floral and faunal attributes, and management issues. Technically, though, being a sanctuary, it enjoys a relatively lower level of protection. Most of the description below applies as much to Siju as it does to Balphakram.

The area included in the National Park represents a unique combination of rare and endangered species of flora, fauna as well as spectacular natural features. The area is also revered by the Garos on account of the belief that the spirits of their dead ancestors inhabit the place.

Geographical Profile

Significance

The Balpakram National Park and the Siju Wildlife sanctuary encompass one of the last remaining pristine stretches of forest in the Garo hills. Despite its limited extent, the Balpakram national park has a varied elevation, which ranges from a bare couple of meters on the southern part of the Park adjoining Bangladesh to over one thousand metres at the Chutmang peak. This variation in elevation has resulted in the existence of a number of climatic zones resulting in species diversity. The National Park, besides being the storehouse of a large number of plants, birds and animal species, is also the source of a number of rivers and streams. It is also characterised by the various natural features such as canyons, gorges and limestone caves.

It has also been reported that the park harbours the highest density of elephants in the world.

(Source: Preliminary Management Plan, Balpakram National Park 1992-1997 and Questionnaire)

Location and area

Balpakram national park, located in the south eastern part of the South Garo Hills district of the state of Meghalaya, covers an area of 220 sq km. It lies between the Longitudes 90° 45' East and 91 and the Latitudes 25° 20' North to 25°30' North. The park is located at a distance of 65 km. from Baghmara, the headquarters of the

South Garo Hills district. Baghmara is 170 kms from Tura, the capital of West Garo Hills District and 220 kms from Shillong (via Balat), the capital city of the state.

The Siju sanctuary is 5.18 sq.km in area and is located between 25 20' N to 25 30' Latitude and 90 45' to 91 E Longitude.

The nearest railway station is at Guwahati, about 390 Kms from the park. The nearest airport is the Borjhar international airport at Guwahati.

There are two routes for approaching the park, one from Shillong (via Balat) and the other from Tura. The approach from Tura is generally preferred due to the poor condition of the road from Shillong. The border with Bangladesh adjoins the park and the border town of Maheshkola is barely 7 km from the park boundary.

(Source: Questionnaire and Personal communication from field director BNP)

Physical Features

Most of the park is hilly, with heights reaching up to 800 meters. A spectacular plateau, lying almost at the centre of the park at an elevation of 750 meters, is a major attraction of the park. It has a large number of deep gorges, the deepest among them being the Mahadeo gorge, also known as the "mini grand canyon," with a 600 meters drop. The plateau slopes gradually towards the south to meet the plains of Bangladesh and towards the north to meet the Rengamo plains in Meghalaya. The northern slopes meet the Nawa and Rongkai basin. The southern portion of the park has a rich lime-stone bed with its characteristic out crops visible almost everywhere. The lime-stone belt is also characterised by the presence of a large number of caves and crevices. The rocks found in the region are mostly granite, schist and gneisses. The area is also very rich in coal.

The soil type varies according to the nature of topography and ranges from clayey to sandy soil. In general, the soil in the entire region is not very stable and hence the entire region is exposed to heavy land slides. The depth of the soil also varies and is the least in the steep slopes and deepest in the valley area.

(Source: Preliminary Management Plan, Balpakram National Park 1992-1997 pages 4,5,6)

The BNP has a number of rivers and streams that run across the park. In fact three rivers, the Mahadeo, Rongdi and Ganeshwari originate from within the park. There are a total of eight rivers/streams in the park. There are also 28 tanks and water holes in the park.

(Source, questionnaire page 20)

Climate

The BNP receives very high rainfall, on account of the fact that the area directly faces the monsoon clouds that come from the Bangladesh plains. The bulk of the rain occurs between during the months of May and October. However, occasional showers occur throughout the year. The average rainfall recorded in the area is 2226.4 mm⁴ (Doc H- unsourced, undated document on Balpakram). The summer months are quite hot and humid with temperatures reaching up to 38^o C. The winters are generally cool with occasional showers. The minimum temperature recorded in the park is 6^oC. The area is exposed to high velocity winds, in fact the very word

Balpakram in the Garo dialect means the “*land of the eternal wind*”. The area also experiences whirl winds and cyclones.

Biological Profile

FAUNA

The Balpakram national park and Siju sanctuary, because of their unique geographical location and climatic conditions harbor a wide variety of animal, reptile and bird species.

The principal faunal species found in the park are the Elephant (*Elephas maximus*), Gaur (*Bos gaurus*), Hoolock gibbon (*Hylobates hoolock*), Capped langur (*Presbytis pileatus*), Wild buffalo (*Bubalus bubalis*), Sambar (*Cervus unicolor*), Barking deer (*Muntiacus muntjak*), Hog deer (*Axis porcinus*), Serow (*Capricornis sumantraensis*), Wild pig (*Sus scrofa*). Other species of importance on account of their rarity are the Bintorong (*Arctictis binturong*) and Red panda (*Ailurus fulgens*). Carnivores are represented by tiger (*Panthera tigris*), leopard (*Panthera pardus*), Clouded leopard (*Neofelis nebulosa*), Golden cat (*Felis temmincki*), leopard cat (*Felis bengalensis*). The reptile species in the park comprise of Monitor lizards (Agra, Yellow and the Bengal), Python (*Python molurus*), Indian cobra (*Naja naja*), Banded krait (*Bungarus fasciatus*) and Common krait (*Bungarus caeruleus*).

There exists an immense diversity of avifauna in the Park with over 120 species recorded (Source: Preliminary Management Plan, Balpakram National Park 1992-1997). Some of the more flamboyant ones are the Great Hornbill (*Buceros bicornis*), Peacock Pheasant (*Polyplectron calcuratum*), and the Hill myna (*Gracula religiosa*).

Species of special significance

Among the faunal species found in the park, some species are of particular importance on the following counts:

The park is home to a small population of Wild buffalo (*Bubalus bubalis*). Wild buffalo populations have declined drastically throughout their former range and now survive in isolated pockets in Madhya Pradesh, Assam and Arunachal Pradesh. There are no confirmed sightings of the wild buffalo from Balpakram, though the forest officers and other staff posted here claim that they regularly spot the animals in the park. Since the animals are difficult to identify by sight, any definitive claim about the presence or otherwise of wild buffalo in the park will have to wait until the area is surveyed by a competent authority.

In Balpakram, the wild buffalo is reported to confine itself to the Atambing – Pindengru area of the Park and occasionally migrates towards the Nawa-Rongcheng- Agimpal area.

The Hispid hare (*Caprolagus hispidus*) or Assam rabbit, is the closest relative of true rabbits that is found in India and is an extremely rare species throughout its range.

Very little is known about the Golden cat (*Felis temmincki*), though it is stated to be quite common in the park.

The Malayan sun bear (*Helarctos malayanus*) is the smallest of all the bears and is uncommon throughout its range of distribution.

Though no official estimates exist of the population of Hoolock gibbon (*Hylobates hoolock*) in the park, it is reported that a sizeable number exist in the park. The BNP offers a relatively safe habitat for this ape since outside the park they are threatened by hunting and habitat destruction. The Hoolock gibbon is the only ape found in India.

There exist unconfirmed reports about the presence of Banteng or Tsaine (*Bos banteng*) in the park (Preliminary Management plan, Balpakram National Park, 1992-1997). Further investigation needs to be carried out as this is not a part of the known range of the animal although it has been reported to occur in Mainipur earlier. (Source: Prater 1971)

Distribution of Animals in the Park

The distribution of animals in the park, depends on the nature of habitat and forest types.

Tropical Moist Evergreen forest: Located in the Mahadeo range of the park, these form the habitat of the Hoolock gibbon, Red panda, Bintorong, and Flying squirrel.

Bamboo Forest: Patches of bamboo forests are distributed all over the park and are preferred by elephants, Bison and various species of deer. These also form the ideal habitat of predators such as Tiger and Leopard.

Grassland and savanna: The grasslands along the Rongcheng and Chinaru plateau form the grazing grounds for Elephant, Gaur and various species of deer. The population of wild animals however varies according to the availability of water in the area.

The Riverine Forest: Otters, monitor lizards and wild buffalo thrive along the riverine forests.

According to a report of the Wildlife Institute of India, the Balpakram national park and its adjoining areas harbour one of the highest densities of elephants in India. This area offers the best chance for the long term survival of elephants in the region. The park is a part of the South Garo hills range of the distribution of elephants in the country. Elephants occurring in this area have been found to prefer areas abandoned by shifting cultivators (also known as *jhum* fallows) for less than 10 years. This finding is consistent with other studies that have shown that both the Asian elephants (*Elephas maximus*) and their African counterparts (*Loxodonta africana*) prefer secondary forests.

(Source: Williams and Johnsingh, 1996)

FLORA

The BNP has a unique diversity of floral wealth. It has a wide variety of trees, shrubs and orchids. The entire area is rich in orchids with many of them being quite rare and endangered. Prominent among them are (COMMON NAME???), *Paphiopedelum venustum*, *Paphiopedelum insigne*, *Phais tankervillei* and *Dendrobium densiflorum* and lady's slipper orchid (BOTANIOCAL NAME???), which

is listed in Schedule VI of the Wildlife (Protection) Act, 1972. Ground orchids like the Bamboo orchid (Scientific name ?) also abound in the area. The area is also rich in bamboo and cane. The species of bamboo commonly found in the park are *Dendracalamus hamiltonii*, *Dendracalamus giganteus*, *Bambusa bambos*.

The Balpakram National Park is also storehouse of a wide variety of medicinal and aromatic plants. The most important and prized being *Acquilaria malacensis* commonly known as *Agar or Agar*. Unfortunately due to heavy illegal exploitation, the species is now very rare in the park. *Persia vilasa*, whose bark is used for medicinal purposes is also threatened with over exploitation. Two species of insectivorous plants are endemic to this region⁵, pitcher plant (*Nepenthis khasiana*) which is included in the Schedule VI of the Wildlife (Protection) Act, 1972 and the sundew plant (*Drossera burmanii*).

(Source: Questionnaire, page 10 + interviews with villagers and forest officers during field visit)

The park consists of a forest area of 213 sq km and grasslands in 7 sq km. The different forest types, according to Holdridge et. Al., 1971, are classified as⁶:

- (a) Tropical Moist evergreen forest
- (b) Tropical semi-evergreen forests
- (c) Shola type forest
- (d) Riverine forest
- (e) Grassland and tree savannah
- (f) Tropical moist deciduous forest
- (g) Bamboo forest
- (h) Secondary formation

An idea of the diversity of plant species in the national park can be had from a classification of plant species according to the nature of canopy.

The top canopy basically comprises of *Artocarpus chaplasi*, *Artocarpus gomeziana*, *Terminalia balerica*, *Michelia balerica*, *Shorea robusta*, *Ficus bengalensis*, *Ficus religiosa*, *Ficus retusa*, *Ficus benjaminii*, *Terminalia arjuna*, *Michelia champaca*, *Schima Wallichii* etc

The middle canopy comprises of *Bauhinia malabaricus*, *Zyzipus jujuba*, *Aparosa roxburghii*, *Actinodaphne obovata*, *Pareya arborea*, *Premna barbata*, *Litsea chinesis*, *litsea cubeba*, *Rhus succedana*, *Sapium baccatum*, *Magnifera sylvetica*, *Morus laevigata*.

The shrubs basically comprises of *Abroma augusta*, *Allophylus cobbe*, *Antidesma diandrum*, *Thespesia lampus*, *Dalbergia stipulata*, *Eupatorium odoratum*, *Adhatoda vasica* etc

The species of grass that are found in the park belong to the genus *saccharum*, *Pharagmites*, *Arundo* etc. Trees like *Helicia nilagirica*, *Emblica officinalis* and *Engelhar* are also found in the area.

The park has seen a steady infestation of weeds in almost all its ranges, although no estimate of the total area affected by weeds is available. Common weeds found in

⁵ Preliminary management plan, Balpakram National Park , 1992-1997

⁶ The area of each forest type is not known

the park are *Michenia* spp, *Eupatorium* spp and Lantana. These weeds are reported to have an adverse impact on the regeneration of important floral species. These species generally spread over an area that has been left fallow after jhum cultivation has taken place. Over time they gradually spread to the forested areas, ultimately affecting species diversity. The PA management is unable to carry out regular weed eradication due to lack of funds for the purpose. (Source: Questionnaire, page 11 + personal communication from local in charge of BNP)

MANAGEMENT PROFILE: _____

The Balpakram national park extends over an area of 220 sq km. The area was declared a national park vide government of Meghalaya's notification No. RDA. 73/80/83 dated 15th January, 1986.

A unique feature of the process of setting up the Balpakram national park is that the entire area of the national park was purchased by the forest department from traditional village head men, locally known as *Nokmas*. According to the land tenure system prevalent in the Garo hills, land (known as *akhing*) is owned by the *Nokma* on behalf of the village. He reserves the right to sell or otherwise transfer land in his jurisdiction to any party and under any condition. Thus, the park was set up by purchasing *akhing* lands from 3 *Nokmas*.

(Source: Questionnaire)

The land comprising Siju sanctuary, that was notified much before Balphakram, in 1979, is also land that was owned by *Nokmas* and subsequently purchased by the government.

At places, the boundary of the park corresponds to certain natural features like rivers, streams and hillocks (Source: Preliminary management Plan, Balpakram national Park, 1992-1997 pg 4). However, the boundaries of the park were primarily decided on the basis of the boundaries of the *Akhing* lands that were purchased and converted to a national park.

The park is currently in the process of extension. An area of 132 Sq Km was added in the Siju, Rongra and Mahadeo range. However this addition is yet to be formally notified. An additional area of 352.332 sq km is proposed to be acquired, raising the total area of the park to 572.332 sq Km. (Source: Preliminary management plan and questionnaire)

Stage of Completion of Legal Procedures:

All the legal procedures relating to the declaration of a national park and the sanctuary have been completed and the PAs do not include any areas where rights exist.

(Source: Questionnaire)

Management Planning and Zonation:

There is no zonation in Balphakram. Though there is a management plan for the park, for the period 1997 to 2000, it is unapproved. The previous management plan for the period 1992-97 was also unapproved.

Tourist-Park Interface:

Due to its inaccessibility, very few tourists visit the park. Vehicles are permitted to enter the park only through Hatisia. Entry on foot is permitted and for this purpose there are four points of entry.

Tourists require a permit issued by the chief wildlife warden of the state for entry into the park. The entry fee for foreigners is Rs. 200 and for Indian nationals is Rs. 75. Cars entering the park are charged Rs. 25 while buses are charged Rs 50 .

The best months to visit the park are from December to April and the visitor traffic is at its peak between the months of November and May.

The park is closed during the monsoon season, from June to October. For travelling within the park private vehicles are permitted since no vehicle is provided by the BNP management for this purpose.

Records maintained by the PA management show that very few tourists visit the park. Though Garo myths are associated with the park, yet the area does not attract pilgrims.

Facilities for tourists are available at the Hatisia complex at Mahadeo. There is a dormitory and a VIP inspection bungalow, both of which are open to general tourists. According to the PA management, as a consequence the relatively small scale of tourism, the park does not seem to face any problem from tourism.

Tourists have not been known to visit Siju.

(Source: Questionnaire)

Poaching Pressure Anti - Poaching Measures:

Though the PA management reports that poaching pressure on the PA is negligible, there are regular reports of poaching of elephants from surrounding areas. Further, NGOs familiar with the region have reported that there is considerable poaching prevalent in the area, particularly of elephants. It has been reported that elephants are hunted not only for ivory but also for meat. Elephant meat is a delicacy among local people, and is also known to be sent to neighbouring countries like Myanmar. (Source: Interviews with B. Talukdar and V.Menon)

It is possible that the park itself is relatively less affected by poaching because of its inaccessibility and because of the fact that elephants are found in large numbers outside the park.

Though there are no dedicated anti poaching squads operating in the PA, the field staff undertake regular patrolling in the park. The park has a wireless network that covers a part of the PA.

The patrols face a lot of difficulty on account of the rugged terrain, lack of motorable roads and heavy rain. There is also a shortage of uniforms for the staff. The patrolling staff are exposed to climatic hazards and have frequent bouts of malaria. The staff have a total of 38 rifles/guns, out of which 30 are in working condition.

(Source: Questionnaire)

In 1997-1998 two elephants (tuskers) were poached in the Mahadeo and Rongra range respectively, whereas in 1998-99 one tusker was poached in the Rongra range of the park. Poaching does not seem to be uncommon in and around the park as well as in the South Garo hills District. Johnsingh and Williams' report also

mentions about three cases of elephant poaching around the area of the BNP⁷ during the course of their study.

Commercial/Development activities inside the PA.

The management plan (1992-97) mentions that the Coal India Ltd. has initiated mining operations in the north western portion adjoining the park. The area which was once a ideal habitat of the elephant has been clear felled and leveled so as to make way for mining operation. The current status of this activity is unknown. Besides, private coal miners are also known to be operating in the periphery of the park⁸.

It was also propose to set up a cement plant close to the park, adjoining the Siju Wildlife Sanctuary. This move has however been blocked by the forest department

A battalion of the Meghalaya armed police has been camping in one of the buildings of the tourist complex at Mahadeo since the middle of 1999. The 30 member force is undergoing survival training in the jungles of BNP. It is not clear how this force was accorded permission to use the park for "survival training". Though it has been contended that their presence is a deterrent to insurgents and other undesirable elements, the BNP management has taken the stand that such an activity will not be permitted in the park in the future.

In the 1980's, there was a plan to set up a cement plant on the periphery of Siju sanctuary. However, the forest department was able to stymie the move.

Encroachments

There are no encroachments currently in either of the PAs.

Staff and Equipment

A divisional forest officer stationed at Baghmara heads the Balphakram national park wildlife division. Apart from managing the BNP, the DFO also holds additional charge of Siju wildlife sanctuary and Baghmara pitcher plant sanctuary.

As far as BNP is concerned, at the field level, an officer of the rank of ACF is stationed at Mahadeo.

The total staff attached to the park is 43, including 1 DFO, 1 ACF, 3 RFOs, 9 Foresters, 21 forest guards/ game watchers and 51 daily wage employees.

A veterinary doctor is also attached to the park.

There is a research range headed by a RFO. There is however no full time research staff and the forest department is not conducting any research in the PA.

The facilities available for the staff of the BNP are highly inadequate. The nearest hospital, post office, and bank is 66 km away from the park. There is a dispensary at the nearest market town of Mahadeo, at a distance of about 5 km from the park. Mahadeo also has a high school and a middle school.

⁷ Williams,A.C and A.J.T Johnsingh (1996). A status Survey of Elephants, their habitat and assesment of the elephant – human conflict in garo hills, Meghalaya, WII

⁸ Source Preliminary Management plan, Balpakram National Park, 1992-1997

In case of Siju, the local Incharge is a forester assisted by a staff of 8 forest guards, 8 daily wagers and a boat man.

Equipment

The park has four vehicles, including one truck and three jeeps. A country made dug- out boat is also available with the PA management. Out of sixteen available wireless sets, seven are in working condition. Similarly thirty out of the thirty eight guns at the disposal of the staff are in working condition.

Basic literature like check lists of animals, birds and plants does not exist.

Research and Monitoring

Between January 1997 and March 2000, a researcher from the Wildlife Institute of India (WII), Dehradun studied the biodiversity of the park. The results of this study are awaited.

In 1996, a status survey of elephants and their habitat and an assessment of the elephant-human conflict in Garo Hills was carried out by A.C.Williams and A.J.T.Johnsingh.

The PA management has reported that no monitoring activities (including census) are being carried out. However, a section of the questionnaire mentions that the total number of elephants in the park is 741. It is not clear when and how this figure was recorded.

Involvement of Local People and Awareness Programmes

It has been reported that wildlife week is observed in the park and nature trails and trekking expeditions are also organised. There are however no details about the frequency and nature of such programmes. There is an interpretation centre at Hatisia that is yet to be equipped.

The local people have not been involved in the management of the PA or in the implementation of any scheme or activity of the national park.

Offences

In the year 1998 – 1999 and 1999-2000, 3 cases each were filed for under section 29 and 35 (b) of the WPA, 1972 for the destruction and exploitation of wildlife.

(Source: Questionnaire page no.55)

SOCIO-ECONOMIC PROFILE

While there is no inhabitation inside the BNP, there are forty two villages within a ten kilometer radius of the park. These comprise almost exclusively of Garos, the local tribe inhabiting this part of Meghalaya.

Dependence of the People on the PA and its Surrounding Areas

The inhabitants of the surrounding villages depend upon the forest for meeting a variety of their livelihood needs. Fuel wood, timber for house construction and a number of related needs, thatch, cane and bamboo, selected medicinal plants are some of their forest based needs.

People do not generally enter the park, since they are able to meet most of their biomass needs from their *Akhing* lands. *Akhing* lands of most villages on the periphery of the park continue to harbour healthy forests. Thus the people demands

of forest based products are met from these forests. (Source: interviews with peripheral villages)

OCCUPATIONAL STRUCTURE AND LAND USE PATTERN

The tribal population around the park mostly practices shifting cultivation or Jhum. In recent times there has been a move away from shifting cultivation and now more and more people are taking to growing oranges, cashew nuts, areca nut, pineapple and jackfruit. The forest department is also encouraging the people to take to settled agriculture by providing saplings and seeds free of cost.

Apart from agriculture and horticulture, about 20% of the population on the north, east and western boundary of the park are engaged in coal mining and timber extraction, according to the preliminary management plan 1992-97.

While some villagers do own livestock, these are very few in number. This is because cattle are predominantly a source of meat and are not reared for milk. These are therefore not a source of pressure upon the park.

Most of the people living on the periphery of the park practice agriculture, while some are government servants. Since the creation of the BNP, the forest department has employed a number of people residing in the villages adjoining the park, in various capacities.

RELIGIOUS AND CULTURAL SIGNIFICANCE

Balphakram occupies a place of honour in Garo mythology. It is believed to be inhabited by the spirits of the dead. Of particular significance to the Garos is the plateau at the centre of the park, which is approximately of 7 sq. Km in area. Some of the rock formations on the plateau are linked to local beliefs and mythology. There are however no religious monuments inside the park nor is there any tradition of pilgrimage to the park.

Impact of the PA on the People

Two villages, Agimpal and Rongchen were relocated when the park was notified in 1986. Rongchen, consisting of 21 families was moved to Rongra and Agimpal (11 families) was moved to Masighat. Information gathered from the relocated people of Agimpal revealed that the entire compensation amount of Rs. 38 lakh was paid to the *Nokma*. The *Nokma* in turn distributed the money to the other villagers. The *Nokma's* relatives are reported to have received Rs. 2-3 lakh while other villagers were given Rs. 25,000- 30,000. The *Nokma* kept a bulk of the money himself. Apart from cash compensation, other components of the rehabilitation package were: orchards and rations for 5 years. Since the villagers were given orchards but no *jhum* lands, some villagers purchased *jhum* lands using the compensation money.

The total cost of relocation of Rong cheng village was Rs. 13,28,221 and of Agimpal was Rs. 9,10,700/.

(Source: Interviews with forest staff and relocated villagers)

DEATH AND INJURY TO HUMAN BEINGS

There have been no injuries or deaths of human beings inside the park. However significant man-animal conflict is reported from areas outside the park. Figures

available with the forest department show that 28 houses were damaged in 1996-1997 and 12 during the period 1998-99.
(Source: Questionnaire)

Injury and death of Livestock

Between the years 1996 and 1999, 18 cattle were killed by tiger according to official records. All the incidents took place outside the PA in the area adjacent to it.
(Source: Questionnaire)

Crop Damage:

In 1996-97 elephants were responsible for damaging 335 ha. Of area under cultivation for which losses were estimated to be Rs. 2,23,320. In 1997-98 the figure was 374 hectares and estimated losses sustained was Rs 1,80,150. In 1998-99 the figures were 270 ha and Rs. 1,95,530 as the estimate of losses.
(Source: Questionnaire)

As has been stated earlier elephants prefer *Jhum* fallows less than 10 years old. Oliver (1978) speculates that elephants could be attracted to secondary forests due to greater diversity of food plants, less likelihood of the plants being protected by toxins and tannins, and a higher proportion of available food being within the reach of the most elephants. The shifting of villages from inside the park has created a landscape dotted with secondary forest patches of various ages. In the future as the secondary vegetation tends towards a climax stage, the quantity of food available will decrease. It is therefore likely that elephants will shift and extend their home ranges to include areas outside the park boundaries. Shifting or extending their home ranges will allow the elephants to utilise areas outside the park boundaries where *jhum* fallows less than 10 years are available. These areas will also have current *Jhum* crops like rice, maize, tapioca and cotton, which attracts elephants as they provide high quality food. Crop raiding which is a major form of elephant – human conflict is bound to increase as a result. This aspect has to be considered seriously in the management plan of the reserve.
(Source: WII report)

RIGHTS OF THE PEOPLE

With the declaration of the park all the rights of the local people to the forest and forest produce were terminated. A few villages that were dependent upon the PA were shifted out from the area. The PA continues to be used by the inhabitants of a couple of villages as thoroughfare to reach the market town of Mahadeo. The impact of this activity is unknown, though field observations have revealed that the grasslands all along the path have been affected by fires. Though the reason for this is not clear, the field staff surmise that the people using the path could be lighting these fires in order to prevent tall grass from overrunning the path.

CONFLICT AND PROBLEMS ARISING OUT OF THE EXISTENCE OF PA:

The *nokmas* of the 2 relocated villages and those of 8 villages whose *akhing* lands have been included in the extension to the BNP have filed a case in Guwahati High Court on the issue of the rate at which their *akhing* lands were purchased. Apparently the rate paid by the state government was lower than the rates fixed by the District Councils.

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NOKREK NATIONAL PARK

INTRODUCTION

The Garo hills constitute the western region of Meghalaya and lie between 25⁰⁹'-26⁰¹'N and longitude 89⁰⁴⁹'-91⁰²'C with the altitude ranging from 300 meters to 1400 meters. These hills are a part of the Meghalaya plateau, which was once a part of Gondwana land.

The area of Nokrek National Park (NNP), despite its small size, falls within 3 districts - West, South and East Garo Hills.

While the initial notification of the park was on 2-11-1985, it was finally notified on 11-11-1986.

GEOGRAPHICAL PROFILE

Significance

Nokrek National Park represents the core of the proposed Tura Ridge/Nokrek Biosphere Reserve. The park occupies a unique position in the Sub-Himalayan region in general and Meghalaya in particular. In the entire state of Meghalaya, the Tura ridge of which NNP is a part, is among the last remaining tract of undisturbed tropical forest. It is an important catchment area for many rivers that support life in the valley due to its altitude and dense vegetation. This area is also the home of *Citrus indica*, the wild relative of all cultivated citrus species being used today. The north-eastern Himalayan region is considered the natural home of many citrus species. Wild citrus species are relatively common in the north east, particularly in the Himalayan foothills and hence do not attract priority attention. However, *Citrus indica* is considered the most primitive and the progenitor of all citrus species. On account of this and because of its severely restricted distribution, this is a prime candidate for conservation efforts. The plant requires dense forests for its propagation and the Nokrek national park is a response to this need.

(Source: Establishment of the first gene sanctuary in India)

The immense diversity of the area further adds to its uniqueness. The diversity of floral and faunal species found on the ridge is one of the highest in the entire sub-Himalayan region. The area has a dense network of hills and a wide variety of tropical forest species.

Location and Area

The area of Nokrek National Park falls within 3 districts viz. West, South and East Garo Hills districts. The total extent of the protected area is 47.48 km² situated between 25⁰²⁰' N and 25⁰²⁹' N latitudes and 90⁰¹³'-90⁰³⁵' E longitudes.

Nokrek National Park is off the National Highway connecting Tura to Guwahati. Tura is the nearest town situated at a distance of about 40 km. The nearest railhead is Guwahati around 220 km away and the nearest airport is Borjhar (Guwahati) about 190 km from the park. The best way to approach the PA is by Taxi/hired jeep from Guwahati or Tura or by bus to Tura and from there by jeep to the PA.

Physical Features

The physiography is characterized by dense cluster of hills of varying elevation. The hills to the north are low with a gentle slope but rise towards the Tura hills. The central ridge is oriented along a NW/SE axis and lies at about 1200 mtrs above the mean sea level. The highest peak is Nokrek, which is about 1412 mtrs. The terrain is rocky and in many places the ridge is devoid of top soil.

Tura ridge forms the primary catchment of all the major water systems of the Garo hill districts. Simsang is the largest river draining the area, to the north of the Tura range.

Climate : Conditions in Garo hills are characterized by high rainfall and humidity in the summer and monsoon (April-Oct) and a moderately cold winter. Maximum temperature ranges between 33.9^o (April) and 25.4 C (Jan) and the minimum temp. varies from 11.9^o C (Jan) to 20.9^oC (Sept). The mean annual rainfall is 2400 m.m. Pre-monsoon showers are quite frequent. However, 95% of rainfall is received between April-October, with June and July as the wettest months. Rainfall does not appear to vary much from year to year.

For area in and around the park the rainfall is to the tune of 7565.3 m.m /annum, Feb is the driest month (5.2 m.m) and June the wettest (2201.7m.m)
(Source: Questionnaire)

BIOLOGICAL PROFILE

The entire area of Nokrek National Park is mountainous. According to Champion and Seth's revised classification, the entire park is covered by Eastern Sub-Montane Semi-Evergreen Forest. Subtypes are as follows:

Tropical moist evergreen found in areas with a moderate slope and over deep gorges.

Tropical semi evergreen found on steep slopes.

The evergreen and semi-evergreen forests are generally confined to areas near streams and swamps and are restricted to undisturbed higher elevations. Here, trees grow up to 20-25 meters in height with smooth cylindrical poles and a thick crown.

The top and middle storey of trees comprise of *Ailanthus grandis*, *Aesculus panduana*, *Castanopsis indica*, *Terminalia chebula*, *Sysiquim cumini*, *Michalia champala*, *Terminalia myriocarpa* and species of *Ficus* and *Quercus*. The undergrowth consists of species that belong to *Alpinis*, *Ardisa*, *Phloqacanthus* and *Calamus*. There are also a variety of climbers like *Spatholobus roxburghi*, *Dalbergia stipulata* and *Inteda scandens*.

Tropical moist and dry deciduous forests are found on the periphery of PA. These forests include many commercially important species like *Gnorea robusta*. Common top canopy trees of these forests include *Schima wallichii*, *Alstonia scholaris*, *Sterculia villosa*, *Lagerstoremia parviscora*, *Adina cordifolia*, *Mansonia dipickai* and *Dalbergia grandiflora*. The middle storey is made up of *Nouarrbena sp.*, *Zizyphull sp.* *Embllica officinalis* and other fire resistant species.

Sub – tropical broad leaf hill forests occupy the middle portion of the park. Bamboo forests, mixed with other deciduous species occur as a climax vegetation type on the northern slopes of the park. A variety of bamboo species like *Nelocanna*

bambasoides, *Dendrocalamus sikkimensis*, *D. hookeri*, *D. harultonii*, etc. are found. Investigation and research carried out by the regional centre of The National Bureau of Plant Genetic Resources, Shillong has revealed that this area is also rich in many indigenous citrus species like *Citrus atips*, *C. macroptera*, *C. ichangensis* and *C. assamensis*.

Species of Special Interest

Among floral species listed in schedule 1 of wildlife (Protection) Act 1972 *Nepenthes khasiana* is found in the PA. Its status has been reported to be declining due to destruction of habitat. *Citrus indica*, as already mentioned earlier is endemic to the area. Its status in the PA is not known.

(Source: Questionnaire)

Weeds

NNP is significant in terms of near absence of weeds in the PA. Weeds are however evident in the peripheral areas, especially on abandoned jhum plots.

(Source: Questionnaire)

Fires

In NNP there have been some instances of fire spreading from jhum plots to the park. However, these have not adversely affected the PA as a consequence of measures taken by the park staff. It is not clear as to what these measures are.

(Source: Questionnaire + interviews with park staff)

FAUNA

The area forms an important part of the north eastern range of the Asian elephant (*Elephas maximus*). Other mammals include jackal, wild dog (*Canis alpinus*), sloth bear (*Melursus urasinus*), Asiatic black bear, large Indian civet (*Viverra zibetha*), small Indian civet (*Viverricula india*), Leopard cat (*Felis bengalensis*), jungle cat (*Felis chaus*), tiger (*Panthera tigris*), leopard (*Panthera Pardus*), and gaur (*Bos gaurus*).

Locally threatened fauna

Tiger, leopard, gaur, sambar, barking deer and great Indian Hornbill have been listed as locally threatened. Present or past population estimates are not available. The decline is attributed to destruction of habitat and hunting, particularly in the areas surrounding the park. Management activity to prevent the slide of population is yet to start.

(Source: Questionnaire)

Fauna of Special Interest

Hoolock Gibbon (the only ape of Indian sub-continent), stumped tailed macaque, pig tailed macaque.

(Source: Questionnaire)

Deliberate Introduction of Fauna

No species of fauna have been introduced in the PA either intentionally or accidentally nor have animals been bred in captivity.

(Source: Questionnaire)

An important feature of NNP is the presence of good quality forests on akhing lands, which connect Nokrek NP to Balphakram NP. This has been known to facilitate the movement of elephants between the two parks.

SOCIO – ECONOMIC PROFILE

The Garos constitute the most important tribal community and their villages are spread out along the periphery of the NNP. The Garos are matrilineal in descent, inheritance and succession. Social organization is primarily based on exogamous clans. According to the Garo laws of inheritance, household property goes to the nokna, a heiress daughter. She is usually the youngest daughter.

The Garo villages are usually set up in the valleys or on the gentle slopes of hills. Availability of water is the primary consideration for selecting the village site. The other criterion is the availability of good forest for the practice of shifting cultivation. The binding force of the village organization is the community land or akhing land. The land is generally administered by aching Nokma who is a direct descendent of the founder mother of the village lineage group.

The Garos continue to practice the traditional mode of agriculture commonly referred to as jhumming. A spot of land, generally on a hill side is selected for cultivation and the jungle is cut down. Trees are burnt on the spot and the plot is cultivated for 2-3 years before being abandoned. This practice was sustainable so far as human populations were relatively low and the fallow cycle lasted for 25-30 years. However with a burgeoning population, fallow periods have fallen to 2-4 years resulting in rapid deterioration of this system of agriculture.

Habitation within the PA

There are no villages or human population inside Nokrek National Park. However, there are 128 villages within a 10 km radius of the PA. The aggregate population of these villages is 39,432, all being tribals.
(Source: Questionnaire)

Dependence of the People on the PA

The PA does not face any grazing pressure and there are no migratory graziers as well. However, there is felling of *Michelia champaca*, *Gmelina arborea*, *Mesua ferrea* and *Calamus* species. The first three are extracted for timber and the fourth for its shoot and stem, both of which are edible. Extraction is however seasonal and is carried out by locals both for household consumption as well as for sale to nearby villages and towns.

Impact of the PA on the People

The principal impact of the PA upon the people living in its surrounding areas stems from extensive crop damage that wild animals, primarily elephants, cause to the jhum crop. Between 1995-99 wild elephants, on several occasions damaged jhum

lands, horticultural crops and tea gardens adjoining the PA. This has resulted in damages to 188 hectares of land valued at Rs. 1,32,000. These are only the reported cases. The PA management believes that the quantum of loss is actually much greater, with numerous cases not being reported. The matter has been compounded by the fact that the government has been unable to pay compensation for crop damage for the past 6-7 years. This has led to clashes between park authorities and the locals. Whenever wildlife staff goes out for surveys it is abused and the locals threaten to kill animals. It is significant to record the sentiment of some villagers who reported that crop damage on account of elephants is not a new phenomenon and that they have been used to marauding elephants for decades. However, after the govt. started paying compensation, the people have become extremely intolerant and have begun to believe that the elephants belong to the government and it should therefore compensate all losses caused by elephants. Another dimension of this issue is the fact that increasingly people are taking to cash crops like supari and fruits. Thus the financial investments they make and the losses they suffer as a consequence of elephants have gone up considerably. This factor contributes to rising levels of intolerance. At any rate, the state government's failure to pay compensation has resulted in rising tension between the local people and the forest department with the animals being the eventual losers.
(Source: Questionnaire + interviews with local people and forest staff)

Apart from crop depredation, wild animals have also attacked people in the vicinity of the park.

In 1999 a Himalayan Black Bear attacked two persons causing injuries to them. It is not known if any ex gratia payment was made in this case.
(Source: Questionnaire)

Local Participation and Alternatives Provided

Since the setting up of the park, various ecodevelopment programmes have been taken up in 128 villages (4283 households). These include distribution of horticulture seedlings, honey bee boxes, improved chulahs, construction of a school, construction of roads and foot paths. The PA management reports that these initiatives have resulted in people gradually adopting permanent/settled agriculture and horticulture. However, for these efforts to show tangible results, the initiative will have to be taken up on a very large scale. Further the question of sustainability of these measures will need to be addressed because of the substantial sums of money required for these programmes.

MANAGEMENT PROFILE

Area- 47.48 sq.km.

Initial notification – 02-11-1985 no. FOR 103/84/162

Final notification - 23-12-1997 no. FOR 23/ 86/ 316

(Source: Final notification Doc- K)

Districts- The PA falls in 3 districts- east, west and south Garo hills districts.

Status before notification- The entire land was owned by *Nokmas* and was purchased by the government. However, one *Nokma* refused to part with his land and as a consequence, 1.9 sq.km had to be left out of the area initially proposed as NP.

The PA limits have been defined according to the boundaries of the existing *Akhing* lands that were purchased.

Stage of Completion of legal Procedures

The PA has been finally notified and no rights exist in the PA.
(Source: Final notification Doc- K)

Management Planning

There is no zonation in the PA at present. It is proposed to declare an area of 782.52 sq.km (inclusive of NNP) as a biosphere reserve. The NP will become the core surrounded by a buffer zone. This proposal is currently being processed by the state and central governments.

(Source: Questionnaire page 36 + interview with PA director)

The forests within N.P.P. are divided into two ranges- the Nokrek Northern Range and Nokrek Southern range. The former occupies 24 sq.km. area and the latter 23.48 sq.km. Approximately 98% area of both the ranges is reported to be undisturbed while 2% is slightly disturbed. There is no part of either range that is heavily disturbed. While in the northern range, disturbance is attributed to illegal felling of trees, in the southern range it is attributed to illegal collection NTFP.

(Source : Questionnaire)

No management plan exists for the management of PA. However, a plan is in the process of being formulated.

(Source: Questionnaire page 37)

Financial Aspects

Apart from meeting salary and maintenance costs, in 1997-98 the park authorities had requested Rs. 20 lakhs from the plan fund. However, no amount was sanctioned to the park. In 1998-99, against a demand of Rs. 43 lakhs under plan funds, the park was granted Rs. 13.63 lakh and all of it was spent.

(Source: Questionnaire page 38)

Tourist-Park Interface

The park has one motorable entry point and three non-motorable entry points. Only the motorable entry is manned. The park remains open throughout the year and permits to enter the park can be obtained from the DFO and range officers. Entry is prohibited at night. Roughly 200-300 visitors come to the park annually, most of them between February - May. There is no pilgrim traffic. The major tourist attractions are pristine forests, idyllic surroundings, citrus species and Hoolock Gibbon. As the tourist traffic is low the park at the moment faces no threat from excessive tourism.

There is a forest rest house at Daribokqree on the periphery of the PA. It has 4 rooms, which can be used by tourists if they are not occupied by officials. Park authorities have plans to construct tourist lodges and watch towers. In addition to this, construction of nature trails, provision of literature and film shows, provision of trained guides etc. is also planned.

(Source: Questionnaire pages 39, 40 41)

Poaching and Anti Poaching Measures

The PA itself is not particularly affected by poaching, though outside the PA, elephants are hunted for ivory as well as meat. Other herbivores and primates too fall prey to hunters, chiefly for the table.

There is no staff available exclusively for anti-poaching patrolling. Regular staff (12 forest guards and 6 daily wagers) carry out this work. Inside the park, patrolling is done on foot while, the staff has a jeep at their disposal for patrolling duties outside the park. The staff is also equipped with rifles and double barreled guns. Difficult terrain poses problems for the foot patrols, which is further compounded during the rainy season. The staff, depending on availability of funds, is provided with raincoats and boots at the interval of 2-3 years. The PA management feels that the availability of wireless communication will considerably enhance the effectiveness of the patrolling squads.

(Source: Questionnaire + interview with PA director)

Commercial/ Development Activities

None

Encroachment

None

Staff, Staff Facilities and Equipment

The PA is staffed by one DCF, one ACF and two range officers, 9 foresters and 12 forest guards. There are also 21 daily wagers employed in the PA, all of them locals. The PA director, in addition to managing the park is also responsible for the east and west Garo hills wildlife division. Because of the proximity of the park to Tura town, availability of various facilities for the staff does not pose a problem.

(Source: Questionnaire)

The wildlife division managing the PA is equipped with 3 jeeps and a motorcycle. The division also has a tranquilizer gun, fire arms, and maps of the PA. It is also equipped with educational material like a TV, VCR, film projector, slides and books on wildlife.

(Source: Questionnaire)

Awareness Programmes and Peoples Participation

Some awareness campaigns are organised in areas surrounding the PA as and when funds are available. Peoples participation in PA management is in the form of local people being engaged as labourers by the forest department. They are also consulted for the formulation of ecocodevelopment programmes.

(Source: Questionnaire)

MANAGEMENT ISSUES AND STRATEGIES

Among undesirable activities that the PA management feels need to be tackled are:

- During the fire (jhum) season people set fire to vegetation on jhum plots. These fires sometimes spread in the PA.
- Sporadic felling of trees on the boundary of the PA.
- Lack of funds for implementation of various schemes.
- Ex-gratia payment to victims of wild animals has not been made for the last 6-7 years.

Sources:

Questionnaire

Final notification of Nokrek National Park (Doc K)

Interviews with PA management, local villagers, senior Meghalaya forest department officers

Undated document on establishment of the first gene sanctuary in India

NONGKHYLLEM WILDLIFE SANCTUARY – A PROFILE

Introduction

Nongkhyllem Wildlife Sanctuary is located in Ri-Bhoi district of Meghalaya, 18 kms from the national highway linking Guwahati to Shillong. Twenty nine square kilometers in area, Nongkhyllem was declared a sanctuary vide notification no. FOR. 25/815 in 1981 the Wildlife (Protection) Act, 1972. The area has undisturbed, thick forests and also harbours a lake which is home to several species of birds and fishes.

Nongkhyllem's significance, in part, stems from the fact that it is the only PA in the Khasi and the Jaintia hills of Meghalaya. The fact that the area surrounding the PA is under shifting cultivation and the fallow periods are progressively reducing, further enhances the significance of the PA as a refuge for faunal populations in this area.

GEOGRAPHIC PROFILE

Location

NWLS is situated in Ri-Bhoi district of Meghalaya and situated between 25°45'E – 91°50'N latitude and from 91°40'-91°50'5" E longitude.

The approach road to the sanctuary branches off at Umling village along the Guwahati-Shillong road. Nongpoh is the town closest to the sanctuary, at a distance of 40 kms. Guwahati is the nearest railhead 60 kms away and Umroi, the nearest airport, 62 kms. away.

Physiography and Drainage

The altitude of NWLS varies between 400m and 990m above sea level and the area is an undulating hilly cluster. The highest point of the sanctuary is Mahikyndah (990 mtrs above msl) and the lowest point is Borhulong (400 mtrs above msl). The sanctuary has good water resources, with 3 reservoirs (WHAT ARE THESE RESERVOIRS FOR AND WHERE? DO THEY HAVE ANYTHING TO DO WITH THE POWER STATION LOCATED NEAR BIRBAH?), 1 natural lake and 8 rivers/streams. Water is consequently not a limiting factor in the PA.

Climate

The area in and around the sanctuary experiences mild climate, with the maximum temperature rising to 25.3°C in July and minimum falling to 5.8°C in January. The PA annually receives 173.11 mm of rainfall on an average. July (371.7mm) and

August (414.1mm) are the wettest months while, January experiences least rainfall (10 mm). (Source: Questionnaire)

BIOLOGICAL PROFILE

Habitat Type and Extent

Approximately 25 sq. km. of the PA is under forests, 3 sq.km under rangelands and the remaining 1 sq. km. under wetland. Perennial rivers/ streams flow through almost 60 km. of the PA. Such rivers and streams also surround the PA on all sides.

The forests of NWLS, according to Champion and Seth's revised classification, can be classified into: tropical evergreen forest (2 B/1S1) in 9 sq. km of the Umrahuleng area, moist mixed deciduous forest (3c/C3B) in 6 sq. km. of the Lailad area and Khasi mixed sal forest [3 C/C1 a (ii)] in approximately 10 sq. km. of the Birbah area.

(Source: Questionnaire)

Flora

Some important floral species found in the area are mentioned below. Their status is given in parenthesis along with their names. Wet sal (*Shorea robusta*) (status not known), Pine (*Pinus khasiya*) (status not known), *Goniothalamus simonsii* (rare), *Xylia dolabriformis* (rare), *Wrightia coccinea* (rare), *Ulmus lanceifolia* (rare). Climbers are represented by *Strophanthus wallichii*.

The Lailad area of the PA is extensively covered by bamboo (BOTANICAL NAME??). According to the PA authorities this is a consequence of extensive felling in the past. As mentioned earlier the area that is now NWLS was earlier a part of the Nongkhylllem RF. Until Meghalaya was carved out as a separate state from Assam, in 1972, the Nongkhylllem RF was extensively worked and the area that is now the Nongkhylllem wildlife sanctuary was a part of a felling coupe. The PA management reports that those parts of the PA where felling had been carried out in the past, now sport extensive bamboo brakes.

Though there is no report of locally threatened species of flora, it is not possible to be certain of this in the absence of scientific research on the issue. It has also been reported that no species of flora have been deliberately introduced in the PA. It is certainly possible that there have been accidental introductions of certain floral species, especially given the fact that there is considerable cultivation on the periphery of the PA.

There are no plantations inside the PA and no weeds have been reported from the sanctuary.

Fauna

Mammals found in the sanctuary include elephant, tiger, leopard, Hoolock gibbon, sambar, barking deer, dhole, clouded leopard, golden cat, gaur, binturong, slow loris and leopard cat. Populations of tiger, wild buffalo and gaur have been reported to be locally threatened on account of considerable hunting pressure on the area. The PA management is of the opinion that while tiger and wild buffalo populations are stable, gaur numbers may actually be rising. This information is however based on personal estimates and not on any formal census findings. In fact faunal census' are not carried out in the PA (with the exception of an elephant and tiger census) and there is no data on faunal population trends. While wild buffaloes are reported from the area, these reports can however not be authenticated because, visually, it is impossible to distinguish a wild buffalo from its domestic counterpart. Further, Nongkhylem is not a part of the reported range of the wild buffalo.

The status of clouded leopard is reported to be stable and these animals have been reported from sub-tropical mixed deciduous forests in the PA. The population of golden cat is declining and it predominantly occurs in sub-tropical evergreen forests. Wild dogs or dhole are found in all parts of the sanctuary and their current status is not known. Surprisingly the population of Hoolock gibbon has been reported to be increasing despite the fact that hunters particularly target it. These animals occur predominantly in sub-tropical evergreen parts of Nongkhyllem.

There are five natural salt licks in the Lailad area of the sanctuary, which are now being replenished artificially. The reason, frequency and impact of replenishment could not be determined.

There have been no accidental or deliberate introductions of fauna in the PA. No faunal diseases have been reported from the PA or its surrounds. However, this is again something that cannot be confirmed in the absence of regular monitoring. 90% of the livestock in the surrounding villages has been reportedly vaccinated.

Corridors and Surrounding Forests

The PA was carved out of a reserve forest measuring 129 Sq. Km. and consequently, 100 Sq.km. of reserve forest still adjoins the PA on the north east and

southern side. As the RF is still well conserved and supports fairly good populations of wild fauna and flora, the effective size of the sanctuary is much larger. The two patches of RF adjoining the NWLS are more or less extensions of the PA because these are not subjected to forestry operations. In fact, the forest department of Meghalaya, since the mid 1980's has suspended felling and other forestry operations in reserve forests, with the exception of plantations in selective areas. There are, however, reports of illegal felling from the reserve forest. In addition to the RF, there are also private forests around the PA. However there is no information about extent, quality and composition of these forests.

It is proposed to add another 22 Sq.Km. to the existing 29 Sq. Km. area of the PA to the west of the existing sanctuary. This proposed extension consists of private land that harbours significant biodiversity values and expanding shifting cultivation threatens to eat into this patch unless it is granted protection. Land for this purpose has been surveyed and negotiations for purchasing this land are currently ongoing with private landowners who own it. (Source: Personal communication from PA management)

There is no corridor connecting Nongkhylllem to any other PA.

