MANAGEMENT PLAN OF PAMPADUM SHOLA NATIONAL PARK 2020-21 TO 2029-30

Prepared by

LEKSHMI. R
WILDLIFE WARDEN, MUNNAR

Under the guidance of

ANOOP. K. R. IFS
CCF & FIELD DIRECTOR
(PROJECT TIGER), KOTTAYAM

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PREFACE

Pampadum Shola National Park is an integral part of the High Ranges, located in the Southern most part of the Western Ghats which is one of the eight hottest hotspots in the world. It has a unique Shola vegetation and mostly consisting of Southern Subtropical Hill Forests with Shola Grassland eco-system present in higher altitude. The Park has an altitude range varying from 1760 to 2531 m from sea level. Due to the geographical location, uniqueness of climate and geo-morphological features, the area harbours a wide range of endemic flora and fauna. Biodiversity of Shola vegetation also serves as a field laboratory for activities like conservation education, research and monitoring and participatory management. Moreover, the Park acts as a corridor for the wildlife.

The forest area of Pampadum Shola was under the erstwhile Travancore Rajas before the advent of the British rule. The colonial forest policy greatly understood and appreciated the values of forests Pampadum Shola area was notified as a Reserve Forest in 1901 and published in the Travancore Gazette. Being Shola forests these areas were managed under the Protection Working Circle. They were managed for the purpose of conservation of water sources. Identifying the ecological importance of this area, the Kerala Government declared Pampadum Shola as National Park in December 2003 as per the **Notification No. 12875/F2/2003/F&WLD dated 14/12/2003.**

Nilgiri Marten (*Martes gwatkinsii*) is a globally threatened species, endemic to Southern Western Ghats and this species is included in the IUCN Red List of Threatened Species as "Vulnerable". This endemic and elusive species is present in Pampadum Shola National Park and the study reveals that the Park provides healthy habitat conditions for this species. Nilgiri Marten is considered as the **"flag ship species"** of Pampadum Shola National Park.

The eco-restoration activities at Pattiyankal of Pampadum Shola National Park are one of the pioneer eco-restoration by Kerala Forest Department. This plan provides a systematic approach in eco-restoration of shola grassland ecosystem by focusing on the eradication of black wattle and eucalyptus plantations in the Park. The Park is located in the physical proximity of several human settlements, private plantations and interstate boundary with old forest plantations, so fire protection is one of the major areas of concern. Detailed fire protection activities like creation of firelines, tree breaks / firebreaks inside exotic plantations, controlled pre-burning, etc. in strategic locations are included in this plan to protect the Park from forest fire.

Various workshops involving forest officials, scientists, professionals and local people were conducted for the preparation of this plan. It is prepared as per the guidelines of the Ministry of Environment and Forests and approved by the Chief Wildlife Warden of the State. All the further management activities would be carried out only as per the prescriptions of this approved Management Plan.

Lekshmi. R
Wildlife Warden
Munnar Wildlife Division

ACKNOWLEDGEMENTS

I would like to place on record my sincere gratitude to **Sri. P. K. Kesavan IFS**, Principal Chief Conservator of Forests & Head of Forest Force, **Sri. D. K. Varma IFS, Principal** Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, **Sri. Surendrakumar IFS**, Retd. former Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden for their overall guidance and motive force for timely completion of this Management Plan.

I sincerely acknowledge the input by **Sri. Pramod G. Krishnan IFS**, Chief Conservator of Forest Working Plan and Research, **Sri. Georgi P. Mathachen IFS**, Chief Conservator of Forest, High Range Circle, Kottayam. **Sri. Anoop K. R. IFS**, Field Director (Project Tiger) Kottayam and **Sri. Anjan Kumar IFS** Technical Assistant to Chief Wildlife Warden, for giving the necessary advice in the preparation of this Management Plan.

I also sincerely acknowledge the contribution made by **Dr. P. S. Easa**, Ex-director of Kerala Forest Research Institute, **Prof. E. Kunhikrishnan**, Ret. Professor University of Kerala, **Sri. P. U. Saju**, Wildlife Warden, Idukki Wildlife Division, **Km. S. Geetha**, Retd. former Deputy Director (Wildlife Education), Palakkad, **Smt. Reney Pillai** Deputy Director (Wildlife Education), Trivandrum and **Shri. Benny**, Deputy Director (Wildlife Education), Kottayam for the successful completion of this Management Plan. I am indebted to the contribution made by **Dr. Hrideek T. K.** Scientist KFRI, **Dr. Sreejith Namboothiri**, Scientist KFRI, **Dr. Kalesh Sadasivan** (TNHS), and all those who had attended the stake holders meeting, for their valuable suggestions, technical supports, biodiversity assessment and sharing photographs etc.

I am thankful to **Dr. Rameshan M.** Project Officer (Conservation, Ecology) UNDP-IHRML, **Sri. Ajay** of Kannan Devan Hill Produce company Limited and **Dr. Ramashree A. B.**, Director Research of Indian Cardamom Research Institute for sharing knowledge and weather data indispensable for this Management Plan.

I express my gratitude for the financial and technical support for the preparation of Management Plan from GoI- GEF- UNDP under India High Range Mountain Landscape project.

Last but not least, I am grateful to my team, **Sri. Sameer M. K**. Assistant Wildlife Warden, Shola National Parks, **Sri. Salish J. Menachery**, Wildlife Assistant, Eravikulam National Park, **Sri. Bhavadas Sarman**, Biologist, Munnar Wildlife Division. **Sri. Joby Antony**, Accountant, AFDA, **Cinimole. K.K**, Selection Grade Typist, for their active involvement throughout the process of preparation of the Management Plan. I am also thankful to my friends **Sharon Vergis** and **Indu K. R.** For helping me in the various stage of this Management Plan preparation.

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PART 1

THE PROTECTED AREA
THE EXISTING SITUATION

CHAPTER 1

Introduction of the area

1.1 NAME, LOCATION, CONSTITUTION AND EXTENT

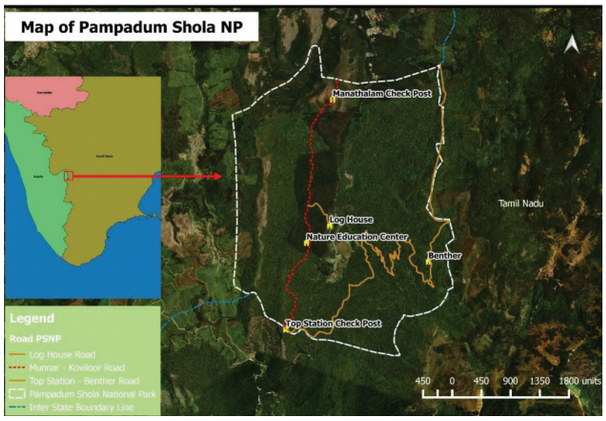
1.1.1 NAME

The name of the protected area is Pampadum Shola National Park (PSNP). The first Management Plan of Pampadum Shola National Park was for the period from 2010-11 to 2019-20. This is the second Management Plan for the period from 2020-21 to 2029-30.

1.1.2 LOCATION

Pampadum Shola National Park is located on the Eastern portion of High Ranges of Southern Western Ghats of Kerala and lies within the geographical limits of North latitude of 10° 7'-10°10' and East longitude of 77°14' - 77°17'. It is surrounded by Kannan Devan Hills in the West and the Palani Hills of Tamil Nadu on the East. Administratively, the Park falls in Vattavada Panchayat of Devikulam Taluk, Idukki District, Kerala **(Figure: 1.1).**