Impact of People Upon the PA

Though the PA itself is free of habitation, the peripheral villages are reported to have the following impacts on the sanctuary:

- (i) Grazing by cows has been reported between November and May. 20-30 animals graze in approximately 3 sq.km of the Birbah/Mawkyndah area. Due to this rangelands in the area are reported to be under pressure. The PA management has claimed the number of cows that enter the sanctuary has been going down. The research team that visited the sanctuary was of the opinion that such a small number of animals were unlikely to have a significant impact on the PA.
- (ii) These villages are also the source of hunting pressure on the PA, particularly during the community- hunting season. This issue is discussed in greater detail later.

SOCIO – ECONOMIC PROFILE

Though the PA has no villages inside it, there are approximately 62 villages within a 10 km. radius of the PA.

The following negative impacts of the PA upon local people have been reported:

- (i) Between April 1998 and May 1999 tiger and leopard attacked cows, buffaloes, goats, and dogs killing 12 of these. No compensation has been paid to people for the same. All these incidents took place outside the PA, on its periphery.
- (ii) Elephants cause considerable damage to crops, particularly paddy and maize. In 1996-97, the area affected by crop depredation on account of elephants was 950 hectares leading to losses worth Rs. 81,050. In 1997-98 the area affected was 572 hectares leading to losses worth Rs. 21,200. All losses to crops have been compensated in toto.

According to the filled questionnaire, there is no fishing, collection of timber and NTFP from the PA. The PA authorities attribute this to the good health of the village forests around the PA. The people do not venture into the sanctuary as all their bio mass needs are met from the village forests.

Unlike in the Garo Hills, the forest staff at NWLS had not heard of agarwood (*Aquilaria malaccensis*). Extensive harvesting of agarwood had been reported from the forests of Garo hills, including from within PAs.

Cultural Values and Conflicts

The PA has no site of religious or cultural significance and there have been no instances of clashes between PA authorities and the local population.

Ecodevelopment

The only eco-development activity undertaken on the periphery of the PA has been the construction of a lower primary school at Tasku village, which is expected to benefit 16 families. It is not clear what pressure(s), on the PA, is/are sought to be relieved through this activity.

MANAGEMENT PROFILE
Legal Status and Control

The PA has been finally notified and there are no rights existing inside the sanctuary. The boundaries of the PA have not been altered since its inception.

Zonation and Boundaries

There is no zonation in the PA and the boundaries of the PA correspond to the boundaries of the Nongkhylllem RF and to natural features like rivers.

Management Plans

NWLS has never had a management plan, nor are there any immediate plans of developing one.

Budgets and Expenditure

The funds received and spent by the PA are as under:

Plan and Non Plan Funds (These figures pertain to the entire Khasi hills wildlife division and not specifically to NWLS. However, since this is the only PA in this division, it is conceivable that the PA receives a substantial proportion of the total financial allocation of the Khasi hills wildlife division.)

PLAN FUNDS				NON PLAN FUNDS	
	Asked For	Received	Spent	Allocated	Spent
1996-97	Not Available	32,42,000	29,74,436	58,16,200	56,85,253
1997-98	Not Available	23,57,350	22,86,700	64,50,250	62,75,302
1998-99	Not Available	29,74,950	23,88,681	91,52,000	91,27,343

Other Funds

	(Rs.)	SOURCE	PURPOSE
1996-97	5,19,537	Centrally Sponsored Scheme (CSS)	Payment for wireless sets
1997-98	3,80,760	C.S.S.	Project elephant
1998-99	16,28,000	C.S.S.	Payment for wireless sets, computers, and ex-gratia relief.

As is the situation in other PAs of the country, in Nongkhylllem too, during certain years the funds allocated to the PA have remained unspent. Reasons for this remain unclear.

Tourism and Regulation of Entry

Tourists, primarily due to lack of access, do not frequent the PA. The PA has two entrances for motor vehicles and four pedestrian entrances. Both the motorable entrances are manned while none of the pedestrian ones are currently manned. In 1997-98, there were 4 foreign overnight visitors and 10 Indian overnight visitors. There were also 10 day visitors, all Indians. Visitor traffic is at its peak between August and January. The best time to visit the PA is between September and February. Entry charge per person is Rs.60/- for foreigners, Rs.30/- for Indians and Rs.15/- for students. Movie cameras are allowed in on payment of Rs.1000/- and still cameras on payment of Rs.10/-.

According to the questionnaire filled by the PA management, there are no immediate plans of extending tourist facilities as the PA is too small to support additional tourists.

As far as accommodation is concerned, there are two forest rest houses, one inside the PA, at Lailad and the other at Umtasor, on the periphery of the sanctuary. Both places are open for use by non officials.

The PA management is of the opinion that tourism should not be encouraged beyond the currently prevailing level as the PA is too small to sustain large number of tourists.

Poaching And Preventive Measures

The major pressure faced by Nongkhylllem WLS is on account of the custom of community hunting widely prevalent in the area. The community hunting season usually lasts from end of February to April. Community hunting is prevalent in large parts of the north east and as is the case with other areas, here too, the hunt enjoys cultural legitimacy and does not have any religious connotation. Usually a group of up to 30 people camp in the forest for hunting and the hunt comes to an end only if the party is able to bag some meat. Such ritual hunting is the biggest source of pressure and wild herbivore populations are particularly affected.

The forest department has in the past apprehended hunting parties. However, there haven't been any convictions so far because of laxity on part of judiciary and failure

of the forest department to present a watertight case. Failure to prosecute has emboldened hunting parties and they have even attacked forest staff that has attempted to stop such groups. The PA management is keen to set up a legal cell that can assist the forest department in pursuing cases related to offences against wildlife and also sensitize the concerned judicial officers in matters relating to wildlife and forests. A local NGO by the name to Wilderness Concern is facilitating this process.

Major hunting pressure is in the Birbah area because of relative lack of patrolling. Hunting parties on a few occasions have attacked forest guards at Binbah beat headquarters. The guards expressed the need to boost the number of forest staff at Birbah. Lailad is comparatively better protected and the field visitors were told that for this reason wild animals are concentrated in this area.

There is no dedicated anti-poaching squad operating in the PA, though regular staff does carry out routine patrolling. It comprises of one forest ranger, six foresters and nine forest guards in addition to twenty four daily wagers (all locals) working as game watchers. The field staff has fifteen guns and a jeep. Poaching in the sanctuary is predominantly for food, and is particularly rampant during the community hunting season. The hunters use rifles, shotguns (there are 200 licensed gun owners in the fringes of the PA), traps and poison and are also equipped with jeeps and mini buses.

Patrolling is severely hampered by the difficult terrain of the area and dense forests. There are no roads inside the sanctuary and therefore patrolling can only be on foot. Even this becomes extremely difficult during the rainy season. The entire PA is covered by the wireless network and the PA personnel expressed the opinion that good communication is their most effective tool the staff has against poachers. Good communication enables the staff to summon reinforcements and prevent poachers from escaping.

Since the area of the sanctuary is only 29 km² animals frequently stray out of the sanctuary and become vulnerable to hunting in areas outside the PA. Nongpoh (the town nearest to the sanctuary), at one time, used to be a favourite market for

connoisseurs of bush meat. However, with stringent law enforcement open sale of bush meat in Nongpoh has ended. The wildlife department makes surprise checks in local markets every week.

There is an NGO active in this area called Wilderness Concern, headed by one M.A. Nampui who is also the honorary wildlife warden of the area. The NGO has initiated some work in the fringe villages of Nongkhylllem where most of the hunters hail from. According to Nampui such efforts have been very successful and villagers are beginning to shun hunting. Nampui mentioned that his NGO is strapped for resources which hinders the scope of their activities.

Staffing and Staff Facilities

Nongkhylllem has more personnel per square kilometer of its area compared to other PAs of Meghalaya. This includes one range officer, six foresters, nine forest guards and twenty-four wildlife watchers employed on daily wages. The sanctuary is under the control of a DFO, who, apart from managing the PA, is also entrusted with the responsibility of handling all wildlife related issues in the east Khasi hills, west Khasi hills and the RiBhoi district. The local officer incharge of the sanctuary is a RFO stationed at Nongpoh, 40 km. from the sanctuary.

Apart from these there are 24 daily wagers employed for protection. They have all been recruited from among the locals.

All most all institutions of basic requirements such as market, hospital, bank, etc. are within 10-17 k.m. radius of PA.

Research and Monitoring

Monitoring is restricted to an elephant and tiger census conducted once in 5 years. Elephants are counted on the basis of direct sightings, while the tiger census relies on the pugmark method. However because of the difficult terrain of the PA and the limited number of people available, only about 20% to 30 % of the PA is covered. In addition to tiger and elephant census, the PA management has listed the following priority areas for intensive research :

- (a) study of migratory bird species
- (b) local migration of mammalian species
- (c) availability of food in different seasons
- (d) availability of water, and salt licking habits of various animals.

However, the basis of this listing is unclear.

Equipment

As far as equipment is concerned, the sanctuary is in possession of four fixed wireless sets, one mobile wireless set, four hand sets, fifteen SBBL and DBBL rifles, two binoculars, one electric generator and one jeep.

Maps of the PA are available with the authorities along with a checklist of birds, animals and plants.

Offences

The following figures depict poaching cases in and around PA since 1994-95:

Year	Species Killed or Removed	No. Killed or Removed	Reason for Poaching	Name of range	Method
94-95	Barking deer	1	Meat	Nongpoh	Gun
95-96	Wild boar Civet cat	2	Meat Skin	Nongpoh	Gun Trap
96-97	Clouded leopard	1	Skin	Nongpoh	Gun
97-98	–	–	–	–	–
98-99	Sambar, barking deer	2	Meat	Nongpoh	Gun

These figures may not accurately describe poaching pressure on the PA and its surrounds. This is because only a small proportion of poaching incidents may actually be getting detected and recorded.

Though specific details of other offences were not available, the local staff opined that offences have shown a downward trend over the years. This has been attributed to:

- a) Installation of a wireless network that covers the entire sanctuary and also links it to the PA director's office in Shillong.
- b) A dedicated team of field staff.
- c) Positive intervention by N.G.O.s that has helped in building bridges with local people.

CONCLUSION

According to the PA authorities the most important problems that the PA is facing are:

- a) Feeder roads inside the PA are not maintained and this hampers movement of forest personnel and patrolling.
- b) Eco-development in the surrounding villages has not been taken up. Ecodevelopment is likely to mitigate, at least to some extent, the adverse impact of the PA upon the people, in terms of crop and cattle depredation and vice versa.
- c) A legal cell should be formulated to look into all legal matters related to wildlife cases and to ensure that the accused are prosecuted. This point needs to be pursued particularly in the context of the ritual hunting that takes place in Nongkhylllem.

MIZORAM

Murlen National Park

Murlen National Park

Introduction

The Murlen National Park (MNP) is situated in east Mizoram, about 40 kms. from town of Champhai, near the Burmese border. The park, situated at an elevation of 1897m MSL is spread over 200 sq. km. The park encompasses steep and undulating hill ranges intercepted by high cliffs and saddles. At the centre of the park is a famous hill range, called Vapar Tlang, with an elevation of 2075m.

(Source: Management plan)

Significance :

The forests of Murlen play an important role in maintaining the water regime of the area. The rivers Pumpet Lui, Tuithing Lui, Chemte Lui, Zanthim Lui and Tuiphal Lui originate from inside the park. The area also hosts the following charismatic animals – tiger, leopard, Hoolock Gibbon, Serrow and Hume's Bar Tailed Pheasant. Besides varied flora and fauna, it includes many rare bryophytes, pteridophytes and epiphytal orchids.

(Source: Management plan)

Geographical Profile

The park lies in the eastern district of Champhai and is situated about 40 km east of Champhai town. It is 240 km from the capital city of Aizawl. It covers an area of 200 km² and is situated between latitude 23⁰ 34' N to 23⁰ 43' N and longitude 93⁰ 13' E to

93° 22' E. The nearest railhead is Silchar, in Assam, at a distance of 420 km and the nearest airport is Lengpui, 280 km away.

Physical Features –

The area is marked by steep and undulating hills. The highest point of the park is Vapar Tlang (1897m) and the lowest point Chamelur (720m).

Rocks inside the park are sedimentary in origin. River beds and streams have alluvial deposits which are very good for tree growth.

There are 12 rivers/streams draining the area the important ones have already been mentioned. A number of streams and rivulets are perennial and as such, there is no water scarcity except in the upper hill areas where water is a problem during summer. To solve this problem in the hills artificial water holes cum salt licks have been constructed at various locations for wildlife. A few natural waterholes have also been improved.

A number of natural salt licks are also found in the area which serve to fulfill the requirement of mineral and micro nutrients of wild animals.

Climate –

The climate is sub-humid in general. The hottest months are from May to August and the coldest from December to February. The lowest temperature is 8° C and highest is 33° C. The average rainfall is about 2000 mm .

Biological Profile

According to the Champion and Seth's classification, the forests of Murlen comprise of:

1. Khasi tropical wet hill forest (8 B/C 2); this type occupies area of eastern and central region of the park from 1000 m to 2000 m.
2. Assam sub tropical pine forest (9/C2) occupying hill areas rom 800 m – 1600 m.

The PA management reports about 94% of the area of the park is reported as undisturbed, 1% slightly disturbed and 5% highly disturbed on account of jhum fires, habitation, cultivation and felling. There are no plantations in the forest.

Corridors-

A forest corridor, approximately 15-20 km in length links Murlen to Lengteng wildlife sanctuary.

Fauna -

Prominent animals found in Murlen are Sambar, Barking deer, Serrow, Goral, and Malayan Giant Squirrel, tiger, leopard, Jungle Cat, wolf, fox, Wild boar, Himalayan Black bear. The park is particularly rich in

primates, the following species of which have been recorded:

Rhesus macaque, Common langur, and Hoolock gibbon.

Avifauna in the park comprises of Hume's bar tailed pheasant, Kaleej pheasant, Peacock pheasant, Malabar pied hornbill, Wreathed hornbill, Red jungle fowl, Black partridge, Racket tailed drongo, hill mynah, green pigeon.

Of particular significance is the Hume's bar tailed pheasant, the state bird of Mizoram and a globally threatened species.

Flora-

The following species of flora are found in Murlen - Quercus spp., Betula spp., Terminalia spp., Michalia champaca, Pinus kesia, Rhododendron arboreum, Lady's slipper orchid and blue vanda.

The park faces a problem of weed infestation; Michenia macarantha has spread to an area of 10 Km² in the North Khawbung range, primarily in areas where villagers either continue to jhum or did so in the past.

SOCIO – ECONOMIC PROFILE

There are 5 revenue villages surrounding the park and one village, Murlen, inside the park. The villages on the periphery of the park, namely, Vapar, Ngur, North Khawbung, Tualpui and Rabung are almost evenly distributed around the park and along with Murlen, are dependent upon the PA for most of their livelihood resources. Murlen village, with a population of 68 families (about 400 people) has been situated in the park since 1891. The process of relocating Murlen village was initiated in 1991 by the then forest minister of Mizoram but was stalled due to the lack of initiative on part of his successor. Some money was spent before the process was stalled and Rs.39 lakh have been left over from the funds sanctioned then. Relocation was further disrupted in 1996 because the number of families inhabiting Murlen went up from 47 to 68. The additional 21 families have reportedly come from Manipur and claim that they were originally residents of Murlen and had to leave because of insurgency.

Interviews with the villagers revealed that they are not keen on moving out of the park and wanted the park to rivet back to the status of a sanctuary, as was the case prior to 1991. The area of the PA then was 150 sq. km. and Murlen village was not included in the PA.

The main source of livelihood of people in these villages is agriculture and animal husbandry. They keep cows, horses and goats. Their house construction needs of timber and bamboo are met from the PA. The main crops raised in their jhum lands are rice, maize, seasonal vegetables and sometimes sugar cane. However, it is reported that productivity is poor on account of poor soil quality. Though grazing is

reported all the year round but since the cattle population is quite small, the impact of grazing on the PA is minimal.

Jhum cultivation results in fires spreading from the jhum plots to the surrounding forests. The PA management estimates that each year an area approximately 4 sq.km. is affected by spreading jhum fires.

Michelia champaca, Terminalia spp, Schima spp, Quercus spp, Toona spp and Canes are the floral species that are exploited by the local villagers for their bonafide use. Apart from these orchids such as Blue Vanda are in great demand in towns like Aizawl and the local people report that there is widespread collection of these for sale in urban centres. It is also reported that Burmese cross the border to collect these orchids.

(Source: Interviews with villagers of Murlen)

Apart from cultivation and collection of wood and bamboo, that have a significant negative impact on the habitat of the park, the PA is also prone to considerable hunting pressure. Hunting, an activity that the Mizo society traditionally indulges in, has taken a considerable toll on numbers of Sambar, wild boar, barking deer, primates and birds.

Ecodevelopment activities like terracing, raising of passion fruit, water storage tank construction and introduction of community piggery farming have been introduced to reduce pressure on the park due to jhumming and hunting. The success or otherwise of these initiatives is not clear.

In terms of impact of the PA upon the people, there are reports of instances of crop damage. Interviews in Murlen village brought out the fact that people guard their crops to prevent animals from damaging it. On the whole it would appear that this problem is restricted and does not cause any significant inconvenience to the people.

MANAGEMENT PROFILE –

Prior to being declared a sanctuary, in 1989, this area was under the jurisdiction of the Murlen Village Council and was known to be rich in game.

It was initially notified as Murlen Wildlife Sanctuary in 1989 covering an area of 150 km² (vide Government notification No. B.11011/23/89 – FST/dated 07.09.89). This status was modified to that of a national park in 1991 (notification No. B.11011/13/84 – FST/dated 08.07.91) extending over an area of 200 km². The final notification has not yet taken place.

Management Plans –

One management plan was prepared for the area in 1993 by the then ACF in charge of the PA. This was however not approved by the government and currently a fresh plan is under preparation.

Entry points and thoroughfare –

There is only one entry point to the PA by vehicle and a check post has been built across it. However, there is no provision of manning this check post. There are a number of pedestrian entry points on the PA. There does not exist any system of issuing permits for entry into the PA. Effectively, therefore the PA management has little control over entry and exit from the PA. There also does not exist any information on tourism. The local forest department staff is however, of the view that tourism is negligible, apart from relatives of the villagers of Murlen, who visit them occasionally.

There is an unmetaled road that connects Vapar and Robung, two villages on the periphery of the park. This road passes through the park and serves as a link for Murlen village to the outside world. Vehicles, primarily jeeps and trucks, that carry supplies for Murlen village also use this road.

Poaching –

Poaching is fairly common as can be seen from the number of people carrying guns. There does not seem to be any attempt on part of the PA management to curb this practice. There are no poaching patrols/flying squads, informer network or an incentive scheme. Hunters predominantly use SBBL guns.

Developmental Activities –

Powerlines are currently being laid in an area of 50 km in N. Khawbung along the roads by the MSEB (Mizoram State Electricity Board).

Encroachments –

Encroachments have been reported in an area of 10 ha. The main purpose of such encroachment seems to be cultivation (in this case ginger). Mainly, Vapur villagers are involved in this case. The PA authorities have requested the villagers to vacate the land but in vain.

Staff and staff facilities–

Murlen National Park is under the administrative control of a sub-division forest officer headquartered at situated at N. Khawbung near Champai. This officer works under the administrative control of the DFO, Wildlife, Aizawl. The park has also been assigned a range officer, 2 deputy rangers, 3 forest guards and 1 game watcher. Apart from these, 22 people are employed on daily wages throughout the year.

The PA director whose office is located in Aizawl is also the incharge of the Aizawl Wildlife Division that looks after Lengteng and Khawnglung Sanctuaries.

There are no veterinarians attached with PA. The nearest hospital is about 20 km away and so are the nearest post office, bank, market, school and college.

Equipment and Literature –

For all the PAs under the Wildlife division – Lengteng, Khwanglung, Murlen; the following equipment is available – 1 fixed wireless set, 2 hand held wireless sets, 6

rifles/guns (only 3 are in a working condition), 1 binocular, 3 tents, 1 telephone, 1 computer, 1 slide projection, a T.V, V.C.R. and 1 gypsy and truck each.

The park does have maps and booklets for reference.

Research and Monitoring-

No research has been undertaken in the park. A census is held every 3 years that covers about 70% of the park.

Interpretation, Education and Extension –

Awareness campaigns are carried out annually in schools of peripheral villages during the wildlife week. A football match is also organized by the PA authorities each year. The purpose of this match is not clear.

People's participation in ecodevelopment activities is through village committees in 5 villages. These committees identify the beneficiaries and also implement various activities.

Sources:

1. Management plan of Murlen National Park prepared by Navraj Pradhan, 1993
2. Questionnaire
3. Interviews with villagers of Murlen village.

Phawngpui (Blue Mountain) National Park

Introduction

The Phawngpui (Blue Mountain) National Park (PNP) is situated in the Chintuipui district, 350 km from Aizwal, in south east Mizoram. (22° 36' 30" to 22° 42' and 93° 1' to 93° 4' 20"). PNP lies close to the Myanmar border and the Chin hills housing Mizoram's highest peak, the Phawngpui, which stands 2360 m. The hills found in the park are a part of the Mizoram on Lushai hills which are a series of hill ranges oriented in a north-south direction. The terrain is highly dissected with streams and rivers. In the east and south-east the hills are considerably higher than in the north part of the range. The PNP covers an area of 50 km². The area was declared a NP in 1991 (G.O. No. B 11011/33/91) but the final notification came only on 22.7. 1997 (Notification No. B 12011/5/97). Despite its size it supports a population of many important flora and fauna, the most significant being the endangered Blyth's Tragopan.

Significance

The park is an isolated patch of Oak Forest and the only abode of the endangered Blyth's Tragopan (in the state). Besides the park contains a host of rare species of orchids which need to be preserved. Rhododendron is found abundantly in this park .

Status of the Park

The park is surrounded by villages on all sides – as many as 21 villages lie within a radius of 10 km around the park (IIPA map). However, the questionnaire lists only 8 villages and the chief Wildlife Warden's report speaks of 5 peripheral villages (definition of periphery is not clear – for IIPA its 10 km of surrounding area). These villages pose a considerable amount of pressure on the buffer area for meeting the requirements of firewood, timber and other forest produce (mainly different species of orchids for their ornamental value). The practice of jhumming, around the park poses a fire hazard during the dry season and occasional forest fires have been reported.

The park housed one village constituting 23 families and practicing 'jhum'. The village 'Pangrang' was rehabilitated to a new village site at Sentetfiang near Sangau village on the north side of the park. The areas affected by jhumming were subjected to plantations, mainly Pine trees (*Pynus kesya*) to improve the habitat. There are no reports on the success of these plantations. Besides there is no confirmation regarding the indigenous nature of the pine species used for plantation.

The vegetation found in the park is varied ranging from pockets of oak dominated patches to grasslands. Major part of the area is under forest cover and rhododendron are commonly found in the park. The habitat is suitable for a number of species of flora and fauna. About 90% of the park is totally free from disturbance.

Geographical Profile

Location and Area – PNP falls in the Saiha district of south Mizoram. The nearest town is Sangau at a distance of 13 km. The nearest airport is at Lengpui (Aizawal), at a distance of 350 km. The park is 450 km away from the nearest rail head at Birabee. The best way to approach the park is by air upto Lengpui and from there to Sangau by road.

Physical Features – The southern park of the Lushai hills, bordering Myanmar, ranges between 1,500 – 1,800 m. The Park is well fed by many water holes, streams, springs and a river. The Cheu River is a perennial source of water along with 3 springs and 12 natural water tanks/ holes and 20 seasonal water holes. Despite these water scarcity is reported in the park in the months of April – May (dry season). The terrain is etched with a number of cliffs and grasslands spread over the park. Patches of oak dominated primary forest are to be found though these are separated by secondary growth in various stages.

Climate – The high altitudinal existence of the park accounts for a cold climate during winters with temperatures touching 0⁰ C and a warm summer with the temperatures reaching a high of 25⁰ C (Absence of any indications regarding the time at which the data was collected as well as whether the data are rough estimates or based on recorded data poses doubts on the authenticity of the information) [Source : Forest department at PNP]. The questionnaire reports only about the presence of frost during January, February and December. The Topographic sheet ref. No. is 84F/2. The rainfall is recorded as 2500 mm (approx.)

Biological Profile

Habitat – The entire area is hilly with about 2 km² of interspersed grasslands and 48km² of forest. The forest type ranges from dominant patches of sub-montane tropical evergreen (30 km²) to deciduous (18 km²). About 1 km² of forest range is highly disturbed because of jhum fires, NTFP collection etc. Between the years 1994-97 a total area of about 230 ha. was subjected to plantation.

Corridors – The PNP is an isolated haven for animals. The area surrounding the park is degraded, comprising mostly of jhum land. There are no corridors linking it to other PA's noticeably Ngengpui WLS which is close by and is reportedly managed by the same DFO and FR. Due to the lack of a buffer zone animal movement is under severe pressure from the villages situated outside the park.

Fauna

A census carried out in May 1999 reported the presence of the following species of fauna:

Carnivore	: Tiger and Leopard
Omnivore	: Civet, Himalayan Black Bear
Herbivore	: Coral, Barking deer, Serow Sambar, Wild Boar, Hoolock, Rhesus macaque, Giant Squirrel, Flying squirrel,
Bird	: Tragopan Blythii, Pheasants etc.
Snake	: King Cobra, Python

While the tiger is an occasional visitor from across the Myanmar border and the bear is migratory, rest all are residential species. *Tragopan blythii* is endemic to the park. Movement outside the park and migration leaves the animals prone to hunting. Also, extensive habitat degradation outside the PA has adversely affected the animal population. Confrontation with humans is common and often fatal for the animals.

The population of *Tragopan blythii* is increasing steadily according to the census report (which ?) , personal estimate of the DFO and local impressions.

Flora – The blue vanda, pitcher plant, ladies slipper and *Rhododendron* are schedule I species. The first three are threatened species due to their decorative value. People from Myanmar attempt collection as these fetch good money in the town market and this needs to be checked. While the first 3 are confined to a small area, *Rhododendron* is widely distributed and common and is a major tourist attraction .

Other main species found in the PA include *Taxus bacata*, *Quercus* species, *Messua terrea*, *Chukrasia* species, *Michelia* species, *Gmeliana* species, *Cinnamomum* species, *Dysoxylum*, *Phoebe* species, various species of cane, bamboos and various other species of trees, herbs shrubs, climbers etc. No new species has been introduced in the national park. No weed infestation has been reported.

The pressure on biodiversity mainly comes from jhum fires which occur at an 3 yearly interval in about 1 km² of the PA and result in a change in the habitat . Extraction of NTFP is reported from an area of 17 km² (annually). NTFP collection is said to have a negligible impact, but the validity of such a statement needs to be established.

NTFP includes collection of blue vanda, pitcher plant, ladies slipper due to their medicinal and decorative uses. This would surely impinge on their regeneration ability. Fire is believed to have affected (questionnaire) *Rhododendron*, grasses, *Quercus incava* leading to poor regeneration. Combative measures for fires – firelines, are said to be present in the park and firefighting is carried out by the staff with some help from local villagers.

No research has been conducted on the diseases affecting flora and fauna in the park. Vaccination of livestock (20-40% of the livestock covered) is conducted sometimes with the help of Animal husbandry and veterinary department of Mizoram. There are no reports on the passage of livestock through the Park.

SOCIO-ECONOMIC PROFILE

Pangran village was situated within the eastern side of the Park housing 23 families, all belong to the ST category. But the village was relocated to Sentetliang about 10 km away from the original site. There is lack of information on the strategy used for relocation.

Presently, there are no people residing in the Park. There are 8 villages within a 10 km radius of the Park (The IIPA map indicates the presence of 21 settlements within the radius of 10 km thus, this point needs to be taken notice of). There are no

census reports pertaining to the settlements. There is no grazing inside the park, not even migratory.

The quantum collected of NTFP is unknown. Main market for NTFP (constituting mainly Blue Vanda, pitchu plant, ladies slipper) is in towns and cities. It is usually the outsiders (Burmese) and not the locals who collect these.

The Park does not hold any religions or cultural uses for the people.

The land use pattern inside and outside the Park, in the past, consisted of the practice of jhumming (prior to 1991). The villages of Archhuang, Thaltlang, Pangrang, Lenghor, Vaunbuk were stopped from jhumming in the area and were given compensation (no mention about the kind of compensation and the time frame etc.). However, no alternatives were provided for the curtailed activities. Areas adjoining the park are still under jhum cultivation. No eco-development has been introduced in the park or the surrounding area.

In terms of impact of the PA on local people no animal attacks on people have been reported. There are, however, instances of attack on livestock (Cows, Pigs, Goats) by tiger, leopards, clouded leopards in the area adjacent to the park. Since no official reports were made, no compensation was paid for the attacks (find out whether there is any provision for compensation).

The questionnaire doesn't report any crop damage due to animals but the Chief Wildlife Warden's report on PNP (Jan, 2000) states that damage to crops by wild boars is frequent, leading to man-animal conflict and that there are not enough funds for compensation (no mention on the provisions and methods followed for establishing the claims for compensation) [find out about the compensatory mechanism followed by the state]. There are no reports of clashes between men and animals inside the park.

MANAGEMENT PROFILE

The area was declared an Intended National Park (INP) on 02.08.91, notification no. B.11011/33/91 – FST under the WLPA 1972. The final notification under WLPA section 18(1) or 35(10) came on 22.07.92 declaring Phawngpui to be a National Park, notification no. B 12011/5/91 – FST. The limits of the park were defined on 02.08.91 (50 km²). The proclamation was issued by the collector on 29.08.91 and the acquisition of the area, 50 km², took place on 03.08.94. Prior to being notified as a PA (NP) the Phawngpui forest area was under the Lai district council. [In the proposed conservation methods for the state of Mizoram as given in Rodgers and Panwar (1988), the proposed area for PNP was 60 Km² – search for any information on why the present area was reduced to 50 km²].

The NP has been divided into core zone (40 km²) and tourist zone (10 km²). The size and shape of the National Park is contained within natural boundaries – from Khamkhuaiva meeting Cheu Lui river in the north to the tri-junction point followed by 120° E and from Archhuang peng – moving in a south-west direction to 254° W till Ailian Lui, moving in a northward direction to meet Cheu Lui.

Major concern for the management lies in countering the problem caused by the Burmese people who are involved in the illegal extraction of NTFP.

MANAGEMENT PLANS

There have never been any management planning for the NP. It is only now that the DFO, Chhimtuipui Forest Division, Mr. K. Kar is devising such a plan. Objectives of the PA as specified in the management plan are that the NP because of its floral and faunal value and rich bio-diversity demands protection and perpetuation of the wildlife and its environment and surroundings.

BUDGETS AND EXPENDITURE

Years	Proposed		Sanctioned		Spent		Total Spent
	Dev.	Eco.	Dev.	Eco.	Dev.	Eco.	
1996-97	2.15	3.50	1.30	2.00	-	All	3.30
1997-98	3.29	2.00	1.99	2.00	1.45	0.7	2.15
1998-99	19.72	3.05	2.40	NIL	2.40	NIL	2.40
1999-2000	10.77	18.90	4.75	1.30(R)	Not yet received from DFO		

The amount sanctioned as against the proposed amount is much less. (Since no activity has been carried out in the name of eco development the expenditure of funds for the same needs to be questioned.)

Checkposts – There are 3 points of entry by foot to the park and all are manned. There are no entry points by vehicle. The entry to the park doesn't require a permit.

Tourism – About 20% of the park is open to tourists but no modes of transportation are available. There are very few visitors to the park – last year only 2 (overnight) foreign visitors and 20 day visitors were reported. Since the visitor traffic is low , tourism is not a cause of concern. The best time to visit the NP is from January – March. No fee is charged at present from the visitors. There are no plans for the extension of tourist facilities in the NP. Presently there are only 2 forest rest houses in Farpak and Sangau containing 2 rooms each.

Public thoroughfare is reported in the park. About 1000 people pass through the park every year (check). There are no motorable roads inside the park. The questionnaire only talks of inter village paths during the dry reason.

Poaching – The staff does not carryout any specific anti-poaching work, there are no anti-poaching patrols/flying squads.

Equipment – There is a radio/wireless network covering the entire NP. There are 2 fixed communication stations and 3 hand sets which are used for NWLS as well.

Literature – The PNP has maps and booklets on the PA for reference.

There are no ongoing research activities in the NP. As regards the monitoring activities for flora and fauna only a 2 yearly census (Block counting method) exists, covering about 75% of the park.

There is no information on the number of guns – licenced or unlicenced in and around the NP. The Chief Wildlife Warden's report (2000) says that there are no guns available to the staff and neither are uniforms.

No commercial activities are reported in the NP at the moment or in the past (check)

No developmental activities have been carried out ever (where did they spend the sanctioned amount?).

STAFF AND STAFF TRAINING

There is only one range officer. He looks after Ngengpui WLS too. 2 rangers and 12 forest guards along with 11 persons employed on daily wages (from '96-'98) to look after the park. People on daily wages have been inducted from nearby villages and are employed all the year round. The senior most officer stationed near the park is the FR, range officer stationed at Sargau. The park director is stationed at Lawngtlai and takes on the double responsibility of the park as well as the territorial work of Chhimtuipui Forest Division. All the staff currently under employment has not been imparted any wildlife training.

There are no vets, hospital or research staff in/near the park. The nearest hospital is at a distance of 12 km.

INTERPRETATION, EDUCATION AND EXTENTION

There are programmes to educate villagers residing around the park. Film shows, distribution of pamphlets, and school awareness programmes are carried out annually in about 10 villages.

The interpretation Centre is yet to come up. Ecodevelopment committees have been made in 8 villages who will select beneficiaries for the proposed eco-development programmes. They will also help in protecting the NP and in fire fighting activities.

The Young Lai Association is the only NGO associated with the NP. There are no reports on the kind of work undertaken by it.

All these programmers as well as Young Lai Association seem to be of recent origin as no instances of community involvement in the management or protection of the NP are mentioned in the questionnaire.

MANAGEMENT ISSUES AND STRATEGIES

Very low number of offences detected in the NP – only 2 cases of teasing/molestation of wild animals by villagers (1998) and 3 cases of fire in 1998. This shows either paucity of staff available or negligence on part of the field staff in

detecting cases of offences or overlooking such cases and not reporting them officially.

MANAGEMENT ISSUES

Lack of detection of poaching and official reports on the theft of NTFP from across the Burmese border reflects the inability of the forest staff to catch the offenders. Lack of detection does not mean that these incidences do not occur. It only means no official reports were made. Further, this data also does not cover the incidences of arrests made outside the park.

PROBLEMS FACING THE NP

- ❖ Biotic pressure due to jhumming and fire hazards.
- ❖ Illegal NTFP collection.
- ❖ Poaching, wild animal sale/trade in Myanmar.
- ❖ Staff needs to be well equipped with uniforms, guns and other equipment.
- ❖ Mobile vans, vehicles, motorbikes are required for better vigil and control.
- ❖ Communication facilities at the beat level are missing.
- ❖ Non availability/less funds for ecodevelopment.
- ❖ No proper management strategies have been chalked out.
- ❖ Setting up of compensation packages is necessary and a proper policy regarding cases of animals causing damage to crops, livestock etc.

RECOMMENDATIONS

Problems of PNP are mainly biotic pressure, effect of isolated fragments on animals and plant species etc. The area needs to be treated with great care if its faunal and floral components are to be saved for posterity. This may necessitate inclusion of more areas to the park, bringing more area under legal protection. There is perhaps the need to decrease the gap between two similar areas like PNP and Murlen (WPA report, WWF, 1996)

Such small areas may be handed over to non-governmental village communities to try and make use of the local people as custodians of their resources. Such activities can be started at one or two experimental sites initially and then extended over to other areas if found to be viable.

DAMPA WILDLIFE SANCTUARY

INTRODUCTION

The Dampa sanctuary forms a part of the Dampa Tiger Reserve, which is 500 sq. kms. in area. The tiger reserve is situated in Mamit district, 128 kms from Aizwal on the Bangladesh border. The nearest town is West Phaileng, ___ km from the sanctuary. West Phaileng is the sanctuary headquarters and the field director is stationed here.

The tiger reserve is divided into two ranges- Teirei and Phuldungsei, each of which is 250 sq.km in area

Rodgers and Panwar had recommended the creation of a composite conservation area of 681 sq.km comprising of Dampa national park and a WLS. R&P had prioritised the Dampa conservation area as a Nationally Important area. Such areas were recommended for protection in order "to give significant protection to endangered species or to communities, which are poorly covered at present."

BIOLOGICAL PROFILE

Flora

Dampa encompasses fairly large tracts of dense forests, in a landscape that is otherwise being increasingly brought under jhum.

According to Champion and Seth's classification, the vegetation in Dampa comprises of evergreen and semi evergreen tropical forests, with sub montane patches. There are large tracts of secondary habitat, primarily bamboo brakes and regenerating *ghum* fallows. Other secondary features are plantations (primarily *Gmelina arborea*, *Michelia champaca*, *Tectona grandis*, *Artocarpus heterophylla*, *Syzigium cumini*). The forest department carries out plantations of species like *Gmelina arborea*, *Michelia champaca*, These plantations have been carried out by the forest department to supplement food for wild animals and as habitat improvement measures.

Apart from these the other principal species of flora found in the PA are: *Mesua ferrea*, *Macaranga indica*, *Dillenia indica*, *Dipterocarpus indicus*, *Michelia champaca*, *Samanea spp.*, *Licuala peltata*, *Calamus spp.*, *Borassus flabellifer*, *Melocanna baccifera*, *Dendrocalamus hookeri*. *Bambusa tulda*.

The Blue Vanda orchid, which is found in the PA, is reported to be collected for its high commercial value. It is not known whether such collection threatens the long term survival of this plant in this area.

Lantana and Mikania macarantha are weeds found in some portions of the PA, particularly those bordering roads and villages.

Shankar Raman, Mishra and Johnsingh (1993-94) have stated that most of Dampa is covered by secondary bamboo vegetation. Primary tropical evergreen

forests are restricted to a patch close to the north eastern periphery of the PA. Their study seems to suggest that almost the entire sanctuary was under jhum in the past and bamboo (*Melocanna bambusoides*) has taken over the abandoned jhum areas.

Fauna

Dampa is known to harbour populations of elephant, tiger, clouded leopard, bison, Hoolock gibbon, slow loris, binturong, jungle cat, and Indian hornbill among others.

Hoolock Gibbon, the only species of Ape found in India, are reported to be locally threatened on account of poaching by locals for meat.

Forest fires

Almost every year a part of the PA is affected by fires that spread from adjoining areas where slash and burn cultivation is carried out. However, the area affected by such fires is not substantial and hence the PA management feels that such fires are not a source of pressure on the PA. Further, depending on availability of funds, fire fighting squads are recruited during the fire season.

Extraction from the PA

The PA management permits extraction of dead and fallen logs from the PA by local villagers for meeting their needs of house construction material and fuel wood.

GEOGRAPHICAL PROFILE

Dampa is situated on the western border of Mizoram and also forms a part of the international border with Bangladesh. Located in Mamit district, it is about 100 km from the capital city of Aizawl.

Chhawrpial (1100 msl) and Aivapui (200 msl) are respectively the highest and lowest points in the PA.

The PA is drained by 3 main rivers, Teirei, Tut, and Tlawng, that flow northwards into Assam, and by numerous seasonal and perennial streams. The period between March and May is the driest part of the year.

Rainfall is fairly high and the climate is tropical. However, there is a distinct cold season, particularly at higher altitudes.

SOCIO ECONOMIC PROFILE

The PA itself is free of human habitation, though there are 15 villages with a population of about 10,000 people situated on the periphery of the PA. Though there are no villages situated inside the PA,

Relocation

Twelve villages (580 families) were relocated from Dampa in 1989-90 to the periphery of the sanctuary. Interestingly, all these villages were inhabited either by Bru's (also called Reangs) or by Chakma's, both ethnic minorities. Of the 12 relocated villages, 5 villages were inhabited by Bru's, and 7 by Chakma's.

Interviews with the relocated villagers revealed that the only compensation they were given by the forest department was cash, ranging from Rs.5000 to Rs.7000 despite being promised a whole host of facilities (houses, orchards and churches to name a few). We met some of the relocated villagers at Tuipuibari and they told us that the forest department staff initially came and told them that the area had been declared a sanctuary and that they would have to leave their villages and move out, following which a few families left the sanctuary voluntarily. Such cases did not receive any compensation, not even the cash that was given to the families which moved out subsequently. For instance, in case of Mualvam village, there were originally 89 families when the village was inside the sanctuary. However, by the time the villagers came out of the sanctuary there were only 20 families left. The rest had left on their own following coercion by the forest department. Out of these, only 14 families were paid cash compensation. The forest department at that point claimed that they had no money left and that the remaining families would be paid "later". This has not happened till date. Similar is the case with **all** the other villages. We have been able to collect detailed data from the relocated villagers we met at Tuipuibari about the five Bru villages regarding the number of families not paid compensation so far and estimates of the monetary value of the fixed assets of the village, compensation for which was never paid.

We also learnt that two of the villages, Mualvam and Chikha had to face relocation twice. These two villages were initially relocated to a site called New Chikha, on the BRTF road in an area known as Taitesena Tlang. However, when the decision to add the 4 buffer zones was taken, the people were forced to abandon New Chikha and are now refugees at Tuipuibari. They had been able to access some income generating schemes of the government and had set up orchards etc. at New Chikha. Following the second displacement, they are currently subsisting only through wage labour at Tuipuibari.

Following ethnic tension, between Mizos and Reangs, in the state in 1997, a majority of Reangs fled to refugee camps in Tripura. This exodus also included a large number of Reangs relocated from the sanctuary. Hence, currently, there are relatively few Reangs in the Tuipuibari area.

The relocated Chakmas face similar problems, primarily on account of the fact that the state government, as a matter of policy (according to the CWW), does not substitute or pay for the land it acquires. Thus even if people are compensated in monetary terms, they still have no access to land, the only income generating resource they are familiar with. In some senses, therefore, the government "forces" people to encroach upon PA land as their entire jhum land has been acquired for the sanctuary, without giving them any alternatives. The land acquisition process followed by the state government will have to be looked into. We were told that this problem i.e. of local people encroaching upon PA land for want of alternatives is not limited to Dampa only. Apparently a similar situation prevails in Khwanglung and Lengteng as well. The sanctuary faces encroachment, in the form of jhum patches, almost every year along the edge of the park bordering Bangladesh. The sanctuary management is of the opinion that the perpetrators are Chakmas from Bangladesh. However the people we spoke to told us that it is more likely that the jhum patches in

question belong to the Chakmas who were displaced from the sanctuary. These people, for the want of alternate land are forced to turn to the sanctuary for jhum.

(Source: Interviews with displaced villagers at Tuipuibari.)

Grazing

As is the case with a number of PA's in the north east, grazing is not a source of pressure as cattle are raised primarily for meat. Their numbers are therefore restricted.

Collection of NTFP, timber etc

Consequent to the relocation of villages from the PA, the extraction of forest products from the sanctuary has reduced considerably. However, villages on the periphery of the PA continue to depend upon the PA for meeting their needs of bamboo, timber and fire wood. The jhum areas and supply reserves of a number of villages on the periphery of the sanctuary had been included in the sanctuary during its notification. Consequently, the affected villagers turn to the PA to meet their needs of forest products.

In particular, villagers of Saithah mentioned that they had become worse off as a result of the sanctuary. Apparently a very large area of the *jhum* and supply reserve area of Saithah has been included in the sanctuary without any substitute land being given to the villagers. The PA management has recently initiated ecodevelopment in order to help the people in meeting their livelihood needs. It remains to be seen how successful this venture will be in reducing the people's dependence on the PA.

(Source: Interviews with peripheral villages, particularly Saithah)

Human-Animal Conflict

Crop damage is the only reported area of human-animal conflict in villages on the periphery of the PA. This too is not pronounced and does not seem to be an issue that the people are overly concerned about. There have been no reports of attacks on people or livestock. This is not surprising as the density of animals in the PA is rather low. In any case, animals reportedly do not approach villages fearing persecution. This is unlike the situation around a number of other PAs in the country, where human-wildlife conflict is a major management issue. This difference can be traced to cultural factors. Hunting is very much a part of a number of societies in the north-east, including the Mizo society and wild animal meat continues to form a fairly regular part of meals in a rural households. It therefore is not particularly surprising that there are not too many cases of human-animal conflict.

MANAGEMENT PROFILE

Conservation History:

Dampa was first notified as a wildlife sanctuary in 1976. The exact area notified in 1976 is not clear because the notification mentions 180 sq.miles, while

questionnaires sent in by the PA management during the 1984 survey of national parks and sanctuaries by IIPA, mention 681 sq.km. as the area notified as a wildlife sanctuary. The legal status of the land notified as a sanctuary in 1976 was partly RF and partly unclassified forest land. The government of Mizoram issued eviction notices against the 17 Chakma villages resident within the area that was to be notified as a sanctuary. The villagers however went to court against this order and the Gauhati High Court quashed the notification on account of the fact the authorities had not followed the requisite procedure for declaring a sanctuary as laid out in the Wildlife Protection Act.

(Source: AIR 1983, Gauhati pages 18, 19, 20. Jaladhar Chakma v. Dy.Commr, Aizawl)

The state government issued a fresh notification in 1985 declaring 681 sq.km. as Dampa WLS. An area of 340 sq.km. was finally notified as a sanctuary in 1989, subsequent to the Collector's inquiry and settlement of rights. In 1994, the sanctuary was declared a tiger reserve. The total area of the tiger reserve is 500 sq.km. While out of this, 340 sq.km had been notified as a sanctuary in 1985, the legal status of the remaining 160 sq.km. remains unclear.

Area of the PA:

After the final notification of the sanctuary (340 sq.km.) in 1989, apparently a central government team advised the Mizoram Forest Department that the sanctuary was "too small" to be declared a tiger reserve and the size should be increased if the state was keen on securing the status of tiger reserve for the sanctuary. Consequently the then forest secretary of Mizoram, initiated a process to bring fresh areas under the purview of the sanctuary so as to increase its size. From all accounts, this was an arbitrary exercise and lines were drawn on a map without any ground surveys being carried out. As a consequence, areas with villages and areas that harboured *jhum* lands of these and other villages came to be included in the tiger reserve. The notification for the tiger reserve was issued in 1994.

(Source: Interviews with Mizoram forest department officers)

Ambiguity of boundaries:

The tiger reserve notification is ambiguous insofar as it states "*There shall be a buffer areas at four different locations as indicated in the map (as buffer area I, II, III, and IV)*". The wildlife map of the sanctuary shows 4 shaded areas, one each on the northern, southern, eastern and western peripheries of the sanctuary, which are presumably the buffer areas. However, according to the boundary description in the tiger reserve notification the northern and the western buffers have been included in the tiger reserve while the others do not form a part of the tiger reserve. Presumably the so called buffer areas do not form a part of the sanctuary. The buffer areas seem to have added in order to increase the size of the sanctuary from 340 sq.km. to 500 sq.km. for reasons mentioned above. This inclusion has, however, created the below mentioned complications for the PA management.

Inclusion of areas with rights in the PA:

The northern buffer (locally referred to as Taitesena Tlang), approximately 20 sq.km. in area, comprises of *jhum* patches and orchards of the inhabitants of Serhmun village. Discussions with the ex-president of the Serhmun Village council revealed

that the village council had issued passes to about 37 families, mostly for orchards, but some also for jhum in Taitesena Tlang. He estimated that villagers of Serhmun are cultivating approximately 100 hectares of Taitesena Tlang. The villagers of Serhmun have been using Taitesena Tlang for at least the past 80 years, if not more, according to the ex village council president. He further told us that they had never received any official communication from the revenue department or the forest department regarding the plot of land in question and its inclusion into the Dampa Sanctuary.

Taitesena Tlang is bordered by a PWD road to the north and north-east, and a Border Roads Task Force (BRTF) road to the south. The Tlang thus forms an enclave distinct from the rest of the sanctuary. It appears that the settlement of rights for this area has not been carried out and people continue to use this area for jhum and raising orchards, despite it being a part of the Dampa Tiger Reserve.

(Source: Interviews with villagers of Serhmun)

International boundary

The western boundary of the tiger reserve also forms India's international border with Bangladesh. Consequently, there are 2 BSF camps the sanctuary, each with a strength of 7-10 persons. Though the sanctuary management does not consider these camps to be a hindrance to their objectives, the RFO of Terei did mention that some people from villages on the western periphery of the sanctuary feel safe with the camps inside the PA and this encourages them to encroach/cultivate inside the sanctuary. Other forest department functionaries suggested that the camps are a deterrent to poachers. Either way, it does not seem that the presence of the camps is a source of pressure, particularly considering the small number of personnel manning these camps.

Roads and Thoroughfares

A road (approximately 25 km.) constructed in the late 1970's and maintained by the Border Roads Task Force (BRTF) passes through the northern part of the sanctuary. There is extensive stone quarrying along this road and interviews with labourers at a quarry site revealed that stones are regularly taken from this area for the maintenance of the PWD road mentioned earlier. The IIPA research team that visited the sanctuary came across 3 BRTF labour camps along this road. The team was informed that that these camps have been present from periods ranging from 6 months to 5 years and that such camps are a permanent feature along this road. There did not appear to be any information exchange between the PA authorities and the BRTF about permission for setting up camps, extracting stones, and other activities inside the sanctuary. The team also saw signs of lopping of the trees surrounding these camps for use as fuel. Further, one BRTF camp had an elaborate stone crusher operational within the sanctuary.

Up to 50-60 pedestrians use the BRTF road each day. These are BRTF labourers and local villagers walking to their respective jhum plots. A number of trucks also ply on this road each day, some of which transport stone from the quarries while others service the township of Tuipubari, which is on further down the road. The PA management is unable to regulate entry into the sanctuary through this road as the only check-gate is at Terei village, a good 12 kms. before the road actually enters the sanctuary. The point at which the road actually enters the PA, Tuilutkawn, is a beat headquarter and used to be manned till 1998. Following an incident when a

wireless handset and a gun of a forest department employee was snatched by miscreants, the beat headquarter has been abandoned. In fact the entire staff of the Teirei range stays at the range headquarter itself and none of the beat posts are manned on account of miscreants.

The Bru National Liberation Front (BNLF), a group advocating the rights and aspirations of ethnic Bru's (or Reangs) is active in this area. Its major demand is the demarcation of an autonomous district council for minority Bru's within the state of Mizoram and it is known to adopt violence as a method of persuasion.

In conclusion, both pedestrian as well as vehicular traffic on the BRTF road has to be closely monitored and controlled. The road is a significant source of disturbance to at least the northern part of the sanctuary and barriers at both ends of the road where it enters/exits the sanctuary would be in order.

Staff and Anti-poaching measures

The post of the Field Director of Dampa Tiger Reserve is that of an ACF. The Chief Wildlife Warden has forwarded proposals to upgrade the field director's post to that of a CF, as is the case with all other Tiger Reserves, to the state government. However, status quo remains. Apart from the field director, the sanctuary also has 2 RFO's, 10 Forest guards and 30 daily wagers. As is obvious the staff strength is woefully inadequate, particularly to patrol an area of 500 sq.km. Further, the field director's office in West Phaileng has only one Upper Division Clerk to facilitate office work, the pace of which therefore remains tardy. Past efforts at transferring staff from surplus forest department offices in Aizawl to the tiger reserve headquarters have not succeeded.

Due to the presence of miscreants and the relative isolation of the PA, it appears that there is little effort by the frontline staff to carry out any effective patrolling in the PA. One can therefore see signs of felling in the interior areas of the sanctuary. Hunting as mentioned earlier, is very much a part of the local tradition and it is conceivable that villages on the periphery of the sanctuary would indulge in hunting. It is quite common to see wild animal trophies adorn homes in villages on the periphery of the PA. It appears that the PA management adopted a hands off approach that ensures that its staff do not enter into a conflict with the local villagers. This is to be seen in the context of the fact that in Mizoram most of the forests are owned either by village councils or by individuals. The concept of state ownership of forests is alien. This is exacerbated by the fact that nearly all types of extraction s prohibited from a PA. In such a situation, it will take considerable effort to convince the people about the need and rationale for a wildlife sanctuary. Till such time as the people can be motivated to forego or at least reduce resource use from the forest on their own initiative, it will be unreasonable to expect the ill equipped PA management to enforce the existing law.

In a bid to address this issue, the central government has agreed to fund a protection force for Dampa for a period of 5 years. However, since this would mean recruiting fresh personnel, the state government is reluctant to initiate this as it is not sure if it will be able to support the staff thus recruited once central funding stops.

Habitat manipulation:

At a number of places inside the sanctuary, the PA management has cleared patches of bamboo forest in order to undertake plantations to create grasslands.

Throughout the sanctuary, an area of about 50 hectares has been cleared for this purpose. This proposal had been cleared by the central government, which had sent its share of the budget to the state government. However on account of the state government failing to supply a matching grant, the work could not be carried out in the financial year 1998-1999. The sanctuary management proposes to pursue the matter this year as well. On discussing the issue with the sanctuary management, it seemed to us that there was no clear rationale for the plantation. The site selection was also arbitrary and the management had little idea about how it would manage these grasslands and prevent them from being taken over by the more dominant species in the area such as bamboo. This move of the forest department has been questioned in a recent report (Pawar, S. and Birand, A. (2001)) that advocates that attempts at making such clearings in wet forest areas are unnecessary, and bamboo forest should not be converted in this manner under any circumstances.

Sources:

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KHAWNGLUNG WILDLIFE SANCTUARY

KHAWNGLUNG WILDLIFE SANCTUARY - A PROFILE

INTRODUCTION

Fourty one square kilometers in area, Khawnglung is situated in central Mizoram, 130 kilometers from the state capital Aizawl. The PA adjoins the road that links Aizawl with Mizoram's other major town, Lunglei and also falls in Lunglei district. It comprises of sub-tropical evergreen and semi-evergreen forests. Seventeen villages surround the PA and the jhum lands of some of these villages fall within the sanctuary. The final notification of the sanctuary is pending and as a consequence, every year, a part of the sanctuary is invariably brought under cultivation by one village or the other. During some years, a number of villages happen to cultivate inside the sanctuary.

The sanctuary harbours at least one tiger apart from leopard, bison, barking deer, sambar and Hoolock gibbon. The sanctuary also has significant floral values that are currently being researched by the Department of Forestry, North Eastern Hill University.

SIGNIFICANCE OF THE PA

There is no mention of Khawnglung in Rodgers and Panwars' study. No studies on the biological significance of the area have been carried out apart from the NEHU study mentioned above. According to a census carried out by the forest department in 1997, the sanctuary is host to a number of animal species, some of which are highly endangered such as Tigers and Hoolock Gibbon.

In addition to the fact that it harbours such endangered species, Khawnglung is the only PA in central Mizoram.

BIOLOGICAL PROFILE

According to Champion and Seth's revised classification, the forests of Khawnglung can be classified as sub-tropical evergreen and semi-evergreen. There are no grasslands or lakes inside the sanctuary though a number of streams flow inside the PA.

Corridors

Khawnglung is in some senses an island in central Mizoram, not linked to any other PA.

(Source: questionnaire)

Fauna

A census conducted in 1997 by the forest department showed the presence of Tiger, Leopard, Sambar, Barking Deer, Serow, Wild pig, Hoolock gibbon, Rhesus macaque in the PA.

The Hume's Bar-tailed Pheasant, the state bird of Mizoram has been reported from the sanctuary and its population has been reported to be increasing. It has not been possible to independently verify this.

It emerged through discussions with the local forest department staff that due to the small size of the sanctuary and because of the fact that there is very little good quality forest left in the surrounding areas of the PA, faunal populations in the sanctuary are isolated and are that much more vulnerable.

Flora

The natural vegetation of the sanctuary consists of evergreen and semi evergreen forests. The commonly found trees are *Michelia champaca*, *Terminalia* spp., *Toona*, *Legesstroemia* spp., *Schima wallichii* and *Bombax ceiba*. These are evenly distributed throughout the sanctuary. Some parts of the sanctuary, particularly the southern part, are still under cultivation by the peripheral villagers and such patches, when they are abandoned are taken over by bamboo.

The forest department proposes to undertake plantation of the following species in specific parts of the PA: *Bischofia*, *Artocarpus* spp., and *Porpia roxburghii*. These are meant to benefit herbivores and bird species. The proposed plantations are discussed in greater detail later.

The sanctuary management suspects that some floral species could have been accidentally introduced in the PA as result of cultivation being carried out inside the PA. The impact of such introductions, if any, is however indeterminable.

The weed *Michania macarantha* reportedly infests 5 sq. km. of the PA. The impact of the weed, if any, on the PA is not known. The sanctuary management has not taken any steps to deal with this issue. This is primarily because weeds are not seen as a major management problem relative to the other issues facing the park and in the context of the lack of resources at the disposal of the management, both in terms of manpower as well as finances.

GEOGRAPHICAL PROFILE

The sanctuary is situated in Lunglei district and Lunglei is also the nearest town, 75 km south of the sanctuary. Altitude inside the sanctuary varies from 660 msl to 1190 msl. Eight rivers and streams drain the PA, and there is one water hole in the sanctuary. Maximum temperature recorded has been 35 degree centigrade, while the minimum has been 9 C. The area receives an annual rainfall of about 1780 mm.

No droughts or floods have been reported from the PA.

SOCIO ECONOMIC PROFILE

There are no villages inside the PA, though there is a record of 2 abandoned villages in the PA in the (Source: Survey of India topo sheet 84A/16).

There has never been any relocation from the sanctuary and it is not known why these villages were deserted.

There are approximately 17 villages within the 10 km radius of the PA. Details of 7 of these villages are available:

Name of village	No. of households	Population
1. Khawnglung	407	3002
2. Chekawm	35	210

3. Sialsir	47	250
4. Lungchhuan	96	520
5. Rawpui	143	840
6. Bungtlang	320	2050
7. Pangzawl	450	2500
Total	1498	9372

As rights have not yet been settled, these villages continue to jhum inside the sanctuary and annually about 50 hectares (or 5 sq.km) of the PA is affected as a result of jhum fires and subsequent cultivation activities. For instance during the current jhum cycle i.e. for the year 2000, 64 families of Pangzawl village clear felled about 48 hectares of the southern area of the sanctuary for cultivation.

Fire and cultivation are reported to degrade the habitat and also encourage proliferation of weeds and other hardy species. These activities also adversely affect birds, herbivores and primates as they cause loss of breeding site(s) and of food sources. Bamboo, Calicarpa spp, Schima walichii and Aperusa spp are the floral species reported to be particularly affected as a result of fire and cultivation. These activities hamper regeneration of these species and at the same time cause changes in habitat and vegetation.

MANAGEMENT ISSUES

Disturbance

78% of the sanctuary has been reported to be slightly disturbed on account of fires and cultivation, while 12 % is heavily disturbed for the same reasons. Only 10% of the PA is totally free from human disturbance.

The field visit report to Khwanglug however concludes that this 10 % figure is also likely to be an exaggeration and in all probability there is no part of the PA that is completely free of disturbance.

(Source: questionnaire, field visit report)

Plantations

While there have been no plantations so far in the PA, the forest department proposes to undertake plantations of fruit bearing species (Bischofia, Artocarpus spp., and Porpia roxburghii) in order to encourage birds and other herbivores. The forest department proposes such plantations in Dampa and Murlen as well. It emerged from discussions with the forest officers in charge of Khawnlung that there was no explicit justification for the proposed plantations. The field visit report records that since most officers (particularly the ones handing Dampa, Murlen and Khawnglung) were not trained in wildlife management, they were attempting to replicate, in PAs, management strategies used in other forest areas and that in forests of the sort that occur in this part of the country plantations are unnecessary as the natural rate of regeneration is anyway very healthy.

Fires

Fires are an annual occurrence, particularly in the months of April, May and June, when jhum patches are fired. Fires from jhum patches spread to the surrounding forests and cause loss of habitat. About 1 sq.km of the forest is reported to be affected as a result of forest fires that spread from jhum patches. This in addition to the 5 sq.km of the sanctuary that is directly affected by jhum activities.

Though the questionnaire records that the forest department staff does carry out fire fighting operations as and when fires occur, the field visit report conveys that it is extremely unlikely that the staff undertake any fire fighting operations.

Conflicts between PA management and local people

As mentioned earlier, some peripheral villages have jhum lands inside the sanctuary. The forest department has reported that roughly at five year intervals one of the peripheral villages (sometimes even more than one) carries out jhum inside the sanctuary and this gives rise to considerable conflict as the forest department staff attempts to prevent the people from clearing land. The incident concerning Pangzawl village mentioned earlier, culminated in the department registering an FIR against the heads of families that have "encroached" upon the sanctuary. No further action has been initiated. A similar incident had occurred in January, 1997 when 30 families of the same village had cleared 40 ha of land for jhuming. The forest department had, however, on that occasion not initiated any action against the encroachers.

Such flash points between the local people and the authorities are likely to reoccur, till the rights existing inside the sanctuary are inquired into and settled.

Ecodevelopment

Ecodevelopment has been initiated in the sanctuary during the financial year 1999-2000. 240 families have been selected in 3 different villages for initiating activities like land terracing, smokeless chulhas, and animal husbandry. The sanctuary management hopes that these activities will act as confidence building measures with the people and will also reduce the extent of jhuming in the vicinity of the sanctuary.

It seems that eco-development has been initiated without much planning or participation of the people. The forest department personnel interviewed by the field team were unable to clearly articulate how and why the villages, beneficiary families and activities that are proposed to be carried out under eco-development, were selected.

Other uses

Despite the presence of a large number of people on the periphery of the sanctuary, no hunting, NTFP collection or felling for firewood or timber is reported in the questionnaire. This is surprising, particularly considering the fact that at least one village has its jhum land inside the sanctuary. It is assumed that before this area was declared a sanctuary the peripheral villagers might have been extracting various forest products from the PA and also might have hunted inside the PA. It is likely that such activities still continue but are not noticed by the local staff because of their small number and lack of mobility. A certain level of connivance of the staff too may not be entirely improbable.

No instances of livestock depredation, crop damage or human injury/death have been reported. Neither are there any reports of poaching or hunting in the past 3

years. The reported lack of grazing is not surprising because of factors mentioned earlier.

Budgets and Expenditure

So far apart from staff salaries, the state government does not seem to have spent any money on the sanctuary. All other work in the sanctuary has been carried out using money allocated by the centre under various schemes. Khawnglung has been receiving money under the Development of Parks and Sanctuaries scheme as well as the Ecodevelopment scheme of the centre.

In 1996-97, against a demand of Rs. 3.60 lakh, the sanctuary was allocated Rs. 2.89 lakh (these are consolidated figures for both schemes) out of which only Rs. 1.74 was spent. The gap between the proposed and the sanctioned amount was Rs. 71,000.

In 1997-98, the proposed amount rose to Rs.5.39 lakhs while the sanctioned amount was Rs. 4.54 lakh. The gap between proposed and sanctioned was Rs. 85,000. Out of the sanctioned amount, Rs. 4.39 lakh was utilised.

For the financial year 1998-99 no money was sanctioned to the PA despite a demand of Rs.13.85 lakh.

In the current financial year, proposals for Rs. 14.35 lakh were submitted and Rs.12.35 was sanctioned. Utilisation figures were not available at the time of writing this report.

Tourism and Entry in the PA

There is one entry point into the PA by vehicle but it is unmanned. Apart from this, there are a number of entry points by foot. No tourists have visited the PA since it came into being and there is no system of seeking permission from any authority for entering the PA. No rates have been fixed for entry into the PA and the management has no plans of extending tourist facilities. There is no forest rest house or any other accommodation in or around the PA.

Anti Poaching

There is no staff dedicated solely for the purpose of anti poaching. Poaching pressure on the PA is likely to be significant given the fact that hunting is very popular among the local people and it also enjoys cultural sanction. There are 100 licensed guns with villagers living on the periphery of the sanctuary and many unlicensed ones (as reported by the forest department as well as observed by the field visit team). The sanctuary management has reported an urgent need for an anti poaching squad with at least one vehicle and other equipment.

No commercial or developmental activities have been reported inside the PA or from surrounding areas.

Encroachment

Encroachments have been reported to occur roughly at five year intervals as a consequence of the peripheral villages' jhum cycle entering the sanctuary. This year 48 ha has been "encroached" by the villagers of Pangzawl and the sanctuary management has filed a FIR against the concerned families in Hnathial Police station. However in the absence of settlement of rights and without compensating the villagers for the land that falls inside the intended sanctuary, whether the fact that

the villagers exercising of their customary rights can be called encroachment is an open question.

Staffing and Equipment

The sanctuary is manned by one range officer, one forester and two forest guards. There is no other staff, including muster roll employees. The sanctuary shares a DFO and an ACF with Murlen National Park and Lengteng Sanctuary. Apart from looking after these three PAs, these officers have been entrusted the charge of Wildlife protection duties in all of Mizoram excepting in the autonomous district councils of Lai, Chakma and Mara.

The attention that senior officers are therefore able to pay to Khawnglung is therefore obviously extremely limited. None of the staff, including the ACF and the DFO are trained in wildlife management and there is also no research staff attached with the sanctuary. The PA management has reported that it undertakes an environment awareness campaign in the fringe villages during wildlife week.

Apart from booklets and maps for the PA, the sanctuary does not have any other equipment/material, including things like wireless sets.

Animal Census

Pugmark and direct sightings are used to perform faunal census every 3 years and approximately 90% of the PA is covered by this method.

People's involvement

The implementation of ecodevelopment activities is carried out through ecodevelopment committees comprising of villagers. Beyond this activity there is no involvement of the local people in the management of the sanctuary or in protection work.

Offences detected within the PA

Very scanty information was available about offences within the PA. This could mean that there have actually been no offences, however its more likely that either offences have not been detected or even if the forest staff has detected offence, it has not, for various reasons, filed complaints, FIRs etc. Given the morale of the forest staff, their training and motivation levels, the probability of the later is greater than the former.

According to the field visit team, the fact that the PA management has reported that there have been no instances of poaching in the PA in the past three years is reflective of the laxity of management and protection. Though the field team was unable to visit Khawnglung sanctuary, interviews with the officers in charge of the PA gave the impression that the management is predominantly "hands off". Further, the PA management has itself admitted that only 5-10% of the PA is totally free of human disturbance. This adds credence to the belief that official figures on poaching and other offences do not convey an entirely accurate picture.

Neither is there any report of any extraction (legal or illegal) of firewood or timber from the sanctuary. Considering the general lack of attention that this PA suffers from, it is not surprising that there has been no vaccination of cattle in the surrounding areas. However the cattle population in the surrounding areas (in fact in all of Mizoram) is very small because cattle is primarily a source of meat is rarely, if

ever reared for milk. Therefore, as such, cattle are not likely to have an impact on PAs in Mizoram in general.

LEGAL STATUS

Prior to being declared a sanctuary the area belonged to various village councils. The initial notification was issued in 1991 vide government of Mizoram order number B.11011/13/84-FST dated 8th July 1991. The process of settling rights is yet to be completed and hence this area is legally only an intended sanctuary.

There is no zoning in the PA and the concerned ACF is currently in the process of preparing the management plan for Khawnglung. This would be the first management plan of the sanctuary since it came into being.

Lengteng Wildlife Sanctuary

Introduction

The Lengteng Wildlife Sanctuary (LWS) is situated 180 km away from Aizawl city in the eastern part of Mizoram. The LWLS covers an area of 120 km². The area was recently notified as a WLS in April, 1999 under the Wild Life(Protection)Act 1972. The terrain is hilly throughout. The PA falls within the Champhai district. The WLS is surrounded by 5 villages whose jhum lands fall within the PA.

Significance

The LWLS is connected to Murlen NP through a corridor and houses a number of faunal species similar to Murlen. Hence, it acts as a genetic buffer area. It is seen as an extension of MNP. IIII

Geographical Profile

Location and Area – The LWLS is located in the Champhai district of Mizoram It covers an area of 120 km². The WLS lies between long. 93⁰ 11' 04'' E – 93⁰ 18' 58'' E and lat.23⁰ 44' 35'' N – 23⁰ 52' 10'' N according to the IIPA map. The nearest town, Ngopa lies at a distance of 10 kms and the nearest railhead, Silchar is 320 kms away. The nearest airport falls 180 kms away in Lengpui (Aizawl). The best way to approach the WLS is by air to Lengpui and from there to Ngopa by road into the PA (190 kms).

The highest point of the sanctuary is the Lengteng peak rising to 2300 m above MSL and the lowest point is 400 m above MSL.

According to the PA authorities at LWLS information on drainage in the area is not available but the IIPA map shows 6 streams(approx.) spread across the sanctuary. No water scarcity is reported for the PA.

The weather conditions inside the PA are more or less similar to those in Murlen NP which is very close by, with temperatures ranging between 8⁰-25⁰ C (minimum) and 18⁰ C- 33⁰ C (maximum). The toposheet reference numbers for the PA are 84E/1 and 84E/5.

The average rainfall for the area is above 2000 mm(?).

Boundary – The northern boundary starts from the point where Ngopa – Mimbung BRTF road crosses Minpui stream. The boundary runs along the Minpui stream upwards till it reaches its source and crossing the ridge it meets the BRTF road at Phulbial camp. Then, running in N-E direction the boundary meets the source of Pharsih river. Then it runs downstream to the point where Kawlbem to Selam footpath crosses Pharsih river, and then running along a stream to Hmunpui mual peak. From there it again follows an unknown stream till it meets Pharsih river, following it to the juncture where an unknown stream meets the Pharsih river.

The eastern boundary starts from this point, and runs upwards the unknown stream in the S.W. direction till it reaches a peak and then crossing a footpath meets the Leiva river. Upstream the Leiva river meets an unknown stream, Following the stream the boundary runs , upwards, and meets the sources of Luanguual river. Following the river downstream till it meets Dimphai river and the boundary ends at the source of the Dimphai.

From this point the southern boundary begins running along western direction, following Tuimui river till it meets Tuiphal river. Then along Tuiphal river downstream till it reaches the point of convergence of Tuiluai river and Tuiphal river.

The western boundary then runs along the Tuiluai river upstream till a point near Leiawngkawn. Then running northwards to meet the foot path to Lengteng, crossing it it runs along hill ridge till it meets Saibual peak. From there it runs down to the northern slope and then runs along an unknown stream to meet Tuila river and BRT F road. It then runs along the BRTF road till it meets the starting point i.e. Minpui stream.

Biological Profile : The LWLS covers a forested, mountainous area of 120 km.sq. The forest types existing in the WLS are of sub-tropical evergreen type.(It covers an area of 70 km²) and montane sub-tropical (covering 50 km².) The forest has not yet been demarcated into ranges. About 16% of the forest is undisturbed, 68% slightly disturbed and another 16% is heavily disturbed. The causes of disturbance are cultivation, fire for Jhumming, felling of trees and hunting. At present the status of these disturbances is reportedly stable.

There are no plantations presently in the PA but there is a proposal for some plantations to help in recuperation of jhum lands.

Corridors : The PA is connected to MNP by a forested corridor of about 15-20 kms. This is highly beneficial for the animals in both the PAs.

Fauna : The important faunal species of the PA include Tiger, Leopard, Hoolock gibbon, Hume's bartailed pheasant, Sambar, Barking deer, Goral, Serow, Wild boar, Rhesus Macaque and Himalayan Black Bear. Most of the species are found along the cliffs along Lengteng Tlang through many are widely distributed. Tiger is a seasonal visitor and the first 4 species are rare but fairly well distributed in the forest. A proper census is yet to be carried out. No overpopulation of fauna has been reported. The Hume's bartailed pheasant is a threatened species but its numbers are stipulated as increasing according to the personal estimates of the DFO. No new species of fauna have been accidentally or intentionally introduced into the sanctuary.

Flora : The census for flora also remains to be carried out but according to personal estimates Pinus khasia is rare in the PA and confined to a small area. Quercus sp. , Betula sp., Terurenia Spp. Michelia Champaca, Lady's slipper and Blue Vanda are abundantly found and widely distributed in the PA.

Out of the species found here the Blue Vanda and Lady's slipper have commercial value. They are sold in markets for their ornamental value.

Since the villagers from the surrounding area carry out jhum inside the PA, they introduce new plants into the PA. Apart from this there are plans to introduce Bischofia, Parbia roxburghii and Artocarpus spp. in the WLS in an area of 2000 ha. They would act as food sources for birds and animals.

No locally threatened species of flora are reported. There has not been any wild infestation either.

Pressures on Biodiversity

There are reports of annual occurrence of fires affecting 36km² of area, cultivation affecting 20 km², felling of trees in 5 km². All these activities lead to the degradation of the habitats, destruction of forest and disturbance to animals.

Birds, herbivores, primates, carnivores get affected due to the loss of their food sources and habitats and become easy preys for predators – natural as well as human. The forest fires are mainly attributed to jhumming but no steps are taken to control such fires.

There are no floods reported in the area. No cases of droughts, water logging or problems due to natural causes have been reported either.

The main species of trees felled/ extracted include Michelia Champaca, Toona, Terminalia, Schima wallichii, Oak. The main purpose behind the extraction seems to be fuel wood as well as commercial timber and the people involved are mainly the locals.

No floral or faunal diseases have affected the PA. The livestock around the PA have never been vaccinated.

Socio- Economic Profile

There is no habitation inside the PA. According to the field report the PA is surrounded by 5 villages – all having their jhum lands within the PA. The population of the fringe villages along with the approximate area impacted by each is given below :

Village	No. of Families	Impacted Area
Pamchung	50	50 km ²
Selam	80	20 km ²
Kawlberm	80	10 km ²
Lamjhol	110	10 km ²
Ngopa	450	6-7 km ²

There is no grazing reported in the PA. It is imperative that during the process of settlement of rights these villages are given adequate land in compensation for the land that has been included in the PA. The failure of the government to do so as in case of other PAs in Mizoram has resulted in people being 'forced' to encroach upon the PA for want of alternatives. The amount of timber extracted varies from 100-200 cu. Ft. per species. The extraction is mostly in the month of Oct. -May. Oak is extracted all the year round. About 50% of all timber and 70% of oak is utilized at home and the rest is sold in towns and cities.

There are no religious and cultural uses of the PA and evidently no effects of the PA on the people have been recorded meaning that there have been no reported instances of animal attacks, crop damage etc.

In Jan, 2000 the people of Ngopa and Selam were involved in a non violent protest against the inclusion of their jhum lands in the PA. However, no action was taken by the authorities. The people of the peripheral villages have always held customary rights on the land now under PA for jhumming, extraction of timber and hunting. This has resulted in habitat destruction. Eco development is yet to be introduced in and around the PA.

Management Profile

The area was declared a sanctuary on 8/4/99 vide Notification No. B12012/15/94-FST under the Wild Life(Protection)Act 1972 Sec. 18(1). Prior to this the land was a village council land under the management of the 5 villages.

The size and shape of the PA is to be contained within some natural boundaries. No zoning has been done for the PA. The PA does not fall on any inter state or international boundary. Myanmar border falls within the 10 km radius around the PA (IIPA map) but is not causing any problems reportedly.

Management Plans

There is no current management plan for the PA but one is being devised by the ACF, Mr. P. O. Kawlhnuma. The main objectives for the PA are stated as protecting, propagating and developing the WLS and its environment.

Budget

No information is available on the budget and expenditure.

Tourism

There are 2 entry points to the PA via vehicle and none is manned. Apart from these there are numerous entry points to the PA by foot. No permits are issued for entry. No tourism is reported from the PA and there are no plans to develop any tourist facilities within the PA either. There is a public thoroughfare through the PA but the number of people using it is not known. The road connecting the villages Selam and Kawlbem passes through the PA.

Anti Poaching

There are no specific anti-poaching patrols. The poachers reportedly possess SBBL guns. The infrastructure for such squads is non-existent. The number of guns possessed around the PA is not known. No permits are issued for hunting.

Commercial and developmental activities are non-existent in the PA.

Apart from the customary jhum patches no other encroachments are reported.

Staff and Staff training

At present there is a Dy. Ranger and 2 forest guards along with 5 daily wage workers in the PA who were hired in November 1999 as game watchers.

The local incharge of the PA is Forester, Mr. Pu Ramthianglima. He is stationed at Ngopa. The PA director is stationed in Aizawl. He has the additional responsibility of Wildlife Division, Aizawl and directorship of both Murlen NP and Khwanglung WLS.

There are no vets attached to the PA. The nearest dispensary, P. O., Bank and market are about 10 kms away. The nearest hospital is 110 km away.

Training – The staff has not received any wildlife training.

Equipment and literature – There is a consolidated list of equipment for the entire division out of which equipment is used for Lengteng as and when required. The PA

is in possession of Maps and booklets for reference. There are no research and monitoring activities currently (or in the past) underway. There are no programmes to educate villagers and no interpretation facility is available.

Problems facing the PA

- ❖ Inadequate staff
- ❖ Inadequate transport and other infrastructure
- ❖ Encroachment and resource use by the fringe villagers

The field staff is skeletal and insufficient for effective wildlife management and protection duties. Further, no infrastructural development has been executed in the park as yet. Also the rights settlement issues are still awaiting final inquiry report from the District collector, Champhai. The 5 peripheral villages exert biotic pressure on the LWLS as their livelihood depends mainly on jhum, and timber collection from the forest. Also, hunting is quite common in the area as in the rest of the state. Communication facilities and other equipment are needed urgently along with trained staff.

NGENGPUI WILDLIFE SANCTUARY

INTRODUCTION

Ngengpui Wildlife Sanctuary (NWLS) lies in the Laungtlai district of Mizoram. The area falls under the jurisdiction of the Lai Autonomous District Council. The sanctuary with an area of 110 km², encloses the valley of Ngengpui river and adjoining hills. The area was declared as an intended sanctuary in 1991 and the final notification came in 1997. The river Ngengpui flows from north to south through the heart of the sanctuary. Various large and small streams form the actual boundary. There are 3 main ridges in the sanctuary – Zawhlet-Tlang, Sialphai-Tlang and Diphai-Tlang on the western side of the river, and Saise-Tlang on the eastern side. Altitude ranges from 180 msl from the river bank to 540 msl on Saisi-Tlang. The area is dissected by numerous rocky as well as silted streams. While the former are usually found in the hills the latter are restricted to the valley and adjoining low lying areas. All major streams flow into the river Ngengpui.

Almost all villages surrounding the sanctuary are situated along the metalled road that surrounds it. Ngengpui and Khawmawi villages are situated near the sanctuary boundary.

GEOGRAPHICAL PROFILE

The NWLS is situated in the Laungtlai district falling in between 92°45'12" E – 92°50'20" E and 22°21'24" N – 22°30'06" N. The nearest town is Laungtlai at a distance of 40 km and the nearest railhead lies at a distance of 440 km at Birabi. Lengpui (Aizawl) is the nearest Airport at a distance of 380 km. The best way to approach the PA is by air to Lengpui. From there by road to the Laungtlai town and then to the PA.

The highest point is(Saisi-Tlang ,540 msl) about 1200 msl and the lowest point of the PA lies at 200 msl. The area is criss crossed by as many as 23 perennial rivers/streams and 5 natural water holes. There is no data available on climatic conditions within the PA.

(Report-) Due to lack of recording stations, information regarding temperature and precipitation are not available. The southern part of the state receives maximum rainfall and conditions of high humidity persist almost all the year round.

BOUNDARY DESCRIPTION

The northern boundary of NWLS starts from the point where Aikhanlui meets Kawrawnglui, following which downstream it meets river Ngengpui following it downstream upto Khangpui. It follows Khangpui upto its source crossing a saddle till it meets Bukmual lui downstream upto the meeting point with Pawizawh lui. Following Pawizawh lui upstream it meets Ramhuai lui following which to its source the boundary crosses a saddle till it meets Sinlui source.

The eastern boundary beginning from Sinlui source, follows it down stream till it meets R. tuiphal following it downstream it meets Ngengpui river. From here the southern boundary marks its way upto the point where Tuiphal meets Ngengpui. It then follows Ngengpui downstream till it meets Zawhlet lui and then follows Zawhlet

lui upstream upto its source. From here the western boundary starts and crossing a saddle till it meets Sialphuilui source, following the stream till it meets the Sialpheiluite. It then goes upto the source of Sialphei luite crosses a saddle and meets the source of Diphalluite and goes upto the point where it meets Diphalluite going upto its source crossing a saddle and meets the course of Aikhan lui. It then follows Aikhan lui downstream till it meets the starting point at Kawrawnglui.

The toposheet reference number of the PA is 84 B/15 with a scale of 1:50,000.

BIOLOGICAL PROFILE

The type of forest occurring in the PA is sub-tropical evergreen and semi-evergreen. While sub-tropical evergreen covers an area of 60 km², semi-evergreen is found in 50 km² of the PA. The entire area is totally free from disturbance. There are no plantations in the PA. The PA is not linked to other PA through any corridors.

FAUNA – The 1999 census carried out in the PA reports the following species of fauna –

Carnivores – Tiger, Leopard, Wild dog.

Omnivores - Bear, Slow Loris.

Herbivores – Elephant, Caw, Sambar, Barking deer, Wild boar, Hoolock, Langur.

Reptiles – Python, King cobra, Tortoise.

Birds – Jungle fowl, Pheasants, Hornbills.

Tiger is a seasonal visitor to the park. Elephants, Python and Hoolock Gibbons are rare and confined to a small area. Rest of the animals are abundantly found and spread out in the PA. There is no over population among the faunal species and they are under no local pressures.

FLORA – Most of the area within NWLS is mature/primary forest, while the surrounding areas are a mosaic of bamboo-dominated patches, remnant mature forest, teak plantations and jhum follows of varying ages (Report; personal observations).

The vegetation of the area is of tropical evergreen corresponding to Northern Tropical Evergreen Forest (1b/c2) and Chittagong Tropical Evergreen Forest (1b/c4) [Champion and Seth, 1968]. The forest is characterized by a magnificent 3 – tiered structure with towering, buttressed, deciduous emergents, followed by middle and tertiary canopy characterized by evergreen trees like *Nephalium* sp., *Palaquium polyalthum*, *Chisocheton paniculatus*, *Amoora* spp. etc. with some deciduous ones

like *Arto carpus* spp. There are tracts of tall grassland on either side of the river, Ngengpui along most of its length. Palms such as *Licuala petlata*, *caryota wens* and canes are seen in all areas. Bamboos often occur in moist nalas and in the understory in some places. [Report]

[There is no information available regarding the flora of the Wildlife Sanctuary in the questionnaire].

The questionnaire mentions that there are no plantations inside the sanctuary.

In the questionnaire no weed infestation is reported. No disease of flora are reported either.

PRESSURES ON BIODIVERSITY –

No effects of human activities on the PA is registered including effects on fauna and flora. But the 1998 questionnaire does report occasional timber extraction from surrounding areas as well as minimal fuelwood extraction, NTFP and fodder extraction. Also, it reports jhum cultivation in the surrounding areas as a cause of some disturbance to the PA. Occasional cultivation of seasonal crops (Nul) on the riverbed of Ngengpui is undertaken.

No fires are reported.

Occurrence of floods is also denied as against the 1998 questionnaire which reports occasional floods in an approximate area of 20 km².

There are no means of checking water and air pollution. Landslides have been reported in 1995 in an area of 3 ha leading to the destruction of habitat. The livestock near the PA have never been vaccinated.

SOCIO-ECONOMIC PROFILE

There is no habitation inside the PA but it is surrounded by 9 villages falling in the radius of 10 km. There is no grazing inside the PA.

Fishing is pursued in the months between August-May, by the locals, mainly for food. About 1200 kg of Nghapum (small fish) and Nghakeng (Big fish) are collected out of which 20% is for household consumption and the rest enters the local or the town markets.

There are no cultural uses of the PA. The PA's effects on local people are again unlisted.

The Elephants have reportedly damaged crops in adjoining areas in 1998. Losses are estimated at Rs.30,000 for which compensation is yet to be paid.

There have not been any incidences of conflicts or contradictions between the locals and the sanctuary authorities. There is no data available on the nature of resource use and resource use activities prevalent inside the PA. No eco-development has been introduced in/around the PA yet.

MANAGEMENT PROFILE

The sanctuary was declared as such in 1991 notification came on 08.07.91, no. – B.11011/13/84 – FST under the WLPA, 1972. The final notification came in 22 July, 1997, notification no. 12012/4/91 – FST. In the initial notification the proposed area for the sanctuary was 150 km² but the final notification had it reduced to 110 km² due to admission of claims made by people of the surrounding villages.

Before the notifications the area came under the Lai Autonomous district council.

The council leased the area out to the forest department for management for a period of 25 years beginning on 10.05.83. Even if lease is not renewed, these areas will continue to be PAs under the WPA. It would then be managed by the LADC which is a constitutional body.

The WLS is not divided into zones. There are no inter-state or international boundaries causing any problems.

MANAGEMENT PLANS – There is no current management plans for the PA and no new plans are being formulated.

BUDGETS AND EXPENDITURE – The figures for the last two years are as follows –

YEARS	PROPOSED		SANCTIONED		SPENT		TOTAL SPENT
	DEV.	ECO.	DEV.	ECO.	DEV.	ECO.	
98-99	8.15	4.55	1.6 2.6 (R)	2.00	ALL	ALL	ALL
99-2000	8.43	18.90	4.15	8	NOT YET RECEIVED		

TOURISM AND ENTRY TO THE PA – There are no entry points to the PA by vehicle or by foot. No tourism is reported for the area. There are no public thoroughfare or highway through the PA.

There is a FRH is Ngengpui. It is open for non-officials as well.

There are no anti-poaching squads for the PA. There is no information available on poaching in the area. It is stipulated that none takes place. The PA is completely free from commercial and developmental activities.

STAFFING AND STAFF TRAINING – According to the field report Ngengpui staff and management seem neglected. Its RFO was transferred out 6 months ago and RO of Phawngpui was given dual charge on 8 Feb., 2000. There does not seem to be any patrolling and local staff have very little idea about location of patrol camps inside the PA, areas preferred by various animals, uses that villagers are making of the PA etc.

Pu Hram Zama, existing RFO plans to shift some of the existing staff of NWLS out, while bringing in fresh staff from the Headquarters. He also plans to assign duty

rosters to the staff present at Ngengpui in order to ensure that basic patrolling and protection work is carried out.

The questionnaire indicates the presence of 2 deputy rangers, 6 forest guards and 15 daily wagers employed for the entire year. The PA director is stationed at Lawngtlai.

The PA does not have any veterinarian or research staff. The nearest Bank, P.O., hospital, College lie 40 kms away. The staff has not received any training.

The equipment used is shared with Phawngpui NP. There are 3 rifles and 1 hand held wireless set.

The PA does have maps and booklets for reference.

INTERPRETATION AND EDUCATION

Some programmes to educate villagers are being pursued like distributing pamphlets, school awareness programmes etc. during wildlife week.

Eco-development committees have been formed who will select the beneficiaries. The YLA is associated with the developmental activities around the PA.

During the field visit, discussions with the eco-development committee members and the villagers brought out the following things to light – the villagers support the sanctuary and wildlife conservation but were unable to precisely say why. They seemed to be mouthing campaigns and messages of YMA, YLA etc. The sanctuary management should capitalize upon the situation and enlist greater public support for wildlife conservation.

Further, in Ngengpui village most of the bio-mass needs are met from surrounding forests and they don't really need to go into the PA. This is again a situation the authorities need to capitalize upon.

Eco-development activities should be so framed that the surrounding forests which act as buffers to the PA, are sustainably used thus ensuring that the villagers do not have to turn to the PA for their bio-mass needs.

- * Though the villagers have no idea regarding the functions of eco-development committee and how it will benefit them. There are a lot of expectations from the eco-development programme. People want the committee to help them improve the productivity of their land since the current jhum yield is insufficient to sustain them through the year. But care should be taken such that people's expectations do not threaten the sustainability of the programme.

It is likely that formation of sanctuary has not adversely affected them since the surrounding forests are still in very good shape.

MANAGEMENT ISSUES AND STRATEGIES

6 cases of offences were detected in 1998 but none resulted in convictions. All the offenders were villagers .

Problems facing the PA :

- * Biotic pressure in the form of practicing jhum activity followed by burning in the fringe villages. This poses threats of fire hazards.
- * Need for regular mobility/patrol around the PA. Vehicles, equipment etc., are needed urgently. All field staff needs to be equipped with uniform, guns, ammunitions, binoculars etc.
- * Regular and proposed site specific eco-development programmes should be carried out in the peripheral villages.
- * More man power is needed for effective management of the PA.

The PA is almost totally free from human disturbance. About 80% of it is pristine primary forest. Field visitors did see 4-5 patches from which trees had been extracted but no one seem to have any idea regarding who took them and why.

Since the area is in such good shape steps should be taken to preserve it as such and sustainable eco-development introduced for the surrounding areas .

NAGALAND

INTANKI NATIONAL PARK- A PROFILE

Introduction

Intanki national park (INP), Nagaland's first and only national park, was notified in 1993 and is located very close to Nagaland's biggest town, Dimapur. The park is 202 sq.km. in area and is surrounded by rivers and streams. As a consequence of prevailing insurgency in the state, the forest department has very little effective control over the sanctuary. Hence most of the information presented here has been reconstructed on the basis of interviews with the forest department staff and with the people of Beisumpuikam, a village inside the sanctuary. The questionnaire filled by the forest department has also contributed to the information presented below.

The NSCN's (IM), a faction engaged in the movement for a sovereign Naga state, has taken over the forest complex at Bara Monglu (immediately on the periphery of the PA) and has established a "cease fire monitoring cell". Since August 1997 the forest department has been unable to conduct routine patrolling in the park. The officer-in-charge of the park does go into the park sporadically. However, this is contingent upon the whims of the insurgents.

(Source- Field visit report)

Geographical Profile

The Intanki National Park is located 45 km south of Dimapur District of Nagaland between longitude 25° 30'N to 25° 45'N and latitude 93° 10' E to 93° 30' E. The nearest town, railhead and airport is Dimapur which is well connected with the park by a motorable road. The average maximum temperature is 35°C and minimum is 5°C. On an average the annual rainfall is recorded at 1557.5 mm. Water sources inside the PA include five seasonal artificial holes, seven perennial rivers and four perennial streams.

Intanki National Park is located in Dimapur district of Nagaland lying south west of the state. Its northern, north western and south western boundary is along the Dhanisiri river. The Southern boundary is along Tuilung river. The south eastern and north eastern boundary is along Balu Nala, Intanki River and Misapdisa Nala upto the Monglu river.

[Source- Management plan]

The highest point is at Lungphudi, the altitude of which is 682 m above mean sea level. The lowest being the Dhansir river at 180 m above msl.

(Source – Questionnaire)

Biological Profile

Flora

The park is characterized by the following forest types: Semi evergreen, Sub tropical cane and Bamboo brakes and Riverian forest and swamps. The top canopy in these forests is characterised by species that are deciduous for a short period, with the middle and lower canopies being mainly evergreen in character. Hill type of forests occurs in the upper slopes and tops and ridges of the hills. The crop composition is essentially mixed in character. There is no particular dominant species, the whole crop is a mixture of a large number of miscellaneous deciduous and evergreen species.

[Source – Management plan]

In the top canopy the main species (above 5 m in height) found are :

Sterospermum chelonoides (paroli), *Terminalia myriocarpa* (Hollock), *Phoebe goalparensis* (Bonsum) *Cederella toona* (Poma), *Mangifera indica* (Am), *Mansonia* spp (sopa), *Canarium rosimifoum* (Dhuma), *Artocarpus lakoocha* (Sam), *Bombas ceiba* (Semul), *Duabanga sonnerotoides* (Khokhon) *Gmelina arborea* (Gamari), *Pterospermum acerifolium* (Hatipolia).

In the middle story the species (1.8-5 m in hieght) found are:

Dillenia indica (Owtenga), *Dryptes assamica* (Rali), *Premna* spp. (B.Ghas), *Polyonthia semarina* (Kohori), *Anoora rohituka* (Lali), *Dellinia Pentagyna* (Bajiw), *Agalaria edulis* (M.Lete Kn), *Cordia Mysca*, *Kyadia calyoina*.

Aquillaria malaccensis (Agar), *Syzigium* spp. (Jamun), *Citrus reticulata*, *Muraya* spp., *Hydnocarpus kurzii*, *Baccauria sapida*, *Moringa oleifera*.

Climbers like *Acacias*, *Bauhimias*, *Cambretus*, *Dermia* and *Smilex* are found.

In the grassland and open areas, speceis like wild pan (piper beetle), *Polygonum* spp., *Micamia scandens*, and *Xanthium* are observed.

Among bamboos *Dendrocalamus hamiltonii*, *Bambusa tulda*, *Teinostachyum* spp., Canes are represented by *Calamus flagelum*, *Calamus tenuis* and *Calamus floribunda*.

[Source – Management plan]

Most of these forests were presumably under cultivation until the beginning of the last century and as a result, at present, these represent a seral state.

[Source - Questionnaire].

Fauna

Due to abundant availability of water in the park, is an ideal habitat for a wide variety of fauna.

Mammals - elephant (*Elephas maximus*), tiger (*Panthera tigris*) Sloth bear, gaur (*Bos gaurus*), Sambar, Barking deer, Wild dog, wild boar, porcupine, Common Langur, Hoolock Gibbon, (*Hylobates hoolock*), Rhesus monkey, Jungle Cat, Civet Cat, Flying squirrel, Goral, Fox, Pangolin (*Manis crassicanda*), Leopard Cat (*Felis bengalensis*),

Reptiles- Crocodile, Turtle, Monitor lizards, Python, King cobra. Crocodiles are sighted only in the Kumsumdisa nala, Hatipudisa, Dhansiri and Intanki rivers.

Avifauna- Lesser hornbill, Jungle fowl, Kaleej pheasant, Green pigeon, Egret, Crow Pheasant and Black stork.

[Source – Management plan]

The fauna of Intanki is under severe threat, with the populations of most species having declined significantly in the past couple of years.

For instance the census figures available with the forest department indicate that 67 individuals of Gaur were recorded in the 1990's. However, currently only about 5 survive. This decline has been attributed to degradation of habitat and hunting.

Similarly Sloth bear numbers have fallen from 11 to 2. Earlier about 55 Hoolock gibbon were counted in the park, while currently their population has been estimated at 12. Both species have borne the brunt of rampant hunting in the area.

The greatest damage caused by fragmentation of habitats resulting from heavy logging and encroachments by humans has been to the elephant population. Its past peak population was recorded at 141. The current population estimates show 29 individuals. The park has been brought under Project Elephant to protect and regenerate the elephant population. Prior to 1993, elephants used to be present in the areas presently encroached by Beisumpuikam village. After encroachment, elephant herds have moved beyond this area and are now confined to interior areas

of the park. In summer, the elephants remain in Intanki National Park while in winter they migrate towards Assam. The area occupied by Beisumpuikam village was a good elephant habitat and the proposed exchange of land with this village is likely to affect the elephants of this area. The area that is proposed to be added following the exchange with Beisumpuikam village is comparatively more hilly and is therefore unlikely to support the same density of elephants as has the area that is in the process of being given up to the villagers.

Intanki National Park is connected to Dhansiri Reserve Forest in Assam forming a corridor for Elephants all along the Dhansiri river.

The tiger, leopard, and Sambar are also severely threatened due to hunting & poaching pressures.

[Sources- Questionnaire]

Socio-economic Profile

There are at least 15 villages on the immediate periphery of Intanki National Park with a population of 12,800 (all STs). In addition, Beisumpuikam village, illegally established in 1993, is situated inside the PA occupying an area of 15.54 sq.km. Details about this encroached village are presented in the section on encroachments in the management profile.

Of the 15 villages adjacent to the National Park, Zeliang tribals inhabit about 4 villages, Kukis in about 7 villages and Dimasa Kacharis in 2 villages and the remaining are inhabited by Angamis, Chakhesangs and Khelmas. The villages settled in the vicinity of the NP are Mokhan, Sonapur, Khelma, Ekisingram, New Suget, Bongkholong, Pelhang, Vonkithem, Phaijol, Lillen, Jalukekam and Monglumukh.

(Source- Questionnaire)

Dependence of the people on the PA

Grazing - At least 20 sq.km of the tourist and buffer zones of the PA is affected by grazing. This occurs generally in the months between January and April. About 200 cows and buffaloes graze illegally (annually). Though the number of animals grazing has increased, it is not seen as an immediate cause of concern as cattle is normally reared for ploughing and for meat. There are no migratory grazing passing through the PA.

Collection of timber and NTFP- Although not at a very alarming scale, yet there is illegal collection of timber in the months, between October and January. The stem of the timber species namely Hollock (*Terminalia myriocarpa*), Lali (*Amora Wallichii*), Titachap (*Michialia champaca*), and Sam (*Autocarpus chaplasi*) are collected amounting to at least 35 cubic metre per year by the locals from the park for domestic use.

Fishing also takes place by both locals and outsiders in the wetlands between October and March for use in the household. The quantity collected is not known.

Hunting does take place in the PA by both locals and outsiders. Sambar, sloth bear, Wild boar, barking deer and gaur are hunted for food and for their perceived medicinal properties.

Apart from all this, illegal trade in Agar wood (*Acquilaria agolacha*) is reportedly fed by wood extracted from the park. The forest staff report that the number of standing trees of Agar has been considerably declined in the park. The quantum of agarwood collected is not known.

(Sources- Questionnaire and interviews with forest staff)

Impact of PA on Local People

No compensation has been paid for attacks by wild animals on human beings and for crop damage. In February 2000 an elephant attacked a boy inside the park and killed him. In the same year in the month of October elephants destroyed paddy over an area of 7 hectares causing an estimated loss of Rs. 60,000 which has not been compensated. [Source- Questionnaire]

A lone elephant is held responsible for the killing of a boy in Doldoli and Donzing pham villages. Elephants become particularly active during harvesting and rainy seasons. The villagers report that during their early settlement in early eighties around the PA the elephant problem was more severe. Now it has comparatively decreased. However crop raiding by wild boar has increased over time. Villagers protect their crops by maintaining constant vigil over their fields and use noise (drums etc.) to keep animals away.