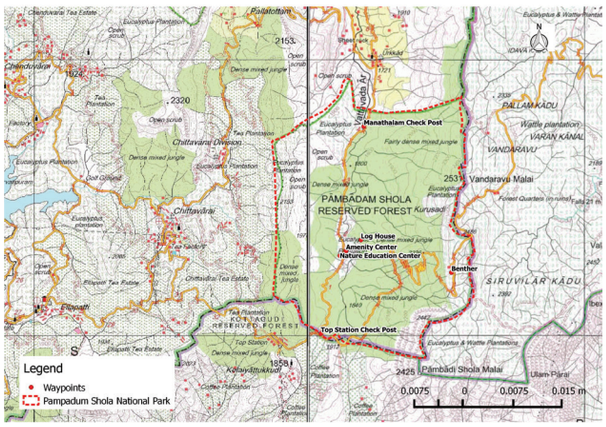
FIGURE 1.1: LOCATION MAP OF PAMPADUM SHOLA NATIONAL PARK



1.1.3 CONSTITUTION

Originally, the area was notified as Pampadum Shola Reserve No. 55 in 1901. The area was previously included in the Working Plan of Malayattoor Forest Division, prepared by Sri. T.P. Viswanathan, for the period 1951-52 to 1966-67. In the above mentioned plan, it was included in Muvattupuzha part of Malayattoor Forest Division. As per the Plan, though the extent of Pampadum Shola Reserve No. 55 in 1901 was mentioned as 320 acres, the actual extent in the field exceeded 2600 acres. It was prescribed in Page 72 of the working plan to take steps to survey and notify the Shola Reserve. On considering the ecological, biological and geo-morphological significance of the region, the State decided to elevate its status as a National Park vide **Notification no.12875/F2/2003/F&WLD dated 14/12/2003 of Kerala Government,** Pampadum Shola was declared as National Park **(Annexure 1.1)**. The extent within the notified boundaries is 1168.59 ha. as ascertained and verified by the GIS unit working under the Chief Conservator of Forests (FMIS). Map prepared by FMIS wing is shown in **Figure 1.2.**

FIGURE 1.2: MAP OF PAMPADUM SHOLA NATIONAL PARK



1.1.4 EXTENT

As per the **Notification no.12875/F2/2003/F&WLD dated 14/12/2003 of Kerala Government the extent of PSNP is 131.80 ha.** (Approx.). Whereas, as per the findings of GIS Mapping conducted by FMIS, the extent of area protected as the Park is 1168.59 ha.

1.2 APPROACH AND ACCESS

Pampadum Shola National Park is situated about 37 kms from Munnar Town on the Vattavada route.

The accessible airports from Munnar town are Cochin International Airport (107 km) and Coimbatore International Airport (156 km). The nearest Railway Station is Aluva (108 km) in Kerala and Pollachi (114 km) in Tamil Nadu. There is only a single road passing through the National Park, Munnar - Koviloor road. The old Munnar - Kodaikanal road is closed at the interstate border at Bendhar and a part of it is passing through the Park from Top Station Check post to Bendhar which is maintained for protection purpose.

1.3 STATEMENT OF SIGNIFICANCE

Pampadum Shola National Park is an integral part of the High Ranges, located in the Southern most part of the Western Ghats which is one of the eight hottest hotspots in the world. It has a unique Shola vegetation and mostly consisting of Southern Subtropical Hill Forests with Shola-grassland ecosystem present in higher altitude. The Park has an altitude range varying from 1760 to 2531 m from sea level. Due to the geographical location, uniqueness of climate and geo-morphological features, the area harbours a wide range of endemic flora and fauna. Biodiversity of Shola vegetation also serves as a field laboratory for activities like conservation education, research and monitoring and participatory management. Moreover, the Park acts as a corridor for wildlife. The diverse features of the Park are as follows: -

I) BIODIVERSITY VALUE

The Park is recognised as the smallest National Park in Kerala. However, it is a significant and unique habitat for a wide range of endemic / threatened fauna, flora, and several other species. During the rapid field exploration, a total of 351 species of plants were identified from the Park. Of which, 335 species are Angiosperms and the remaining 16 species are Pteridophytes. Among these, 165 (49%) species are 'endemic'. Of the 13% of plants recorded as Threatened, 4 are Critically Endangered, 11 are Endangered and 21 are Vulnerable. *Impatiens elegans, Vernonia heynei, Myriactis wightii,* and *Ilex gardneriana* are the four Critically Endangered species recorded from the Park. *Cyathea crinita* (Hook.) Copel, endemic to Southern Western Ghats and Sri Lanka (Sasidharan, 2004), is present along the banks of streams in the Park. This species is included in the IUCN Red List of Threatened Species as “Endangered” (IUCN, 2019). In addition, the Park also harbours many species of Orchids, Balsams, Strobilanthes and Mushrooms.