The people of Beisumpuikam felt that human wildlife conflict can be reduced by fencing off the PA.

(source – interview with inhabitants of Beisumpuikam)

Eco-development Activities

Eco-development has been taken up in the villages surrounding the PA. Fuel wood plantations have been taken up for 200 families; horticulture for 50 families; 60 families benefited from construction of ponds for cattle and villagers; 10 families have been helped to erect cowsheds and 40 families were covered while creating grasslands for livestock.

All these activities were meant to reduce the peoples' dependence on the PA. The authorities suggests that these schemes are the only ways to elicit support of village communities and thus reduce pressure on the PA.

(Source – Questionnaire)

People Participation

Locals are involved in developmental activities such as plantation and other habitat enrichment activities. Based on interviews with the residents of Beisumpuikam, it is apparent that even though the people voice a positive attitude towards the park, this is quickly evaporates if the people have to make any sacrifices for the sake of the park. The fact that the village has encroached upon the park and has carved out a football field in prime elephant habitat is evidence that it is improbable to find support for the park among the people.

(Source- Interviews + field observations)

No information on perceptions of villagers other than residents of Beisumpuikam.

Management Profile

Area- 202 sq.km.

Notification- 3rd March 1993 vide Notification no.FOR-43/83 under section 35 of Wildlife (Protection) Act, 1972. Final notification awaited.

Area not under the control of PA authorities- the land encroached by Beisumpuikam (approx 15 sq.km) is not under the control of PA authorities.

Status before notification- The legal status of the PA prior to its being notified as NP under the wildlife (Protection) Act, 1972 was that of a wildlife sanctuary comprising of 202.02 sq.km.

Basis on which PA limits were defined- boundaries of existing RF and natural boundaries like rivers, which surround the PA on almost all sides.

Significant boundary alteration since notification- None so far. However, it is proposed that the area currently encroached by Beisumpuikam may be denotified and additional, equivalent area may be notified.

Stage of completion of legal procedures

It may be noted that the proclamation was issued on 14th May 1998 as per the Supreme Court directive and the final notification of Intanki National Park is awaited. This includes the area that is encroached by Beisumpuikam.

(Source- Interview with in charge INP)

Management Planning:

Zonation- The PA has been categorized into Core, Buffer and Tourist zones with an area of 31.08, 155.40 and 15.54 sq.kms respectively. Hence, the Buffer zone covers 76.85% of the total area of the PA, the core zone constituting 15.38% and the Tourist zone (which is encroached upon by Beisumpuikam villagers) covers 7.68% of the total PA.

Management Plan- The first management plan was made on 1st June 2000 by the wildlife wing of the Forest department of Nagaland. It is pending approval and its period of its viability is from 2000 to 2010.

(Source - Questionnaire)

Budget and Expenditure

In the last three years the Intanki National Park received Rs. 1.65 lakh each for 1997-98, 1998-99 and 1999-2000 from states plan funds. From the Non-plan funds the PA was allocated Rs.16.09 lakhs in 1997-98, Rs.15.44 lakhs in 1998-99 and Rs.16.45 lakhs in 1999-2000 towards salary of the PA staff. The total amount allocated and spent adds upto Rs.47.98 lakhs (Rupees forty seven lakhs mirety eight thousand) only, in the last three years.

The PA also received other funds from the government of India in the last three years. In 1997-98 it received Rs.7 lakhs, Rs.19.92 lakhs in 1998-99 and Rs.61.7 lakhs in 1999-2000. All for management and development of the PA.

[Sources- Questionnaire]

Tourism

Tourism in Nagaland, and by corollary in INP, is virtually non existent.

The best months for visiting the PA are from October to April.

The management plan does have strategies for making tourism eco-friendly. Already there is a rest house in the forest colony near the PA with three non-AC room for Rs.50/- each per day. It is not open to non-officials normally.

The PA does not attract any pilgrim traffic.

[Source – Questionnaire]

Poaching and Anti-Poaching Measures

It has been reported that prior to the insurgents setting up base in the forest colony, city dwellers from Dimapur as well as people of the surrounding villages used to make frequent attempts at poaching in the sanctuary. However, as a consequence of regular patrolling in the park, a number of such attempts were thwarted. Subsequent to the coming of the insurgents, poaching by such parties has come down because their presence is a deterrent to people venturing into the area, particularly with weapons. (Source; Personal communication from Mr. Meyase, in charge INP). There is no specific information on poaching by the militants and hence its likely impact cannot be commented upon.

A discussion about anti-poaching measures is academic in the current scenario, when the forest staff is not even able to venture into the PA. However, under the assumption that the presence of militants is not a permanent feature, the PA needs a

wireless network on priority. This is necessitated by the general inaccessibility of the area.

Further, all the anti poaching camps are concentrated in the southern area of the park. This has left the northern area of the park virtually unguarded. According to interviews with the forest staff, this area is particularly prone to wood and NTFP theft. Since this area of the park is unaffected by the insurgents, it can be subjected to regular patrolling, thus reducing the probability of illegal removal of wood and NTFP. Lack of adequate staff has been reported as the reason for the northern area of the park not getting adequate attention. However, given the fact the high priority status that Intanki enjoys on account of its biodiversity value, wherever feasible, the PA should receive suitable protection.

Though the PA does not have anti-poaching patrols operating exclusively for the purpose, as reported earlier, prior to the presence of the militants routine patrolling used to take place regularly in the park.

(Source – personal observations)

Arms and ammunitions- 19 nos. of 12 bore gun and 45 nos of muskets all of which are in use. There are also 9 tents and 22 vehicles, a mini truck and a Maruti gypsy and 9 Walkie-Talkies

The poachers use lethal weapons and jeeps. Patrolling does get hampered during monsoons. Though not a formal informer network, the PA management does receive information from the locals on a number of aspects regarding the park, such as hunting parties and so on. However, there is no incentive scheme in place. The PA management strongly articulates the need for such a scheme, given past successes in combating poaching as a result of information supplied by the locals.

No assessment has been done on the number of licensed/unlicensed guns in the PA and its surrounds.

[Source- Questionnaire]

Commercial / Development activities inside the PA

A 7 sq.km dam was constructed (BY WHOME??)in 1999 to provide irrigation to peripheral villages through canals. This was made in the tourist zone where Beisumprikam village has settled. The negative impact of this development has been in turning a grassland into water-logged area. No preventive or control measures have been taken to mitigate the problem.

Further, a playground has been made by leveling an area of the size of a football field using bull-dozers by the villagers of Beisumprikam. This is meant to be used by the villagers for recreational purpose and is located on the edge of the village, inside the PA.

There is no public thoroughfare or highway through the PA.

[Source- Questionnaire + personal observation]

Apart from these pressures, the Reserved Forest on the Assamese side that borders Intanki National Park towards its north-west is being increasingly encroached upon. The PA management believes that if this is not curbed, it can be a threat to INP in the future.

(Source- Interview with In charge, INP)

Encroachment

The area that is today INP has a history of encroachment. It is summarised below:

1. Prior to the declaration of the sanctuary some Kukis encroached the forests on the bank of river Bara monglu (year not known). This encroachment was evicted.
2. After the declaration of sanctuary around 1976 there was an encroachment by Zeliang Nagas in what is now the core zone. This too was evicted.
3. Around 1978 encroachment by some kukis on the bank of Bara monglu opposite Libenphai village in what is now the tourist zone of the NP. Eviction carried out.
4. In 1984-by the tourist zone was again encroached, this time by Zeliangs between Monglumukh and Misap Disa nala which was also evicted.
5. Again in 1985 the same group of people encroached over the same area which was also subsequently evicted.
6. The same Zeling people eventually settled in a village outside the PA on the banks of Misap Disa nala. This was called the New Beisumpuikam village.
7. Heavy illegal timber operation started inside the Tourist zone by traders from 1991 onwards. In 1994 about 8 groups of people consisting of zeliangs, semas and Sangtams encroached the Tourist zone to establish 8 separate villages.
8. The govt. evicted all the other 7 villages encroached. However, one village, Beisumpuikam, was not evicted because they had submitted a representation to the govt. claiming rightful ownership over the encroached area.

The villagers of Beisumpuikam have now proposed that they be permitted to retain the 15 sq.km. of park land that they have encroached upon. In return, the villagers are prepared to give to the forest department an equivalent amount of land that was a part of old Beisumpuikam village and adjoins the park. (Personal communication-K. Meya Se)

The Villagers of Beisumpuikam enjoy political patronage of the forest minister of the Nagaland govt. and hence the forest department has not been able to evict this village. In fact, a minister of the Nagaland govt. in 1992 "inaugurated" the village thus lending it legitimacy. There is a plaque to this effect displayed in the centre of the village.

As a consequence of the political patronage enjoyed by Beisumpuikam, the state govt set up a cabinet sub-committee to look into the matter. The committee has given its go ahead for the so called exchange proposal and a preliminary field survey of both the areas has been carried out. However, as a consequence of ambiguities in the maps that were used for the survey, the officer-in-charge of INP has recommended a re-survey. This is currently awaited.

(Source- Personal communication and field observations)

The current population of Beisumpuikam is 649 and these are all Zeliang Nagas. Their major occupation is agriculture. The village also has 65 cattle that are used for ploughing and reared for meat. There is dependence on the forest for their other needs such as fuel wood and timber for house construction. The villagers of Beisumpuikam have an interesting story to justify their encroachment. They claim that the area that is INP and its surrounding areas traditionally belong to the Zeliang Nagas and in particular to the village of Old Beisumpuikam that adjoins the park to its north-east. In 1922 when the British started reserving forests in this area, the people of Beisumpuikam, in return for friendship with the British and a token tribute of a gun, a shawl and salt presented to some influential people in the village agreed to give to the British the area that is today INP. The villagers however now claim that the area that is being currently encroached by New Beisumpuikam village was

actually not given to the British. When confronted with documentary proof to the effect, the response of the encroachers varies. Some common refrains are- “our forefathers were ignorant of paperwork and were confident of Gods paper work in the form of rivers and streams”. The villagers also allege that the people who were among the group that surveyed the forest for demarcating the boundaries, did not actually represent the people of Beisumpuikam to whom the ‘encroached’ area belongs because a few of their villagers were hand-picked to join in the survey. They insisted that while the entire forest was given up for Reserve Forest (With the exception of permissible access to and use of salt pits at a few spots inside the RF) the ‘encroached’ area had not been given up.

The forest department’s version about the encroachment is the following:

Soil quality coupled with shifting cultivation ensures that people have to move from one area to another in search of agricultural land. As the population of a village expands, some people invariably have to colonise new areas and set up fresh villages. Similar has been the case of Beisumpuikam. Some inhabitants of old Beisumpuikam moved to the encroached area in INP in search of viable jhum lands and potable drinking water. As they were repeatedly evicted from this site, they finally settled down in an area just outside the national park. However, the events of 1994 (described above) provided the villagers a toe hold and they encroached into the park once again. Since then, political support has ensured that the department is unable to take any action against the encroachers. In fact the encroachers have now been able to influence the state govt. to “exchange” the encroached area for the area where they had earlier settled i.e Old Beisumpuikam. The encroached area used to be prime elephant habitat. In fact, elephants continue to frequent this area resulting in incidents of elephants killing villagers and damaging crops.

(Source – Interview with forest department)

Staff and Equipment

There are 17 staff members sanctioned and in position in the PA.

The PA’s officer- in-charge is the ACF who is assisted by a range officer (local in charge), 4 Deputy Rangers/Foresters, 5 Forest Guards, 4 game watchers and 2 mahouts. Besides, there were daily wagers employed in the PA for patrolling duties in the last three years. From 1998 to 2000 there have been 16 each daily wagers employed each year. All of these are from villages adjoining the PA.

None of the staff posted at INP has undergone wildlife training.

There are 2 forest colonies on the periphery of the park. The one at Bada Monglu village, which is on the immediate boundary of the park is under the control of insurgents. However, the one at Monglumukh (approx 3 km from the PA) has lodging facilities for forest staff and is occupied by them. Basic facilities are available at Monglumukh. (Source- Questionnaire)

Research and Monitoring

No research work either in the past or at present has been carried out. Fauna census’ were carried out in 1978, 1988, 1991 and 1999 using direct sightings. The entire PA was covered during the census.

Awareness Programmes

Nature awareness campaigns are conducted annually for the general public in and around the PA. There are no interpretation, education or extension centers in the PA.

(Source- Questionnaire)

Offences

There used to be a number of cases of poaching and illicit felling from the NP. However, after the insurgents set up camp on the periphery of the park, there has been considerable reduction in such incidents.

(Source: Personal Communication with in charge, INP)

Despite the encroachment, it is estimated that at least 75% of the PA is totally free from any human disturbance.

(Source- Questionnaire)

Sources;

1. Field visit report
2. Draft management plan for Intanki national park.
3. Questionnaire
4. Interviews with villagers of Beisumpuikam
5. Interviews with forest department staff

Pulie Badze wildlife sanctuary

Introduction: This sanctuary is situated in Kohima District with an area of 9.23 sq.km. It is located at Lat. 26⁰ Long 93⁰. South of the sanctuary is surrounded by Japfii mountain (the second highest mountain in Nagaland) adjoining the famous Dziikou Valley, which is proposed for a merger to form a unified sanctuary, i.e.; Pulie Badze-Dziikou Wildlife Sanctuary. The distance of the sanctuary from Kohima is 9.5 km and from Dimapur it is 85 kms. From kohima one can ride upto kohima science collage situated in Jotsoma village. From here the sanctuary is approachable only by trekking for a few kilometers up the mountaintop of the sanctuary. The forest type here is temperate evergreen rain and high forest and southern sub-tropical broad-leaved wet hill forest. Some major fauna include goral, Tragopan and khaleej pheasants.

Tourist -Park Interface: The sanctuary has no village inside. Tourism was not open for some years until recently. There are no zonations of the sanctuary though.

Legal and Management issues: The Pulie-badze wildlife sanctuary was declared on 18th January 1980. Until 1979 it was under the category of Protected Forests. Entry permit is not required. No rights for collection are permitted.

Conclusion: Information provided was inadequate regarding many aspects of the sanctuary. The merger of the sanctuary with Dziikou valley seems to be a very good proposal.

RANGAPAHAR WILDLIFE SANCTUARY

INTRODUCTION

Rangapahar Wildlife Sanctuary (RWLS), 4,7 sq.km in area was notified in 1986. Located on the outskirts of Dimapur town, the sanctuary today has been nearly wiped out on account of encroachments.

A series of 24 instances of encroachment and subsequent evictions have been reported from Rangapahar since 1992. However, despite repeated evictions, a village by the name of Tulazouma (the same village that had been evicted earlier) continues to exist in the northern part of the sanctuary, it occupies a major portion (approx 2.35 sq. km.) of the PA and the village also cultivate inside the PA. The people of Tulazouma have an interesting version of the rationale for their repeated encroachment. This has been explained in some detail in a document entitled The Truth About Tulazouma, prepared by the Tulazouma village council in 1999.

It is claimed that the area that today constitutes the Rangapahar WLS has traditionally been the land of the Angami Nagas. The Angamis fought against numerous British expeditions in the frontiers of Chumukedima (an Angami village close to the sanctuary) in order to safeguard their land (sources as cited in The truth about Tulazouma; Mackenzie, Reid, Elvin, Johnstone, Butler, Haimendori and others). John Hutton recorded that the borders of the Angami country runs up to Nambar Forest in Assam (John Hutton; Angami Nagas), In the Pol. Case No. 17 of 1912/13, J.P.Mills, Asst, Commissioner, unambiguously stated Angami ownership of Rangapahar forest vide his ruling dated 20/3/1913.

It has been alleged in the above-mentioned document that the imbroglio of the Rangapahar Reserve Forest has its very genesis with the Forest Department. A few vested officials in collusion with politicians and criminals set the trend in order. Formerly a heritage for the future generation, these vested elements looted and plundered the 'public property' directly or indirectly and through open or camouflaged criminalism, built fortunes for a lifetime. The document further states that," under circumstances of such unbearable plunder, coupled with the fact that the Department had connived with criminals in land grabbing and timber smuggling, Tulazouma people asserted their rightful ownership over the land bequeathed to them by

Chumukedima village for the purpose of subsistence and re-forestation.” Since then, Tulazouma people have been persistently struggling to live here despite 39 (24 according to authorities) instances of evictions.

The people of Tulazouma approached the Kohima bench of Guwahati high court in 1992 in support of their claim over the land of Rangapahar. In 1994 the court dismissed their plea and ordered the villagers to vacate their land. The government of Nagaland however, in response to a representation by the villagers, constituted a cabinet sub committee to look into the matter in 1999. The Committee in turn empowered the ministers of the Angami region to organize a meeting of the Angami Public Organisation (APO-the apex institution of the Angami Nagas) and its subordinate organizations and the leaders of Chumukedima and Tulazouma villages to sort this matter out. The decision arrived at during this meeting was informed to the Sub-Committee that the ownership of land in the encroached area under reference had been authorized in favour of Tulazouma village.

Based on these findings the Cabinet Sub-Committee on Tulazouma village is considering the possibility of recommending settlement of a minimum area of land in favour of the claimants subject to the following:

- (i) The legal limitation faced by the Government in the matter and orders of the Supreme Court and as discussed in the meetings is clearly understood.
- (ii) In view of legal compulsions and programmes of the Forest Department any Settlement on the above lines would have to be in the nature of one time final settlement of the matter and this should not become a precedent for opening up other similar claims in the future.
- (iii) The settlement of the new area would be in favour of the original claimants to ownership of land who have to be identified carefully. Such claims would have to be vouched by the original landowners (Chumukedima villagers) along with the APO. The recognition can only be in terms of the existing guidelines of the Home Department.
- (iv) The concerned parties including APO would be requested to furnish a written understanding requiring them to protect further encroachment in future. They would also commit to undertake afforestation in the area as

may be required in terms of the relevant Act in the event that the recommendations are finally accepted by the Government of India.

- (v) The finding of the committee can only be recommendatory in nature and the final decision will be taken by the Indian Board of Wildlife, under reference by the state Government

In order to better understand the current state of affairs in the PA, a brief history of the PA and the surrounding Rangapahar RF is described below:

Background and History; Constitution of RWLS

Rangapahar was first constituted as a Reserve Forest in the year 1916 (Vide Notification No.3808 R dated 24th October 1916 under Section 17 of Assam Forest Regulation, 1891 (VII of 1981) for an area of 6,816 acres (27.60sq.km). This was subsequently modified and amended (vide Notification No. 4823R dated 18th December, 1916) and increased the area to 0,611 acres (42.97sq.km).

Again, on 28th November, 1919, an additional area of 7,865 acres (31.85sq.km) was reserved under Section 17 of the Assam Forest Regulation 1891 (VII of 1891) and added to Rangapahar Reserve Forest (Vide Notification No.8583 F). Further, on 8th January, 1924, another notification No.58 R was issued under Section 17 of the same Regulation which modified the earlier notification and added some more Land to the proposed Reserve Forest, finally increasing the area to a total of 21,768.4 acres, (88.16sq.km) {Sources; "The Truth About Tulazouma" , page 3 + Doc B-Rangapahar RF notification}

De-Reservation and Deforestation for Sugar Mill

In the year 1966 an area of 4896 acres (19.82 sq.km) was de-reserved and deforested for the purpose of establishing a sugar mill & cultivating sugarcane vide.

Notification No.FOR-15/65 dated 1st July, 1966, Subsequently, by an order No.DLS-2/69/6155, dated 11th September, 1969 (which was later modified by an order No.Rev/DLS/46/71, dated 2nd July, 1971), an area of 2230 acres (9.03 sq.km) out of the above mentioned area was allotted to the Department of Industries and Commerce.

Apart from the 4896 acres (19.82sq.km) that was de-reserved, no other portion of this Reserve Forest was ever de-reserved. This should have left an area of 16,872.4 acres (68.38 sq.km) intact. What is left of the sanctuary however, is a mere 4.7 sq.km and the Reserve Forest is left with just 1.61 sq.km. The fate of this Reserve Forest from late 1960s till 1990s remained a chronicle of plunder, mismanagement and a clash of selfish interests at play. There was unrelenting depredation of the Reserve Forest eventually leading to the establishment of several villages. These villages in the Reserve Forest ultimately gained legal sanctity when the state Government, by flouting all norms and codal procedures, granted recognition.

[Source: “ The Truth About Tulazouma” , page 6]

Proposal for Wildlife Sanctuary

It was in 1986, that the Nagaland Government issued an order (Vide Notification No.FOR-84/84 dated 30th January 1986), declaring an area of 470 hectares (4.7 sq.km) of land within the Reserve Forest as “Rangapahar Wildlife (Deer) Sanctuary”. Six months later, the Government issued yet another notification on 29th June, 1986, superceding the earlier notification and renaming the proposed sanctuary as “Rangapahar Wildlife Sanctuary” under Section 18 (1) and (2) of the Wildlife (Protection) Act, 1972.

[Source – “The Truth about Tulazouma”, page 7]

Deforestation of Proposed Sanctuary by Forestry Department, 1990

“Against prescribed tenets under the Act, the Forest Department in 1990, deforested the entire area by an order No. FG-2/29/90/5033-36, dated Kohima 16/11/90. The clear felling of trees in a proposed sanctuary purportedly for the wellbeing of wildlife was as absurd as the act of pumping a fishpond dry. Not being satisfied with the deforestation, the Department continued to clear fell all standing trees by an extended order No. FG-2/29/90/418-20, dated Kohima 20/4/91”.

[Source – “The Truth about Tulazouma”, page 8]

Present Status of the Reserve Forest and Wildlife Sanctuary

The reserve forest portion having 1.61 sq.km. which has been earmarked for State Zoological Park is facing duel High Court cases, one from the unrecognized Selouphe village (encroached) and another from Tsithrongse village (encroached but

recognized). The cases are pending with the Kohima Bench High Court and Guwahati High Court, respectively. In addition, the above-mentioned cabinet sub committee's recommendation upon the fate of Toulazouma, is also awaited.

[Source – Report by DCF-WL to PCCF)

GEOGRAPHICAL PROFILE

Rangapahar Wildlife Sanctuary is located in Dimapur District of Nagaland Between latitudes 25⁰ 50' to 26⁰ 0' and longitudes from 93⁰ 35' to 93⁰ 45' bordering the state of Assam towards its west which is separated by the Dhansiri river. It is just 1 km from Dimapur, which is the 'gateway to Nagaland' and is connected through a PWD road. The road forms the boundary and goes on to Intanki National Park. It is the most populated urban center and has the state's only airport and railway station. The road to Intanki National Park passes through Rangapahar.

Elevation ranges from 163.40 m, at Borkoti to 145.17 m at Singrijan-Dhansiri confluence above mean sea level.

[Source – Questionnaire]

Topography

Dhansiri River bound the northern side of the sanctuary and a PWD road on the remaining sides. There are a few natural salt licks. They had contained luxuriant natural growth of vegetation where heavy operation was carried out during the Second World War, which was one of the causes behind depletion of the vegetation. So some of the areas had been planted up by clear felling and facilitating artificial regeneration. There are a few meadows and swampy areas.

[source – Summary Write Up on Rangapahar Wildlife Sanctuary]

Climatic conditions

The average annual temperature ranges between 35⁰ C and 5⁰ C. On an average, the area around the sanctuary receives at least 2000 mm of rainfall. Water sources inside the sanctuary include 2 perennial natural lakes, 1 perennial river and 3 seasonal rivers/streams.

[source – Questionnaire]

BIOLOGICAL PROFILE

Forest Type

Rangapahar Wildlife Sanctuary used to be under the “Northern Tropical Semi-Evergreen Forests”. It is a flat land unlike the hilly and mountainous terrain of the rest of Nagaland, Bounded by river Dhansiri towards its northern side.

[Source – Questionnaire + Field Observation]

Faunal Species

In the past, the following species were found but now the population has vanished due to indiscriminate hunting and habitat destruction. Sambar, barking deer, wild boar, monitor lizard, porcupine, python, turtle, water birds including visiting wild duck, jungle fowl, kaleej pheasant and various species of smaller birds were found. Earlier, there were such threatened species as the elephant, tiger, leopard, hornbill, etc., which have vanished.

[Source – Questionnaire]

Flora Species

Some of the original species which are not found now are Ammora Wallichii, Dillenia indica, Bischofia javanica, Spondias mangifera, Sterospermum cholonoides, Terminalia balerica, T.nudiflora, Tetrameles nudiflora, etc. Planted species are teak, sal, gmelina, Chekressia tabularis, Albizzia procera, Lagerstroemia flos-regina, Bombax ceiba, etc.

[Source – Questionnaire]

It was noted also that a lot of teak tree plantation fruit trees were seen belonging to the Tulazouma villagers.

[Field Observation]

SOCIO-ECONOMIC PROFILE

History of the People’s Relationship and Association with the PA

As described in the introduction.

Dependence of the People on the PA

Atleast 2.35 sq.km of the 4.70 sq.km area of the PA (50% of the total area) is under the occupation of Tulazouma village since 1992. The major occupation of the

villagers is agriculture. There are at least 13 villages adjacent (10 km radius) to the PA with an approximate population of 7,500, all tribals.

[Source – Questionnaire]

Grazing has been increasing inside the sanctuary in the forest and grassland areas over an area of 2 sq.km. between November and May at least 700 cows graze legally and 800 illegally, And between January and December 500 goats graze legally and 900 illegally.

[Questionnaire]

Around Dimapur- Rangapahar area, it is not surprising that with the expansion of urban population these fertile plains have been encroached upon for agriculture and plantations. One could see bullocks ploughing the fields almost all over the place you set your eyes on .

[Field Observation]

Fishing and collection of fodder species by locals as well as Nepalese labourers have been reported. No timber collection is going on because not much of it is left anyway and whatever is left are a few trees in which the Indian Army has been posted temporarily in the interest of the sanctuary as well as for strategic reasons. In any case, there is an army headquarters a few yards across river Dhansiri, not far from this post.

[Field Observation]

Extent of local rural and urban pressures on the PA

The Rangapahar Wildlife Sanctuary being a relatively plain land of the forest type of Northern Tropical Semi evergreen forests and very close to Dimapur, the commercial hub of Nagaland, it was invariably susceptible to illegal activities. It was only in 1993 that the area was declared as Sanctuary and during its Reserve Forest status much of the area had already been exploited to the hilt in terms of heavy logging and encroachments. The presence of Tulazouma, a report says, has been an icon for other surrounding villages, such as Thaheku, Tsithrongse, Chekeye, Sangtamtilla, Murese, Nagarjan, Thilixu, Vishema, Singrijan and other individuals and groups from Dimapur who are being sponsored by some powerful people.

[Source – Doc-G Report to PCCF + Field Observation]

Conflicts and problems arising out of the existence of the PA

According to official reports, evictions were carried out 24 times and on every occasion there were clashes between encroachers and Park authorities. There was violence at all instances and the encroachers were arrested and deported to police custody but were released without trial on a bail bond.

[Questionnaire]

According to local people, particularly Tulazouma, since December 28, 1994 and upto 9th March 1999, a chronology of burning/destruction of Tulazouma by the Government has been reported. Crops like mustard, maize, paddy, vegetables, banana and other fruits trees, 30 CGI-rooted houses, church, livestock etc. were either burned or destroyed. It amounted to a total of 2360 houses in all plus other properties. The estimated loss reported was two crores forty-three lakhs and forty thousand (Rs. 2,43,40,000/-).

[Source – Doc-E “The Truth about Tulazouma”]

The main problems faced by PA authorities in dealing with local people

The sanctuary being very close to Dimapur town, it is encroached upon from every direction. Due to funds constraints for development and management of the Sanctuary, the encroachers can easily take undue advantage by way of physical occupation, and despite 24 evictions, encroachment is still going on. Tulazouma village has been a major problem for the PA authorities to deal with. This is so because the villagers had filed a lawsuit against the Government claiming ownership of the land. Some sources say that the encroached areas are actually “remote-controlled” from outside by influential classes while their ‘care-takers’ are placed in their respective lands with mutual understanding. Normally these caretakers happen to be the poorer relatives of the influential lot. Now, with the final decision on the issue of Tulazouma being with the state Cabinet Sub-Committee the PA authorities cannot go ahead with evictions. This is going to have a great impact on the ‘Wildlife 2001’ project, which is certainly a very critical need at this juncture in Nagaland.

[Field Observation]

MANAGEMENT PROFILE

Summary of legal and Management issues

Rangapahar Wildlife Sanctuary was notified on 20th June 1986 (vide Notification no. FOR-84/84, under the wildlife (Protection) Act, 1972. It occupies an area of 4.70 sq.km. Initially, the Sanctuary was a part of the Rangapahar Reserve Forest, the area of which stood at 21,768.4 acres (88.16 sq.km.). Since then, the area had been drastically reduced due to the following reasons (according to official reports):

1. Government of Nagaland rehabilitated the Second World War victims.
2. De-reservation of an area for growing sugarcane to enhance the supply of raw materials to Nagaland Sugar Mill.
3. Government of Nagaland rehabilitated the surrendered underground insurgents.
4. Due to encroachments by villagers and subsequent recognition given by the Government an area of 4.70 sq.km. was declared as Wildlife Sanctuary in 1986 vide the Government notification No. FOR 84/84 dated 15/6/1986. Adjacent to this plot there is another plot measuring 1.61 sq.km. of the reserved forest, which has been earmarked for a State Zoological Park.

During 1988-89, there was heavy smuggling of teak and so the Government decided to fell the teak of 20-40 years old during 1990 in order to discourage smugglers and to improve the habitat of the wildlife (then) of the sanctuary.

The result of all this has been a significant alteration of boundaries. What is remained of the Sanctuary is 2.35 sq.km out of the 4.70 sq.km (following encroachment by Tulazouma village) and 1.61 sq.km of the Reserve Forest out of the original 21,768.4 acres (88.16 sq.km), which is earmarked for settling up of a State Zoological Park.

Stages of Completion of Legal Procedures

A proclamation was issued by the Deputy Commissioner under Section 35(3) of the Wildlife (Protection) Act, 1972, on 13th May 1998. Beyond this, there has been no progress with completing legal procedures.

[Questionnaire]

Management Plan

Currently there is no Management plan and is not proposed to prepare one in the near future.

[Source – Questionnaire]

Budget and Expenditure

From the State Plan Fund Rs 0.12 lakhs was allocated and spent in 1997-98 and a similar amount in 1998-99. In the following year, 1999-2000, Rs. 0.61 lakhs was allocated and spent. From the State Non-Plan fund the PA received Rs. 37.92 lakhs in 1997-98 towards staff salary. The following year, 1998-99, it was allocated Rs. 36.87 lakhs and the same was spent on salary. In 1999-2000 it received Rs. 3.03 lakhs towards salary. Apart from this, the PA received Rs. 21.67 lakhs as Central Assistance. In 1997-98 it received Rs. 15.67 lakhs for management and development. Similar amount was allocated the following year, 1998-99. In the third year, 1999-2000, it received Rs. 6 lakhs.

[Source – Questionnaire]

Tourist- Sanctuary interface

There is one entry point for vehicles into the PA, which is managed by a unit of the Bihar Regiment. By foot, there are 3 entry points, which are not manned. There are no tourists visiting the PA currently. No permits are issued for entry to visitors. No time of the year is the PA closed to whoever wants to get in.

The only major tourist attraction in the PA is the Shiv Mandir situated near the Sanctuary. The best months for visiting the PA are between November and April. There is no highway or public throughfare through the PA. There is one rest house within the forest colony having 2 Non AC rooms at Rs.20 each but is not open to non-officials.

[Source – Questionnaire]

Poaching and Anti Poaching Measures

Because of the small size of the sanctuary and the large proportion of the PA under encroachment, there are no reports of fauna from the PA. However, there are

reports of large scale theft of timber from the area, so much so that it is rare to see standing trees in the PA.

The forest department has sought the help of the Nagaland Armed Police to patrol the PA, particularly to prevent further encroachment. Currently a group of 30-40 personnel of the NAP are posted at the forest complex on the edge of the sanctuary. This is an addition to the forest department staff that patrols the sanctuary.

[Source – Field Observation)

Commercial/Developmental Pressures on the PA

Though currently there are no commercial or development threats facing the PA, it is conceivable that roads, electricity lines, permanent buildings will come up if the Tulazouma encroachment is regularized.

[Source Questionnaire, interview with PA in charge)

Permits

No permits for hunting have been issued.

[Questionnaire]

Encroachments

As mentioned earlier Tulazouma is the biggest encroachment of the PA. A part from this there is another village, Selouphe that has encroached upon the PA.

Area encroached by Tulazouma-470 ha

Area encroached by Selouphe- unknown

Population of all encroached villages_____

The PA management is of the opinion that if Tulazouma can be evicted, the other village too can be dealt with. However, if Tulazouma is regularized, it will become difficult to evict the other village and it will also invite other villages in the periphery of the sanctuary to attempt encroachments.

It of course remains an open question as to why these encroachments were allowed to come up in the first place.

On the 17-11-2000, the encroachment of Selouphe village was evicted from the PA.

(Source: Questionnaire, interviews with FD staff)

Staff and Staff Facilities

A DFO, who is the Wildlife Warden of this area, looks after all the 4 PAs of the state including this Sanctuary. He is assisted by a Range Officer who is the local in charge of the PA. 13 Deputy Rangers/Foresters with housing facilities stationed at Dimapur, 19 Forest Guards with no housing facilities and 8 game watchers with no housing. Because of the proximity of the PA to Dimapur, availability of facilities to the staff does not pose a problem.

A part from these permanent staff members daily wagers were employed in the PA. From 1998 to 2000 each year, 10 persons were employed from villages adjoining the PA as daily wagers.

Because of encroachment generated problems, the PA authorities have sought the assistance of one company (approx 30 persons) of Nagaland Armed Police to Safeguard the Sanctuary.

There are 2 Forest Colonies on the edge of the Sanctuary which have lodging facilities for the forest dept. staff, however in the present circumstances, most of the PA staff stays at Dimapur because the forest colonies are being used to house the NAP company and a regiment of the army.

(Source: Questionnaire, personal observations, interviews with PA management)

Equipment

There is one field wireless set and 7 mobile wireless sets and one vehicle, a Maruti Gypsy.

(Source: Questionnaire)

Research and Monitoring

No past or ongoing research.

(Source: Questionnaire)

Awareness Programmes

Through the Questionnaire states that awareness programmes are undertaken, there are no details about their frequency, target groups and effectiveness.

Offences

The only recorded offences are the encroachments that have been described earlier. It appears that incidents of encroachments are rising.

(Source: Questionnaire and personal observations)

Major problem being faced by the PA according to its Director

Apart from lack of adequate manpower to deter potential encroachers, paucity of funds has been the biggest problem that stood in the way of protection and proper management of the Sanctuary.

Conclusion

Rangapahar Wildlife Sanctuary has virtually gone out of control of the concerned authority. With the State Cabinet Sub-Committee's decision prolonging its decision on the "encroachment" issue of Tulazouma village the issue is only getting more complex by the day. There is only 1.67 sq.km of Reserve Forest at the disposal of the PA authorities. The "Wildlife 2001" project as reported will be established in this 1.61sq.km once it is approved and sanctioned. The other area under Reserved Forest is being frequently encroached upon and even given official recognition in many cases by the Government itself. What will remain of the Sanctuary will be a mere 2.35 sq.km. if not lesser, in case the cabinet decision goes in favour of Tulazouma village which seems likely according to field reports received.

FAKIM WILDLIFE SANCTUARY

Introduction

Fakim Wildlife Sanctuary (FWLS) was notified in 1976 (vide notification no. FOR-75/76 dated 13-02-1976) under the wild Life (Protection) Act, 1972. The sanctuary has been set upon land purchased from the local people. Its entire area of 6.41 sq.km is completely undisturbed The wildlife wing is pursuing a proposal to

expand the area of the sanctuary. The main objective behind the creation of Fakim was the conservation of the Blythes tragopan. A comprehensive Management plan has been prepared for this, which, apart from enhancing the conservation potential of the bird in the wild, also proposes to set up a breeding facility in Dimapur.

The sanctuary is located in Tuensang district on the Myanmar-India border lying adjacent (15 kms) to Mt. Saramate (3600 meters above msl), the highest mountain in Nagaland. There are only a few habitats in Nagaland where tragopan is found. Fakim forest area which is on the lower Saramati Mountain was found to be most abundant with this rare and endangered bird. Hence, the area was procured by the government and declared a wildlife sanctuary.

Elevation ranges between 2000 m. and 2729 m. above mean sea level. The entire habitat is mountainous with thick virgin forests and several nallahs and streams. Other animals found in the sanctuary include Goral, serow, bear, gaur, tiger etc. Floral species include Castenopsis, Magnolia, Cinnmomum, etc. with heavy undergrowth of small thorny bamboos (Arun dinacceous)

Geographical profile

Fakim Wildlife Sanctuary is located in Tuensang district of Nagaland bordering Myanmar-India and lying adjacent to Mt. Saramati, the highest mountain in Nagaland between latitude 25° 45' to 25° 50' N and longitude 94° 50' to 95° 0' E. The nearest town is Pongro (30 km.) which is connected by a motorable road. The nearest railhead and airport is at Dimapur, approximately 300 km from the sanctuary. The highest point of the sanctuary is 2729 m (Fakim village). Temperature ranges between 25° C and 5° C. On an average the area around the sanctuary receives 2000 mm of rainfall. There are 3 perennial streams inside the sanctuary namely, Serakuto, Cand and Songmanto.

Biological profile

Flora:

Some of the major species of flora include Quereus, Betula, Castonopsis, Cinmamomum, Rhododendron, Phocba, Bamboos, Ferns, Magnolia, heavy undergrowth of small thorny bamboos (Arundinaceous).

Fauna:

A wildlife census held in 1989 showed the presence of 571 Tragopan individuals. Other areas that have recorded a Tragopan population include Japfu range, Digirkon valley in Kohima District, Pfistero and Meluri areas in Phek District, and Satoi area in Juneboto districts of Nagaland. Due to the fragmentation of their natural habitats as a consequence of deforestation and jhum cultivation, the birds have been confined to pockets where there is relative less disturbance, and this includes the Fakim area. The census mentioned above also recorded the following other animals: deer, sambar, civet cat, gaur, flying squirrel, wild boar, bear, jungle cat, porcupine, bamboo rat, pangolin, hornbill, jungle fowl.

The Tragopan blythii is being hunted for its flesh and beautiful plumage/feathers. The male bird is particularly prized for this purpose. A pair of tragopan can fetch between Rs. 15,000 to 20,000. Some villagers excel at trapping tragopan and in addition the

habitats of these beautiful birds have also been shrinking rapidly. duplication calls for ecological attention. The tragapan pheasant is included under part III of schedule I of the wildlife (Protection) Act, 1972.

Socio-economic Profile:

As mentioned earlier, the sanctuary is completely undisturbed because of its remoteness. There are only 2 villages adjacent (10 km radius) to the sanctuary, Fakim and Chansom.

These villages are able to meet their bio mass needs from the extensive forests that surround the sanctuary and thus there is no resource use pressure on the PA.

Management Profile:

Legal Status and control-

Fakim wildlife sanctuary (FWLS) was notified on 13th February, 1976 (Vide notification no FOR – 75/76 of dated 13/02/1976 under section 18 of the wildlife (Protection) Act, 1972. It occupies an area of 6.41 sq. km. The sanctuary had been created after purchasing the land from Fakim villagers. The proclamation was issued on 14/05/1998 and the final notification by the government is awaited.

Areas, zones and boundaries

There is no zonation in the PA. There is a proposal to extend the area of the sanctuary, though details about this are not available.

Management Plan

The express objective of the management plan is conservation of the tragapan and its habitat.

The management plan is in the process of being approved. There were no previous plans.

Budget and Expenditure

From state plan funds the PA received Rs 0.16 lakhs for 1999-2000. It did not receive any in the previous two years from the plan funds. From the state non-plan funds the PA was allocated Rs. 1.117 lakhs for 1997-98 and the same was allocated Rs 1.56 lakhs. In 1999-2000 it was allocated Rs 2.00 lakhs towards salary. No other fund has been received in the last three years by the PA.

Tourism and Regular of entry

Though this area holds great tourism potential, currently there are no tourists visiting the area. The best time to visit this PA is between January and April. In summer there is regular rainfall from the month of mid-May to August, winters are very cold with occasional snow fall.

Staffing and Staff Facilities

The FWLS has 3 forest guards, for whom housing is available around the PA. The sanctuary, like the other 3 PAs in Nagaland, is looked after by the wild life warden stationed at Dimapur. In the last 3 years since 1998, 3 persons from villages adjoining the PA have been employed on daily wages for protection and surveillance.

There is no equipment or facilities in the vicinity of the sanctuary.

Research and Monitoring

There has been no research so far in/on the PA. A census was conducted during 1989 covering the entire area of the PA.

People's Participation

Locals are engaged in boundary line clearance and foot path cutting from time to time. Their attitude towards the purpose of the sanctuary has been quite forthcoming. The village council of Fakim village has prohibited hunting & capturing of wild animals and birds from the PA.

ORISSA

Balukhnanda Wildlife Sanctuary- (BWLS)

The BWLS was notified in 1984 under the WL(P)Act, 1972. The PA covers a total area of 72 sq.km. Located in the Puri district, the PA falls between latitude 19° 8'N to 19° 9' and longitude 85° 8' E to 86° 2' E.

The PA is 10 km from Puri town which is also the nearest railhead. The nearest airport is in Bhubaneswar, 70 km away. The average elevation of the area above msl is 10 m.

Geographical profile

Climate

The PA experience summer from April to June with the maximum temperature touching 38 ° C. The average rainfall for the area is 1400 mm falling mainly in the months from July-September. The mean temperature for winters (November to January) is 12° C.

The PA is prone to gales and cyclones, which might occur during any time of the year. The frequency with which such events hit the area is about 1-2 years. Also, hailstorms are common during monsoon.

Physiography and drainage.

The PA is located near the sea shore.

The area has 2 perennial and 4 seasonal streams. There are 5 man made water holes.

Biological Profile

There is no information of on the flora found in the PA.

The forest type in the PA is Dry Deciduous thorny type.

Casurina was introduced in the PA in 1973 for commercial purposes. It enjoys a stable population. Eucalyptus was introduced in 1967, also for commercial purposes and its status is also stable. These plantations were carried out by the territorial division.

There are no corridors connecting the PA to other PAs.

Fauna

The main faunal species found in the PA are black buck, spotted deer, sloth bear, hayena, monitor lizard, jungle cat, fishing cat, storks, white billed sea eagle, brahmani kite and green sea turtle.

A breeding programme for the Olive Ridley turtles is currently being pursued in and near the sanctuary. The programme was initiated in 1984 under which captive breeding is carried out but the turtles have not been released yet. Olive Ridley turtles are not endemic to the area. There are plans to introduce them in this area as a part of the ongoing efforts to find alternate breeding sites for them.

Three artificial salt licks have been set up in the PA to compensate the salt requirements of the animals.

The nearest veterinarian is situated at a distance of 3 km from the PA at Gop.

No encroachments have been reported in the sanctuary.

Socio-economic profile

25 revenue villages surround the PA with an estimated population of 200,000 (in a 10 km radius). The PA does not support any tribal population and no population is totally dependent on the PA.

Roads

There is a 43 km road inside the PA, 35 km of which is controlled by the PWD and 8 km by the forest department. Transmission lines, spanning 35 km, have also been set up in the PA.

Regulation of entry

No permits are issued for entry to the PA. There is a mention of crop protection guns in the surrounding villages. These guns are to be surrendered during the non-harvest season but this is rarely the case.

Management Profile

The PA is under the DFO, Territorial Division. There is a forest ranger, a forester and three forest guards currently looking after the PA. No equipment is available with the PA management. The staff has not received any wildlife training either.

There is no fencing around the PA and there are no checkpoints to regulate the entry to the PA. There is a public thoroughfare through the PA and neither vehicles nor public on foot are regulated.

The PA was affected by drought in the year 1987-88. Pressures on the PA include lopping and cutting of trees for firewood, which is quite common. Furthermore, even though there is no fodder collection from the PA but approximately 1300 cattle graze in the PA.

Tourism

There is no restriction on tourism and on the use of equipment like cameras, video cameras, floodlights, vehicles etc.

There is an FRH at Saikot inside the PA. There are many lodging facilities available for tourists in Konark along with the Tosali Sands hotel situated on the outskirts of the PA.

The best months for visiting the PA are between November to May as the weather is pleasant.

The PA witnesses large-scale tourism with about 106,000 tourists visiting it in a year (1983-84).

There is talk of proposed denotification of 9 sq.km of beach and surrounding area of the PA. On this land Tourism complex and hotels and resorts are to be constructed. The reason being given for this is that it would help decongest the Puri beaches and give a glimpse of the real Orissa to the tourists. (TOI-9/1/93)

This denotification, if seen through, would harm the PA in a big way. Constructions of the scale mentioned above could cause extensive damage to the PA as it would put pressure on the beaches in terms of tourists and would pollute the coast. Also, if the proposal goes through the local fishermen might lose their livelihood.

DEBRIGARH WILDLIFE SANCTUARY

The Debrigarh wildlife sanctuary was formed in 1933 by the Bihar and Orissa government. It was notified under the wildlife (protection) Act, 1972 in 1989. The sanctuary covers a total area of 346.90 sq.km and includes the whole of the Debrigarh reserve forest and Lohara Reserve Forest areas situated in the Sambalpur district.

The sanctuary falls between latitude $21^{\circ} 28' 30''$ N – $21^{\circ} 43'$ N and longitude $83^{\circ} 30'$ E – $83^{\circ} 46' 30''$ E. the nearest railhead is at Bargarh situated about 20 km away and the nearest airport is 250 km away at Raipur.

The mean sea level elevation of the sanctuary lies in between 210 m to 760 m.

CLIMATE During summer, the PA experiences an average temperature of 35°C , though the maximum temperature may reach 45°C . Monsoons fall between July and September. The average rainfall for the area is about 1300 mm. Winters are cold, with an average temperature of 15°C .

FLORA According to Champion and Seth's revised classification, the PA has the following types of forests.

- 3 C - North Indian tropical moist deciduous forest covering an area of 146.90 sq. km.
- 3 B - Dry deciduous forests which cover 20 sq.km of area. [No information on the type of forest cover on the remaining area and on floral species of significance].

FAUNA The important faunal elements of the area include leopard, cheetal, barking deer, sambar, sloth bear, wild pig, wild dog, pea fowl, jungal fowl, partridges and koels.

The sanctuary has been divided into core zone of 79.80 sq.km and buffer zone.

The Hirakud reservoir falls within (check) the sanctuary the best time to visit the sanctuary is from October to March.

Queries

1. How is the notification of 1933 different from the one come out under WL (P) A, 1972 in 1989?
2. Has the area of the sanctuary or any other sphere been altered since 1933?
3. If the Hirakud reservoir falls within the sanctuary how much land was aquired for the project? How much land has been submerged under the reservoir? What species were affected most?
4. Boating in the reservoir is permitted. Check.

SATKOSIA GORGE SANCTUARY - FIELD VISIT

Introduction: The Satkosia Gorge Sanctuary (SGS) was declared a wildlife sanctuary on May 19, 1976. It lies on either side of River Mahanadi and extends over an area of 795.25 sq.km. The sanctuary with its moist and dry vegetation on either side of the Gorge abounds with a variety of wild animals like tiger, leopard, elephant, sambar, cheetal, gharial, mugger, python, cobra, etc.

Objective: SGS was created for the purpose of protection, propagation and development of wild life.

Geographical Profile: The Satkosia Gorge Sanctuary falls under four districts – 60% of the PA comes under Dhenkanal, 19% under Puri and 1% in Cuttack district. We are not sure whether the remaining 20% of the PA falls in Boudh-Kondhmals district or Phoolbani district. The sanctuary is located between 20°13' N – 20°45' N and 84°38' E – 84°58' E. The nearest town is Angul at a distance of 58 km from where daily buses ply to Tikarpara FRH. Talcher, which is 76 km away, is the nearest railhead. Nearest airport is at a distance of 220 km in Bhubaneswar.

SGS lies on both sides of River Mahanadi. The river divides the sanctuary into two parts, which for a stretch of about 14 miles is very deep throughout the year. The valleys on both sides of the river are deep and narrow, surrounded with dense forests. However, there is not much vegetation on the Tikarpara bank of the river, where the gharial project was going on till 1983. The average elevation of the sanctuary above mean sea level is 450 m. The highest point of the PA is 926.6 m and the lowest is 63.3 m above msl.

The PA is connected to Baisipali Sanctuary through a forest corridor.

Climate: Summer months stretch from mid-February to mid-June, with the mean temperature being 37°C, though the maximum temperature goes up till 45°C. Hence, the PA experiences drought from Feb. to June. Monsoons start from mid-June and continue till October. The PA receives the mean annual rainfall of 1500 mm.

November-January are the winter months with 20°C as the mean temperature during these months. However, the lowest temperature falls down to 5°C.

Water sources: The water sources inside the PA include five perennial streams and 18 non-perennial streams, one spring, 12 man-made non-perennial waterholes and many artificial tanks.

Biological Profile

Flora: The main forest types found in the PA are Moist Peninsular Low Level Sal (which is spread in 200 sq. km.) and Northern Tropical Dry Deciduous (which covers 400 sq. km.). An area of approx.3600 ha. is under teak plantations.

Rare floral species found in the PA include *Anogeissus acuminata* growing on the banks of Mahanadi. It has become rare, as there is hardly any regeneration due to forest fires. Other species affected severely by the fires are ferns and orchids. *Dalbergia latifolia* (which provides good furniture wood) and *Pterocarpus marsupium* are also rare.

A few species were introduced in the PA as far back as 1880 such as *Tectona grandis*, which was introduced for commercial timber. It was present in the PA till 1984. Para grass, *Penisetum pedicellatum*, *Cenchrus ciliaris* and *Stylosanthes* were introduced in 1984 as food for herbivores. These species were planted only on 26 ha.

Fauna: [Note: Figures in brackets indicate the population of the species between 1981-84 based on pugmark census and head counts]

Faunal species found in the sanctuary include elephant (118), gaur, wild dog, giant squirrel, barking deer, cheetal, nilgai and sambar which are all commonly found in the PA. However, leopard (30), tiger (25), four-horned antelope, gharial (8), mugger (10), emerald dove, brahmani duck and racket-tailed drongo are rare. Species occasionally found in the PA are Indian wolf, mouse deer and python. Indian wolf is locally threatened due to predation stress and fires. Malabar pied hornbill is trapped for medicinal use.

Gharial was re-introduced in the PA in 1978. The species disappeared probably in 1975 because of floods and disturbance due to fishing (for which nylon nets were used). A breeding programme was initiated in 1978 for gharial and in 1982 for mugger. The programme involved –

- (1) Collecting gharial eggs from Nepal or Chambal, rearing them in the PA and releasing in the wild (called Grow and Release Programme).
- (2) Adult females of the captive stock released in the gorge in the territory of the resident male.

Till 1984, 183 gharials were released in the wild and 215 were still in captivity. However, no mugger was released in the wild (till 1983-84), but the captive stock of mugger was 105.

Management Status: Satkosia Gorge Sanctuary was notified on May 19, 1976 under the Wildlife (Protection) Act of 1972, vide notification no. 4F (W) 33/ 76.12727/ FFAH. It extends over an area of 795.25 sq.km. (including 35.25 km of the riverbed). It falls under 4 districts – Dhenkanal, Puri and Cuttack. The team intends to clarify whether the remaining part of the PA falls either in Boudh-Kondhmals or Phoolbani district. The settlement officer was appointed but the procedures for acquisition of rights had not been initiated till 1984.

The total area of PA is 795.52 sq.km, out of which 536.64 sq.km. are RF, 99.94 sq.km are PF, 35.25 sq.km comprise the riverbed, and 123.69 sq.km belong to the villages. The sanctuary, till 1984, was under the Territorial Division and not under the Wildlife Division, according to the old questionnaire. However, a clipping from an undated WWF newsletter suggested that the then Chief Minister of Orissa had directed that the sanctuary be given to the Wildlife Division.

Management Issues: A Management Plan was prepared in 1980 by the DFO, Wildlife Conservation Division, which was valid till 1985. The plan was not approved. However, Annual Plan of Operations was proposed in accordance with the budget ceiling for the Division fixed by the CCF/ CWLW.

The equipment in the PA in 1984 included one rifle, two binoculars and one spotlight. Wireless sets were not available to the staff till 1983-84. There were only two vehicles, a motorcycle and a jeep, in the PA.

The staff included an ACF, a DCF, two Rangers and one Forester. The DCF, the ACF and the Rangers have had their training of varying durations at D.W.L.M., Dehradun. The sanctuary also had 11 Forest Guards. The research staff included two research assistants, till 1983, who worked as full-time researchers in the PA. There was a small field laboratory also at Tikarpara. However, there was no electricity in the laboratory. The other equipment in the laboratory (such as compound microscope, PH meter, weighing machines, and thermometer) is highly inadequate, as reported by the then DFO.

There are 10 entry points to the PA, out of which only two are manned. A highway passes through the PA. Though all vehicles on the highway have to pass through the check-posts, only trucks and carts carrying timber, fuel and bamboo are checked. Thorough checking of jeeps is not done. Though the entry of tourists into the PA is prohibited after sunset but it is difficult to stop people passing through the highway. In 1983-84, around 10,510 tourists visited the sanctuary. Other than these, approx. 50,000 persons pass through the PA annually on the highway. Only 5% of the PA is open to tourists.

The PA authorities have constructed 15 salt licks. The purpose was to increase the concentration of animals at particular spots so that they can be viewed easily by tourists. Also, the authorities pointed out that the existing organisational set-up was inadequate for protecting the animals, and hence more protection could be provided at selected spots. Cheetal and Sambar were artificially fed from March-May (according to the old Questionnaire), as there is a scarcity of food during these months due to fires. This was done by heaping mohua flowers near these salt licks or water holes.

The PA experiences drought from Feb. to June. In 1979, 40% of the PA was affected; in 1980, 60%; and in 1984, 75% of the PA. The PA authorities adopted certain remedial measures, which included renovation of game tank and construction

of temporary water holes. On the other hand, communication to the interiors is disrupted for five months during monsoons (July-November) as rains damage kutcha forest roads from

The Forest Department had employed people from the villages inside the sanctuary and on the periphery, during November-June, 1983-84. The Department hired 16,200 villagers for forestry and plantation works and 14,100 for wildlife oriented work. Contractors also employed 1,50,000 people for bamboo cutting,

Plantations: Teak (*Tectona Grandis*) was planted between 1979-84 on 60 ha. of land, on an average. They were planted for commercial use.

Compensation package: No incident of death/ injury to human beings by wild animals inside the PA was reported from 1978 to 1983. However, there is no compensation package for the damage to crops or death/ injury to livestock by wildlife. The field visitor Madhu Ramanath, who visited the PA in June 1986, felt there was no rapport between the villagers and authorities.

NGOs: The following NGOs are active in the PA: Central Indian Task Force of the Elephant Specialist Group of IUCN; Elephant Status Survey and elephant habitat inventory.

Accommodation: These are 15 Rest Houses inside the sanctuary, out of which six belong to PWD. Three Rest Houses are adjacent to the PA, the rest are all inside the PA. The PA offers subsidised accommodation for researchers from other organisations in all the FRHs inside the PA.

The then DFO had suggested (in 1983) that the sanctuary should be extended to the west in the Athmallik Division, which is an area with a good tiger population. He also suggested that more of riverbed (both upstream and downstream) should be included in the sanctuary, as gharials migrate over long distances after release.

Pressures on the PA

Habitation – There were 308 villages inside the sanctuary till 1983-84, out of which three were forest villages and 305 were revenue villages. The total population of these villages was 88,000. Approximately, 10% of this population was tribal. Villagers living inside the sanctuary are dependent either on forest or fishing for livelihood. Almost 1000 ha., i.e., 30% of the river is used for fishing. Fishing has had a direct impact on gharials (the babies and pregnant females, in particular). Issuing licenses, however, controls fishing, according to the old Questionnaire. Besides these villages, there were 197 villages adjacent to the PA (within 10 km radius). All peripheral villages were revenue villages with a population of 61,100. Almost 5% of the population in these villages was tribal.

So far, no attempt for relocation was made.

However, no incidents of clash or confrontation between the people and the PA authorities were reported.

Grazing: While demand for fodder collection is minimal, approximately 57,000 cattle graze inside the PA (12,000 from the villages that are inside the PA and 45,000 from the peripheral villages). Besides this, 9500 goats also graze in the PA (3,000 from the villages inside the PA and 6,500 from the peripheral villages). Grazing takes place only between September and March in 10% of the PA. The Section Forester of the Territorial Division issues the grazing permits. The fee charged for grazing livestock inside the PA is as follows-

Livestock	Fee Charged for	
	Park villages (Rs.)	Adjacent villages (Rs.)
Cow	0.25	1.00
Buffalo	0.37	1.50

Out of the 57,000 cattle, 47,000 are unauthorised and only 10,000 are authorised. The livestock is not vaccinated inside or around the PA. As a result of grazing, the

area has become prone to cattle borne diseases like FMD and RP. Gaur population was specifically affected.

Fodder: Villagers are allowed to cut grass from the PA for fodder. The old Questionnaire reports that the demand for cutting fodder is very less and only 50 ha. of the entire PA is used for this purpose.

Forest use activities: A number of forest use activities took place in the PA till 1984 - such as felling of trees for timber, collection of fallen trees, cutting of trees for pulp and for other industrial use, and cutting of trees for firewood. All these activities generated more than Rs 2 crores of revenue for the Department in 1983-84. Tendu leaves, collected for making 'bidi', generated Rs 4.83 lakh while bamboo fetched a revenue of Rs. 20 lakhs. Seeds from Sal trees and mohua flowers were also collected. Though the Forest Department of the Angul Territorial Division had opened a depot in 1979 to supply fuelwood and timber for local population. This did not divert any pressure from the sanctuary.

Use of PA by government departments/ other agencies: The total length of roads inside the sanctuary is 83 km. Out of this, 64 km are controlled by PWD and 19 km by the Village Panchayat. More than 10,000 ha. of land is under agriculture. This land belongs to the Revenue Department. Eight ha. of forest land is used for housing. Out of this, three ha. is controlled by C.W and P.C. (GOI); Revenue Department, Police, PWD and Health Department. The state controls the rest of the 5 ha. Also, there are transmission lines inside the sanctuary (the length of which is not known).

Poaching: Poaching is highly prevalent in Satkosia Sanctuary. It goes on in almost 60% of the PA. People from towns in collusion with local villagers are involved in it. Cheetal population has been tremendously affected by it. According to a report in The Times of India (30.06.1997), rampant poaching has sharply reduced the elephant population also. Satkosia has Orissa's second largest elephant population of nearly 250 (largest being in Simlipal). At least 20 Tuskers are killed in the area every year, according to The Times of India report. In 1997, the sanctuary had only about 30 male elephants. Elephant is one of the worst-hit species as hundreds of

bamboo cutters and timber smugglers are destroying their habitat. Those elephants that did not fall victim to bullets have been chased away from water holes and their usual pasture grounds and thus died of starvation. A few migrated to Katarang and Barasingha area under Athagada Forest Division. A new threat to the elephants' survival came from the heavy exodus of tribals evicted from the new industrial zone near Sukinda belt, driving the elephants out of their natural habitat.

Timber mafia: Timber mafia based in Banpur across the Gorge, is very active in Satkosia. Satkosia is facing virtual denudation with massive felling of teak and sal trees. Illegal timber trade worth Rs.1 crore was carried out in 1997 (Indian Express, 16.10.97). They rope in villagers from surrounding villages to cut the trees, which are then dragged by teams of bullocks to the Gorge. The branches are cut off, the logs thrashed together and are then floated down the river. The logs are cut into planks at Banpur and transported to markets in Bhubaneshwar and Cuttack. Villagers alleged that senior forest officials were hand-in-glove with the timber mafia (as reported in Indian Express).

Pollution: Apart from these pressures, a fast growing industrial area around Angul poses a threat to the PA. The industrial complex stretches for miles along the road resulting in noise, air and water pollution. Leaf litter and bacteria are other major sources of water pollution in the water holes and game tanks. Preventive measures taken by the authorities include removal of debris and treatment with potassium permanganate.

Places of cultural/ religious interest: There is a temple of lord Shiva in Tikarpara on Baigani Parbat. A fair is held in Baigani Parbat on Shiv Ratri.

Fire: Villagers are mainly responsible for fires (either accidentally or on purpose). They do so for clearing the ground litter in order to collect sal seeds, mohua flowers, tendu leaves or for growing grass for cattle. In 1980-81, 60% of the PA was affected by the fires, which reduced to 50% in 1981-82, and 40% in 1982-84. The PA authorities to tackle fire used traditional fire fighting methods, such as digging firelines and clearing of leaf-litter.

Guns: There are 36 registered guns for crop protection with villagers. These guns are not surrendered during periods when there are no crops. According to the old Questionnaire, these guns could have been used by the villagers for poaching.

FIELD VISIT

The team intends to find out the following during the FV.

1. (i) The current status of the floral species introduced in 1880 and 1984.
(ii) Whether they are indigenous or exotic.

2. (i) We would like to find out the accurate year of re-introduction and the current status of the gharial and mugger population.
(ii) Whether the breeding programme is still going on or not.
(iii) Has any measure been taken to control the causes of disturbance (fishing, floods) which led to the decline in their numbers?

3. The length and status of the forest corridor that connects SGS to Baisipali Sanctuary.

4. (i) We intend to find out whether the sanctuary is still under the Territorial Division or is handed over to the Wildlife Division.
(ii) Whether procedure for settlement of rights has been completed?

5. Has relocation of villages from within the PA and the periphery of the PA been taken up?

6. Impact of the highway passing through the PA.

7. The exact reason for forest fires. Is it only for the purpose of improving the grazing grounds or is there a history of conflict between the people and PA authorities? If there is a conflict, we wish to find out its reasons and extent.

8. Flood is stated as one of the reasons for the declining population of gharials and muggers. In another Question, the information conveys that there is no significant flooding. We intend to clarify this.
9. Do forest use activities like felling of trees for timber, cutting of trees for pulp and firewood, etc. still continue in the PA?
10. What was the purpose of the game tanks and their impact?
11. Are various government departments/ agencies still exercising control over land inside the PA?
12. The team intends to find the extent of fishing on the PA. At one point in the old Questionnaire, it is mentioned that the impact of fishing is minimal; and in response to another Questions, it is mentioned that fishing is responsible majorly for the decline in population of gharial and mugger.

SUNABEDA SANCTUARY

Sunabeda is a plateau located in Kalahandi district of Orissa, which was notified as a sanctuary in 1988. The northern boundary of Sunabeda touches the Madhya Pradesh border. Mainly Deciduous Forests are found in the sanctuary. Commonly found animals in the PA include sambar, cheetal, barking deer, hyena, sloth bear, etc.

Objective: Sunabeda Sanctuary was created for the purpose of protecting, propagating and developing wildlife.

Legal Status: Sunabeda plateau was notified as a sanctuary on August 13, 1986 by the Government of Orissa in the Forest, Fisheries and Animal Husbandry Department, vide notification number 24422. However, the sanctuary was brought under Wildlife (Protection) Act of 1972 on May 10, 1988.

Geographical Profile: Sunabeda Sanctuary is located in Kalahandi district of Orissa between 20° 3' N - 20° 8' N and 82° 4' E - 82° 6' E. The nearest town is Nuapada, which is at a distance of 25 km from the sanctuary. Khariar is the nearest railhead, 45 km away from the PA and Raipur is the nearest airport (120 km).

Average elevation of the area is 500m above msl. The highest point is 784 m and the lowest is 300 m above msl.

Climate: Summer months stretch from March to June with the mean temperature being 35° C. May is the hottest month with the maximum temperature shooting up till 40° C. The months from July to September bring 1096 mm of rains, on an average. October to February are the winter months with a mean temperature of 10° C, and the minimum dipping down to 1° C in January. The best time to visit the PA is Dec-June.

Biological Profile

Flora: Deciduous forests form the dominant forest type in the sanctuary. 315 sq.km of the PA are covered with dry mixed deciduous and 7.13 sq.km with moist deciduous forests. Besides these forests, there are 120 sq.km of grasslands also. Important plant species in the PA include *Vetiveria zizinioides* (on the plateau), *Thysanolacna agrostis* (in the valleys), and *Dalbergia latifolia* .

Fauna: Faunal species found in the PA include wild buffalo, swamp deer, pangolin and mugger, all of that are rare. However, sambar, cheetal, barking deer, hyena, sloth bear, jungle cat and gaur are commonly found. Birds include peafowl and spurfowl. The census, which used pugmarks as the methodology, (IS THIS CORRECT USAGE?) in 1984 revealed that there were seven tigers and eight leopards also in the PA. There is no information regarding their current status.

Management issues

Habitation: It seems from the boundary description given in the notification that there is a concentration of villages on the eastern and the western boundary of the PA (almost 10 villages on both the boundaries).

Field Visit

During the field visit, the team intends to clarify the following information –

1. Whether Brahmani Nallah, which is on the northern boundary of the PA, Indra nallah (towards the eastern boundary) are inside the sanctuary or outside.
2. The impact of the PWD road (the length of which is not known) inside the sanctuary.
3. The impact of Hakar, a tribal festival, which is celebrated in January inside the PA.
4. Impact of tourism on the PA (nearly 1200 tourists visited the PA in 1983-84).
5. What impact do the villages surrounding the PA have on the Sanctuary? Whether there are any habitation inside the PA or not.

RAJASTHAN

PHULWARI WILDLIFE SANCTUARY, RAJASTHAN

Year of Notification: 1983

Total Area: 51141 hectares.

Acquisition of Rights: No record.

Grazing: There is year round grazing by the domestic cattle in the villages on the vicinity. There are a total 5400 cattle grazing in the PA of which 1200 come from inside the PA, 2700 from the adjacent villages and 1500 from outside the state on the Marwar side. The migratory cattle come between November and June. There are a total of 1640 sheep grazing in the PA of which 240 belong to people living inside the PA and 1400 come from the adjacent villages. The number of goats grazing in the PA are 2950 of which 450 belong to people living inside the PA and 2500 belong to people living outside the PA. All grazing is authorised and 100% of the park is grazed.

Timber Felling: There is timber felling by people living adjacent to the PA and unrestricted collection of timber is reducing the forested area according to the ACF.

Settlements and Population: There are 12 villages inside the PA with a population of 26000 of which 100% are tribals. There are 50 villages adjacent to the PA with a population of 10,000 of which 100% are tribals. All villages are revenue villages.

Encroachments: There are 105 encroachers and cases against them have been filed under the Forest and Revenue Acts.

Plantation: Till 1985 there were 175 hectares of plantation out of which 150 hectares were for fuel wood. 25 hectares were planted in the core zone.

Zonation: There is no information about how much area the Core and Buffer zones cover.

ACF's Perceptions: ACF wants relocation to take place and wants the prohibition of the Marwar cattle into the PA forests.

MOUNT ABU WILDLIFE SANCTUARY, RAJASTHAN

Year of Declaration: The sanctuary was notified under Rajasthan Wild Animal and Bird (Protection) Act, 1951. It was only transferred to the wildlife division in 1980-81 and was not renotified after that.

Total Area: 28,884 hectares.

Extension of Area: The PA authorities are proposing to acquire 3954 hectares from the forest department.

Settlement of Rights: The rights were settled under the Rajasthan Forest Act and not under the Wildlife (Protection) Act, 1972.

Departmental Works: Salai gum tapping is done by the Sirohi forest department worth 2.5 Lakhs and from this area the forest department is eliminating the contractors.

Weeds: Lantana is a common weed in this area and about 75 local tribals have been given permits to clear the area off lantana.

Encroachment: 15ha is encroached for agriculture.

Timber Felling: No timber extraction is recorded.

Fuel Wood Collection: Local tribals are allowed to collect fuel wood. They sell it at the Government Depot. Fuel wood for the town of Mount Abu is imported from the Katara and Chittorgarh areas. The buying rate of fuel wood is Rs. 26 per quintal and the selling rate is Rs. 32.

NTFP Collection: Tribals collect honey, gums, fruits and wax from area for which permits are issued by local authorities.

Grazing: When the rights were settled under the Rajasthan Forest Act, free grazing was allowed for domestic milch cattle. Cattle camps with 12-13 cattle each are set up in various parts of the PA for this purpose. People keep cattle for milk and organic manure. All grazing is authorised. In all 1738 cattle graze inside the PA of which 238 come from inside the PA and 1500 from the adjacent villages. 2520 goats graze inside the PA of which 520 belong to people living inside the PA and 2000 to those living in the adjacent villages.

Hunting: Local tribals have a festival of Akshay Teej on which they go for hunting. In order to stop hunting foresters do patrolling at that time and distribute literature to educate people as to why they should't hunt.

Settlements and Population: No villages are recorded in the core or buffer zones. There are 36 villages adjacent to the park with a population of 36,000 of which 20% are tribals.

Relocation: Two villages were to be relocated with 500 people in 5 years after 1984. People were to be given land as compensation.

Plantation: 1 kilometer on the periphery of the PA is to be planted as fuel wood plantation.

Development Activities: There was a proposed Mt Abu Hydel scheme at Gambhir Nala and Salgam Nala which would generate 10 Mw of electricity. The intention is to

construct one tunnel in two km of forest and the project was expected to take 10 years to complete.

5 hectares is covered with roads and there are two telephone lines. Stone quarrying is taking place in 12 bhighas for road blocks. 23 km of road between Abu and Sirohi was constructed as a part of famine relief work.

Human Wildlife Conflict: Bears attack fuel gatherers. Cattle lifying by wild animals is common.

Poaching: Some poaching is done by local people of wild animals who attack them.

Compensation: ACF had proposed a scheme for compensation for lifting of livestock.

ACF's Perception of Problems: 1) Forest fires are a major problem in this PA. Local people believe that forest fires give peace to the soul of the dead and therefore start forest fires when their elders die. 2) Grazing is considered a problem and therefore he recommends that stall feeding should be encouraged. 3) There is a lack of communication about offences.

JAISAMAND WILDLIFE SANCTUARY, RAJASTHAN

Year of Declaration: 7 November, 1956. There has been no renotification since then.

Settlement of Rights: The rights have been settled under the Rajasthan Forest Act 1951.

Total Area: 5200 hectares.

Development Activities: Minor irrigation projects are going on all around the sanctuary and their extent is not known. The fisheries department controls the Jai Samundra lake. There is a 48 km road to Gengwala village and a large number of transmission lines.

Agriculture: In 1973 a number of villages were inundated in the floods and moved into the sanctuary. They are doing illicit cultivation.

Grazing: Though there is a sort of a buffer zone, grazing is going on all over the sanctuary. There is authorised grazing by 2000 cattle, 500 goats and 25 sheep from the adjacent sanctuaries.

Fishing: The local people are given permits to fish in the Samundra lake. The ACF feels that this pressure may have been on the forests if fishing was not a lucrative business for livelihood.

NTFP Collection: There is illicit collection of gums.

Fuel Wood Collection: Headloading is allowed and a tribal sells a headload of fuel for a maximum price of Rs. 4.00.

Settlements and Population: There are 30 revenue villages in the surrounds of the PA with a population of 10980 where 50% are tribals.

Poaching: Many locals have guns and they use these to kill animals. Explosives are also used to trap fish.

Human Wildlife Conflict: Till 1984 there were as many as 51 cases of cattle lifting.

Compensation: No compensation is paid for death or injury to livestock.

Clashes between PA Authorities and Local People: There are no major clashes but there have been cases of injury to forest guards by stone-throwing villagers.

Problems of the PA: 1) Forest fires due to negligence, 2) Shortage of fodder for wild animals in the summer since domestic cattle eat up the grass. Therefore grazing is a problem. 3) Offences are not reported.

KUMBALGARH WILDLIFE SANCTUARY, RAJASTHAN

Year of Declaration: Though the sanctuary was notified under the Rajasthan Forest Act in 1971, its control was only transferred to the wildlife department in 1981-82. It has not been renotified since then.

Total Area: 7825.86 hectares.

Denotification: 0.1372 hectares have been denotified for two transmission lines of 220 watts each.

Acquisition of rights: Though there is no record of the acquisition of rights under the Wildlife (Protection) Act 1972, rights were settled under the Rajasthan Forest Act when the sanctuary was notified. Rights are recognized in 100% of the area.

Encroachments: There are 96 ha under illegal occupation for cultivation. The encroachers are 173 tribals against whom cases have been registered under the Rajasthan Land Revenue Act, 1956.

Development Activities: There are minor irrigation projects all around the sanctuary.

Tourists and Permits: Two lakh people visit the Parsuram and Ranakpur temples every year. Though there is a system for permits for entry no one takes permits to enter the PA.

Fuel Wood Collection: Forests were felled for fuel wood before the sanctuary was declared and neighbouring villagers still use the forests for fuel wood.

NTFP Collection: Locals collect gums and fruit from the PA.

Shikar: There was excessive shikar during the time of the Raja.

Grazing: There 5787 cattle grazing inside the PA out of which 787 belong to people living inside and 5000 to people living in adjacent villages. There are also 63715 sheep, 41153 goats, and 123 donkeys that graze inside the PA and belong to the adjacent villages. A total of 5530 camels of which 530 belong to people living inside the park and 5000 belonging to other people graze inside the PA.

All grazing is authorised but not free. All cattle belonging to settlements inside the park are allowed to graze free of charge. Those from the villages adjacent to the park have to pay 1.12 Rs. per cow and 2.25 Rs per buffalo. The charges for cows coming outside the state are Rs. 2.50 per cow and Rs. 3.50 per buffalo. The goats graze at a rate of Rs.0.25, camels at a rate of Rs. 5.00 and Donkey at a rate of Rs. 1.50 per animal. 90% of the total area is open to grazing.

Settlements and Population: There are 9 forest villages and 5 revenue villages inside the sanctuary with a total population of 2000 of which 1670 are tribals. There are 85 revenue villages in the surrounds with a population of 1,50,000 of which 20% are tribals.

Compensation: There is no provision for compensation but the ACF feels that there should be a scheme for compensation for goat or cattle lifting or the bitterness between the PA authorities and local people will grow.

Clashes: In 1982-83 one forest guard was killed when trying to stop a truck carrying illicit timber.

Local Perceptions: The local people believe that if a goat is killed by a leopard or wolf then the owner gets two in return.

Local Participation in Management: The villagers were taken on a park tour and their problems were listened to. 2000 ha of land to grazing during the rainy season with public support. Majority of the people were convinced but some gave money and hired politicians to plead their cause that no restrictions be placed inside the PA.

ACF's Perception of Problems and Suggestions: 1) Forest fires are caused by negligence. 2) Offences are not reported and informers should be given incentives to report them. 3) There is hunting for trophies. 4) Local political pressure to allow grazing is a problem and the entire sanctuary should be closed to grazing for at least one year to minimise the threats from local politicians.

Addition from the field visitors notes:

Grazing: Entire area is open for grazing. 1,20,288 cattle graze in the area. Warden is trying to introduce rotational grazing to avoid over grazing.

Fuel wood: Tourists cook at the Ranakpur temple complex, using fuel wood from the p.a. About 2 lakh tourists visit every year. Not all of them issue entry permits.

Population pressure: There are 14 villages inside the park. Out of them 5 are revenue villages and nine are forest villages. These villages have a population of 20,000 and all of them are dependant on forest products for their livelihood. The surrounding areas have a population of 1,50,000 of which 20% are dependant on forest products.

Fodder extraction: Fodder is made available to the actual users at a subsidised rate of Rs. .20 per kg.

Compensation: No compensation is paid for loss of life, livestock, and crops by wild animals. There were 503 cases of livestock lifting in 83-84 but no compensations were paid. Due to the lack of compensations the people have turned sore about conservation.

SITAMATA WILDLIFE SANCTUARY, RAJASTHAN

Date of Declaration - 2nd Jan 1984

Encroachment-800 ha of Land under submergence of Jakham Dam

There are large-scale encroachments in the Park possibly, running into a couple of 1000 ha. Some people were given land in the Sanctuary as compensation for land lost in the Mahi Dam submergence. This relocation was done by the revenue dept. - Illegal occupation by tribals for cultivation - 1097 ha - about 923 tribals.

Fishing - Locals do fishing in the lakes in the sanctuary. Due to easy availability of dynamite from Jakham dam site they use it to kill fish. Two crocodiles killed.

Timber - Illicit felling of VI grade teak. Problems from tribals of Bunswara & many truck loads of teak poles are smuggled out. The sanctuary has many 7 unmanned entry points & trucks tractors can go deep into the forests. [The locals have some pvt forests and these act as cover to get transport permits for timber felled from forests]

NTFP - Locals collect honey, tendu etc. For collection of Mahua, there is state level concession in Rajasthan.

Management plan-Since 1981-82 - Sanctuary has been included in the centrally sponsored Scheme of assistance to selected parks and sanctuaries on 50% sharing basis, on the basis of a proposal based on a comprehensive scheme for development of the sanctuary.

This sanctuary was declared in the year 1978, the management was looked after by different territorial ranges till 1983. The State Trading Corporation extracted timber and fuelwood during this time.

After July 1983 the whole forest area was put under the Wildlife Warden. Before 1982 it worked on adhoc allotment.

Staff-The Sanctuary is insufficiently staffed. But (according to field visitor) they are quite efficient. Lower ranked staff are very demoralized due to interference by politicians and due to delay in legal procedures against offenders.

Checkposts-A highway forms the boundary of the park. There are territorial checkposts on the highway.

Erosion-Last field visitor reports - erosion "due to water", and loss of top soil. No measures taken due to low budget.

Vaccination-Vaccination prog. not undertaken. Cattle passing through are not checked as well.

Weed control-Lantana - reported in '82-' 84 as spreading and suppressing the local flora.

Endangered species-Samber, Cheetal - reported as endangered species. Cause for decreasing population - destruction of habitat, construction of irrigation dam inside the sanctuary and heavy poaching.

Measures taken for protection - Habitat regeneration. Anti poaching patrols done.

NTFP collection-No area of the park is restricted for such collection of twigs, leaves,grass allowed “free of cost” to “right holders”. The number estimated at 100 about 200quintals extracted p.a.

Management malpractices-Field vistor reports incidence of goats tied as baits for panther sighting.

Fodder collection There is no systematic distribution pattern to dispose the fodder, therefore tribals choose to collect foddeer from wherever they like so the whole area is fill of human disturbance .

Grazing- Grazing pressures quite high with 3,750 cattle, 2000 sheep and 2,350 goats from park villages as well as surrounding villages grazing in the park.

Tourism -Tourist acess to P.A complete. Sitamata temple is situated inside the sanctuary.

NGO - A group called ‘Prayas’ working with tribals with head office in Deogarh.

TAMIL NADU
Mukurti National Park

1. INTRODUCTION

1.1 History: Mukurti National Park (MNP) is located in the Nilgiri District of Tamil Nadu. The Nilgiri hills “consists of a plateau roughly 35 miles long and 20 miles in width and some 6500 feet, on an average, above sea level. The hills were formed long before the Himalayas, by a gigantic upheaval at the junction of Eastern and Western ghats”. [Townsend 1977]. The Sanctuary lies in the South-Eastern corner of the Nilgiri Plateau.

In 1886 the entire area was declared a reserved forest. Later in 1982 it was declared as a wildlife sanctuary under section 18(1) of the wildlife (protection) Act 1972, as per G.O. Ms. No. 240, issued by the Forest Department on 8.3.1982. The entire sanctuary has been upgraded to a National Park by G.O. Ms. No. 716(Environment and Forest), dated 5-10-90.

1.2. Significance: The entire sanctuary is one of the last surviving tracts of natural vegetation, typical of higher altitude of South India. The sanctuary landscape comprises of rolling grassy downs, interspersed with temperate sholas (woodlands), occupying depressions and valleys. This land needs to be protected for its scenic splendour. Mukurti contains one of the very few viable populations of Nilgiri Tahr, which has been declared as an endangered species under Schedule I of the Wild Life (Protection) Act of 1972 and the IUCN Red data book. Another noteworthy feature is the endemism⁹ of the local fauna and flora and their relationship with Himalayan flora and fauna. From the biogeographic point of view, the Nilgiri Hills, forming an important component Western Ghats complex, are one of the most fascinating region of the Indian Sub-Continent. Altitude, climate and rainfall make this a particularly rich habitat for the plants and animals. [Salim Ali, 1977].

There appear to be sites of archaeological importance, within the present Mukurti National Park, relating to some aspects of the life of pre-historic men. Many artefacts have been shifted to the Museum in Madras, but evidences like old burial stones are still present.

1.3. Status of the Park: The rolling downs of the present Mukurti National Park, with the exception of steep sided peaks, came under plantation working in the early history of forest conservation. Large scale Wattle plantations were raised in Mukurti Avalanche, Naduvattam and Kundahs. With the exception of areas subjected to high winds and poor soil, the plantations have, generally, been successful [Kala1977]. The plantations have failed to establish in MNP due to high wind velocity and hostile climatic conditions. The remnant Wattle trees appear stunted and sparsely spaced on some of the grasslands. Presently the Rhododendrons are established as bushes on the sheltered slopes. Sholas occur along the crevices of the folded hills and in deeper valleys. The diversity of bird life is limited. The habitat is ideally suited for Nilgiri Tahr and its predators, such as tigers and panthers.

There are no villages inside the Park. Reservoirs belonging to the Electricity department have come up inside the protected area. The colonies of the employees of electricity board (EB) are located just outside the park. The EB also maintains a road inside, connecting the reservoirs. The Mukurti peak is a pilgrimage centre for the Todas and other hill tribes and they are allowed to visit the peak during the festival in the month of February. Except for occasional groups of trekkers the park is undisturbed.

2. DESCRIPTION:

2.1. Geographic profile:

2.1.1. Location and Area: MNP is situated in the Nilgiri district of Tamil Nadu. The sanctuary has a linear shape. It extends from Nilgiri peak in the north to Sispara pass in the south. Avalanche is the Range headquarters and is located at about 30 km from Ooty. The nearest town, Udthagamandalam [Ooty] is the headquarters for the Wild Life division. It is connected by a hill train, to Mettupalayam at the foothills. Nearest airport is Coimbatore, about 120 kms away. Ooty is also connected to Mysore by road. There is no public transport to Avalanche, the park headquarters, only private buses and other vehicles can reach Avalanche from Ooty. From Avalanche Upper Bhavani can be reached by road and the park begins beyond Upper Bhavani. Another entry point for the park, is from Anumapuram, near Pykara, which is 24 kms from Ooty, on the Ooty-

⁹ Belonging to a particular area or native to a region.

Gudalur road. The total area of the National Park is 78.46 sq. kms. There is a proposal for enlarging this area.

2.1.2. Physical features: The Kundah range of hills, form the Western edge of the Nilgiri plateau. These hills rise steeply from the Silent Valley, the Nilambur Valley and the Ouchterlony Valley and constitute an unbroken wall, except at the Sispara Pass. There are a series of peaks along the western (outer) margin, most of them being over 2500 mts. in height. A second inner range of hills run parallel to the outer ranges. The Mukurti sanctuary area includes both these ranges and the valley enclosed by them. The difficult terrain effectively prevents all biotic interference. Kolaribetta is the highest point [2630mts]. Other major peaks are Mukurti [2556mts] and Nilagiri [2477mts.]

The general slope of the land is towards south and east. Many perennial streams drain the area. Majority of them join Bhavani puzha. The main river system is the Billithadahalla, whose catchment is on the slopes of Kolaribetta, Kudikadubetta and Deverabetta. It is one of the main tributaries of Bhavani [Reconnaissance Report 1988-94]. There are five reservoirs inside the sanctuary, namely the Western Catchment 1,2 and 3, besides Upper Bhavani dam and Mukurti dam.

2.1.3 Climate: Because of high altitudes, the climate is cold. The summer months are from April to June, with the mean summer temperature being 15 degrees Celsius. Hottest days generally occur in the month of April, with temperatures rising to 20 degrees Celsius. Winter months are from November to February, with mean temperatures being 15 degree Celsius. Coldest days generally occur in December. Maximum rains are from June to September. Mean annual rainfall is 450 mm. [QA1]. Monsoon rains are accompanied by howling strong winds and low visibility. Frosty nights are common from December to February. Mist is a factor to be reckoned with in the park. Wisps of ground mist rise from the Malabar plateau, as the Sun warms up and creeps inland, coming to rest along the cliff line, until either the wind or rising temperature moves it away [Reconnaissance Report 1988-94].

2.2 Biological profile.

2.2.1 Flora: The natural vegetation of the National Park consists of vast stretches of grasslands, interspersed with numerous isolated, compact and sharply defined small woodlands, called “Sholas”[Reconnaissance Report 19888-94]. Imperial Gazetteer of India, compiled and published during the British regime in the first decade of twentieth century, describes the vegetation, as follows. “ On the grassy downs occur several varieties of orchids; and wide stretches of land, especially in the neighbourhood of Kundahs, are covered with *strobilanthus*, which once in seven years burst into a sheet of blue blossom and then dies down;.....in the sholas grow rhododendrons, several species of *Leix*, *Eleocarpus* and *Eugenia* [the varied tints of the leaves, of which render these little woods, extremely beautiful in the spring]; Sambars are common in the sholas, throughout the hills, especially in the Kundahs.”

The woodlands or the sholas are tropical rain forests, occurring under extreme and limiting condition of the montane locations. Champion and Seth have classified these sholas under the type, Southern Montane Wet Temperate forest [sub groups II A/1 - type II A/C1] in the “Revised Survey of Forest Types of India”. The average height is hardly 20 Mts., this low height being the consequence of exposure to wind. Only two storeys of trees are discernible. Large lianas like *Rose leschenautiara*, *Toddalia asiatica*, *Rhamnus wightii*, *Eleagnus latifolia*, *Jasminum* species etc. are quite commonly seen. Epiphytes are abundant and mostly consist of lichens ferns and bryophytes rather than of flowering plants. The crowns of trees are usually dense and often rounded with entire coriaceous leaves, which show varied tints of red when young, is conspicuous feature of this forest. The sholas are distributed all over the park.

Grasslands

Throughout the Western Ghats, all extensive grasslands lie adjacent to the evergreen forest formations, assuming a forest-grassland continuum. Therefore do forest and grassland communities represent stable climax formation? Champion in his “Forest Types of India”[1936], considered grasslands as secondary formation, because grasses in general are colonisers and occupy edaphically and bioclimatically stressed habitats. Ranganathan [1938], who studied the grassland-shola eco-system of the Nilgiris, proposed that the hill top grasslands of South Indian hill stations, also represent a climatic climax vegetation, comparable to that of shola forests. Ranganathan suggested that grasslands have a high degree of stability and the ability to survive frost and fire. Tree seedlings of the sholas do not have this ability and they fail to progress into the grasslands. However, evidence for occurrence of both sholas and grasslands in the Nilgiri plateau, since around 30,000 years, before present time, has been provided by palaeopalynological investigations. However, in this period of 30,000 years, regular fires have a history of less than 1000 years.[Swarupanandan et al. 1998]. If indeed grasslands are climax vegetation then it needs to be preserved. [Swarupanandan et al 1998].

The striking feature of the vegetation of the sanctuary, is the vast expanse of grassland, compared to the limited extent of sholas. The grasses reach a height of as much as a meter, in favourable localities. In the dry season, in February to March, the grasslands get dry and are inflammable, when fires are frequent. Repeated burning of these grasslands seem to have taken place, since a long time. [Reconnaissance Report 88-94]. It is said the Todas, who used to graze their buffaloes in the fringe areas, used to set fire to the grasslands, to obtain a fresh flush of leaves. This could not be verified. There are however, ongoing debates where one group claims that the grasslands are climax vegetation and another group claims that the grasslands are the result of anthropogenic interference and resulting successional status (see box – Grasslands).

Observations over several decades have shown that the shola forests do not advance into grasslands. On the other hand where fire and frost erode the sholas the grasslands advance into the forests. The sholas have sharply defined margin where the 'ecotone' is absent. The sholas maintain a condition within that is totally different from that obtained outside. The humidity is high and so is the moisture content of the soil. Ground frost does not occur. The shola species thus regenerate under peculiar and special conditions maintained by themselves. Thus these specialised species cannot live in any other environment. [Reconnaissance Report 88-94]

A typical example of a tree species that is both fire hardy and winter hardy is *Rhododendron nilagiricum*. Rhododendron trees are found along the shola forest margin, they are also capable of colonising grasslands adjacent to the shola forest patches. Rhododendron, unlike most other shola species, which have berries, has a capsule that breaks open when the atmospheric humidity reduces (as it happens during fire incidence). The seeds, which are small, get carried away by wind. [Swarupanandan et al 1998]. Rhododendron shrubs are commonly found on many grassy slopes in Mukurti NP.

2.2.2 Fauna

Mukurti NP has some endemic fauna that are special to the area. However one does not come across animals in such great numbers as in Mudumalai and other adjoining areas. It is an open country and Tahrs can sometimes be sighted, perhaps from a long range. Even these sightings are controlled by wind direction and mist.

The animal species which might be sighted here are; Nilgiri Tahr, Sambar, Barking deer, rarely elephant, Black naped hare, wildboar, porcupine, Tiger, Leopard, Jungle cat, wild dogs, Jackal. Stripenecked mongoose, Nilgiri marten and giant squirrels. (List of fauna with latin names given in annexure) The avifauna are mostly hill birds and include Kestrel, Black eagles, grey young fowl, woodcock and Thrushes. Except for the mildly poisonous pit viper venomous snakes do not exist here.

There are some species of butterflies with Himalayan affinities like the Blue admiral, Indian red admiral, Indian fritillary, Indian cabbage white, Hedge Blue etc. many of the Nilgiri butterflies are not found anywhere in peninsular India.

2.2.3 Endemism

Endemism of biotic elements found on the Nilgiri Plateau is a feature of great biological significance. MNP will be preserving for posterity this special feature worthy of research.

“The flora and fauna found in the plateau has it’s nearest relative only in the Himalayas. The two populations are often separated by 2000 kms or more. Among the mammals the most outstanding and familiar example is the mountain goat called Tahr. The Nilgiri Tahr (*Hemitragus hylocrius*) belongs to a genus which has a curious broken and farflung geographic distribution on the Asian continent. Besides the Nilgiri species, this genus has one species (*H. Jemlahicus*) in the Himalayas ranging from PirPanjal range to Bhutan, and a third one (*H. Jayakari*), found only in the mountains of Oman. Another mammal genus with the same Nilgiri-Himalayan distribution is the Marten, belonging to the carnivorous Weasel family(*Mustilidae*). The genus *Martes* is represented in the Himalayas by two species one of which, the yellow throated Marten(*Martes flaviguala*), has closely related and superficially similar species (*M. gwatkinsi*) in the Nilgiri hill complex. The former occurs in the Himalayas and extends into the hill ranges of Assam, Burma, W. China and Malaysia. *M.gwatkinsi* is confined to Nilgiris and associated hills of South Western Ghats. Among reptiles a typical example is the Flying Lizard, genus *Draco*. It is represented by three species in the Himalayas and the tropical moist-deciduous forests of Nilgiri and Kerala foothills. Among the amphibians a notable example is the beautiful tree frog genus *Ixalus* (now *philaditus*) which has more or less identical distribution. The prominent endemic, sedentary population of birds found in Nilgiri and associated southern hills which have their original population in the Himalayas are as follows:

Laughing Thrushes (*genus Garrula*)

Fairy Bluebird (*Irena Quella*)

Great Pied Hornbill (*Buceros Bicornis*)

Two Bazas or Lizard Hawks (*Aveceda Jerdoni* and *A Lenphotus*) and

Rufous bellied Hawk-Eagle (*Lophotriorchis Kienerii*)

The Laughing Thrushes are pre-eminently Himalayan and are found throughout the range in about 27 species. After a complete absence of 2000 kms in the intervening peninsular India, they reappear in the South Western hills, as two endemic species. *G. Cochinnans* is restricted to Nilgiris and *G. Jerdoni* in the Palani and Kerala hills. The presence of the Laughing Thrushes is symbiotically associated with the plant genus *Rubus* (blackberry, raspberry etc.), whose berries provide the birds with food and who in turn, help disperse the seeds. The plant genus *Rubus* are themselves relics of Himalayan species.

There are many endemic Himalayan birds that winter in the equable temperate climate of the Southern hills. They apparently perform the annual migration of 1500 to 2000 km in a single stop. A typical example of this migration is the Woodcock (*Scolopax rusticola*). It is rarely seen in the intervening country side, which confirms the postulate that it must be flying nonstop from the Himalayas to the Southern Hills. The relics of the Himalayan biota found in the Nilgiris and associated hills are organisms of narrow ecological tolerance. The origin of these relics can best be explained on the assumption that in the geological past, there was a direct elevated land connection, between the Himalayas and the Southern Hills, providing the requisite physiographic conditions, for continuity in their distribution. Through the action of geotectonic forces (subsidence and erosion), the connecting landbridges disappeared, cutting off the more stable sections from the Himalayas as 'islands', thus marooning the local population on them in a natural refugium.

Besides, all the common fauna and flora, there are several species of fishes, common to both the region. These fishes are specially adapted to the torrential hill streams. The fish depend on a watery medium to travel and therefore, the Himalayan fishes could not have reached the Southern Hills, except through direct water connection between the two regions. It was while investigating this problem that late Dr. Sunderlal Hora came up with his famous 'Satpura Hypothesis'. The Satpura-Vindhya trend of mountains, stretching across India, was once more elevated and moister than now and with a more temperate climate. It could have been continuous

with the Assam Hills in the east and with northern end of the Western Ghats in the west and could have served as the causeway for the spread of the Himalayan flora and fauna” [Salim Ali 1977].

Much more work needs to be done to establish the hypothesis. In the meanwhile, it is of utmost importance to preserve any unique region, which acts as a natural refugium for such relic biotic population.

3.Socio economic Profile:

3.1 Settlements: The lower slopes of the Kundah hills were once pasture grounds for the Toda buffalo herds. Todas were the original inhabitants of the area. They are a pastoral tribe, their life and economy being linked to rearing of buffaloes. Toda villages are called *Munds*. There are a number of Munds along the fringe of the park. With the hydel reservoirs occupying the depressions, the Todas gradually lost their pastures. The settlement records show that many of their rights here have been extinguished with the declaration of the reserve forest. Presently, they are engaged in potato cultivation and raise very few cattle. Slowly their life style seems to be changing. The present generation when questioned, did not remember anything about the annual burning of the grasslands inside the park for getting fresh pasture grass. Many old records including Imperial Gazetteer, mention such occurrences. On Mukurti peak is a holy shrine, where the Todas go to worship. The whole area is considered sacred for the Todas and other tribes like Badagas and Kurumbas. The Todas believe that the spirit of man and buffalo leap to Heaven from the Mukurti peak.

Another place of archaeological importance is the peak called Devara Betta. “On its crest are ancient burial stones, made in an oval shape, pointing east.”[Miller G. 1997]

3.2 History of Conservation in the Nilgiris: The foothills of the Nilgiris had the reputation of being a malarial site. Though the region was ceded to the British by Tipu Sultan, none explored it. The scenic splendour and salubrious climate was first noticed in 1818, by the Coimbatore collector Mr. Thomas Sullivan. He tried to build a sanatorium for the British soldiers. Slowly, a settlement sprang up around the present day Kotagiri and Ootacamund. (Udhagamandalam) The British residents and visitors took to sport hunting and in less than fifty years the wildlife was brought to the verge of extinction. Nilgiri Tahr was one such affected species. The Nilgiri Game Association was formed in 1877 to curb this trend. As a follow-up, the Nilgiri

Fish and Game Preservation Act of 1879, was passed and with this wildlife preservation was achieved.

3.3 Land use in and around the Park: There are no villages inside the National Park and the area is totally protected for wildlife preservation. The park is surrounded on all sides by other reserve forests. To the west, are the new Amarambalam Reserve forest of Kerala and to the east and south are the forests under the Nilgiri South division. The Nilgiri South division has plantations of wattle, pines and bluegum. Silvicultural operations are carried on here. It was reported the wattle plantations harbour the Sambar herds. The Electricity Board [EB] have their staff colonies around the hydel reservoirs and they are located outside the Park.

3.4 Grazing: Ever since the Todas moved out of the Park area, because of the difficult terrain and inhospitable climate, there are no other herds grazing inside the Park. The villagers in the fringe areas do not send their cattle that far inside.

3.5 Fuelwood and Non Timber Forest Produce collection: There are no rights, or leases existing for the collection of firewood or NTFP. There are no instances of such collection.

3.6 Development Activities: There are already five reservoirs, in and around the Park. Any other such activity, can only take place far outside. One such scheme, the Pandiar-Ponnampuzha Hydel Power Project threatens to dislocate the tribals and affect wildlife and this is being stoutly resisted by environmental activists. At present, it is kept in abeyance. There is likely to be stiff resistance to such schemes from the environmental groups, who zealously guard and take great pride in protecting the Mukurti National Park.

3.7 Introduction of New Species: Dr. Francis Day introduced brown trout in 1863, in the rivers of the Nilgiri pleatu for game fishing, as the climate seemed ideal. However, this failed, but Mr. H.C.Wilson in 1906, switched over to rainbow trout, which was acclimatised to tropical conditions. By 1910, the rivers were stocked with rainbow trout and fishing was formally inaugurated in 1911. The Nilgiri Game Association thereafter, constructed a couple of fishing huts for use of its members. These are not in use, anymore. The Australian Blackwood (*Accacia melanoxylon*) together with silver wattle (*Accacia dealbata*) were first introduced into the Nilgiris about 1832, by Captain Dun and the blue gum (*Eucalyptus globulus*) in 1843 by Captain Cotton of Madras Engineers [Kala, 1977]. Some of the plantations are surviving at present. Silvicultural operations like thinning are being carried out.