The faunal diversity of the Park consists of 31 species of Mammals (other than Rats, Shrews and Moles), 114 species of Birds, 16 species of Reptiles, 17 species of Amphibians, 85 species of Butterflies, 20 species of Odonates and 16 species of Ants. Nilgiri Marten (*Martes gwatkinsii*) is a globally threatened mustelid species, endemic to Southern Western Ghats. This small carnivore is included in the IUCN Red List of Threatened Species as “Vulnerable” (IUCN 2016). This endemic and elusive species is present in Pampadum Shola National Park (Krishna & Karnad 2010) and the study reveals that the Park provides healthy habitat conditions for the species. Hence, Nilgiri Marten is considered as the “**flag ship species**” of Pampadum Shola National Park. **(Figure 1.3).**

FIGURE 1.3: PHOTOGRAPH OF FLAG SHIP SPECIES OF PSNP (NILGIRI MARTEN)

II) ECONOMIC VALUE

The economic value of the Park largely depends on tourism potential, perennial water supply and catchment area. The Park also generates revenue for the Kerala state, particularly from the eco-tourism and nature education programme. The perennial water resources from the Park cater their irrigation needs and drinking water requirement of forest dependent communities. The Park is the watershed area of Amaravathy River through Thalinji Aar. Amaravathy reservoir generates huge revenue for the TamilNadu Government and the water from the reservoir is mainly used for irrigation and generation of electricity.

III) AESTHETIC VALUES

The Park is a globally renowned tourism destination due to its pleasant climate, scenic beauty and visual splendour. The clean air, the stretch of green meadows and thick foliage teeming with flowers makes it a dream destination for tourists. The tourism activities are designed to offer a wide spectrum of opportunities for the visitors and to provide means of sustainable livelihood for local communities. The Park offers chances for sighting the elusive Nilgiri Marten and it also provides chances for sighting the Indian Gaur in close quarter. The Park is a heaven for birders and nature lovers.

IV) SCIENTIFIC VALUES

The Park has a large number of plants and animals unique to the high-altitude Shola-grassland vegetation. It also provides ample research opportunities for studying the biodiversity of Montane vegetation and the ecological roles associated with the ecosystem. It can also serve as a field laboratory for activities like nature interpretation, conservation education, and research.