4.Management:

The following management objectives have been given in Reconnaissance Report of 1988-1994, which formed the basis of the first management plan of the Mukurti Sanctuary. A new management plan is under preparation for the Mukurti National Park.

1. Maintain the different characteristics of each type of natural community and landscape, to protect the unique habitat.
2. Provide facilities and opportunities for purposes of formal and informal education, research and monitoring of the environment.
3. Provide opportunities for healthy, constructive outdoor recreation, without hampering the naturalness of the area.
4. Restore the habitat for the endangered species, by keeping away biotic influences

Management Zones: The entire area of 78.46 sq. kms of the National Park is considered the core zone. Because the entire area is very sensitive to biotic interference, it is to be protected with great care.

Tourism: Trekking parties visit this park regularly. There is a lack of public transport facility to the park. Therefore the general public does not visit it. There are a few trek paths inside the sanctuary and a few bridle paths. There are very limited facilities for the stay of the tourists. There is an EB resthouse at the Upper Bhavani. The Bankitapal rest house and a trekking shed at Mukurti are the only two places, under the control of the Wildlife Wing. The Pandiar forest rest house and the Avalanche forest rest house are under the control of Nilgiri South Division and are slightly away from the park. An interpretation centre has just been started at Upper Bhavani.

Checkpoint gates and watch towers: The approach to the park from Upper Bhavani, Porthimund and Parson's valley dam are controlled by the EB authorities. The approach to Mudimund through Terrace estate, passes through staff quarters and hence, there is some control over it. There is a watchtower just outside the sanctuary, near Western Catchment III. It gives a panoramic view of over half the park.

Road network: The road network inside the park is limited. The Upper Bhavani-Western Catchment I road is maintained by the EB. The Porthimund-Western Catchment II road is also maintained by the EB. There is road connection to Bankitapal from Upper Bhavani; the rest are only trekking paths.

Habitat management: The roads act as fire lines. Old fire lines around the plantations still exist. Some fire lines around the sholas have been cut. More fire lines are to be created. Earlier to 1982, this forest was worked by initiating a number of plantations of wattle pine and eucalyptus. The plantations have reduced the habitat of the endangered Nilgiri Tahr. But, in many areas, these plantations have failed due to fire and frost. It has been decided to allow these regions to restore to the natural vegetation. Due to absence of habitation and livestock, in and around the park, there is no grazing. Endemic diseases are not likely to affect the wild herbivores and neither have such instances been recorded. The predators are not large in number; so the prey base is stable.

Weeds: Three exotics; *Eupatorium glandulosum*, *Cytisus scoparius* and *Ulex europaeus* are invading the grasslands. Eupatorium weeds seem to be checking the spread of fire by forming a green belt around the edge of burnt sholas [Reconnaissance Report 88-94].

Poaching: Though poaching has drastically reduced it is still carried on in some areas. There are two kinds of poachers. There are the game hunters who come in small teams and kill animals to sell the meat. They may hunt a tahr only if they get a chance. They camp inside the forest overnight to get their quarry. The other group of poachers are trophy hunters who go for tahr. They avoid the national park and operate from the periphery especially along the interstate boundary from places like East Varagapallam, Bison Swamp etc [Murugan N. 1997].

Personnel and equipment: The park is under the control of one range officer, who has his headquarters at Avalanche. The range is divided into four beats, with beatguards and watchers. Vehicle and wireless sets are provided to the range officer, apart from other equipment, like binoculars and cameras;

Funds: The funds are adequate and come from different sources.

Other organisations: This is one of the few well-protected parks. There are no adverse anthropogenic influences on the park. The Nilgiri Game Association, which helped conserving animals for game hunting, later was recast as conservation oriented non-governmental organisation and was called as Nilgiri Wildlife and Environment Association. They assist the forest department in whatever way, they can. They conduct awareness campaigns and nature camps. The District Forest Office (North) has given office space for their use. They also publish a newsletter called 'Tahr'.

5.Issues:

1. Fire and frost:, The grass becomes highly inflammable by March, due to the drying of the vegetation, by frost and winds. Earlier large scale fires have affected the park, especially the sholas. Fires themselves are caused mostly by human agencies. With strict control over access to the park and protective measures, the incidence of fire has greatly reduced. Frost is a natural phenomenon and hence, cannot be controlled.
2. Plantions: Earlier, some of the grass hills, had been planted with pines and wattle. Where the conditions were unfavourable, the trees have died. However, in the lower valleys, some of the thriving plantations afford cover to some ungulates, like sambar. The effect of such plantations have to be researched, before a decision is taken regarding their future working.
3. Disturbances to tahr habitat: exotic plants like *Cytisus scoparius*, *Ulex europeus*, *Eupatorium glandulosum* are found to be invading some of the tahr habitat. The disturbance to the habitat is high in Bangitapal area frequented by visitors and EB officials. Fire and noise by trekking parties disturb the animals. Poachers, pilgrims and cine shooting also cause much disturbance [Murugan,N. 1997].
4. Poaching: Instances of poaching and unauthorised fishing, have reduced. But the management is alert to the possibility and is on guard.
5. Tourism: Considering the biological value of the area, this park can not be opened up for commercial tourism. It is advisable to maintain only trekking paths. Only those wildlife enthusiasts, who are willing to trek, are being allowed. The Wildlife warden's office has to deal with this contentious issue and convince the visitors.

6.Recommendations

Research studies are being conducted in this park. The recommendations for the management of the grasslands and sholas, will be a part of the output. Since the debate on the status of the grasslands in this area, being a climax vegetation, is still going on, it is not clear, what kind of management options would emerge.

Ooty is a very popular tourist destination. Many people are becoming aware of wildlife and nature tourism is gaining popularity. It will become more difficult in future, to control eco-tourism. A target has to be fixed for the number of trekking parties to be allowed, inside the park. It should be done soon. Apart from full-fledged interpretation centre at Upper Bhavani, a smaller one can be set up at the Wildlife

Divisional Office, to satisfy those, who cannot reach Mukurti. This would also be useful for those, who wish to collect information.

Acknowledgement: This report has drawn largely from the Reconnaissance Report for the Management Plan of Mukurti Sanctuary, from 1988-89 to 1993-94, prepared by Mr. K.S. Neelakantan, IFS, Wildlife Warden, Udagamandalam.

Reference:

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APPENDIX II

FLORISTICS

1. FLORISTICS OF THE SHOLAS:-

The flora is a varied one including elements of tropical as well as temperate origin. The species are all evergreen. The families that are well represented both in the variety of species as well as in the proportion to other families are as follows:-

Ternstroemiaceae
Elacocarpaceae
Rutaceae
Icacinaceae
Celastraceae
Sabiaceae
Rubiaceae
Compositae
Sapotaceae
Symplocaceae
Acanthaceae
Piperaceae
Lauraceae
Elaeagnaceae
Loranthaceae
Euphorbiaceae
Orchidaceae
Liliaceae
Commelinaceae
Cyperaceae
Graminae
Ericaceae
Magnoliaceae
Berberidaceae
Aquifoliaceae
Caprifoliaceae
Vacciniaceae

The undergrowth belongs predominantly to the families Rubiaceae and Acanthaceae (strobilanthes). The ground flora consists of a great wealth of ferns, mosses and fungi. The occurrence of temperate species in intimate mixture with the predominantly tropical genera and species, as well as the reduction in the total number of species especially of trees mark this out from the typical tropical rain forest. This comparative improvement of the flora is not accompanied by any tendency to single species dominance. The more important species comprising the forest are as follows:

I. TOP STOREY

Michelia Nilagirica
Gordonia obtusa
Xantolis tomentose
Sideroxylon tomentosum
Melisoma wibhtii
Elacocarpus oblongus
Cinnamomum wibhtii
Litsea wightiana
Neoliteea zeylanica
Evodia Luna-ankena
Nothapodytia fostide
Ilex wightiana
Ilex denticulata
Glochidion nilgehrrense
Daphniphyllum gluceseena
Machilua sarantha
Syzgium arnottinum,
Syzgium montanum
Syzgium calophyllifolium,
Celtis tatrandra
Ternstroemia gyaanthera
Olea glanulifera
Phoebe paniculat
Meliosma

II. SECOND STOREY

Turpinia nepaulenata
Viburnum erubescens
Viburnum acuinatum
Viburnum hebanthum
Vaccinium nilgherrense
Ligustrum roxburghii
Euonymus crenpulatus
Symplocos spicata
Symplocos foliosa
Symplocos pendula
Symplocos obtusa
Hydnocarpus alpina
Ixora notoniana
Chomelra sp.
Rhododendron nilagricum
Pittoperrum nigirense
Gomshandra corisoea
Microtropis ovalifolia
Eurya japonica
Memecylon malabaricum
Rapania wightiana

III. SHRUBS

Maesa perropattiana
Psychotria congesta
Hedyotis stylosa
Lasianthus coffeoides
Alsophila Latebrosa
Angioptaria evecia
Strobilanthes spp.
Eupatorium glandulosum
Arundinaria wightiana (Bamboo reed)
Polygala arillata
Laportea terminalis
Sarcococca saligna

IV. LIANAS, SCANDENT SHRUBS & OTHER CLIMBERS

Rosa leschenaultiana
Senecio corymbosus
Senecio scandens
Senecio intermedium
Mahonia leschenaultii
Rhamnus weightii
Toddalia asiatica
Clematis wightiana
Rubus spp.
Elacagnus latifolia
Heptapleurum venulcaum
Pentapanax spp.
Lygodium scandens
Gleichenia dichotoma
Passiflora calcarata
Schefflera wellichiana
Lonicera leschenaultii
Lonicera ligustrina
Rubus cordifolia
Jasminum spp.
Piper spp.
Smilax spp.

V. EPIPHYTES

Aerides radicosum
Oberonia spp. (several)
Taeniophyllum spp.
Saccolabium filiformis
Eria braccata
Eria manna
Coelogyne odoratissima
Coelogyne nervosa
Coslogyne mossiae

Fragraea abovata
Peperomia spp.
Ferna, mossae and Lichena

VI. GROUND COVER

Impatiens spp.(severa).
Anotis monosperma
Rotala rotundifolia

Scutellaria violacea
Pogostemon Pleotrenthoidea
Laportea terminalia
Calanthe veratrifolia
Chlorophytum attenuatum
Disporum leschanaultiaum
Cyanotis arachnoidea
Arisaema tortuosatum
Viola distans
Polygala sibirica
Fragaria nilgherrensis
Oxalis spp.
Ranunculus spp.

II. Floristics of the grass lands:

Grasses:

Agrostis schmidii
Brachypodium sylvaticum
Bromus diandrus
Poa gamblei

Other tropical families include compositae, Acanthaceae,
Labiatae, Balsiminae, Melastomaceae, Rubiaceae, Euphorbiaceae ,
Commelinaceae , Orchidaceae, Eriocaulaceae, Cyperaceae etc.,
Anaphalis spp
Helichrysum spp.
Senecio lavendulifolius
Senecio wightianus
Coyza stricta
Osbeckia
Melastomo

The important temperate families of the common occurrence are
Gentianaceae, Ranunculaceae , Violaceae , Umbelliferae , Oxalidaceae ,
Ranunculaceae , and Dipsacaceae.

The species of these families, which are frequently

met with, are:
Exacum spp.
Gentiana spp.
Buplenrum spp.
Dipsacus leschenaultii
Ranunculus spp.
Viola spp.
Gentella,
Pispinella

APPENDIX III

Checklist of fauna

Mammals

Nilgiri Takr	(Hemitragus hylocrius)
Sambhar	(Gervus unicolor)
Barking deer	(Muntiacus muntjak)
Elephant	(Elephas maximus)
Blacknaped hare	(Lepus nigricalis nigricaulis)
Wild bear	(Sus scrofa)
Porcupine	(Hystrix indica)
Tiger	(Panthera pardus)
Jungle cat	(Felis chaus)
Leopard	(Panthera pardus)
Wild dog	(cuon alpinus)
Jackal	(Caris sureaus)
Stripenecked mongoose	(Herpestes vilticollis)
Brown palm civet	(Paradoxurus jerdoni)
Nilgiri amtren	(Martes gwatkinsi)
Common otter	(Lutra lutra)
Glawless otter	(Annyx niranai)
Giant squirrel	(Ratufa indica)
Large brown flying Squirrel	(Petaurista P.Phillipensis)
Feral buffaloes.	

BIRDS

Kestel	(Falcot innuncules)
Lesser Kestrel	(Falco navamuni)
Black eagle.	
Grey jungle fowl	(Galbus scunerati)
Red spur fowl	
Woodcock	(Scolopax runticola)
Nilgiri wood piegeon	(Colcaba elphinstonmi)
Nilgiri Vertitar fly catcher	(Musciapa albicaudata)

Black and orange fly catcher	(Musciapa nigroruga)
Nilgiri blackbird	(Truddus simillinus)
Black bird	(Truddus mercula)
Nilgiri laughing thrush	(Garralax Cahhinnaus)
Black bulbuls	(Hysipeteu madagascariensis)
Blue chats	(Erithacus brunneus)
Sun bird	(Nectarina minima)
Nilgiri pitpits	(Anthus nilgiriensia)

REPTILES

Green pit Viper	(Trimeresurus macrolepis)
Horse shoe pit Viper	(Trimeresurus Strigatus)
Sheild tail	
Forest colotes	(Colotes rouse)

BUTTERFLIES

Grass Yellows	(Eurema species)
Blue admiral	(Kanishka,Canace)
Indian red admiral	(Vemessa indica)
Indian Fritillary	(Argyres hyperbius)
Indian cabbage white	(Pieris camidia)
Pale colouded yellow	(Colias nilgiriensis)
Hedge blues	(Lycaenopasis species)

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Elaeagnaceae
Lorhanaceae
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Orchidaceae

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Cyperaceae
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Ericculaceae
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Vacciniaceae

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Neolitsea zeylanica
Evodia Luna-ankena
Nothapodytia foetida
Ilex wightiana
Ilex denticulata
Glochidion nilgherrense
Daphniphyllum glucescens
Machilua sarantha
Syzigium arnottinum,
Syzigium montanum
Syzigium calophyllifolium,
Celtis tatrandra
Ternstroemia gyaanthera
Olea glanulifera
Phoebe paniculata
Meliosma

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Turpinia nepaulenata
Viburnum erubescens

Viburnum acuinatum
Viburnum hebanthum
Vaccinium nilgherrense
Ligustrum roxburghii
Euonymus crenpulatus
Syplocoe spicata
Symplocos foliosa
Symplocos pendula
Symplocos obtusa
Hyancocarpus alpina
Ixora notoniana
Chomelra sp.
Rhododendron nilagricum
Pittoperrum nigirense
Gomshandra corisoea
Microtropis ovalifolia
Eurya japonica
Memecylon malabaricum
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Maesa perropattiana
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Lasianthus coffeaidas
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Polygala arillata
Laportes terminalis
Sarcococca salingna

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Senecio intermedium
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Rhamnus weightii
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Clematis wightiana
Rubus app.
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Passiflora calcarata
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Oberonia spp. (several)
Taeniophyllum spp.
Saccolabium filiforms
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Eria manna
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Senecio wightianus
Coyza stricta
Osbeckia
Melastomo

The important temperate families of the common occurrence are Gentianaceae, Ranunculaceae, Violaceae, Umbelliferae, Oxalidaceae, Ranunculaceae, and Dipsacaceae.

The species of these families, which are frequently

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Gentiana spp.
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Porcupine	(<i>Hystrix indica</i>)
Tiger	(<i>Panthera pardus</i>)
Jungle cat	(<i>Felis chaus</i>)
Leopard	(<i>Panthera pardus</i>)
Wild dog	(<i>cuon alpinus</i>)
Jackal	(<i>Caris sureaus</i>)
Stripenecked mongoose	(<i>Herpestes vilticollis</i>)
Brown palm civet	(<i>Paradoxurus jerdoni</i>)
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Hedge blues	(Lycaenopasis species)

UTTAR PRADESH

CORBETT NATIONAL PARK

Introduction: CNP is located in Nainital district of U.P. It was formed as Hailey National Park in 1936, and received its final notification in 1966 as Corbett National Park (CNP) with the total area of 520.8 sq. km., under the U.P. National Parks Act 1935 (its status under WL (P) Act, 1972 is yet to be ascertained). It was brought under Project Tiger in 1973.

The objective of CNP is to conserve bio-diversity, and in particular tiger conservation, by promoting people's participation. (Source: new questionnaire)

Geographical description: The Corbett Tiger Reserve (CTR), of which CNP is a part, is a roughly trapezoid valley below the central Himalayan foothills, with its axis more or less west to east. Two-thirds of the area is in Pauri-Garhwal district and one-third in Nainital district. CTR contains two protected areas within its precincts, namely CNP (area - 520.82 sq. km.) and Sonanadi WLS (area - 301.18 sq. km.). A ridge runs right across the axis of the valley. A feature of this valley is the Ramganga River, breaking into many subsidiary streams running in all directions. It enters the north-east part of the reserve, runs south-west to Sarpduli, turns north-west to Dhikala and then turns south-west again near Kalagarh covering a distance of 40 km. Mandal, Palain and Sonanadi are its main tributaries. Construction of a dam across the Ramganga at Kalagarh has led to the formation of a large reservoir spread over an area of 82 sq. km. One half of the reservoir falls in CNP and the other half in Sonanadi WLS. The highest point of the PA is 1141 mts., and the lowest is 432 mts. above msl.

Climate: The temperature varies from a minimum of 7°C in the month of January to a maximum of 40°C in June. It receives rainfall in excess of 1500 mm.

Fauna: The PA is rich in both flora and fauna. Fauna includes tiger, elephant, leopard and leopard cat. Besides these, there are chir pheasants and white storks, both of which are rare. Ghariyal and crocodile, which were introduced in 1994, are now commonly found. The hog deer is a locally threatened species because of the loss of grasslands (42.2 sq. km., according to the Field Director's report, 1985) due to construction of the Ramganga Reservoir. (However, hog deer was never abundant in the PA). On the other hand, Corbett is reportedly over-populated with elephants.

Flora: Floral species include pine, rhododendron, sal, acacia, neem, mango, tamarind and cannabis. Silver oak and eucalyptus were deliberately introduced for decorating the area around the forest rest houses.

Significance: CNP is the flagship PA of India. It is a trend-setter in many ways, as the history of CNP coincides with the history of conservation in India. CNP, along with other parts of CTR, houses the second largest tiger population of the world. It is also an integral part of the range of the elephant population of north-western India. Around 6 per cent of the total bird species of the world are also found in CNP and Sonanadi WLS.

Management and Administration: The management of CNP rests with the Wildlife Division of the U.P Forest Department. It is under the jurisdiction of the Director, CTR, stationed at Ramnagar. The Director is an officer of the rank of the Conservator. There is also an officer of the rank of D.C.F. stationed at Ramnagar, who assists him in his work. For the sake of administrative convenience, CNP is divided into six ranges, namely Dhikala, Sarapduli, Bijrani, Kalagarh, Jhirna and Dhela. Each range is headed by an R.F.O.

The following issues were identified prior to the visit on the basis of information available from various sources:

- *CNP received its final notification in 1966 under U.P. National Park Act 1935. This means that it does not come under WL(P)Act,1972. We intend to clarify the respects in which the former Act is different from the latter, and what impact this has on conservation of wildlife in the PA.*

According to Mr. Ahsan (Field Director, CTR), CNP was constituted under the U.P. National Park Act, 1935, as the WL (P) Act 1972 did not exist then. However, with the coming into force of the Act of 1972, CNP has automatically come under WL (P) Act, 1972 (according to some clause in the Act of 1972).

(It will need to be verified that whether there is a clause in the WPA that implies this. We could not find any such clause when we went through the WPA.)

- *We have no information as to how successful the eco-development programmes run in the surrounding villages have been. Also, there is no information on how these programmes were organised, and the role of NGOs, if any.*

Seven eco-development committees were formed in 1998-99 in the peripheral villages. Selection of villages was carried out according to the JFM (Joint Forest Management) guidelines of the U.P. Forestry Project (villages exerting high pressure on the PA were selected).

Some of the activities carried out under eco-development are:

digging of bore wells to prevent extraction of water from the NP.

Each village is allotted 500 ha of land to protect the PA against fires. The villagers are paid Rs.15 per ha to discharge this duty. The amount is deposited in the name of the concerned eco-development committee in a nationalised bank or post office, and is operated jointly by the chairperson and the member-secretary-cum-treasurer of the committee.

The villagers enter into formal agreements with the Forest Department for such activities and schemes. We have copies of such agreements. Implementation of these programmes is carried out in collaboration with the NGOs active in the area – Operation Eye of the Tiger and the Corbett Foundation. The Corbett Foundation also

distributes medicines in these peripheral villages. It has also helped one village in getting electricity.

However, there is a negative side to the story as described by the forest staff, who argue that the villagers rather than taking initiative on their own to improve their surroundings refuse to do any work, such as reporting forest fires, without being paid for it by the Forest Department. Moreover, in their opinion, collecting compensation from the Forest Department as well as NGOs has become a profession for some. Many people deliberately let loose their cattle into the forest, so as to claim compensation in case of a kill by tigers or other carnivores. Also, NGOs are not working in co-operation with the Forest Department. This was the impression given to us by the RFO, Kalagarh, who told us that often the Forest Department is not even aware of the activities that a particular NGO is carrying out. Both the RO and a Forest Guard who was interviewed said that apart from the lack of co-ordination between the Forest Department and the NGOs, the local NGO staff is also not motivated. For instance, two employees of the Eye of the Tiger (an NGO) left for better jobs, and another one was said to be waiting for a better job to come along. However, discussions with the Field Director suggested that even if the NGOs are not particularly helpful, they are at least not being disruptive. He seemed to consider this itself as a positive step.

- *The field visitors will check the status of 7.5 sq. km. of area where tree felling was reportedly carried out in 1980-81. The purpose of this activity is not stated in the questionnaire.*

Dry marking has been done in a 100 meters wide strip of land on both sides of the road between Dhangadi and Dhikala, stretching 31 km. Habitat improvement was cited as the reason for this activity. However, another explanation given to us for this activity was that dead trees were cut down to honour the command of the then Governor of U.P. (In 1980-81, the then Governor of the state came on a visit to CTR during the dry season. While passing through this road he expressed his displeasure at the sight of dry trees.)

- *There were 69 forest fires in 1995-96. The causes mentioned in the questionnaire for these do not seem satisfactory. Could all the 69 fires be due to human error is another issue.*

1995 and 1999 were the worst years for forest fires, not only in Corbett, but in the entire hill region of U.P. This was because of reasons like a long dry spell, high biotic pressure, tourist pressure etc. Fires are generally attributed to careless smokers as well as graziers who sometimes cross over from surrounding forests.

Ground fires are most common in the area (as opposed to crown fires), and these affect fallen trees and dry leaves. These fires have no major adverse effect on green trees. All six ranges are reportedly affected by fire. A decrease in forest fires is reported after the shifting out of Dhara village in the Kalagarh range.

Fires are sometimes also caused due to transmission lines of the powerhouse of the Ramganga Project.

- *The questionnaire says that the park is over-populated by elephants. This overpopulation is attributed to the loss of migratory corridors. What are the indicators of overpopulation? Which corridor has been lost?*

In the opinion of the PA Director, the perceived overpopulation of elephants is a matter of personal opinion, as no survey of carrying capacity of the area has been carried out as yet. It is generally believed that in Corbett, there is greater density of elephants per unit of area as compared to Rajaji NP. The perceived cause for overpopulation is habitat destruction, i.e. degradation of the corridor connecting Corbett to Rajaji.

- *A proposal was sent to the central government for approval of measures to be taken to control the overpopulation of elephants. What is the status of the proposal? What were the prescribed measures, and if implemented, how successful were they?*

A proposal was sent by the Park authorities, outlining the following steps to control the perceived overpopulation of elephants:

- sterilisation of males
- elephants should be captured for domestic use (Personally, the PA Director favours this)
- some elephants should be translocated to other PAs

This proposal was submitted to the MOEF in 1998 but is not being actively pursued by the PA management.

- *During the previous survey, it emerged that an area called Sitabani near CNP is of significant biological importance and needs to be preserved. Where is Sitabani? What is its significance and what is its present status?*

Sitabani is a RF located south east of CTR. It is an important site for terrestrial birds. Even though the area has good Sal forest and grasslands, it is a relatively small area covering 500 to 600 ha. Therefore, it might not be feasible to accord it the status of a sanctuary, in the opinion of the Director, CNP. Also, it might not be viable to make it a part of CTR because of the distance separating the two, and the absence of wooded areas in between.

- *What has been the impact of introduction of silver oak around lodges. Has it spread to other areas?*

There is a long list of floral species that have been introduced in the PA. For instance, during the 60's, grasslands were replaced by exotic plantations. The current PA management is of the opinion that exotics are not desirable. The Management Plan recommends gradual removal of exotics from the PA. Teak and eucalyptus are especially undesirable species. According to the Buffer Management Plan, removal of exotics has already started in the buffer zone.

Silver oak is minimal in number and its impact is negligible, according to the PA management.

- *Tourism*

CNP is a major tourist attraction, and about 40,000 tourists visit the park every year. Tourism pressure is the maximum in Dhikala range. According to some tourist guides whom we talked to, the animals have lost fear of human beings.

Opinion of PA staff on tourism: The Field Director is of the opinion that controlled tourism is beneficial for the PA. As tourism is on the terms and conditions of the PA authorities, and is strictly regulated by them, it has no major adverse effect on the PA. In fact, tourism supplements efforts to garner funds, gives publicity to the PA and the issues confronting it, and helps to evoke a favourable response from the people.

- *Meet villagers of Dhara, Jhirna and Kothirao. 300 families from these villages were relocated in 1993. What was the package, and how has the relocation affected them? How satisfied are they?*

It was not possible for the field visitors to meet the villagers because of logistical problems.

Relocation package:

Name of the village	Total Land given in lieu of land (acres)	Total money given for land development(Rs.)	Total building compensation and transportation (Rs)	Total expense on drinking water facility (Rs.)
DHARA	222.96	1,66,000	9,35,000	61,160
TALLA-JHIRNA	75.42	1,76,000	13,70,000	1,22,320
MALLA-JHIRNA	164.24			
KOTHIRAO	85.63	58,000	858,000	61,160

- *What is the status of the buffer zone (NP/WLS) that is used for grazing?*

Grazing is mainly along the southern boundary, which has a large concentration of villages (about 25 to 30). The area affected is more than 20 sq. km. Area under grazing is largely along the fringe of the NP, i.e. a strip of around 0.5 to 1 km is affected by grazing.

Since wild animals and domestic animals supposedly do not graze together, unbridled grazing by domestic animals has resulted in a decline in grazing hours for fauna.

There are no migratory graziers visiting the NP.

- *List of NGOs active in the area.*

Two NGOs, namely Operation Eye of the Tiger, and Corbett Foundation, are active in CNP. These NGOs are mainly involved in organising awareness campaigns, etc. They also offer compensation to the villagers for cattle-kills by tigers. Apart from these, they are also involved in developmental activities such as provision of drinking water, electricity, health centres etc.

Some other issues of significance are mentioned below. These emerged from discussions with local people, as well as forest department staff and officials.

1. During the sixties, plantations were carried out in grasslands, as grasslands were not considered to be eco-systems in themselves. These plantations were mainly in the buffer areas, largely for industrial use. Plantations were carried out in Kalagarh Range, before it was included in CTR. Teak was one of the main species to be planted in the Kalagarh Range. Cutsagwan, Kanakchampa, Teak, Thuja and Eucalyptus were planted in other buffer areas.
2. The questionnaire reports that Crocodiles and Ghariyals were introduced in the area in the year 1994 as part of the Crocodile Project of the Government of India. We were not clear if the reptiles had been introduced or only restocked. We were unable to get definitive information about this. The Deputy Director was of the opinion that river Ramganga is unlikely to have been a part of the original range of either crocodiles or ghariyals. This is because before the construction of the reservoir the gradient of the river was so steep that it would have excluded any possibility of survival for these animals. (We have written to Mr. B. C. Choudhary at WII for clarifications regarding this. He was involved with the Crocodile Project).
3. Weed infestation is reported from all over the Park. Parthenium is seasonal. Other weeds that occupy significant area are Cannabis (of which there is no illicit cultivation) and Lantana. Weeds lead to loss of grasslands. Weed removal measures have been undertaken in a limited way, particularly in grasslands. The management plan has prescribed a rigorous weed removal regime. The limiting factor, as far as weed removal measures are concerned, is timely release of funds by the State Government.
4. Impact of human activities/projects on PA: Almost 43 sq. km. of grasslands were lost as a result of the construction of the Ramganga reservoir. But due to gradual receding of water in the reservoir during the dry months, patches of land emerge where grasses grow. Such grasslands emerge between February and June. About 30 per cent of the submerged area become available as grassland. This provides pastures for herbivores in the dry season. However, according to officials interviewed, contribution by the dam to avifauna is limited. Some migratory birds do come here, but this is not a breeding ground for birds.
5. Wild elephants cause excessive crop damage during monsoons. Preventive measures adopted include use of domestic elephants, forest guards, fire crackers etc. to drive them away. Recent figures for crop damage due to wild animals, and compensation given, are not available.
6. Corridors: Rajaji National Park and Corbett Tiger Reserve are separated by a 30 km long strip of RF that is in various stages of degradation. Elephants, particularly adult males, use this corridor to move between the two PAs. But this movement has been severely restricted due to high levels of disturbance in the RF. For instance, there are some Gujjar villages along the corridor, which are a major source of disturbance. (DETAILED INFORMATION IS AWAITED FROM WII REGARDING THIS CORRIDOR).

Trip to the Kalagarh Range

The team did a 16 km long walk in the forest of Kalagarh range, along the Southern boundary of the PA, initially along the Ramnagar-Kalagarh road, and then along a forest trail leading to a forest department watchtower. The trip was important because it gave the field visitors an idea of the level of disturbance in the area.

- There is a heavy level of disturbance due to many sizeable villages along the southern boundary of CNP. Moreover, this 15-20 km long strip of CNP does not have any buffer, and it directly borders these villages. During our walk, we saw many villagers, mostly women, indulging in lopping.
- 3 villages - Jhirna, Dhara and Kothirao - earlier located along the southern boundary, have been relocated to the Western Terai forest division. The team visited the area vacated by Jhirna village, and saw that the forest has reclaimed the vacated land, but there is a higher infestation of weeds in this area. As reported in another section, we were also told that the incidence of fire in this area has gone down since the relocation of the village.
- A proposal for relocating one more village, Laldhang, lying on the boundary of CNP, is currently being processed. However, the relocation is currently stalled due to a deadlock between the forest department and the landless people of Laldhang, who do not stand to get any compensation under the land-for-land rehabilitation package proposed by the forest department. The team was unable to visit this village due to logistical reasons, and hence was unable to verify these claims.
- A fair-weather forest road connecting Ramnagar to Kalagarh runs along the southern boundary of the PA. This road is only meant for the use of the forest staff, but the villagers are allowed to use it during the monsoons. However, no private vehicles are allowed to ply on the road.
- During our walk, we found that this road seemed to be under use on a big scale. Many villagers passed us on our way back from the watchtower. We also saw some groups of women heading towards the forest. According to the RO, groups of women regularly go to the forest to collect wood, flowers, fruits, etc., and resist all attempts to stop them.
- While coming back, we saw women from Maloni village lopping branches within the PA. They did not seem to be afraid of the Forest Guard at all, and exchanged angry words with him on the confiscation of their two *Darantis* (scythes). This incident is a good indicator of the pressures posed by the peripheral villages on the buffer areas. Incidentally, Maloni happens to be one of the villages covered under eco-development in the Kalagarh range.

- Since the southern boundary of CNP is highly disturbed due to the presence of villages (25-30 villages) all along it, a 12 km. wall was proposed to be built on the southern periphery of the CNP. This is being done for the safety of the animals as well as to reduce incidents of crop deprecation. Of the proposed 12 km., only 5 km. has been built so far (most of which is along the Ramnagar-Kalagarh road). Even in this 5 km stretch there are breaches in the wall due to nallahs and small streams. However, in places where the wall is unbreached, it is, to some extent, successful in keeping habitation and the forest separate.

Visit to Ramganga dam:

- The Ramganga dam and reservoir also fall in the Kalagarh range. These structures are cited as another major source of disturbance in this range. The team visited the dam site, powerhouse and the garden created by the irrigation department near the dam site. The forest department objects to the garden on the ground that the fencing around the gardens prevents animals from coming down to the river to drink water.
- Due to initial clear felling around the power plant no large trees can be found in the area. Exotic species like bougainvillea, eucalyptus and other ornamental trees have been planted around the dam site, and in the gardens.

Dispute between forest department and irrigation department regarding land transferred for construction of Ramganga dam:

The Ramganga project started taking shape in the year 1962 and became operational in 1974. The main purpose behind the construction of the dam was irrigation, though a power plant with a capacity of 40 MW also forms a part of the project. However, the power plant does not operate all year round. It remains inoperational during the monsoons, when the reservoir is used for storing water for irrigation. The land for the project was acquired by the irrigation department from the forest department on the condition that barring the land necessary for the construction and maintenance of the dam, the rest would be returned back to the forest department.

The total land transferred for the project was 23,521 acres (legally the entire area is still a RF), out of which 20,121.6 acres got submerged in the reservoir, and 1258.28 acres came under the main dam, saddle dam, power houses, laboratory and other dam related establishments at the dam site. 357.46 acres of land have been returned to the Forest Department.

The figures relating to land transfer given by the Irrigation Department are as follows:

Particulars	Area (in acres)
Total area taken from FD	22,234.81
Area essential for dam upkeep	21370.38
Balance	864.43 (which was to be returned to FD)
Of this land already returned	758.82
Balance	105.61

On this 105.61 acres, there are two residential colonies in Kalagarh – Central colony and New Colony.

Particulars	Area (in acres)
Area occupied by Kendriya Colony	57.80
Area occupied by New Colony	47.81
Unauthorized houses in Kendriya Colony	261 houses
New Colony	367 houses

Unauthorized huts and khokhas in Kendriya Colony New Colony	67 170
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The forest department's main objection is to the 900 acres of residential land in the Kalagarh colony, in which only about 4,500 residents are authorised occupants working with the Irrigation Department. The remaining nearly 5,500 residents are illegal occupants. Biotic pressure from these encroachers is likely to harm the NP.

The Forest Department and the Irrigation Department are already involved in a court case in the Lucknow High Court regarding the Kalagarh irrigation colony. The case has been filed by the Wildlife Protection Society of India (WPSI). The Irrigation Department has been challenged for allowing misuse of a part of the land transferred to it by the forest department for building an irrigation colony to house the maintenance staff of the Ramganga dam and powerhouse. The colony houses around 10,000 people currently. According to forest department officials, over 50 per cent of the inhabitants are encroachers, in the sense that they are not connected in any way with the operation and maintenance of the Dam and/or the powerhouse. The irrigation department has agreed (in an affidavit filed in the court) that there are substantial encroachments, but has pleaded inability to evict the encroachers, due to organised political resistance by them.

The interim order of the Lucknow High Court forbade the allotment of land to a third party by the irrigation department. In spite of this the employees of irrigation department have rented places to people not entitled to stay in the colony. Now the irrigation department has asked the forest department to evict the illegal occupants and take the area under its control. However, the forest department is unwilling to take on this politically volatile task, specially in the face of constant hostility faced by its staff in Kalagarh colony in the past few years.

- A newly created Corbett (Wildlife) Training Centre is situated at Kalagarh. It has been built on land returned to the forest department by the irrigation department.

Constructing buildings and introducing plantations seems to be a method adopted by the forest department to re-establish control over areas returned by the irrigation department.

Recent news reports on denotification/transfer of the Ramnagar-Kalagarh forest road to the PWD by the forest department:

On our return from the field visit, we found news reports of the transfer of the above-mentioned road to PWD for metalling of this road to connect Ramnagar to Kalagarh, the proposed capital of Uttaranchal state.

The following is a summary assessment by the visiting team of the impact of this development on the PA.

Regarding the supposed proposal to make Kalagarh the capital of Uttarakhand, the moot point is that according to forest department officials, there was, prior to construction of the Ramganga Dam during 1962-74, no habitation by the name of Kalagarh. The entire area was a Reserve Forest, and a part of this land was transferred to the irrigation department for the dam, reservoir, powerhouse, a housing colony and related structures. Now, if this colony is to be made into a state capital, then we will have a huge and growing human settlement inside as well as right on the periphery of the Tiger Reserve. The current denotification/transfer, then, would be only the first in a series, as the entire wherewithal of a state capital would have to be created in Kalagarh. This would include offices, additional housing, a wider network of roads, public transport systems and much more. One needs, thus, to question the very premise of making Kalagarh the state capital.

The Kalagarh Range, and The Corbett Tiger Reserve in general, are already beleaguered due to the submergence of 82 sq. km. of its area under the Ramganga Reservoir (which has interfered with the migratory routes of elephants, and submerged prime grasslands and forest). The creation of a state capital (for which transfer of land to PWD to create a metalled road is only a first step) is something that may have many more far-reaching consequences for The Corbett Tiger Reserve. During an early morning walk, the field visitors saw pugmarks of a tiger on a stretch of about 2-3 km on the very road that has now been handed over to the

PWD. The futility of the entire denotification/transfer exercise seems even more stark when, as has been pointed out by others, one considers the huge expenses and efforts that have already been incurred in relocating three villages from the area, building a wall to demarcate and protect the boundary of the Park, and the ongoing efforts to relocate the single remaining village (Laldhang) existing there presently.

ASKOTE WILDLIFE SANCTUARY- A PROFILE

INTRODUCTION

Askote Wildlife Sanctuary (AWLS) was notified in 1986 (vide notification no. 996{1} 14-3-30/84), under the Wildlife (Protection) Act, 1972. It occupies an area of approximately 599.93 km². The main objective behind the creation of AWLS, in 1986, was the protection of the Himalayan musk deer.

AWLS is located in Pithoragarh district, which is situated in the Kumaoun hills of U.P. An international boundary with Tibet forms its northern limit, River Kali in the east separates it from Nepal, and boundaries of east Almora and Pithoragarh forest ranges form its western and southern limits respectively.

Elevation ranges between 600 m and 6904 m above mean sea level. A rich diversity of medicinal herbs and plants is also reported in the sanctuary. This sanctuary is the habitat of the Himalayan musk deer (*Capricornis sumatraensis*), barking deer (*Mantiacus muntjak*), serow (*Capricornis sumatraensis*), bharal/ blue sheep (*Pseudois nayaur*) and Himalayan thar (*Hemitragus jemlahicus*) among other faunal species. A special feature of Askote sanctuary is that it represents forest types of both east and west Himalayas.

GEOGRAPHICAL PROFILE

Askote Sanctuary is located in Pithoragarh district in the Kumaoun region of U.P. between 29° 46' 45" N – 30° 27' 45" N and 80° 16' 25" E – 81° 01' 53" E. The nearest town is Didihat (7 km), which is connected with a motorable road. The towns of Dharchula, Jauljibi, and Askote, which are inside the PA, are also well-connected to Pithoragarh. The nearest railhead is Tanakpur, which is 205 km from Askote. The nearest airport is 300 km away at Bareilly. (There is an airport, Nainisaini, at Pithoragarh, 50 km from the sanctuary, but it is not used for regular commercial flights).

The highest point of the sanctuary is 6904 m above msl (Panchachuli) and the lowest point is 600 m (Jauljibi) above msl. The nearest meteorological station is located in Pithoragarh from where the data for temperature and rainfall are taken. Temperature ranges between 22.9° C and 0° C. On an average, the area around the

sanctuary receives 1200 to 1500 mm of rainfall. Water sources inside the PA include a few natural water holes and seven artificial water holes, which were constructed for wild animals. There are numerous wells and pumps belonging to the dwellers of Dharchula, Askote and Jauljibi. Besides these, there are three main rivers - Kali Ganga, Gori Ganga and Dhauliganga - and their many tributaries. In all, there are about 10 rivers and streams in Dharchula Range and nine in Askote Range. The sanctuary is also reported to have 20 glaciers.

AWLS is connected to Nandadevi National Park with a forest corridor, which is 20-40 km to its north-west.

BIOLOGICAL PROFILE

FLORA

There is altitudinal gradation in the flora found here. The forest types found in the sanctuary consist of Riverine Chir Pine (*Pinus roxburghii*), Banj Oak (*Quercus leucotrichophora*), Rianj Oak (*Q. lanuginosa*), Tilanj Oak (*Q. floribunda*), Sal (*Shorea robusta*) and Ramla between 1000–2000 m; Tansen (*Tsuga dumosa*), Thumer (*Taxus baccata*), Raga (*Abies pindrow*), Kharsu oak (*Q. semecarpifolia*) and Kail between 2000–3000 m; Birch (*Betula utilis*) and Chimul between 3000-3500 m; and alpine meadows above 3500 m, extending up to approximately 5000 m.

A rich diversity of medicinal herbs and plants, such as jhula (*Parmelia ramitchadalis*), tejpatta (*Cinnamomum tamala*), timurbeej (*Xanthozyllum alutum*), jambu (*Allum sp.*), gandrayan (*Angelica glavca*), dhup lakar (*Juniperus indica*), indrayanbeej (*Cilvillus colocyllis*) and memeriganth (*Captis teeta*) is also reported from the sanctuary.

As already stated, Askote Sanctuary represents forest types of both (humid) east and (dry) west Himalayas. *Pinus roxburghii* and *Quercus semecarpifolia*, typical west Himalayan elements, are not found commonly in the east. Similarly, oak forests of *Quercus leucotrichophora* and *Q. lanuginosa* are widely distributed in the west Himalayas. Whereas *Macaranga pustulata* is common in east Himalayas. All of these are represented in Askote (U.Dhar, R.S.Rawal and S.S.Samant, 1997).

Forests belonging to both pioneer and climax stages are found in the sanctuary. Riverine forest is comparable with the habitat of pioneer communities. Riverine Chir Pine (*Pinus roxburghii*) is an early successional species, and oak is the climatic climax for the region (Champion and Seth, 1968).

A unique feature of the flora of AWLS is a sizeable presence of non-native species. 1120 floral species of the area were studied, and the results revealed that over 54% of the flora is non-native (U. Dhar, 1997). Non-natives have been defined as those floral elements that are not ordinarily found in the Himalayas. The non-native species are mainly found in the herbaceous and shrub layers. The deliberate introduction and establishment of non-native species is facilitated by increased human interference. For example, *Woodfordia fruticosa*, *Arundinella nepalensis*, *Themeda anathera* and *Imperata cylindrica* have been deliberately introduced and promoted by the locals because of their fuel and fodder value. A large proportion of these species are invasive, particularly *I. Cylindrica* (a well-known weed). Non-native species pose a problem for the native species, since most of the former are generally not grazed when they mature. Proliferation of these non-native species will adversely affect the growth of native species and would also multiply the problems of acute shortage of fodder. The nomadic lifestyle of the Bhotiya tribe in the sanctuary (which is described later in the report) may also have contributed to the introduction, spread and persistence of non-native species. Their annual migration with scores of livestock from higher alpine regions (in summer) to the sub-tropical ranges of Terai (in winter) facilitate the dispersal of species from one area to another.

The inhabitants of the area harvest plant resources (either for their basic needs or for trade) and, in the process, populations of a number of floral species have declined drastically over the past few years. Epiphytic orchids are one such rare species. Medicinal plants like gandranyi/ chipi (*Angelica glauca*), chorak (*Pleurospermum angelicoides*), dolu (*Rheum australe*), mameri (*Thalictrum pauciflorum*), rukhi (*Megacarpaea polyandra*) and thuner (*Taxus baccata*) are endangered or potentially endangered species.

FAUNA

The habitat diversity and wide altitudinal range exhibited in the sanctuary offer diversity for threatened and other species of mammals and birds. Among the endangered species, the Himalayan musk deer (*Moschus moschiferous*), Himalayan thar (*Hemitragus jemlahicus*) and snow leopard (*Panthera unicia*) are notable. These species are usually distributed in the

alpine and sub-alpine zones. Other locally threatened species include ghoral (*Nemorhaedus goral*), bharal (*Pseudois nayaur*) and monal pheasant (*Lophophorus impejanus*). A probable cause for the decline in the population of all these species is hunting and loss of breeding space. Musk deer population is particularly under threat, and anecdotal accounts hint at the musk deer disappearing from the area within the next 20-25 years, if hunting continues at current levels. Other common species of mammals are barking deer (*Mantiacus muntjak*), porcupine (*Histrix indica*), wild boar (*Sus serofa*), langur (*Presbitis antellus*), rhesus macaque (*Maccaca mulata*), leopard (*Panthera pardus*), jungle cat (*Felis chaus*), jackal (*Canis aurens*), Himalayan black bear (*Selenarctos thibetanus*), tiger (*Panthera tigris*), serow (*Capricornis sumatraensis*) and mouse hare (*Ochotona roylei*). Most of these species are generally distributed in sub-tropical and temperate zones, except for the serow and mouse hare, which occur in sub-alpine and alpine zones. Himalayan black bear has a wide distribution range, extending from the sub-tropical to the alpine zone.

EXTRACTION OF MEDICINAL HERBS

Askote is a repository of a large number of rare and therapeutically important medicinal plants. Anecdotal accounts suggest that the medicinal plants found in the sanctuary find use in a number of traditional systems of medicine such as Ayurveda, Unani, and Traditional Chinese Medicine (TCM) to name a few. Consequently, there is a large-scale extraction of medicinal plants from the sanctuary and its surrounding forests.

People come from as far off as Delhi to collect herbs from this area. According to the locals, the collectors begin to trickle in shortly before the rains and camp in the forest for about two to three months, collecting herbs. Apart from outsiders, the locals living inside the sanctuary (both tribals as well as non-tribals) are also actively involved in this. Infact, medicinal plant collection forms a major part of the income of a number of families living in the villages and towns inside Askote. The team visiting the sanctuary was told that though medicinal plant collection was earlier an activity that predominantly the Bhotiyas were involved in, the lucrateness of the trade has induced non-tribals to take to collection as well. Further, earlier, collection was by

default, restricted to a specific time. This usually coincided with the summer months when the migratory graziers took their livestock to the upper reaches, which is also where most of the important medicinal plants are found. Collection of plants, therefore, was a tertiary activity, and did not, in most likelihood, contribute to the income of a family. This is because medicinal plants were used predominantly within the family for therapeutic purposes. With time this activity has become commercialised and medicinal plants have become a major source of income for a lot of families. Extraction has therefore begun to reach unsustainable proportions. This has been exhibited in a few studies undertaken by the G.B. Pant Institute of Himalayan Environment and Development, Almora, in this region. To summarise, the commercialisation of medicinal plants has led to a change in the collection strategy of the people involved in this enterprise - from individual households to groups of 3-4 households collecting together in order to increase manpower. Further, the period of collection has also increased to five months (July-November) as compared to two months (August-September) formerly. Previously, the collection of herbs in the alpine meadows was done in conjunction with livestock grazing. However, now, medicinal herb collection has become a full-time activity for many families, because it requires more time. It has become a specialised task done on a long-term camping basis. This has obviously also had an impact on the sustainability of herb collection as a long-term livelihood source, as the danger of over-exploitation has increased (Farooquee, N.A. and Saxena, K.G.).

As the government strictly controls the trade in herbs by a permit system, the herb-collectors have evolved an ingenious method to overcome this. The illegally collected herbs are supposedly first sent to Nepal. As the government allows import of herbs from Nepal, these herbs are brought back to India, and the entire operation is legalized.

Prior to the declaration of the sanctuary, a number of co-operative societies were registered in 1959 exclusively for collection and sale of these plants. In 1992, there were 15 such societies with a total membership of 7009 people in Dharchula block alone. About 18% of these members were SCs and 40% belonged to STs. Medicinal plants collected by these 15 societies were marketed through a government agency called Parwatiya Sahkari Bhesaj Ewam Krai Vikrai Sangh (PSBEKVS) which was

established in 1972 at Pithoragarh. In 1986, KMVN joined PSBEKVS through a government order. This order authorised the Nigam to issue permits to various societies and individuals for collection of and trade in medicinal herbs. This resulted in an increase in herb collection and trade (Nehal A. Farooquee and Krishna G. Saxena, 1996).

The following is an indicative list of market rates for some important herbs collected from this area:

Keedaa	Rs 22,000 per kg	Used as medicine
Chatrak	Rs 2000 per kg	Used as medicine
Saalam Panja	Rs 10,000 per kg	Used as medicine
Root of Akhrot	Not Available	Used as <i>datun</i>
Chibi	Rs 60 per kg	Used for stomach ailments
Jamboo	Not Available	Used as food
Katki	Rs 90 per kg	Not available

Bhang (cannabis) too is collected from the PA. It is said to have a good market abroad.