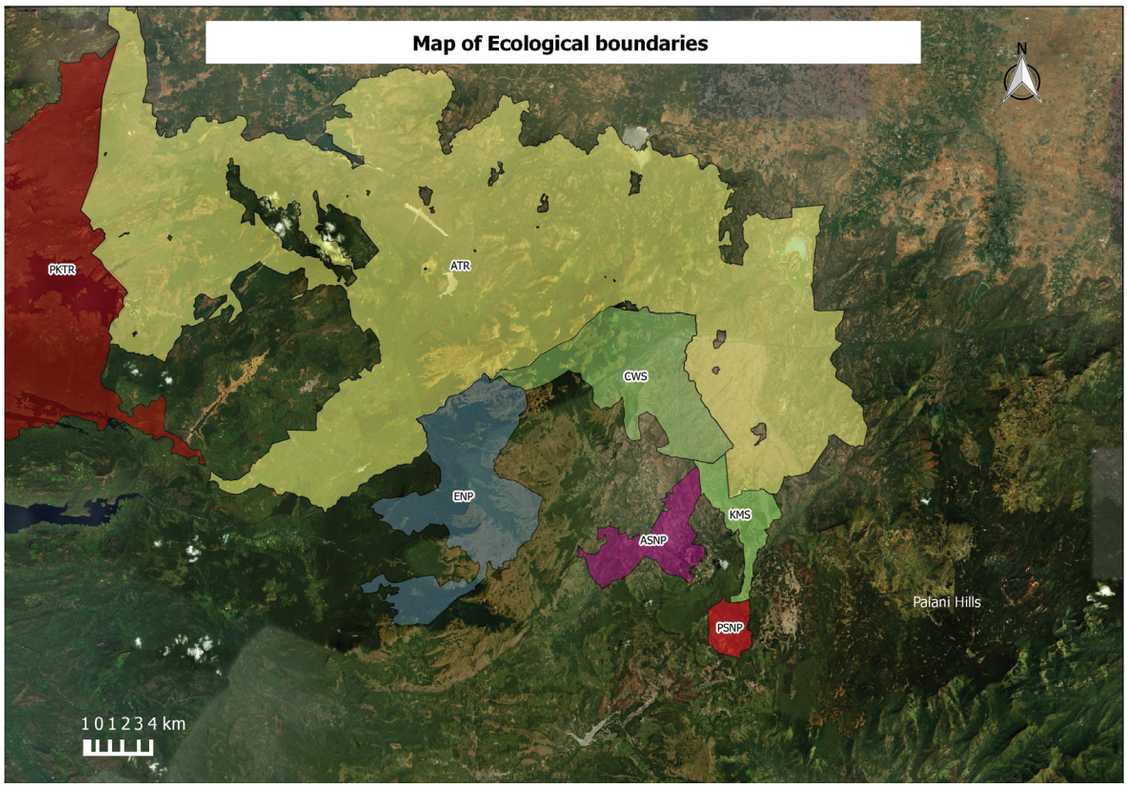
V) SOCIO-ECONOMIC VALUE

There are no forest dwelling communities inside the Park. The sources of livelihood of the fringe area communities are agriculture, horticulture, forest protection, tourism, etc. Eco-tourism adds to the preservation of the natural areas by giving financial assistance and income to the local communities. It uses the common assets and gives employment opportunities to the local people. The nature awareness programme help in developing a positive attitude among the local people to take part in the conservation of natural resources.

1.4 DESCRIPTION OF IDENTIFIED LANDSCAPE, CORRIDOR, LAND USE EXTENT BY OWNERSHIP CATEGORIES AND THE CONSERVATION IMPLICATIONS.

The landscape is undulating with hillocks of varying heights. The Park is located in the Anamalai Hills of the Southern Western Ghats which is one among the 36 biodiversity hotspots in the world. It acts as a corridor between Kannan Devan Hills and Palani Hills. The Park has a direct connectivity with Kurinjimala Sanctuary, Marayoor Sandal Division, Munnar Territorial Division and Kodaikanal Wildlife Sanctuary and has a landscape connectivity with Anamalai Tiger Reserve, Parambikulam Tiger Reserve, Chinnar Wildlife Sanctuary, Eravikulam National Park and Anamudi Shola National Park. Since the Park is connected with other PAs and other territorial divisions, it serves as a corridor for the movement of wild animals. The Park is a part of the 'High Range Circle Landscape Conservation Unit' which comprises of several Protected Areas under the Anamudi Elephant Reserve. **(Figure 1.4)**

FIGURE 1.4: MAP OF ECOLOGICAL BOUNDARIES



CHAPTER 2

Background Information and Attributes

2.1 BOUNDARIES

2.1.1 LEGAL BOUNDARIES

NORTH: The Southern boundary of Pampadum Shola Reserved Forest No.55, starting from a point about 500 m towards South from hill point 2162, then runs more or less South-East to hill point 1896 and thence towards East to meet at a point roughly in the middle of hill points 2497 (Pattitalachai Malai) and 2531 (Vandaravu Malai) on the interstate boundary.

EAST: The boundary runs more or less South along the interstate boundary.

SOUTH: The boundary runs more or less West along the interstate boundary.

WEST: The Western boundary of Pampadum Shola Reserved Forest No.55 adjoining to the Eastern boundary of Chittavurrai Tea Estate till it reaches North- Eastern corner at the starting point.

2.1.2 INTERNAL BOUNDARIES

The National Park is divided into two zones, Core zone and Buffer zone. **(Figure 2.1).**

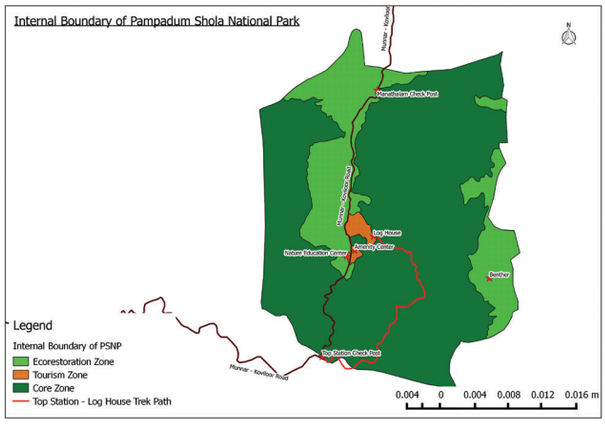
i) Core zone: The Core zone is 7.79 Km^2 in area, protected without any human interference.

ii) Buffer zone: The Buffer zone is 3.90 Km^2 in area, and consists of two Zones, Eco-restoration zone and Tourism zone.

a. **Eco-restoration zone:** All the plantation area inside the National Park is considered as Eco-restoration zone. This Eco-restoration zone will be converted into Core zone after the eco-restoration activities.

b. **Tourism zone:** The area around Nature Education Centre, Amenity Centre and Log Houses are included in the Tourism zone.

FIGURE 2.1: INTERNAL BOUNDARIES OF PAMPADUM SHOLA NATIONAL PARK



2.1.3 ECOLOGICAL BOUNDARIES

Pampadum Shola National Park is contiguous with the Kurinjimala Sanctuary and Vattavada region of the Marayoor Sandal Forest Division in the Northern side. The Southern and Eastern sides are bordered by the Anamalai Tiger Reserve, Tamil Nadu and on the Western side, forests and plantations of Kannan Devan Hills. Park provides habitat continuity with the Anamalai Tiger Reserve, Munnar Territorial Division and Kurinjimala Sanctuary. A map showing the ecological boundaries of PSNP is depicted in **Figure 1.4.** Pampadum Shola National Park plays a key role in connecting the Kannan Devan Hills of Kerala and the Palani Hills of Tamil Nadu.

2.2 GEOLOGY, ROCK AND SOIL

The underlying rock formation consists principally of gneiss of a granite nature, very often foliated and composed of quartz, feldspar and biotite. The soil is deep in general in ridges and hilltops it is shallow. The soil in lower slopes and valleys are considerably deeper and finer.

2.2.1 SOIL SAMPLING AND ANALYSIS

Surface soil samples (0-20 cm) were collected from the Park and the gravel contents were found out. Analysis were carried out for the estimation of particle size separates, soil pH, organic carbon, available N, P, K, Ca and Mg as per the standard procedures in ASA (1965) and Jackson (1958). Characteristics of the soil of the Park are shown in Table 2.1.

TABLE 2.1: CHARACTERISTICS OF THE SOIL FROM PAMPADUM SHOLA NATIONAL PARK

Location	Sand %	Silt %	Clay %	Soil pH	Organic carbon %	Av. N %	Av. P ppm	Av. K %	Av. Ca %	Av. Mg %
PSNP	60	14	26	5.7	4.50	0.037	12	0.27	0.09	0.02

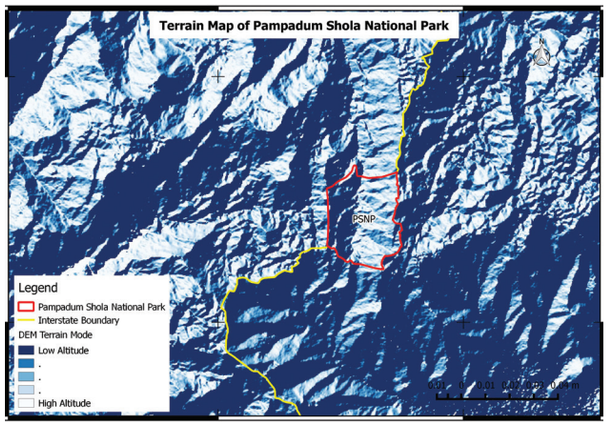
Source: KFRI Extension Project Report No. 15.