It is nearly impossible for the Forest Department to completely prevent or even regulate the collection of plants from the sanctuary. This stems from a number of factors that have been described earlier - ranging from the vast area of the PA (most of which is snow covered and extremely rugged), the fact that the limits of the PA are unclear, to the perennial problem that dogs most wildlife protected areas, that of paucity of staff.

LANDSLIDES AND EROSION

Blasting for widening/ building roads and movement of heavy vehicles on various roads inside Askote Sanctuary have further increased the incidences of landslides in an area that is anyway located in a landslide-prone zone. Landslides affect almost 125 km² annually in Dharchula Range. Both landslides and erosion lead to the degradation of the habitat of the PA. They also result in the migration of faunal species, loss of their food source and grazing grounds, and destruction of certain floral species.

SOCIO-ECONOMIC PROFILE

HABITATION

There are three towns (Askote, Jauljibi and Dharchula) and 108 villages inside the sanctuary. Of these villages, 107 are revenue villages and only one is a forest village. The villages have a population of approximately 53,363. 30% of this population comprises of Scheduled Castes/Tribes. These habitations, alongwith the total livestock of 83,000 - 84,000, exert considerable biotic pressure on the sanctuary on account of grazing, NTFP collection, fire wood collection, and in many cases hunting and poaching.

The Bhotiyas are the most significant ethnic group living in and around the PA. They are a Scheduled Tribe of the Greater and Trans-Himalayan zone, who were traditionally trans-humant pastoralists and agriculturalists. However, many of them have now taken to settled lifestyles, and to other occupations like trade, commerce, government service, etc. In Askote Sanctuary, Bhotiya habitations are concentrated in Dharchula block. There are 19 trans-humant Bhotiya villages inside the sanctuary, located between Kali and Dhauli rivers at the junction of India, Nepal and China, at altitudes ranging between 1200 m to 4100 m above sea level (Farooquee, G.B. Pant Institute, 1996). The trans-humant Bhotiyas shuttle between the alpine meadows during the summers and the lower regions during the winters. They earn their livelihood through a combination of agriculture, livestock rearing, liquor brewing, and trade in woollen products, medicinal plants and wild animal parts. However, settled Bhotiya populations can also be found in most of the villages inside the sanctuary. But it is the former category that is more important from the point of view of biotic pressures on the sanctuary.

This is because the trans-humant Bhotiyas, due to their unique lifestyle and economic system, have greater access to the habitat of the most endangered and widely hunted species of Askote, such as musk deer and ghoral, which inhabit the higher altitudes of the PA. Moreover, the habitat of these animals coincides, during summers, with that of the trans-humant Bhotiyas. The livestock of the Bhotiyas and the wild animals share common pastures in the upper reaches. It is therefore concluded that there would be substantial pressure on such wild species. Added pressure arises from food habits of the Bhotiyas (where meat of wild animals, particularly wild herbivores forms an important part of the diet), as well as from the fact that this community has traditionally been involved in trans-border trade. In addition to trading in various articles like foodstuff, clothes and spices, wild animal and plant parts have constituted a large proportion of trade. Despite the declaration

of a wildlife sanctuary, a number of Bhotiyas are allegedly involved in illicit activities, like trade in wild animal parts and medicinal herbs.

Their agriculture, trade and cottage industries revolve around their livestock. In the winters, the Bhotiyas migrate to the lower reaches along with their livestock. They are famous for breeding many hybrid species of livestock over the centuries, in accordance with their needs of hardy species of livestock that can endure moderate as well as very low temperature, and can travel long distances as draught animals along with the trans-humant populations.

HUNTING

The field visitors learnt from various sources that local people are involved actively in hunting and poaching inside the sanctuary. This, among other things, can be attributed to the fact that the locals (both tribals and non-tribals) are very fond of meat, particularly bush meat. The meat of bharal, musk deer, yafo, biu, changu (*local names for high altitude fauna, for which we were unable to find the common names*) and other animals is relished locally. Besides hunting for food, the illegal trade in wild animal parts takes a heavy toll on the wildlife of the area. Musk deer, Himalayan black bear, sloth bear and monal pheasant are some of the animals and birds occurring in Askote that are exploited for their body parts.

Wildlife trade has been discussed in detail earlier in the report.

AGRICULTURE

Cultivation is also widespread inside the sanctuary. Agriculture is practiced on *naap* land, for which individual occupants hold *pattas*. Among migratory Bhotiyas, income from agriculture contributes to about 32-36% of their total income. Cultivation is carried out in the summer in the higher altitude homes of the Bhotiyas. Typically, they sow the seeds of *phapher* (a kind of legume) and *ogal* (a staple cereal) during the winters. The seeds remain covered by snow during winters, and when the snow melts, they germinate on their own during spring. When the Bhotiyas migrate to the alpine meadows during summer, they harvest these crops and bring them down to the lower reaches when they return in winter. Specific figures for the amount of land under cultivation inside the PA are not available. However grazing, habitation and cultivation have been estimated to affect approximately 318 sq.km-330 sq.km of the PA.

GRAZING

Grazing, along with agriculture, is one of the most important occupations of the people of this area. This activity affects approximately 318-330 km² of the PA.

Around 83,000-84,000 livestock graze in the sanctuary all year round. On an average, each migratory Bhotiya household owns two bullocks, two cows, 15-20 sheep and 10-15 goats (Nehal A. Farooquee, 1996).

AWLS plays host also to migratory graziers from H.P. (especially from the area around Kangra), via Joshimath and Munsiyari. They bring with them around 9,000 livestock every year in the summer months. However, their numbers are reported to have been declining steadily. This is reportedly a consequence of a move by the U.P. Government (details not known) to check the inflow of graziers from other states.

There is also a sheep farm at Pangu village run by the Animal Husbandry Department of the UP State Government. This occupies approximately 18 hectares of land and houses 650 Merino sheep. The sheep graze outside the farm too, and are reportedly even sent up with migratory Bhotiya graziers to alpine pastures during summer months. It is not clear whether the land occupied by the sheep farm has been transferred to the Animal Husbandry Department or whether it is an encroachment.

Vaccination of livestock is unheard of inside the sanctuary. The meagre manpower of the Forest Department is primarily responsible for this. Vaccination is obviously a low priority issue in an area whose boundaries themselves are unclear.

IMPACT OF PA ON LOCAL PEOPLE

Attacks on human beings by wild animals are not very common while attacks on livestock are relatively frequent. The field visitors could get data for the past two years only. One person in 1998 and one in 1999 was injured inside the PA by a leopard and a bear respectively. In both the cases, victims were compensated. However, no compensation was provided for injury to livestock. Also, no scheme exists for compensating crop damage. There has been no official record of any incident of conflict, confrontation or protest with regard to the PA by the local people. However, information collected during conversations with local leaders revealed that the local people opposed the formation of the sanctuary.

ECO-DEVELOPMENT

Despite tremendous pressures on the PA, eco-development has not been introduced in the PA or its surrounds to reduce or minimize these pressures. Collection of critical socio-economic data has been initiated this year in order to prepare proposals for eco-development.

MANAGEMENT PROFILE

LEGAL STATUS

Askote Wildlife Sanctuary (AWLS) was notified on July 30, 1986 (vide notification no. 996{1} 14-3-30/84), under the Wildlife (Protection) Act, 1972. It occupies an area of 599.93 km². Initially, the sanctuary comprised of only one range (Askote), but in 1996 the sanctuary was divided into two ranges, namely Askote (190.86 km²) and Dharchula (409.16 km²).

Prior to being notified as a sanctuary, the land that now comprises the PA, consisted of the following categories of land: 289.43 km² of Reserve Forests, 225.50 km² belonging to Van Panchayat¹⁰ and Civil Forests¹¹, and 85 km² of *naap* land¹². Because of the fact that the process of settlement of rights has not been carried out (it has not even been initiated), the above mentioned categories of land continue to be used in the same way as they used to be before the declaration of the sanctuary.

Besides these categories, 150 km² in Dharchula Range is under the control of ITBP and the Indian Army for the purpose of protecting the international border.

According to official estimates, out of the total area of 600 km², only about 147 km² (i.e. 24%) of the PA is totally free from human disturbance. The various causes of disturbance are provided below:

(i) Lack of Clarity of Boundaries of The PA

The most glaring lacuna in efficient management of the sanctuary is lack of clarity regarding the boundaries of the PA, even among the Forest Department. Apparently

¹⁰ Van Panchayat Forest (VPF), which includes the areas around revenue villages that are preserved as village forests by a local institution called the Van Panchayat. The Revenue Department hands over such areas to the Van Panchayat on a formal request by the body. VPFs are expected to meet the biomass requirements of the village without putting pressure on the PAs.

¹¹ Civil Forest, which includes all land other than *naap* (revenue) land; Van Panchayat land and Reserve Forest land. These types of forests are under the control of the Revenue Department.

¹² *Naap* land includes agricultural land as well as land under habitation given on *patta* by the Revenue Department to individuals, organizations and institutions.

there were no ground surveys conducted prior to the notification of the PA, partly because a large part of the PA is inaccessible as a consequence of the difficult terrain and presence of snow for most part of the year. Consequently, there is ambiguity about the precise limits of the PA and even the office of the DFO in charge of the sanctuary is not certain about what is included in the PA and what is not. There is no map that shows the complete PA and the maps that are available are based upon old Management Plans and show only the southern half of the PA. It has been impossible for the Forest Department to map the entire PA because almost 50% of the PA is depicted in restricted topo sheets and it has not been possible even for the Forest Department to acquire these. This coupled with the twin facts that the notification is itself ambiguous about the limits of the PA and that the settlement of rights has not been carried out, has resulted in a number of management problems. These are enumerated below:

Quarrying:

There are some quarries inside the sanctuary, including two soapstone quarries at Ghatiabagad in Askote Range. Private contractors, under license from the Revenue Department undertake the quarrying. Soapstone is taken out of the sanctuary in trucks, for sale at Haldwani and Tanakpur. Though these quarries are on *naap* land, the local Forest Department staff claim that the *naap* land on which the quarries operate is actually a part of the sanctuary. However, since there is no way of proving this, it is not possible to initiate action against these or even request the Revenue Department to refrain from giving out fresh permits.

In addition to these, there are also many illegal and a few legal (i.e. licensed by the Revenue Department) quarries of sand and stone, used primarily for the purpose of construction. Transporting sand from a long distance would make it unaffordable; therefore, there is a ready market for locally extracted sand.

Soapstone mining affects almost 20-25 ha in Askote Range and sand and stone mining impacts nearly 1 km² in both Askote and Dharchula Ranges. Quarrying has resulted in degradation of habitat, loss of top layer of the soil and general disturbance in the PA.

Presence of towns inside the PA

On the basis of the incomplete knowledge of the boundaries of the PA that is available, it has been estimated that three towns- Dharchula, Askote and Jauljibi are a part of the sanctuary. The cumulative population of these towns is estimated at 70,000 to 80,000 people. All three towns are along the southern boundary of the PA, parallel to the Kali Ganga River. The inclusion of towns inside the PA points to the PA boundaries having been demarcated on paper in the absence of ground surveys.

This calls for urgent rationalisation of boundaries in order to exclude these towns from the PA.

(ii) Development Activities

NHPC Project

The NHPC (National Hydel Power Corporation) has commissioned a hydro-electric power project on Dhauliganga River at and around village Chirkila. The site of this project is inside the sanctuary and approximately 148 ha of land has been transferred to the NHPC in accordance with the guidelines laid down in the Forest Conservation Act, 1980.

The dam, the purpose of which is electricity generation, would affect 186.2 ha (including quarries, roads, colonies etc). However, Reserve Forests would not be affected. The total area affected by the project *per se*, i.e. the area affected by the dam and the power plant, is 148 ha. The total catchment area is 1,36,000 ha and the total submergence area is 28.6 ha. The submergence area includes 9.5 ha of agricultural land and 19.2 ha of Civil Forest land. The project is expected to cost Rs 47,385 lakh.

Besides Chirkila village, which would be completely submerged, a few other surrounding villages such as Sangri, Khet, Jamko etc. would also be partially affected. A total of 617 families are going to be affected for whom a relocation package has been offered. This includes land for land, or cash for land and immovable property; subsidy for agricultural inputs; cost of transporting household goods, etc. Land for resettlement has already been identified at Khet, Duku and Dharchula. The estimated cost of relocation and resettlement is Rs 106.02 lakhs.

The actual construction of the dam and allied infrastructure is going to be carried out by sub-contractors. These are Daewoo-Kajima (construction of the dam and 3 km of the tunnel that will feed the turbines), Hindustan Construction Company (broadening the road linking Chirkila to Pithoragarh) and Samsung (the powerhouse and the remaining 3.9 km of the tunnel that will feed the turbines). The project has received 'conditional' environmental

clearance as per DO no. J-11016/32/85-En.5/IA, according to a letter (dated 14.05.1987) from the Ministry of Environment to the General Manager (PD), NHPC. Nevertheless, work on this project has already begun.

One of the most significant impacts of the dam, as far as the sanctuary is concerned, is the widening of road between Askote and Chirkila to facilitate the movement of equipment for the dam. Blasting for the same has exacerbated landslides in this area, which is anyway landslide-prone. Stones that roll down the slopes retard regeneration and cause damage to the existing trees. The team that visited the area could feel the effects of the blasting (vibrations and the sound of the explosions) in Tejam village, which is at least 10 km from the dam site.

While bricks are bought from outside, most of the other construction material is mined/ quarried from the river-beds inside the sanctuary, thus making it illegal. A large part of the requirement is met out of the debris from the 6.9 km long underground tunnel from the dam site to the powerhouse and 400 m long diversion tunnel. NHPC is also constructing housing colonies for its engineers and staff at three sites (Tapovan, Galati and Dobhat). These sites are not inside the PA but immediately on its periphery.

The initial proposal for the Catchment Area Treatment (CAT) plan covered all 20 micro-watersheds of Dhauliganga River, but NHPC prevailed over concerned authorities to modify the proposal, citing paucity of funds. The revised proposal covers only nine micro-watersheds. CAT is proposed to be implemented through the Forest Department, to which Rs 11 crore have already been allocated by NHPC. The CAT plan includes

- (a) Agriculture
- (b) Horticulture
- (c) Soil conservation
- (d) Forestry

The estimated cost of CAT has been placed at Rs 640 lakhs.

Micro-hydel projects

In addition to the Dhauliganga project, there are five micro-hydel units of the U.P. Laghu Jal Vidyut Nigam. These have been operational for varying

periods of time and some of them were commissioned before the PA came into existence.

For the purpose of the micro hydel projects, land had been transferred to the UP Laghu Jal Vidyut Nigam in five villages, i.e. Chirkila, Kanchauti, Sobla, Kulagad and Galati, along the Dhauliganga River. Total land transferred to the Nigam is 4.79 ha. Out of this land, the project at Chirkila village has come up on 1.88 ha of Civil Forest land. Kanchauti is the site for a project for which 1.00 ha (comprising of 0.56 ha of Reserve Forests, 0.17 ha of Van Panchayat Forests and 0.26 ha of Civil Forests) of land. The project at Sobla village uses 1.83 ha (this includes 1.34 ha of Civil Forests and 0.48 ha of Van Panchayat Forests). The Kulagad project is entirely on 0.98 ha of Civil Forest land. There is no information about the category of land used for the Galati project. However, according to unconfirmed sources, the area acquired for it was *naap* land.

The project at Sobla village is currently being scaled up and an additional power plant is being constructed. There are no details available on the amount of land that this will use or its likely impact. It is, however, a matter of concern and possibly also illegal that land is being diverted from an area that has been notified as a wildlife sanctuary for building hydel projects. The expansion of the Sobla project is particularly concerning as this project is situated right in the midst of the PA and is surrounded by pristine mountains on all sides.

It is, at this juncture, not possible to comment upon the likely environmental impacts of the above mentioned projects. One can, however, conclude that any developmental project in the midst of a wildlife sanctuary is likely to cause some disturbance to wild floral and faunal values.

Construction of roads

The total length of roads inside the PA is approximately 140-150 km. Details of the major roads running through the sanctuary are as follows:

Dharchula to Sobla	40 km
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Kanchauti to Narayan Ashram	30 km
Tawaghat to Ghatiabagad	30 km
Tawaghat to Jipti Motor road	40 km

The Forest Department has transferred land to the Border Roads Organization (BRO) for the Tawaghat-Jipti motor road, which is currently under construction. All these roads are metalled and are maintained by the BRO. The construction of roads and the traffic plying on them causes considerable noise and air pollution. This has been exacerbated of late as a consequence of an increase in the movement of heavy vehicles, since work on the Dhauliganga HE project started. It is not uncommon to see heavy earth-movers plying on narrow mountain roads and this activity has considerably increased the incidence of landslides since work on the project started.

(iii) Presence of Army

As the sanctuary borders the sensitive Indo-China border, it has considerable presence of military and para-military forces (ITBP) inside it. According to a rough estimate, out of the 600 km² area of the sanctuary, the army and ITBP together control around 300 km². Their presence, though probably necessary for strategic and security reasons, is a source of considerable pressure on the PA. The principal sources of pressure are firing ranges, movement of arms and ammunition, food supplies and fodder for animals. In Dharchula, there are three battalions of the Army – one each of infantry, artillery and veterinary. There is also a battalion of sectoral army, the 22, in Dharchula. The last post of the Forest Department is at Pangu village, as there is no RF beyond Pangu. The area beyond Pangu is primarily occupied by ITBP, and in parts, by the Army. However, being a sensitive area, no information is available on the extent of area occupied by these agencies.

(iv) International Boundaries and Wildlife Trade

International boundaries with Tibet and Nepal have added to the problems of the sanctuary. China is one of the largest markets for trade in wildlife. Nepal is a market, a transit point as well as a source of supply point for wild animal and plant parts and derivatives. Proximity to these two countries encourages poaching and illegal collection of medicinal plants inside the sanctuary.

In addition, the town of Dharchula is a major transit point for wildlife trade. Anecdotal accounts from locals have suggested that the visible prosperity of the town is attributable to the high profit margins associated with wildlife trade. Not all the wild animal and plant parts that pass through Dharchula necessarily originate from the Askote Wildlife Sanctuary. Primarily musk, bear bile and medicinal plants are sourced from the sanctuary. Tiger bones and skins are brought from various parts of the county to Dharchula by road. These are then smuggled across the Nepalese and the Tibetan borders, where they are bartered for *shahtoosh* (the underwool of the endangered Tibetan Antelope (*Pantholops hodgsoni*)). The *shahtoosh* is then transported to Delhi (from where it goes to Kashmir where the world famous *shahtoosh* shawls are woven) or directly to Kashmir. As a consequence of the high value of *shahtoosh* (good quality pure raw *shahtoosh* can cost between Rs 30,000 to Rs 60,000) and the risk associated with its possession, there has evolved a system, in Dharchula, through which local transporters who ply pick-up trucks which bring supplies in to Dharchula, on their return leg, carry with them raw *shahtoosh*. These transporters are known as “carriers” and charge Rs.1000 per kilogram of *shahtoosh* that they carry in their vehicles.

In addition to tiger and leopard parts, musk and bear bile form a significant component of illegal wild animal parts smuggled out from Dharchula. These are in great demand in mainland China as well as in Tibet for use in traditional systems of medicine. Musk and bear bile originates from animals hunted inside Askote sanctuary. Like medicinal plants, a large number of people living inside the sanctuary (both tribals and non-tribals) are involved in the exploitation of wild animals. Conversations with locals indicated that musk is fairly easily available with petty shopkeepers in villages inside the PA. They perform the role of middlemen by purchasing musk from the villagers who do the actual hunting and pass it on to contractors in Dharchula, who are linked to national and international wildlife trade routes. The field visit team was informed of two of the biggest such contractors of Dharchula, Uppar Singh Kutiyal of Khari Gali and Deewan Chand Garbiyal of Garbiyal Kheda. Uppar Singh Kutiyal was shot dead in Nepal in the early 1990s by security forces when he was on one of his clandestine missions. His wife has since then taken over Uppar Singh’s considerable interests in wildlife trade.

Contractors from Dharchula regularly visit the villages inside the sanctuary in order to buy various animal parts that have been collected by the villagers. The trade in medicinal plants also works similarly. This system suits the villagers since they do not have to bother about the modalities of transporting the goods to Dharchula, which can be quite an ordeal given the fact that not all villages are connected by road and the terrain is particularly rugged and treacherous.

Askote was initially set up as a musk deer sanctuary. This was in response to a massive seizure of musk pods from the area. However, ironically musk deer still seems to be under considerable hunting pressure. A villager narrated to the field visitors details about a hunt he had participated in that had resulted in the killing of seven musk deer, despite, according to his own admission, several deer escaping.

ADMINISTRATION

Technically, AWLS is under the control of the CF, Corbett Tiger Reserve, but due to the lack of resources and prohibitive distance, it is managed by the North Pithoragarh Territorial Division, currently headed by an officer of the rank of Deputy Conservator of forests.

Staffing

The PA Director is stationed at Pithoragarh and also looks after the territorial operations of the entire North Pithoragarh Forest Division. The local charge of the PA rests with two RFOs, who are stationed at Askote and Dharchula. The staff in Askote Sanctuary includes a DFO, an ACF, two Range Officers, four Foresters and 12 Forest Guards. Daily-wagers are also employed periodically for plantation work or as *chowkidars*. It is obvious that it is virtually impossible for such a skeletal staff to effectively patrol a sanctuary as large as Askote. In addition, the unfriendly terrain of the sanctuary makes patrolling virtually impossible.

Anti-poaching squads

There are no dedicated anti-poaching patrols operating in the PA. Merely 30% of the PA (approx.) is covered by wireless network. Policing, therefore, is not very effective. According to some officials, one factor contributing to this trend has been the recruitment of staff from among local people, who are sympathetic to local offenders.

Equipment

Askote is not a very well-equipped sanctuary. The equipment includes a fixed wireless set and five hand-held sets. There are three watch-towers, two of which are unusable.

Forest fires

Most of Askote Range is vulnerable to forest fires because of abundance of pine forests, as pine needles are rich in turpentine oil (2%). In Dharchula Range, only Duk

block is stated to be vulnerable to forest fires. Forest fires are generally accidental. However, the local people sometimes deliberately set forest patches on fire, to ensure better growth of fodder. 1999 has been the worst year in the past five years for the sanctuary - the fires affected 144 ha. of the PA. However, there are fire lines (the length of fire lines is not known) to prevent fires. Fire-watchers are employed from time to time. Other measures employed by the PA authorities to tackle fires include clearing of pine needles and removal of dead leaves from either side of the roads.

TOURISM

Narayan Ashram is a major tourist attraction in the PA, but there is hardly any tourism *per se* inside the sanctuary. However, the visitor traffic is at its peak during Shivratri, Janamashtami, Raksha Bandhan and during the months of June and August (for Kailash Mansarovar Yatra). Compared to other sources of disturbance, such as developmental activities, hunting, etc., disturbance caused by pilgrims is negligible. There are no plans to extend the tourist facilities in the PA or any strategies for making tourism more eco-friendly.

PLANTATIONS

Plantations inside the sanctuary were carried out regularly till 1999. The Territorial Forest Division, which looks after the management of the sanctuary, carried out plantations on the denuded slopes as well as some patches of grasslands. Species of chir, padam, ritha, soorai, saadan, koeral, tun, utees, banj and deodar (which are all indigenous) were planted in Askote Range during 1993-1999. The purpose of the plantations was to improve degraded forests, to fill blank spaces, and to provide fuel and fodder. However, no plantations have been carried out in those parts of the sanctuary that are under the control of the Forest Department (namely Reserve Forest patches) since 1999. It is however likely that plantations continue, in Civil and Van Panchayat Forests that form a part of the sanctuary. This is because according to local laws, the agencies concerned with the management of these two categories of forests are entitled to carry out plantations in them. The sanctuary management has no jurisdiction over them in this matter since rights of the concerned agencies have not yet been settled.

BUDGETS AND EXPENDITURES

In 1998-99, Rs 1 lakh were allocated to Askote Sanctuary. And in 1999-2000, it received Rs 2.20 lakh. No other funds were allocated to the sanctuary.

RESEARCH AND MONITORING

Currently, no research work is in progress in the sanctuary. However, a number of studies were conducted in the 1990s by scholars from G.B. Pant Institute of Himalayan Environment and Development, Almora. Nehal Farooquee and Annpurna Nautiyal studied the trans-humant Bhotiyas, their traditional knowledge and practices. They also researched the conservation and utilisation of medicinal plants in the higher hills of the Central Himalayas. Upendra Dhar, S.S Samant and R.S. Rawal studied various aspects of bio-diversity of the PA. The Sappers Adventure Foundation, a division of the Corps of Engineers of the Indian Army led an exploratory expedition to the Panchachuli peak. This expedition included biologists and representatives from NGOs who surveyed the status of illegal wildlife trade in the area.

However, copies of the published research papers and various reports brought out by research institutes and others were not available with the PA management. The officer-in-charge of the PA expressed disappointment with the lack of enthusiasm of researchers in disseminating their research findings. Thus, while studies on Askote are published in international journals, these are unavailable with the PA management.

The Forest Department conducts a census of fauna every three years. The methodology employed is individual head counts, i.e. the number of animals and birds of various species actually seen by the enumerators. Indirect methods such as pug marks or scat samples are not used for the purpose of census. The census covers approximately 30-40% of the entire PA. The field visit team felt that the head count method only revealed those animals that were bold enough to venture near habitation. This is because most enumerators (forest guard and forester level field staff) reside in villages inside the sanctuary and interviews with some staff members revealed that no special efforts were made to spot animals during the census. Whatever animals were seen in the vicinity of their places of residence were recorded. This data is, therefore, not very reliable. The lack of effective monitoring is a major management lacuna in a place like Askote Sanctuary because of the variety of endangered fauna it harbours. Regular monitoring would serve as an early warning system against threats to flora and fauna. Such a system is particularly important for a PA like this because of the diversity of sources of pressure and their intensity.

INTERPRETATION AND EDUCATION

There is an interpretation centre inside the PA in Askote town. The PA authorities have been reported to be taking initiatives to educate the villagers within the sanctuary and in the peripheral villages. These include meetings in villages in and around the PA to seek villagers' support in preventing fires, and essay competitions in schools during wildlife week. It appears that the locals do support the Forest Department in fire-fighting activities.

OFFENCES

The opinion of the staff of Askote range is that offences such as wood theft, fishing, herb collection, hunting, mining and quarrying have declined over the past few years. A reason for this could be that people are increasingly looking for income from non-forest based activities and thus instances of illegal removal of forest products declining.

INVOLVEMENT OF NGOs

The Tiger Link newsletter Vol.5 No.1 of January 1999 mentions that TRAFFIC India had conducted a workshop for training ITBP personnel on illegal wildlife trade issues at Pithoragarh. Apart from this there is no information on any local NGOs active in the area.

CONCLUSION

Askote wildlife sanctuary exists practically on paper only. The presence of the Forest Department is virtually non-existent and there are no pro-active measures being taken to protect the PA. Whereas the lack of wildlife staff is no doubt a major hindrance to efficient management of the PA, regular patrolling by the Territorial Division, that is currently in control of the PA, will at least deter blatant violations of law that are currently taking place. Further the collector of the area must initiate settlement of rights proceedings at the earliest. This process will help demarcate the boundaries of the PA and also rationalise them. Lack of clarity of the limits of the PA and its unnecessarily large size, are the biggest stumbling blocks to effective management of the PA.

Poaching, of both fauna and flora, apart from the numerous disturbance-causing activities currently going on inside the sanctuary, is the biggest threat to the preservation of diversity and density of plants and animals of Askote. Obviously the Forest Department has to make special efforts, which are currently entirely lacking, to curb such illegal activities. However, the entire burden of punitive policing, particularly with regard to poaching cannot be left to the Forest Department alone. Other law enforcement agencies will have to be involved in any effort to curb illegal activities that are adversely affecting wild animal and plant populations. Involvement of other agencies such as the state police department, BSF, ITBP, and the army is also desirable because it has been learnt that parties involved in illegal wildlife trade are also involved in other illegal activities as well. Close proximity of the sanctuary to the international border is an added reason for the involvement of para-military forces and the army. These forces best suited and best equipped to patrol such high altitude areas. NGOs, like TRAFFIC India and the Wildlife Protection Society of India, can play a critical role in the control of illegal wildlife trade in and around the PA by providing crucial intelligence support to enforcement agencies and conducting awareness and capacity building workshops for such agencies that would equip them better to curb wildlife trade.

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BINSAR WILDLIFE SANCTUARY- A PROFILE

Introduction

Binsar Wildlife Sanctuary (BWLS), was established in 1988 under the Wild Life (Protection) Act, 1972, vide G.O. No. 153/14-3-148/86, dated 25-8-1988. It falls partly in Almora district and partly in the newly created Bageshwar district, in the Kumaon region of U.P. Binsar is situated on the Almora-Takula-Bageshwar road. Despite being only 47.07 sq.km in area, Binsar is a lifeline for a part of Almora district. Its unique and unparalleled, water retaining oak forests fulfil the water requirements of a number of villages in Almora district as well as of Almora town itself. Binsar commands an amazing birds eye view of the mighty Himalayas (Nandadevi, Nandakot, Panchachuli and Trishul peaks are visible from Binsar) as well as an extraordinary view of parts of the lesser Himalayas. Its altitude varies from 1500 m -2400 m above mean sea level.

The name "Binsar" is derived from an ancient temple of lord Shiva "Bineshwar Mahadev" situated in the heart of the sanctuary.

The sanctuary has an undulating mountainous terrain exhibiting distinct vegetational zonation. The lower slopes have pine forests, which are replaced by mixed forest and oak groves as one ascends. Mammals found in the sanctuary include black bear, barking deer (kakkar), ghoral and wild boar, panther and wild cat.

Objectives and Significance of Binsar Wildlife Sanctuary

Binsar Wildlife Sanctuary was established to preserve and protect the unparalleled oak forests of the area. This is the only area in the Kumaon region that has relatively intact, good quality oak forests. In other areas of Kumaon, oak has been subjected to intensive lopping because its leaves are used as fodder for cattle. The oak ecosystem plays a vital role in the maintenance of the soil and water regimes of the region. This ecosystem, therefore, represents one of the most valuable but threatened ecosystems of the hills of U.P.

GEOGRAPHICAL PROFILE

Binsar Wildlife Sanctuary (BWLS) is situated approximately 30 km. north of Almora town, falling between latitude 29° 42' 32"N and longitude 79° 45' E. The sanctuary has only one range viz. Binsar range and covers an area of 47.07 Km². It comprises areas of North Binsar block, South Binsar block and Rithagarh block of East and West Almora Forest Divisions.

The sanctuary can be approached by an all weather motorable road from Almora. The nearest railhead is Kathgodam, at a distance of 110 km. The nearest airport is 140km away at Pantnagar. The park is best approachable by train up to Kathgodam, and thereafter by bus or taxi to Binsar via Almora.

Boundary description:

The boundaries of BWLS are as follows-

Takula- Bageshwar motor road and the Reserve Forest of West Almora Forest Division along the Basauli and Kangard villages form the northern limits of the sanctuary. The Kafarkhan-Dhaulchina-Kangarchina motor road and Reserve Forest of West Almora Forest Division situated along the Alai, Bamantiladi and Kalaun villages mark the southern boundary. The Jaigan river forms the eastern boundary of the sanctuary along with the Reserve Forest of the East Almora Forest Division along the villages- Nail, Chhauni, Pansar and Khalisirand. Almora-Kafarkhan motor

road and Reserve Forest of West Almora Forest Division along the Naksila, Khutna and Kaaligad villages mark the western limit.

Physiography and drainage

BWLS is located at an altitude of 1500-2400 m above msl. The terrain is hilly throughout. It comprises of a series of narrow ridges providing relatively steep terrain. A series of small gullies bisect the ridges at many places.

There is no major river system flowing through the sanctuary. Two small seasonal rivers- Jaigan and Suyal touch the sanctuary on its northeastern and southern boundary respectively. The oak ecosystem that is highly water retentive feeds various perennial as well as temporary streams and *naullahs*. Small streams of fresh water flow towards the lower areas from these *naullahs*. From some of these *naullahs*, water is channeled (through pipelines) to two retention tanks situated in the southern part of the sanctuary. Once water is collected in the tanks, it is pumped by a pumping station installed at Ayarpani (within the sanctuary), to Almora and about 300 villages surrounding the PA. The entire operation is carried out by the U.P. Jal Nigam. The total length of pipelines passing through the PA is approximately 10 km. The storage capacity of each tank is approximately 35,000 liters.

Keeping in mind the water shortage faced during summer months, nine artificial waterholes have been built to fulfill the requirements of the wild animals.

Climate

The sanctuary experiences three distinct seasons- winters (November-April), summers (May-June) and the rainy season. Rainfall varies between 1000-1500 mm and temperature ranges between 22⁰C to -2⁰C. During monsoon mist, fog and dew are not uncommon at high altitudes. Extremely high velocity winds, created due to high-pressure waves formed in the deep and steep valleys during summer, are a peculiar phenomenon of this area.

BIOLOGICAL PROFILE

According to the biogeographic classification given by Champion and Seth, Binsar has the following forest types- 9C 1B (Himalayan Chir Pine Forest), 12C 1A (Banoak Forest), 12C 1B (Maruoak Forest). There is distinct altitudinal zonation of vegetation; on the lower slopes, the vegetation comprises exclusively of pine. As one moves up a mixed forest of pine and oak replaces pine forest. Oak and rhododendron species follow, and finally exclusive oak groves are found in the higher reaches. Various species of oak themselves form clearly designated belts.

About 40% of the sanctuary is reportedly undisturbed, while 40% is slightly disturbed and 20% highly disturbed. The causes of disturbance include tourism, habitation (both in and around the sanctuary), cultivation and collection of fuelwood and fodder. While tourism is stated to be on the rise, the status of other sources of disturbance is reportedly stable.

The sanctuary was subjected to Deodar plantations during the British times. However, these plantations were carried out in very small pockets, usually near and around the residential places, and have (reportedly) not affected the original forest much. Pine, Acacia, Surai, Akhrot, Deodar and Oak were planted in a total of 84 ha. inside the PA. These plantations, carried out since 1993 (till 1998), were mainly carried out in empty spaces, spread out in the forest. Reasons cited for these were habitat improvement, food for fauna and beautification of the area.

Flora

About 3421 ha of the Sanctuary is under Chir Pine (*Pinus roxburghii*). In the Chir Pine forest no other vegetation is found, particularly on the floor of the forest. This forest type is found in the lower altitudes and almost all around the periphery of the Sanctuary. Banj Oak (*Quercus incana*) and Maru Oak (*Quercus semicarpifolia*) are found in the upper reaches, covering an area of 1335 ha. The Oak forests also contain other broad leaf species like Rhododendron (*Rhododendron arboreum*), Utees (*Alnus nepalensis*), Kafal (*Marika nagi*) and *Corrylus spp.* The broad leaf forest dominates the northeast and southwest portions of the sanctuary.

Over the past few decades the pine forest is seemingly encroaching into the Oak dominated areas, in the sense that the area housing mix forest of Oak and Pine has increased. The Divisional Forest Officer (DFO) and Range Forest Officer (RFO) of the sanctuary are of the opinion that, since such an invasion would have large-scale implications for the ecology of the area it is crucial that scientific research is carried out in the area to determine the causes of this phenomenon and the methods of dealing with it.

Fauna

Binsar is home to a variety of wildlife. Black bear (*Selenarctos thibetanus*), barking deer (*Muntiacus muntjak*) (kakar), ghoral (*Nemorhaedus goral*), wild boar (*Sus scrofa*), leopard (*Panthera pardus*), wild cat (*Felis chaus*), chir pheasant (*Catreus wallichii*), kaleej pheasant (*Lophura leucomelanos*), kokal pheasant (*Pucrasia macrolopha*) and red jungle fowl (*Gallus gallus*) are the main species found here. In all, about one hundred and sixty-six species of birds and eleven species of mammals along with some species of reptiles have so far been recorded from here. There is some variation in the distribution of the various species. Ghoral are mainly found on the northern slopes, black bear are mainly confined to the oak grooves and the other species are fairly well distributed in the area.

PRESSURES ON THE SANCTUARY

The following are the predominant sources of pressure on the PA:

1. Tourism

Binsar is only 30 km from Almora town. It thus attracts a substantial number of local tourists. These people go to the sanctuary for outings/picnics or for holidaying on weekends, attracted by its pristine forests, scenic beauty, and salubrious weather. As most of these are casual visitors, they seem to have neither an understanding of the purpose of the sanctuary, nor much concern for its wellbeing.

Tourism is reported to be on the rise inside Binsar. It already attracts about 9,000 tourists every year. These tourists have to pay a nominal entry fee of Rs. 2 per person. Movie cameras are allowed in for Rs.2500 (**Generally for tourist purposes cameras are allowed free of cost but these mentioned charges are for making professional films and documentary films**), but it seems to be common practice to take movie cameras inside the PA without paying the requisite fee.

Tourists can be accommodated in a rest house (TRH) run by the Kumaon Mandal Vikas Nigam (KMVN), and in a private estate called Mountain Resort. Both these

complexes are situated within the boundaries of the sanctuary. Each can accommodate up to 50 people at a time. Apart from these, there is a Forest Rest House (FRH) and a recently constructed 'snow hut' situated about a kilometer above the TRH in the heart of the sanctuary. The FRH comprises of two rooms while the snow hut has a single room. Tourists have to take prior permission of the ACF stationed at Almora for using the FRH.

The TRH is a major source of noise and air pollution due to generators installed for supply of electricity. Because of the TRH, the kilometer long stretch between FRH and TRH is heavily disturbed as tourists like to move between the two complexes, sometimes even on foot, and often playing loud music. Tourists, by and large, are a noisy lot. Most of them have scant awareness of or regard for rules and regulations of the PA. The field visitors observed some tourists who had pitched a tent right outside the FRH. Throwing live cigarettes around is a common sight. Music can also be heard blaring in the car park of the mountain resort at Khali estate.

The fact that such violations are common reflects on the shortage of field staff, lack of transport facilities as well as on the paucity of communication equipment. There is no frisking of people and vehicles at the entry; therefore it is easy to carry anything inside the sanctuary. Further, the field staff is inadequate to be able to curtail such activities for it takes a lot of time to cover distances, as the terrain is very difficult. Moreover, due to lack of communication facilities it is difficult to call for help or reinforcements in time for immediate action against miscreants. The absence of vehicle with the field staff adds to their inability to effectively monitor tourists. Timely intervention by a higher authority (R.O. etc.) may be of much help in cases where people are not prepared to listen to the Forest guard or the chowkidar etc. The low entry fee may also be a reason behind the influx of casual picnickers who have scant regard for the sanctuary.

In order to deter unruly tourists and keep picnickers away the PA management proposes to hike the entry charges to the sanctuary, and also provide a vehicle to the field staff for patrolling.

The PA has 11 km of metalled road and 1.5 km of unmetalled road. The metalled road stretches from Ayarpani (entrance point of the PA) to the FRH. The unmetalled road stretches from FRH Binsar to Zero point (highest point of the sanctuary).

Disturbance due to tourism is maximum along the road connecting Ayarpani and FRH.

2. Habitation inside the PA

Binsar has eleven *chaks* and five estates within its precincts. These *chaks* are extensions of various revenue villages outside the PA. These hamlets were apparently set up by people whose primary occupation was grazing, during British India. The land of these *chaks* belongs to respective gram sabhas, and individual occupants have ownership pattas of the land they occupy and cultivate. Since the British period, these *chaks* have enjoyed certain rights in the PA. Estates are large

landholdings whose ownership rights are with the individual owners. British officials serving in India owned these estates, to begin with. Now the ownership is with Indians. These estates have their own private forests. Both estates and *chaks* cause disturbance to the PA, on account their location in the inside the sanctuary, and use of the entrance to the sanctuary to access their respective *chaks* and estates. This increases the volume of traffic on the road connecting Ayarpani (the only point of entry, by road, to the sanctuary) to Binsar FRH. Further, these *chaks* and estates occupy prime areas that seem to have been lush meadows in the past. This was evident to the field team from the terrain and vegetation of the area. Also for instance, Khali estate was named so because the land where it was built was devoid of trees or 'khali', signifying that it was, at one time, a grassland. Over time these areas seem to have been converted to agricultural land and also planted with non-native species of flora. This has interfered not only with the range land ecosystem, but has also led to decline in population of herbivores and their migration away from these sites. As a consequence of this the Binsar eco-system has been substantially altered and disturbed.

On the issue of habitation inside the sanctuary the opinion of the DFO in-charge of the sanctuary is at variance with that of the field visitors. The DFO feels that *chaks* are more harmful to the PA than the estates, as they house a greater number of people. Moreover these people are dependent on the PA for almost all of their requirements. The estates, on the other hand, are primarily used as summer retreats. Residents of the estates do not enjoy any rights inside the PA, and so exert relatively lesser pressure on it. However, in the opinion of the field visit team, factors like intensity of need, as well as resource consumption levels need to be taken into account to arrive at a conclusion about this matter. Even though the *chaks* house a larger number of people, the nature of resource use by these is of the subsistence level. Where as, the estates are gradually indulging in commercial activities such as developing hotels and resorts. Such activities are likely to have much more adverse effect on the wellbeing of the sanctuary than the effect of the subsistence use of the forest by the villagers.

3. Grazing

In the lower parts of the sanctuary, grazing affects 4.7 sq.km of the PA. The sanctuary is dotted by villages both inside (*chaks*) and outside with a composite cattle population of approximately 22,000 animals. Residents of these villages had traditionally been grazing livestock inside the sanctuary, but with the area being declared a sanctuary, restrictions were put on grazing. According to the Management Plan, the carrying capacity of the area was measured (though this seems unlikely) and the number of cattle allowed inside the sanctuary was fixed. However, later on this restriction was annulled. Uncontrolled grazing has led to problems such as soil erosion and inadequate regeneration. Grazing affects up to 20% of the PA.

4. Cultural Factors

The Bineshwar Mahadev temple, situated inside the PA, is dedicated to Lord Shiva and is stated to be more than four hundred years old. At present, two women live in the temple and perform dual duties as caretakers as well as *pujarees*. The Range Forest Officer was of the opinion that the temple has no adverse impact on the PA as it is visited only by local villagers particularly at the time of festivals. However, the field visitors were told by some of the locals that a fair is organized on the occasion of Shivaratri. However, there is no precise information on the number of people visiting the temple annually/daily. It seems unlikely that the temple is a source of a significant pressure on the PA.

5. Forest Fires

Forest fires have plagued Binsar Wildlife Sanctuary since its inception. Forest fires are reported every year, though 1999 was the worst year (34 cases of fires were reported, affecting an area of 1238.5 ha). The causes behind the fires are natural as well as manmade. Sometimes the dry spell gets so severe that the pine leaves tend to get highly vulnerable to fire and light up easily from the slightest of sparks. People from the surrounding villages are known to have begun forest fires as well, as an expression of their displeasure over the formation of the sanctuary. Pine leaves are rich in turpentine oil (pine leaves contain about 2% turpentine oil) and therefore extremely vulnerable to forest fires (especially in the months of May-June). Fires are usually in the nature of ground fires, as opposed to crown fires. They tend to spread from lower slopes to higher slopes. In such an eventuality, fire fighters clear the ground of fallen leaves, and then set fire from the direction in which fire is approaching. The fires from two different directions meet and get extinguished. Even though pine forests are more vulnerable, forest fires in these are easier to control. Oak forests, on the other hand, are not so vulnerable to forest fires, but once fire starts in these it is difficult to control as it can keep smoldering for days under an apparently calm surface. Such fires lead to degradation of the habitat, poor regeneration and changes in habitat type.

The RFO feels that fire-fighting equipment is sufficient, even though absence of vehicles and communication equipment poses problems. Binsar WLS has a fairly good network of fire lines. The fire lines within the sanctuary are of the following two categories - 30m width (length of network: 50.54 km), and 15m width (length of network: 33.59 km).

The visiting team felt that fire and tourism are the two major issues facing the PA, though in the opinion of the Director, tourism is beneficial for the sanctuary. He expressed his approval for increased eco-tourism to tap the dormant tourism potential of the sanctuary.

The factors mentioned above, affect the faunal species in that they lead to loss of breeding site, food source and migration away from the site. This affects their population.

The flora is also affected similarly, leading to poor regeneration.

Apart from the aforesaid, about forty-five check dams have been set up in and on the periphery of the Sanctuary. These have said to have a beneficial effect on the PA, as they help in checking soil erosion due to rains and help in the growth of trees in riverbeds.

However, Binsar has been relatively free from incidences of tree felling/extraction from the PA, which is a good sign for the forest. Also, incidences of poaching/hunting/killing of animals are almost unheard of. The locals, when questioned about poaching/hunting in the area, stated that such incidences were negligible and occurred mostly in self-defense (during incidences of crop raiding and the like).

SOCIO-ECONOMIC PROFILE

There are eleven *chaks* (hamlets) inside Binsar WLS namely- Dalar, Ayarpani, Munsiyachaura, Satri, Risal, Beluabagar, Badaur, Maulikhan, Katghara, Gonap and Betulia. The area occupied collectively by seven of these eleven *chaks* is 43.56 ha. Figures for four *chaks* are not available yet. Since the British period, these *chaks* have enjoyed certain rights in the PA. With the formation of Binsar Wildlife Sanctuary, these rights were withdrawn, but were restored in February 2000. The Range Forest Officer feels that restoration of rights is a favorable development because it has eased relations between the forest department and villagers.

Apart from *chaks*, BWLS is unique in that it has five private estates that collectively occupy 69.3 ha of land inside the PA. These estates, namely- Martinkothi, Itanpur, Mission, Gharelkot and Khali estate have their own private forests, but they enjoy no rights inside the PA.

87 villages within a radius of five km surround Binsar. They house a population of 23,350 people and the total cattle population of these villages (buffalo, cow and goat) amounts to about 22,000. The people of these villages have enjoyed customary rights in the forest since time immemorial. (*Rights and concessions were given to the nearby villagers since British age through various G.Os. of later 19's. A copy of these rights and concessions has already been attached in the management plan of the Binsar Wildlife Sanctuary. In fact this area of forest was an old reserve during British*

time, which later on became a Reserve forest. In this reserve forest rights and concessions are duly given to the nearby villagers. Sanctuary came in to existence through a Government order of 1988. Even after declaration of this area as a sanctuary, there is no curtailment over the right and concessions of the villagers. But after the declaration of sanctuary various activities through which revenue was generated and which in term gave employment opportunities to the villagers, were stopped. For example resin extraction, medicinal plant extraction, timber extraction etc. Agitation was primarily because of this above fact and secondarily because of some bad publicity regarding sanctuary by some people.

Rights and concessions were temporarily suspended in the year 1996 (Dec.), through an order of Hon. Supreme Court. This order came into light through a P.I.L. writ petition (Godavardhan Vs Union no. 202/96). This ban was not only imposed in Binsar but it was for complete U.P. and may other states. A number of representations were filled before the honorable court and ultimately the ban was lifted since 1998-99. Due to some procedural complications rights and concessions in Binsar Wildlife Sanctuary could be restored in the year 2000).

Villagers are given rights to collect the following products from the PA: fodder, fuel wood and timber (of trees that have fallen naturally) for house construction. While there are no restrictions on the number of cattle that can enter the PA for grazing, on collection of firewood and fodder, the quantity of timber that a village will get is specified and has not been altered since the British period. Moreover, only fallen trees can be distributed among villages. Trees cannot be cut down for this purpose. The quantity of timber due to a village is transferred to the Gram Panchayat by the forest department after marking the trees. Individual villagers can petition the Gram Panchayat for their personal requirement of timber. The Gram Panchayat has the freedom to use its discretion in the distribution of timber among the villagers.

There are, at present, no plans to relocate the *chaks*. However, it was reported that, people are moving out on their own accord due to lack of facilities, fear of animal attacks, lack of employment opportunities, frequent dry spells, and deteriorating quality of agricultural land. Most of the residents have migrated to Sunoli, a town close to the sanctuary. Those who continue to stay on do so either because of the lack of options or because of attachment to the place.

However, this situation is not repeated in the villages that are relatively more affluent on account of better agricultural land, repatriated income, etc. The people residing in and around the PA own livestock. Grazing is an all year activity. But it is not a serious concern as the number of animals around the PA is steadily declining (the causes given were that it is no longer profitable to keep cattle as the milk yield is not much. Also, as many people are going in for secondary and tertiary sector jobs, rearing cattle is not feasible for them).

The locals also indulge in fodder and fuel wood collection along with collecting 'Kafal' (a seasonal berry). The quantum collected is not so much as to cause serious damage.

Impact of PA on the people

There are reports of leopard attacks on humans as well as livestock. These have led to the death of a villager around the PA in 1999 and the loss of a large number of livestock. Figures available since 1991 show that a total of 948 cattle have been killed so far. Incidences of crop depredation due to wild animals (wild boars and monkeys in particular) are quite common in the area as well.