The soil in the Park is generally dark greyish brown, granular, porous, very friable, low in gravel content, rich in organic matter and nutrients. The decaying leaves form a mat on the forest floor and the soil below surface is medium acidic clay loam.

2.3 TERRAIN

The terrain is undulating with hillocks of varying heights. The elevation of the Park ranges between 1760 to 2531 m above the MSL. The highest peak is Vandaravu (2531 m above MSL), lying on the State border at the South-East portion. The lowest point of the plateau is 1780 m at swamp valleys. The Eastern side of the Park ranges from an elevation of 2300-2550 m, while the Western part ranges from 1900-2100 m. The terrain map of the Park is shown in **Figure 2.2.**

FIGURE 2.2: TERRAIN MAP OF THE PAMPADUM SHOLA NATIONAL PARK



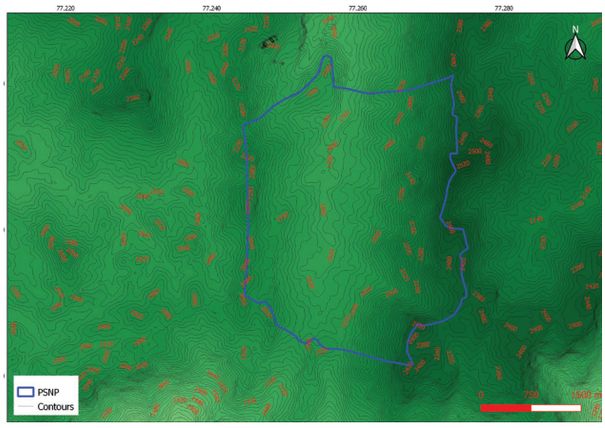
2.4 CLIMATE

The climate of the Park is Tropical Montane. The influence of altitude over tropical latitude brings about the characteristic climate. The Park due to its location towards the East of Kannan Devan Hills receives less rainfall during the South-West monsoon. The coldest months are December, January and February. When the minimum

2.3.1 CONTOUR MAPPING

Contour map of the Park is prepared by using Quantum GIS 2.4.0 which is given as **(Figure 2.3)**

FIGURE2.3: CONTOUR MAP OF THE PAMPADUM SHOLA NATIONAL PARK



temperature inside the shola forest falls to 6^{0}C in the grasslands sub zero temperature occurs. By the end of February to May are the dry months. Due to its geographical position it receives heavy rainfall during the North-East monsoon.

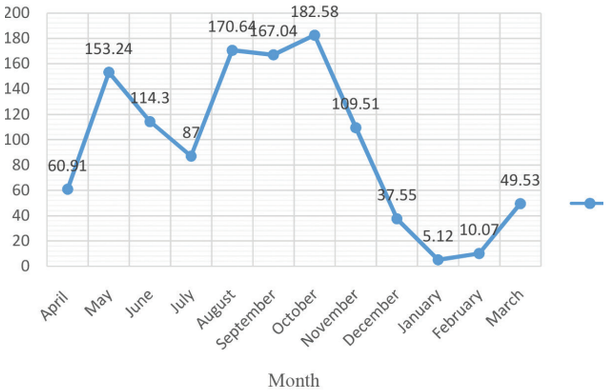
2.4.1 RAINFALL

The average annual rainfall for the last ten years was 992 mm and the maximum precipitation was recorded during 2018 and 2019. Annual rainfall data of the last decade collected from the Chittavurrai Estate is shown in **Annexure 2.1.** Average monthly rainfall data of adjacent Chittavurrai Estate for the last six years were tabulated and shown in **Figure 2.4.** The rainfall of the area is controlled by South-West and North-East monsoon. The trend of precipitation pattern is quite unique to this area. The monsoon starts from May, diminishes towards the mid of July, strengthen in the beginning of August and continues up to October. The monsoon declines in the final quarter of November. About 81 percentage of the rainfall is usually received from May to November. The rainfall is high during August to October. The incidence of summer showers is also common during dry season.