The villagers stated that the loss of livestock to wild animals (especially leopards) was more alarming than crop depredation. For loss of or injury to livestock, compensation is paid, but not for crop depredation. Surprisingly, the Range Forest Officer told the field visitors that he had not received any formal complaints concerning crop depredation. The villagers were of the opinion that compensation paid to them was inadequate but didn't sound bitter about this discrepancy. Animals, especially leopard, come close to human habitation, sometimes even in the light of the day. One reason cited for this phenomenon is excessive exposure to humans (due to tourism and presence of *chaks* and estates). This, in our view, can be dangerous for the animals, as they may become more vulnerable to poachers and hunters.

Incidents of conflicts

The sanctuary has a long history of conflicts. Before the area was declared a WLS it enjoyed the status of a Reserve Forest where people enjoyed certain rights. Since the inception of the sanctuary, a number of prerogatives of the villagers came to an end. For example, raisin tapping, collection of herbs and collection of timber, fodder etc. was stopped. As the surrounding villages were totally dependent on the PA for their needs, large-scale protests followed. The agitation continued through the nineties. It took a violent turn in 1999 when a leopard killed a boy and the forest authorities took no subsequent action. Things settled down partially when the leopard was killed (**A hunter was officially sent to Binsar from Corbett Park. He killed the leopard which was dully declared as man-eater by the Chief Wildlife Warden.**) but the relations between the villagers and the Forest Department remained strained. With the restoration of rights, however, the relations between the two parties have improved.

Eco-development

One important reason behind this improvement in the relations between the two is the successful launch of the eco-development scheme in and around the sanctuary. Eco-development was first implemented in the PA in 1992. However, from all accounts, it has gained momentum in and around the PA only in the last year or so, and is only now being implemented in its true spirit. It would therefore be premature to comment at this juncture on its success or lack of it. However, it did appear that Binsar is one of the few places where the programme has widespread acceptance from both the Forest Department and the locals. Not only did the field team find the local villagers enthusiastic about the programme, the RFO too thought that it was a good idea to involve the people in the management of the PA. The field visitors also

got the impression that the involvement of the Director has also contributed to the acceptance of the programme, particularly among the forest staff.

At present 18 villages are covered under the eco-development programme. Six more villages will be brought within the fold of the programme shortly. These villages lie inside as well as outside the sanctuary.

Most of the villages covered under eco-development have prepared micro-plans, and printed versions of these are available with them.

It was clearly visible that eco-development, along with the restoration of customary rights, has eased the relationship between the PA management and the local communities. The Range Forest Officer is of the opinion that he has been able to win the villagers over to his side and they now actively contribute to the management (particularly in fire fighting) and security of the PA. An NGO (Jan-jagran Samiti) led by Ms. Mukti Dutta has been helping the Forest Department with the implementation of eco-development schemes.

Under the eco-development programme the PA management has begun the practice of employing 2 persons from each village covered under the scheme as fire-

informers and fire fighters. **The interesting feature of this is that “these persons**

will work on an honorarium basis, which will be finally decided by the

ecodevelopment committee. This serves the twin purpose of giving employment to villagers and ensuring better surveillance. The villagers we met conveyed

appreciation for this scheme, because of the employment opportunity it provides.

Some of the locals, whom the field visitors talked to, had a mixed opinion of the eco-development programme and its implementation. While agreeing that there was inherently nothing wrong with the programme, they also felt that it had failed to meet its full potential, because the Forest Department often tries to implement a standardized scheme without considering the unique requirements of the situation in each village. They cited the instance when honeybee boxes were distributed among the villagers under eco-development, but the honeybees died as they were of a species that was unsuited to high altitude conditions. The officials have their own perceptions of the needs of the villagers, and often this perception does not tally with the priorities of the villagers. The villagers then do not participate enthusiastically in the implementation of the scheme.

The villagers felt that more important than the continuous involvement of the forest department is the need to give a direction to the villagers, and to inculcate in them a sense of independence and initiative, and to create institutions and mechanism to support them in their personal endeavors. In the eventuality of the Forest Department withdrawing financial support to the scheme, a trust should manage the consolidated fund so that the principal amount is not touched and the interest is used judiciously.

During the visit to Bhetuli village, on the periphery of the sanctuary another important aspect came up. This village has a population derived from two castes - thakurs and harijans. Needless to say, the thakurs are the dominant caste, and manage to get a lion's share of the benefits accruing from most welfare schemes. Eco-development does not seem to be an exception to this rule. The harijan families that the field visitors talked to were almost completely unaware of the eco-development programme, or even the name of the representative of their caste on the village eco-

development committee. These families were very poor, and the struggle to earn a livelihood and procure water (which they do not have access to in a 15 km radius, unlike the thakurs) leaves them with little time or energy to take interest in issues such as eco-development. **Kindly note in the executive body of the Ecodevelopment Committee proper representation is given to Schedule Cast and backward groups. This is about 40-45% representation out of total 5 elected members. Hence the aligation of the villagers are denied.**

MANAGEMENT PROFILE

Till 1997, Binsar Wildlife Sanctuary was under the jurisdiction of the territorial division of the Forest Department. It was only in 1997 that management of the PA was entrusted to the wildlife division. Now the sanctuary is under the jurisdiction of the Director, CTR, who is stationed at Ramnagar. The local officer in charge of the sanctuary is an ACF stationed at Almora, and a RFO stays at Ayarpani, the only point of entry (by road) into the PA.

At the time of its notification the total area of the sanctuary was 45.5 sq.km. In the year 1999, an area of 1.58 sq.km. was added to the PA for administrative convenience (the boundaries were reorganized such that all areas within the boundary set by the roads on the periphery of the PA got included in the sanctuary). Out of the total area, about 3.87 sq.km. is the core zone while 43.2 forms the buffer. A management plan has been devised for the sanctuary for the year 2000-2010. It is still pending approval.

The exact figures for the budget expenditure for the PA were not available (as the papers had been sent for audit) but in the opinion of the Range Officer, the budget expenditure is adequate for the PA. There is no separate provision for funds for eco-development. The funds allotted for the maintenance of the sanctuary as well as for eco-development arrive collectively under 'funds for Binsar WLS'. The field visitors were told that the funds allotted were mostly similar year after year, to the tune of five to six lakhs. In the year 1999, Rs. eleven lakhs were allocated all of which was spent on eco-development.

Tourism and Entry

The PA is open for tourists all the year round. The best time to visit the PA is between May-June and August to December. There is only one entry point to the PA by vehicle, and it is manned. There are numerous points of entry by foot. Binsar attracts a lot of tourists, both local as well as outsiders. About 10,000 tourists visited Binsar last year. The main attraction for tourists is the scenery, the pristine oak grooves, the bird life and snow during winters. An added attraction is the good lodging facilities that Binsar provides. There is a FRH, a TRH and a private hotel in the Khali estate.

Apart from tourism, the PA also attracts local pilgrims, but they do not form a large number.

Anti Poaching

There is no anti poaching staff but the regular staff does occasional group patrolling. Though there is no official informer network the PA management receives information regarding illegal activities from informal sources.

Developmental/Commercial Activities in the PA

The PA is witness to quite a lot of commercial activities. Apart from the TRH, the Khali Estate Mountain Resort and the FRH and snow hut, a new hotel is being built at Shah estate. Since these are inside the sanctuary, they form a major source of disturbance to animals.

The developmental activities inside the PA include two pumping stations of the U.P. Jal Nigam (covering an area of 100m), water pipeline to Almora (10 km.) and power lines (150m) upto the Khali estate. Some clear felling was done for the power lines and the pump stations but otherwise these activities do not cause any major disturbance.

Staff and Staff Training

BWLS is under the direct control of the Field Director, CTR, stationed at Ramnagar. There is an ACF stationed at Almora. The local officer in-charge of the sanctuary is a Range officer stationed at Ayarpani. Rest of the staff comprises of two foresters, ten forest guards, a senior clerk, an orderly and a FRH Choukidar. Thirty-six people have been employed on daily wages.

As regards training, one Forest guard, the two Foresters and the R.O. have been trained in wildlife for six months, nine months and one year respectively.

Facilities

The PA has no veterinarian attached to it. There is no provision for research staff either. Other facilities like dispensary, school, bank, market, hospital, etc are 18 km away and are thus quite inadequate to serve the needs of the field staff as well as the local people.

As far as equipment is concerned, the PA has 5 guns and some maps and booklets on the PA.

Research and Monitoring

A research project was undertaken with financial assistance of WWF India on the relationship between people and PAs. It was completed in 1998 and has been published by the WWF but copies of it are not available with the local officer-in-charge of the PA.

As regards monitoring activities, a three yearly census is carried out, covering the entire PA. The methodology used is the pugmark technique along with individual head counts.

The management carries out awareness programmes to educate villagers in ecological and conservation issues. Meetings are held from time to time to discuss the various issues of immediate concern. There are, however, no interpretation facilities available in the PA.

The local people have also been involved (recently) in the management of the PA by seeking their support in fire detection and control measures. An NGO, 'Jan Jagran Samiti', is also active in the area and helps coordinate matters between the Forest Department and the people.

CONCLUSION

The people living in and around BWLS are mainly farmers, having fragmented land holdings that do not yield much. Irrigation facilities are virtually non-existent. The locals are thus heavily dependent on the forest resources for their daily needs. The area lacks employment opportunities and as a result, the demand for rights in the sanctuary has become an issue of concern for the long-term survival of wildlife in the area. Man-animal conflicts are quite high in the area. Lack of research facilities, lack of trained personnel and general awareness among locals as well as, lack of proper communication facilities adds to the sordid state of affairs.

After the declaration of the sanctuary, the incidences of people setting fire to the forest had increased. This was attributed to the anger over the loss of rights in the sanctuary. After the restoration of rights in 1999 there has been only one incident of this kind. Apart from this, the PA management reported no serious offences in the PA.

It needs to be mentioned here that there are areas in the PA that do not fall directly under the control of the Chief Wildlife Warden and are occupied/controlled by other Government agencies. The 11km long road inside the PA is maintained by the PWD, the TRH (spread over an area of 100 ha) is managed by the Kumaon Mandal Vikas Nigam and the U.P. Jal Nigam controls the two pump stations (spread over an area of 100m). These are in addition to the estates and *chaks*, over which too the forest department has no control.

Binsar however enjoys the advantage of forest department personnel who have begun to realize the importance of involving people in the management of the PA. The eco-development programme in Binsar is unique in that it enjoys widespread support of both, the people as well as the forest department personnel. This might offset the problems (enumerated above) being faced by the PA.

KATERNIAGHAT SANCTUARY

Geographical Profile

Katerniaghat sanctuary is located in Nanpara tehsil of Bhabra District in Uttar Pradesh. The PA has an area of 400.09 sq.km and is situated in the Himalayan terai region. The northern boundary of the Sanctuary is contiguous to the Indo Nepal boundary (32 km). {q1} The latitudinal range of the sanctuary is 28°06'30" to ??? and the longitudinal range is 81°08'14" TO 81°19'34" E. {tp}

The sanctuary can be approached by road from Delhi via Moradabad, Bareilly, Shahjahanpur to Lakhimpur (411 km) and then onto Katerniaghat (80 Km). Nanpara is the nearest town located around 40 kms from the sanctuary. The nearest airport is Faisabad (120 km) and the nearest railheads are Katerniaghat, Nishangara, Murtiha and Bichia which are located inside the sanctuary. {Dr Sh}.

The sanctuary has an altitude of 170 to 190MSL and the mean annual rainfall is around 1000 mm. {Dr Sh}.

Management Profile

The area was notified a sanctuary on May 31, 1976 vide notification number 388/14-3-32/1976. [to check for final notification]. The area is under the dual control of the territorial and wildlife wing of the forest department. [to check if still same status]. There is no zoning in the PA. {Dr Sh, q1}

According to q1-

- No alteration of boundaries
- No final notification
- No settlement of rights
- No entry permits
- No management plan

Biological Profile

The sanctuary is reported to be connected to the Shukla Phanta in Nepal.

Most of the sanctuary is mixed forest dominated with sal trees. The major forest types are:- Cane Brakes 1/E1; *Terminalia tomentosa* Forest 3/E1; Most *bhabar* Sal Forest 3C/C2b; Low Alluvial Savannah Woodland (*Salmalia-Albizia*) 3/IS1; Eastern Seasonal Swamp Low Forest (*Cephalanthus*) 4D/SS4; *Khair-Sissu* Forest 5/1S2; Dry Plains Sal Forest 5B/C1b; Aegle Forest 5/E6 {Rodgers and Panwar 1988q}.

There are plantations of *Acacia catechu*, *Eucalyptus Spp.*, *False White Teak* *Trewia nudiflora*, *Jamun syzygium cumini*, Silk Cotton *Bombax ceiba*, Sissoo *Dalbergia sissoo* and Teak *Tectona grandis* {q1, fv}. Plantation work in 845 ha. Has been done during 1979-84 of Semal, Khair, Gubhel, Jamun, Shesham and Teak. Teak and Eucalyptus have been introduced in the area. {fv}

Plants of special conservation value are Bael *Aegle marmelos*, *bellirica Myrobalan Terminalia bellirica*, *Chebolic Myrobalan Terminalia chebula*, *Cutch Acacia catechu*, Indian/Common Jujube *Ziziphus mauritiana*, *amun Syzygium cumini*, *Narkul Phragmites karka*, *Sissoo Balbergia sissoo*. {Rodgers and Panwar 1988q}. Some thatching grasses are reported to be endangered.

Teak and Eucalyptus Plantations exist throughout the sanctuary. The area has been worked for a long time and continues to be worked by the forest deptt. Cutting and plantations work are done throughout the sanctuary. There are, in fact, very few stretches of forest where one does not see some kind of human interference-whether it be farming, mining for stones, grazing of cattle or teak/Eucalyptus plantations. The last is by far the most common. Stumps are visible throughout and according to the Range officer-Clear felling has been done in a number of places.{fv}.

Major mammals found are Blackbuck, Sloth Bear, Barking deer, Leopard, Tiger, Sambhar, Wild Boar, Jungle Cat, etc. Reportedly the sanctuary now also has four Rhinos which migrated from Nepal. Information about amphibians, insects, fishes and other fauna is not available. A breeding programme for *Long-snouted crocodile Gavialis gangeticus* and the Marsh Crocodile *Crocodylus palustris* has been started since 1976, at the Gharial breeding Centre. The eggs are collected annually for hatching. To date only Gharials have been released. In the wild (117 approx), after four years of rearing. The populations of Gharial and the Marsh Crocodiles were 500 and 33 respectively in 1984 [q1,fv].

There are four perennial and one non-perennial artificial tanks; two perennial natural lakes. Giruah river and numerous streams also flow through the PA.

Socio economic Profile

There are 16 villages in the sanctuary with an estimated population of 40,500. These villages have grazing rights as well as rights to collection of fire wood/fodder and Minor Forest Products. The result is that there is tremendous grazing pressure on the sanctuary. There is also a lot of movement by villagers through the sanctuary both for collection of wood/fodder/MFP as well as just the passing from village to town/next village on work or for whatever reason. The scale of the movement has got to be a disturbing factor to a wild life. Also with such a large human population dependent on the forest for firewood/fodder etc. the pressure must take its toll of the forest ecosystem. There is also a large human population in a 10 km. radius of the sanctuary.

One of the major activities is in addition to the cattle from the villages, there are a number of Goshalas in these villages. Each dairy has upto 200 Cows/Bufferaloes. This increases the cattle pressure a lot. According to the DFO Bahraich there are 81,247 cattle, legally grazing within the sanctuary. A small fee is paid to the Forest deptt. For grazing each cow/Bufferalo. The villagers have access to all parts of the

sanctuary and are allowed to cut fodder, take MFP and also remove any dead wood lying around.

There is some damage to crops caused by wild boar/porcupines, and monkeys. Compensation is not payable. Damage occurs outside as well, but compensation is not payable. There is a fair amount of livestock lifting by tigers for which compensation is payable. Compensation is also payable for injury/death to humans.

No plans exist to relocate the villages. There are far too many villages within the sanctuary, and so also dependent upon the forest for too many things to even contemplate relocating them.

Other major pressures are:-

- Collection of stones brought down by the River Giruah from the Nepal Himalayas. At the point where the river enters India (also the sanctuary), Contractors have been allowed by the Forest Deptt. Toward 2400 m running length of the river at a cost of Rs. 5 Square meter. More than 500 trucks arrive at and leave the area every day except for 4 months of the year during the monsoon (July-Oct.). A whole settlement has sprung up because of the work. Buses ply between Bichia and this point and all this traffic and habitation has resulted in a fairly badly disturbed part of the sanctuary. There are shacks where people live for 8 months with tea shops and all. About 200 people live here.
- Forest fires were reported to occur in the sanctuary
- A 3300 ha area farm, an experimental state farm exists which has a large staff and there is probably quite a bit of activity generated by the farm. It is bound to be a further source of disturbance to the wildlife. There is a permanent base with housing & staff staying throughout the year.
- The irrigation deptt. Has a canal which also requires some maintenance.
- A major road passes through the sanctuary, and at least two minor ones. The former is a link between Lakhimpur and Bahraich and is very heavily travelled. A smaller road goes from Bichia to the river for the trucks which go for stone collection. A third road goes for 5 km. From Bichia to Katermaghat. This is also heavily travelled. Katermaghat is 3-4 km. From the Nepal border and a lot of traffic passes to and for across the border. From katermaghat, there is only a fair weather (KUTCHA) road people go by bullock carts, cycles or on foot.
- A railway line passes parallel to the road from Lakhimpur to Bahraich and has a number of trains to Bahraich in one direction and a number of services to Palia and further in the other direction.
- The forest deptt. Allows contractors to do some amount of fishing in some of the Tals

- Quite a bit of illegal cutting of trees takes place and the R.O. (Forests) felt quite helpless in the face of no vehicles, no wireless, and a ridiculously small staff.
- Poaching does take place, according to the R.O. (Wild Life) and a lot of it is from the Nepal side.
- To be checked if Taungya plantations were carried out here. If so, check about what happened to the people.

SONANADI WILDLIFE SANCTUARY- A PROFILE

NOTE: There were no specific queries regarding Sonanadi sanctuary that we had identified in advance, since we did not have any information on this sanctuary before we left for the field visit. Also, we could not visit the sanctuary because of heavy rains. However, we were able to compile the following information on the basis of the Management Plan and discussions with Mr. Samir Sinha, DFO [author of the Management Plan for Sonanadi WLS, and currently Director, Corbett (Wildlife) Training Centre, Kalagarh].

Significance:

Sonanadi WLS is an ecological extension of Corbett National Park, and has some of the finest old growth forests in the region. Being at the confluence of the plains and the mountains, the PA has floral and faunal representatives of a number of ecosystems (mountains, grasslands, wetlands and forests).

Out of the 12,000 species of birds found in India, approximately 600 occur in the area comprising the Corbett Tiger Reserve, including the Sonanadi Sanctuary.

The Sonanadi Sanctuary forms a crucial part of the habitat of the N.W population of the Asian Elephant. It serves a critical link between the forest cluster of Corbett (including Corbett Tiger Reserve, Lansdowne Forest Division and Bijnore Plantation Division) and Rajaji National Park. This area is used, among other animals, by large herds of elephants moving between Rajaji and Corbett. This sanctuary is therefore crucial for the long-term survival of elephants in this region.

Sonanadi, along with Corbett National Park and its buffer areas, together comprising the Corbett Tiger Reserve (CTR), holds the second largest population of tigers in the world.

Fauna:

Besides elephants and tigers, several other endangered species such as crocodile, gharial, leopard cat, ghoral, serow and mahaseer have a significant presence in the region. CTR is also home to about 600 species of resident and migratory birds, according to Zoological Survey of India. Common birds include peafowl, jungle fowl, partridges, kaleej pheasant, orioles, kingfishers and woodpeckers.

Flora:

Floral species found here include sal, khair, jamun, haldu, chir, bans, and bhabar grass. Extensive plantations were carried out in some parts of the sanctuary. These include shisham, teak, *Ailanthus excelsa* and kathsagon in older plantations (1955-58) and khair, and semal in younger plantations. Bamboo was raised in 1966 and eucalyptus has been planted recently.

Legal Status and Administration:

Sonanadi Wildlife Sanctuary was constituted on January 9, 1987, with an area of 301.18 sq. km. It is surrounded by 309.9 sq. km of RF that is meant to serve as a buffer to the sanctuary. The sanctuary and the RF together (611 sq.km) constitute almost 50% of the Corbett Tiger Reserve (Total area of CTR is 1318.5 sq.km.).

Sonanadi Sanctuary and its buffer areas are under the administrative control of Kalagarh Tiger Reserve Division (KTRD), headed by a DFO. Though KTRD is a part of CTR, it is administered by the office of the CF, Western Circle.

Sonanadi has five ranges: Sonanadi, Palain, Adnala, Maidavan and Mandal.
(INFORMATION REGARDING SETTLEMENT OF RIGHTS IS ABSENT)

Geographical Location:

Sonanadi WLS is located in the Kotdwar tehsil of Pauri Garhwal district. It adjoins Corbett National Park and falls in the same bio-geographic zone. Only the Ramganga reservoir separates the two PAs. Sonanadi constitutes a crucial corridor between Corbett and Rajaji NPs.

Water Sources:

The area is very well drained, and four perennial rivers - Sonanadi, Palain, Mandal and Ramganga - flow through it. The sanctuary also harbours the Ramganga Reservoir, which covers an area of 43.2 sq.km. It is the largest perennial water body in the region. This was created as a result of the construction of the Ramganga dam between 1962-74. Creation of this reservoir submerged prime grasslands. We could not find any systematic study of the impact of this change of habitat (from grassland to wetland).

Many seasonal rivers and sots also drain the area. However, most of these are usually dry from March to June.

The southern portion of the PA experiences acute scarcity of water. This has been attributed to the texture of the underlying rock strata. The impact of this scarcity on flora and fauna remains indeterminate. The management plan has, nonetheless, proposed creation of waterholes in the area.

Pressures on the PA:

♣ Habitation: While there are no villages inside Sonanadi WLS, nearly 200 villages are located at the periphery of the PA within a radius of 10 km. There are several *chucks* (i.e. extensions of revenue villages) in the buffer zone, and a number of Gujjar *deras* are present inside the Sanctuary. Presently, 67 Gujjar families with an estimated population of 434 and nearly 2,000 cattle live inside the Sanctuary.

Gujjars are nomadic pastoralists whose principal occupation is livestock rearing. The Gujjars currently living in Sonanadi were originally from Jammu. They came to Himachal Pradesh as part of dowry of King of Sirmour who married a princess of Jammu nearly 300 years ago. From Himachal they entered Western U.P. and even today, some of them migrate to Jammu.

Gujjars traditionally construct huts near a water source, using poles and grasses from the forest. These habitations are called *deras*. Each family keeps a herd of buffaloes. Some have also started keeping cows, mules and goats. Gujjars have been using the forests of Kalagarh Division for their livelihood since the 1950s. Initially they were allowed to settle and graze a small number of buffaloes in selected areas of Sonanadi Valley. The Working Plan (1970-80) for the Kalagarh Division set aside areas to be utilised by Gujjars for lopping on a two-year cycle. However, the same document states that the Gujjars almost never follow the prescribed lopping rules.

The rapid increase in the human and livestock population of Gujjars, coupled with the near cessation of their seasonal migration, is cause for severe stress on the

habitat of Sonanadi and its buffer. For quite a few years, Gujjar migration in these parts has been confined to movement from within the sanctuary to its outer fringes. This movement is related to the rise in water level of Ramganga Reservoir and subsequent flooding of the low-lying *deras*.

♣ Grazing: Villagers living in the vicinity of the sanctuary enjoy limited grazing rights in the buffer zone. The southern boundary, where cattle from Bijnore district are brought in for grazing, experiences considerable grazing pressure. Within the sanctuary, the Gujjar cattle (approximately 2000 in number) are a source of constant disturbance to the wildlife and its habitat. Though no grazing permits have been issued since the creation of the Sanctuary, the Gujjars continue to build *deras* and graze their cattle inside the PA.

♣ Fuelwood: According to the rules and regulations relating to the exercise of rights by, and concessions granted to local communities, there is no restriction on the removal of fallen wood for fuel for domestic use. However, the Management Plan reports that lopping also takes place.

♣ Religious sites: There are two religious sites inside the PA.

- i. Banja Devi, which is considered sacred by Hindus
- ii. Kalushahid Mazaar, which is considered sacred by Muslim Gujjars

Note: We have no information on the number of people visiting these sites, and other pilgrimage-related information.

♣ Hunting: Illegal hunting has been, and continues to be a great threat to the wildlife of these areas. Reportedly, tiger and elephant remain under considerable threat from poachers. Communities living on the periphery also indulge in hunting of various animals.

Note: No further details of hunting and poaching are available from the Management Plan.

Eco-Development:

Eco-development has been introduced on the periphery of the PA. (WE DO NOT KNOW WHEN IT WAS INITIATED). Activities undertaken include distribution of pressure cookers, solar cookers and bee boxes, installation of solar lights and afforestation. World Food Programme has also carried out a number of activities in villages on the periphery of the sanctuary, such as construction of primary schools and community halls, and installation of hand pumps.

The management plan considers these activities akin to eco-development.

NGOs:

A few NGOs like Corbett Foundation and Wildlife Protection Society of India are active in Sonanadi. They organise awareness programmes, medical camps and training of women. These NGOs have also attempted to strengthen protection by donating an elephant for patrolling, and jackets for the field staff.

(WE WOULD WANT TO GET THE PA MANAGEMENT'S OPINION REGARDING THE UTILITY OR OTHERWISE OF NGOS. THE MANAGEMENT PLAN SHEDS NO LIGHT ON THIS).

WEST BENGAL

SUNDARBAN TIGER RESERVE

The Sundarban Tiger Reserve (STR) has been carved out of a part of the gangetic delta. It consists of several delta islands, which are covered by thick mangrove vegetation as well as the interspersing rivers, streams and creeks of brackish water. Even though STR has a viable population of tigers, its major values lie in its diverse mangrove and littoral vegetation coupled with varied species of birds, reptiles, amphibians and fishes as well as several species of aquatic and terrestrial invertebrates. Apart from the Tiger, there are no other terrestrial mammals of special interest found in the Reserve with the exception of the Fishing cat. The ecosystem of STR is dynamic with the mangroves at the edges of the delta islands being partly submerged twice each day during high tide. Reportedly, the tide and therefore the flow of water change every six hours in STR. There is no human habitation within the reserve. The major human uses of STR include fishing and prawn seed collection, honey gathering and woodcutting. Poaching by local people for eating meat is also reported to take place. However, due to the remoteness of the area and the problems of transportation within it, STR is naturally protected from any major human pressures at a large scale.

Geographical Profile

The Tiger reserve is located in the 24 Parganas District of West Bengal. It falls within latitudes 21 30' to 21 50' north and 88 45' to 89 east [Q1, old]. The eastern boundary of the reserve is along the Raimangal and the Harinbhanga rivers, which is contiguous with the international border with Bangladesh. The western boundary of the reserve is contiguous with the Matla River.

Management Profile

The STR has been carved out of the 24 Parganas Forest Division. This division was created after partition in 1947 on August 21 and had an area of 4262 sq. km. These forests were initially notified as protected forests vide two separate notifications issued on December 7, 1878 and April 9, 1926 (notification number 4457-For). Subsequently, the entire area was notified as a Reserved Forest under provisions of the Indian Forest Act, 1927 through the following notifications:

1. Notification number 15340-For. Dated August 9, 1928

2. Notification number 1024-For. Dated August 20, 1935
3. Notification number 5174-For. Dated May 2, 1939
4. Notification number 7737-For. Dated May 29, 1943

[MP]

The Tiger reserve was established in 1973-74 and has an area of 2585.00 sq. kms. [FSI]. The intention to notify a part of the STR as a national park was declared on June 6, 1978, for an area of 1330.10 sq. km. The final notification for the national park was done on May 4, 1984, vide. notification number 2867-For. Another part of the STR (362.335 sq. km.) was declared a sanctuary on June 24, 1976, vide. notification number 5396-For. [MP]

The STR has been divided into the following zones:-

Core Zone – 1330 sq. km. (Sundarban National Park)

Buffer Zone – 1255 sq. km.

Within the buffer zone, the following sub-zones are defined:

Sajnakhali Sanctuary – 362 sq. km.

Subsidiary Wilderness Zone – 241 sq. km.

Multiple use zone – 652 sq. km.

Note: Figures have been rounded off [MP]

Socio-economic Profile

There are no villages inside the Tiger Reserve. However, the number of villages in the 10 km radius is 94. [1981 Census]. Most of the people who live around STR are fishermen. There is also paddy cultivation on reclaimed land in the villages. 44% of the population in Sundarban consists of tribals and scheduled castes. The villages around STR are not very prosperous owing mainly to the poor transport and communication with the mainland. The reclamation of Sundarban started as early as 1781 when around 150 leases were given to reclaim these tidal mangrove forests into rice fields or fisheries. In 1985, the Sundarbans Development Board published a report that the Sundarbans territory covered an area of 9630 sq. km of which more than 50% is now under agriculture, brackishwater aquaculture or human habitation. The population density of these reclaimed Sundarbans is 440/sq. kms. [Bakshi and Naskar, 1987, MP].

The human uses or pressures on STR are as follows:-

1. Fishing and Prawn Seed Collection: Local people are issued permits to fish as well as collect prawn seeds in the multiple use zone of STR.

However, illegal fishing as well as prawn seed collection does take place in other parts of the Reserve. This activity goes on through the year. There are no estimates of the number of people involved or the quantities being extracted. The price at which prawn seeds are sold ranges from Rs. 1,000.00 to Rs. 1,600.00 per 1000 seeds. Apparently, the prawn seeds collected in STR sustain most of the aquaculture operations in the area. The local people also sell off most of the fish catch. [Q1, new and Pers. Comm. STR Staff]

2. Honey and Bee Wax Gathering: Permits are also issued for honey gathering in STR. The STR authorities buy the honey collected by local people and dispose it off to the Forest Development Corporation for further processing. However, there is also illegal collection of honey by people who are not permit holders and who enter into restricted areas of the reserve for honey collection. In 1996-97, 32,400 kg. Of honey was collected, resulting in a revenue of Rs. 3,80,603.40, while in the same year, 1858.6 kg of wax was collected and realised a revenue of Rs. 2,90,224.50. During 1997-98, 44,700 kg of honey and 2682.4 kg of wax was collected. The figure for the revenue that was realised for 1997-98 has not been given in the management plan. [Q1, new and MP]
3. Wood Cutting: Wood cutting is resorted to by the fishermen and honey gatherers who enter the forest for cooking etc. However, in some cases local people set out to cut wood and stock it up in their boats for sale in local markets. There are, however, no estimates of quantities of wood thus extracted. Reportedly, this as well as the other forest products listed above, are mostly sold at Jamtola, which is the biggest local Haat or market for this region. [Q1, new and Pers. Comm. STR Staff]
4. Tourism: Almost the entire tourist pressure is confined to the Sajnakhali Sanctuary where a Museum and an Interpretation Centre for STR has been also made. There is also a West Bengal Tourist Development Corporation Tourist Lodge at Sajnakhali as well as a Zilla Parishad Guest House. The number of tourists that visited STR in 1996-97 was 35,515. [MP]

5. Forestry Operations: The multiple use zone of STR is also used for the extraction of timber from the reserve. The Basirhat Range (north eastern portion of the reserve) is where all the forestry operations are reported to take place. In 1986-87, timber extraction was carried out twice a year on about 2,500 ha. However, this has now been reduced to about 1,000 ha. once a year. The quantities extracted have also been coming down. In 1986-87, 1,96,288 quintals of timber was extracted realising a revenue of Rs. 2,46,683.00, while in 1995-96, 48,880 quintals of timber was extracted realising a revenue of Rs. 1,67,059.00. [MP]

The impacts of STR on the local people are as follows:

1. Human Death/Injuries by Tigers: The STR is infamous for its man-eating Tigers. Unofficially, every year, between 50 to 100 people are reportedly killed by Tigers in and around STR. However, from discussions with the local people and staff, it does not seem that this phenomenon has been affected by the creation of the Tiger Reserve. Death/injury of human beings by Tigers has existed in the area for a very long time. Officially, the numbers of deaths/injury have been under control and have been falling. In 1985-86, the total number of people who died due to Tiger attacks was 32, while the number of people injured in the same year was six. In 1995-96, however, these figures had come down to two and one respectively. [MP]

Biological Profile: [This section is entirely based on a report by FSI on Sundarbans. Detailed species lists have also been given in the Management Plan]

FAUNA: The main species of mammals are : The Royal Bengal Tiger, Spotted deer, Wild boar, Rhesus monkey, Fishing cat, Estuarine crocodile, Olive ridley turtle, River terrapin, Water monitor, Gangetic dolphin, Finless porpoise, Horse-shoe crabs etc. A bird sanctuary of 362 sq. kms (Sajnakhali) forms part of the tiger Reserve, represented by a wide variety of birds.

FLORA: The mangrove vegetation of the Reserve is the largest in the globe. The halophytic plants are salt-resistant. The plant species have adapted to the swampy, fragile, submerged condition by developing some special features such as

the pneumatophores, stiltroots, perforated barr, Stomatal special structure, salt gland and salt hair. The predominant plant species and plant associations are as follows:

Trees : *Aegiceras corniculatum*, *Avicennia alba*, *A. Marina*, *A. officinalis*, *Bruguera cylindrica*, *B. Gymnorhiza*, *B. Sexangula*, *Ceriops tagal*, *Cynometra iripa*, *Excoecaria agallocha*, *heritiera fomes*, *Lumitzera racemosa*, *Rhizophora apiculata*, *R. mucronata*, *Sonneratia apetala*, *S.griffuhii*, *S.alba*, *Tamarix troupii*, *Xylocarpus granatum*, and *X.mekonegansis*.

Palms : *Nypa fruticans*, *Phoenix paludosa*.

Shrubs: *Acrostichum aureum*, *Brownlowia tersa*, *Cledodendrum inerme*, *Caesalpinia bundicella*, *Ceriops decandra*, *Acanthus ilicifolius*.

Climbers : *Stichtocardia tilifolia*, *Viscum orientale*, *Acanthus volubilis*, *Derris scandens*, *Delbergia spinosa*, *Entata scandens*.

Herbs: *Sesuvium portulacastrum*, *Suaeda nudiflora*, *S.monocea*, *S. meritima*, *Salicornea brachiata*.

Grasses : *Sacharum cylindricum*, *Porlerasia coarctata*, *Hemitheea compressus*.

Points/Issues of Special Concern

The issues on STR that were identified for special attention while in the field and about which an attempt was to be made to gather information or seek clarification were as follows:

1. There was some confusion regarding the boundaries of STR and the area of the various zones inside the reserve. This was cleared and a map of the reserve was procured from the STR authorities.
2. In the previous survey, problems arising out of the reserve having a boundary, which is contiguous with the Indo-Bangladesh border, were highlighted. When queried, the PA authorities did not think that there was any major problem because of this at present. The field team travelled for almost half a day along the route in STR, which is supposed to be used by the Indo-Bangladesh ship/boat traffic. The team did not find that this route was being used very heavily. In fact, the team did not come across any boat/ship going to or coming from Bangladesh.
3. In the previous survey, the problem of water pollution due to heavy movement of boats/ships in the area was reported. While the field team could not

investigate whether there was any impact on the ecosystem due to pollution in the past, it was clear that currently there was no such problem since one did not come across very heavy traffic inside the reserve. Also, according to the management plan, STR receives only a trickle of sweet water inflow from the mainland. Most of the reserve is fed by the backwaters of the Bay of Bengal. Therefore, there is also not a problem of wastes or pollutants from the mainland, especially from urban agglomerations like Calcutta, Diamond Harbour or Port Canning, being discharged into the reserve.

4. The team visited a village, Dayapur, and met members of its ecodevelopment committee. On the whole, despite minor problems, the committee members seemed satisfied with the progress being made. The major activities in this and all other villages under ecodevelopment are the following:
 - a. Construction of village paths
 - b. Provision of solar powered street lights in the villages
 - c. Distribution of smokeless chulas
 - d. Construction of sweet water ponds in villages for drinking
 - e. Construction and or deepening of irrigation channels in villages
 - f. Plantations for fuel and fodder. The species being planted is mostly Bain.
 - g. Training and distribution of assets for income generation schemes like beekeeping and poultry farming.

Halliday Island Wild Life Sanctuary

Location : Halliday Island Wild Life Sanctuary is located in district 24- Parganas of West Bengal. It falls a little to the south of the tropical of Cancer, at the co-ordinates of 21^o -41" North and 88^o-37" and 88^o-39" East. The Island is situated just on the mouth of river Matla in the Bay of Bengal. [MP]

Area: The sanctuary was notified on 24 June 1976 vide notification number 5388 for. It comprises of compartment -7 (part) of Dulibhasani Block covering a Forest area of 3 Sq. Km. and a beach of 0.5 Sq. Km totaling 3.5 sq. kms. There is no zonation in the sanctuary.[q1] The Sanctuary is bound on all sides by river (Matla) which is said to act as a buffer zone. **The area was declared as a sanctuary as it was a breeding ground for Olive ridley turtles. At present only a few turtles use this island as a breeding ground. [DFO pers. com.]**

Approach: There is no direct road connection with this island. It is only approachable by water craft from Raidighi (approximate 50 Km.), which has a direct road communication from Calcutta via Diamond-Harbour. There is another route from Calcutta via Sealdah to Mathurapur Road railway station by train and thereafter by bus to Raidighi. Diamond Harbour is also connected (60 km) by rail with Calcutta via Sealdah (South). [M.P.] There is no Launch service or any sort of regular ferry service from Raidighi to Halliday Island. Private Launches and boats are however available at Raidighi on hire. The nearest town according to q1 is Namkhana , which is 60 Kms away from Halliday Island.

Climate: The island is a part of deltaic Sunderbans which harbour a tropical estuarine swamp forest. It gets a perpetual flux on account of tidal rhythms. It is also subjected to vagaries of cyclonic storms. There is scouring by wave along the west and south boundary of the island. Its temperature is moderate with a heavy rainfall and humid climate. The summer extends from middle of March to middle of June and the winter from December to February. Monsoon comes from the middle of June and continues upto middle of September. Fair weather prevails between September and March.

Brief past history: The whole forest area of the 24-Parganas district including this island was initially notified as a protected forest on 7th December, 1878 under a notification (no. ??) and finally declared as Reserved Forests under notification No. 7737- For., dated 28th May, 1943. The island was notified as a Wild Life Sanctuary in 1960 under notification No. 2241-For., dated 3rd June, 1960 and subsequently renotified as Halliday island Wild Life Sanctuary vide Notification No. 5388 For., dated 24th June, 1976 under provisions of the Wild Life (Protection) Act, 1972 for the purpose of protecting, propagating and developing Wild Life and its environment. [MP].

Legal Status of the surrounding area : Government Reserved Forests Land, free from all rights. The immediate surroundings are river Matla.

Flora: The forests of the Island fall broadly under sub-group 4B [Tidal Swamp forests] as per the classification of Champion and Seth. The principal tree species are Beal (*Avicennia* Spp.), Dhundal (*Carpa obovata*), Garjan (*Rhizophora conjugata*), Gesswa (*Excaecaria agallocha*), Goran (*Cariops* Spp.), Karanj (*Bruguiera* Spp.), Keora (*senneratia apetala*), Khalshi (*Aegialtis rotundifolia*) etc. The vegetation provides a dense cover over almost 3.0 Sq. Km., except 0.50 Sq. Km. of the beach along the eastern boundary. The mangrove forests of the island have a peculiar adaptation to the estuarine environment. The high osmotic pressure developed by cell sap help the plants in drawing water from concentrated soil solution. Other special features are the pneumatophores for respiration, viviparous germination, special stomata and salt glands on the leaves etc.

Plantations: Some sweet water species like Jhaw (*Casuarina equisetifolia*), Karanja (*Pongamia Glabra*) and Nishinda (*vitex negundo*) etc.. were planted in the blank high land of around 11.0 hectares.[MP] **According to the DFO, the plantations were done in late sixties and are now dying out. These were done to check the sand from coming into the island.**

Fauna: The main animals found in the Wild Life Sanctuary are Chital or Axis deer, wild pigs and Rhesus monkeys. Tigers are reported to occasionally visit from the nearest island of Dulibhasani Block. **(Last census 1997 reported no tiger from the**

PA) Chital mostly subsist on leaves, twigs and fruits of mangroves available in the island or on the banks deposited by receding tides. Fodder grasses are almost absent except in the Jhaw planted areas. Birds are common like other adjacent island of the Sunderbans. Amongst reptiles the common venomous snakes are King Cobra, the common Cobra, Branded Kraits, Russel's viper etc. Other non-venomous snakes are python, chequered kill-back, Dhamin, green whip snake etc. The common lizards are varanus salvator, varanus flavescens, varanus monitor etc. [MP]

The fauna have acquired a special adaptation to the saline environment, tidal rhythms, cyclonic weather etc. The animals consume saline water.

The Matla river surrounding the Sanctuary has plenty of varied assortment of fishes, prawns, crabs, molluses and Crocodile (*Crocodylus porosus*). The honey bee (*Apis dorsata*) which is a source of considerable revenue from the Sunderbans is also found in this Sanctuary. The marine berers, shells are amongst the wide range of minor forms of fauna in the island.[MP]

Forestry operation: The first working plan for 24- Parganas Division (1948-49) to 1958-59) expired and since then forests are worked according to forest working scheme. Selection cum improvement felling was the prescription which was controlled on area basis. Thinning or any other cultural operation is not practiced in the Sunderbans forests. The forests of the Sanctuary were last exploited prior to 1959-60. No soil conservation measures have been taken up in the Sanctuary. A blank area of 11.0 hectares was planted up with Jhaw in the year 1968 and 1969.[MP]

Pressures: There is no habitation or agricultural land in the Island. According to q1 no problem/issues/threats.

The island has no staff or any infrastructure on it. The forest officials visit it occasionally, especially during the tiger census, which is once in five year.

LOTHIAN ISLAND SANCTUARY

Location: Lothian Island Wild Life Sanctuary is located in the Civil District of 24-Pargahas. It falls a Little south of Tropic of Canoor at the co-ordinates of 21⁰ – 35' and 21⁰ – 41' North and 88⁰ -18' and 88⁰ – 22' East. The Island is situated just on the mouth river saptamukhi bordering on Bay of Bengal. It is comprised of comptt. l(Part) of Septamukhi block covering a total area of 38 sq. km.

Approach: There is no direct road connection with this island. It is only approachable by river Grafts from Namkhana (approx. 30 kms.) which has direct road communication from Calcutta via. Diamond Sarbour. Distance from Calcutta to Namkhana is 105 km. There is no regular Launch Service from Namkhana to Lothian Island. Private Launches and boats are however available at Namkhana on hire.

Brief Kest History: Legal Status- The whole forest area of the 24-Paraganas District including this island was initially declared as protected Forests on 7th December, 1878 under a notification and finally declared as reserved Forests under notification No. 7737-For, dated 30th May 1943. Within the Reserved Forests of this Island there is no village or agricultural land. The island was declared as Wild Life Sanctuary in 1948 under notification No. 6870-For. Dt. 13-9-43 and subsequently re-notification as Lothian Island Wild Life Sanctuary vide notification No S392-For, dated 24th June, 1976 in terms of section 18 of the Wild Life (Protection) Act, 1972 for purpose of protecting, propagating and developing Wild Life and its environment.

Surroundings: The Lothian Island Wild Life Sanctuary is bounded on the north by the reserved Forests of Prenties island on Septamukhi river, on the East by Saptemukhi river and cultivation of G?plot (Rakshashkali village) on the South by Bay of bengal, and on the West by Saptamukhi river and Cultivation of G-Plot (Chandahpiri, Dwariknagar etc.). The island extends roughly 11.75 Km. North to South with an average width of 4 Km. (East to West).

Legal Status of the Surrounding area: Govt. Reserved Forest Land, free from all rights. The island being completely separated from the neighboring reclaimed areas by the wide river Saptamukhi and sea from all sides there is no problem of grazing or any kind of right. The immediate surroundings are river Septamukhi, Prentice and Sea full within Reserved Forest.

Terrestrial: Principal forest type: The forests of the island fall broadly under Sub-group 4 B Tidal Swamp forest as per classifications of Champion and Seth. The Principal tree species are as follows:-

- a) Ground Storey - Hargesia (*Acanthus ilicifalins*), Hental – (*Phoenix Paliudosn*),
Nona-Thau (*Temariz-galliea*), gira shok (*Guaenda nudiflora*) and
Dhani ghash (*Oryga Conrotata*)
- b) Middle Storey - Kalo Baen (*Avigennia afficalia*), Goran – (*Carions roxburghians*) Tora (*Aegilitiea rotundifolia*) and Ora (*Sanneratia acids*)

c) Top Storey - Keora (*Sonneratia apetiala*) and Peara or Snda Baen (*Avicannia alba*)

Density of the above forest cover is good. During high tide only 10% of the total habitat is available to Wild animals and the shrinkage of 90% of habitat is continuous for 2-4 hours twice daily. On the whole the vegetation provides a dense cover throughout the habitat excepting for some scattered 'dhal' areas (hushy angle). Along the edges of char lands there are greasy patches. Though extent of seasonal forage is unknown still that the behavioural animals have enough of food like been leaves, Gengwa leaves, Keora fruits, Hargozea flowers, dhanighash etc.

Range of Wild Life : The principal animals occupying the Wild Life Sanctuary are Chitals or Axis deer, Wild Pigs, Jackals and Rhesus monkey. The famous man-eating tigers are absent in this Sanctuary. Jungle cats (*Felis chaus*) are sighted occasionally, Chitals mostly subsist on leaves, twigs and fruits of mangroves available in the forest or on the banks deposited by receding tides. Fodder grass is almost absent but being introduced by turfing to road surface and embankments. Birds are in plenty including a large number of migrants that visit the Sanctuary in winter. Amongst reptiles the common venomous Snakes are King Cobra, the common Cobra, Banded Kraits, Russell's viper etc. and other non-venomous snakes are python, chequered kill-back, Dhamin, green whip snake etc. The common Lizards are *Varanus asvator*, *Varanus flavescens*, *Varanus monitor*, along with a number of species of Aquamids and gekko.

The Saptamukhi river and the marshes of the island used to offer asylum to Estuarine Crocodiles- (*Crocodilus noronensis*) one of the rarest and longest of Crocodile in the world. They are now rarely seen in the area due to heavy disturbances caused by fishing throughout the year. Two of such crocodiles are however sighted sometimes in the northern tip of the Sanctuary.

The river Saptamukhi surrounding the Sanctuary and the channels have plenty of varied assortment of fish, prawns, crabs and molluscs.

The honey bee (*Anis dorsata*) which is a source of considerable revenue from the Sunarban forest is also found in this Wild Life Sanctuary. The marine borers, shells are amongst wide range of minor-forms of fauna in the island.

Main Points

- Crocodile breeding centre in sanctuary – The centre is located at Bhagatpur - which is outside the sanctuary. It is situated on the island which is north of Lothian island
- Compensation paid for cattle killed by tiger – Tiger is not found in the sanctuary.
- According to census it is uninhabited – According to the DFO, it is uninhabited except for the forest staff.
- Major offence destruction of habitat - As the island is surrounded by inhabited islands on all sides except the south, there is pressure for fuelwood and small timber.

- Around 200 hectares of the island has been demarcated as a genepool area. This area is located in the south east area of the island.
- Plantations of Jhaw has been done in around 60 hectares of low lying sandy coast line. This has been done to arrest the land from coming into the island.
- No census is carried out in Lothian Island.
- Mr. Ghosh of BSI, Mr. Amresh Chowdhury of Calcutta University, and ?? of Indian Statistical Institute are currently doing some research in Lothian Island. No further details were available with the DFO.

Sajnakhali Sanctuary

Area: 362.36 sq. kms (35% is saline creeks). It forms a part of Sundarban Tiger reserve. The area was a reserve forest before being notified as a sanctuary.

Date of Notification : 24. 06. 76

Latitude : 22⁰ to 21 30' North

Longitude : 88 45' to 88 60' East

Nearest town : Gosaba (20 Kms)

Nearest Railhead : Canning (76kms)

Entry points : 2 (manned) & 6 (unmanned)

Zonation : q1 says yes but no area given

Forest Type : 4B/TS-3

Threatened Species: *Acanthis volubilis* wall due to change in salinity (to check if mangrove species)

Major Fauna : Tiger, Salt water crocodile, Fishing cat, Salvator lizard, Olive ridley, Gangetic dolphin.

Main Points:

- Water pollution. This is due to mechanised water boats.
- Plantations of accacia, prosopis, casurina, gossipium, panicum in 1976 on banks of sweet water ponds.
- 40 surrounding villages with 30,000 population.(1983-1984)
- Destruction of habitat
- Crocodile breeding centre
- Crop protection guns present in the surrounding area

Miscellaneous: No separate budget, management plan of Sundarbans is followed.