2.4.2 TEMPERATURE - A SUMMARY OF YEAR ROUND PATTERN

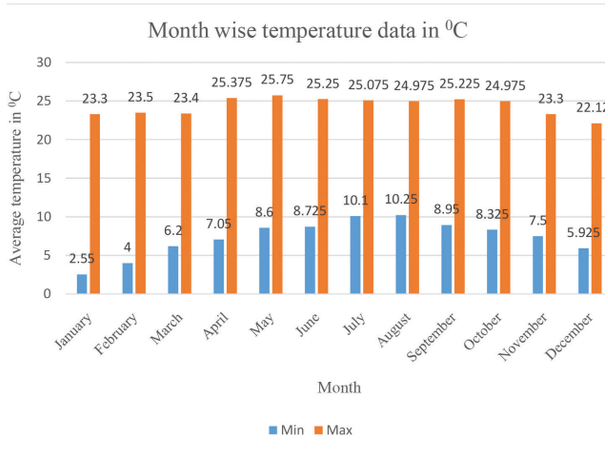
The mean annual average temperature of the past four years ranges from 5.6-8.9 to 23.4-25.1^{0}C. Temperature is high in April and May and low from December to February. The maximum and minimum temperature for the last 6 years recorded at Chundavurrai Estate is shown in **Figure 2.5** The mercury hits maximum in the day hours and goes down in the night hours. The winter season starts from December and lasts upto February. The temperature occasionally falls below 0^{0}C in the winter months. The frost phenomenon is observable in the area during winter months.

Figure 2.4: Month wise average rainfall at Chittavurrai Estate for the past 6 Years (2014-19)



*Source: Chittavurrai Estate(KDHP). * Month wise average rainfall calculated for the past six consecutive years (2014-2019) was given in the graph.*

Figure 2.5: The maximum and minimum temperature for the last 6 years(2014-19)



Source: Chundavurrai Estate (KDHP).

2.4.3 HUMIDITY - A SUMMARY OF YEAR ROUND PATTERN

The humidity of the area reaches its maximum during the period from October to November. The minimum humidity of the area varies from 55% to 70 % during the summer season.

2.4.4 WIND SPEED- A SUMMARY OF YEAR ROUND PATTERN

The wind speed is high in the upper reaches of the Park. No studies were carried out on the year round pattern of winds and their influence on the micro climate of the region.

2.4.5 DROUGHT AND ITS PERIODICITY: NATURAL HAZARDS AND DISASTERS FREQUENCY, INTENSITY, LOSS OF LIVES, PROPERTY, ECONOMIC LOSS AND OTHER CONSEQUENCES.

Dry weather conditions prevail during the period from February to May. There is a scarcity of water and forage for animals during this period. There are instances of landslides inside the park during 2018 and 2019. Strong winds also causes damages to trees. Instances of loss of lives, property, economic loss and other similar consequences are not reported from the region.

2.4.6 GOVERNMENT AND NON-GOVERNMENT AGENCIES WITH WHICH CONVERGENCE OF CONSERVATION PROGRAMME IS POSSIBLE; LIKEWISE DISPARITIES THAT ARE A PROBLEM

The convergence of programme of various departments and activities facilitating conservation programme is achieved through strong co-ordination with various line departments such as Health, Police, Fire Force, Motor Vehicles, Animal Husbandry, Excise, Education, Revenue, PWD, LSGD etc. Participation of Non-Governmental agencies such as WTI, WCS, WWF, SPCA, SACON, TNHS, local clubs and organizations play a substantial role in conveying the message of conservation to the public and enhances their responsible participation in nature conservation programme. Other institutions such as KFRI, College of Forestry, JNTBGRI, IFGTB, IISER etc. also plays a key role in the field of research, studies and conservation activities.

2.5 WATER SOURCES

Several small streams originate from the Park area which join together to form Vattavada Aar, which runs through the Vattavada valley, flows East through Kambakallu of Kurinjimala Sanctuary and drains into the Amaravathy Reservoir through Thalinji Aar. 7 Check Dams and 9 Water holes are also constructed for water conservation and ensure water availability for the wildlife throughout the year. The name and location of check dams and water holes is given in **Figure 2.6** and its seasonality is annexed in **Annexure 2.2.** The local inhabitants of nearby villages depend on Vattavada Aar for drinking as well as irrigation purposes.

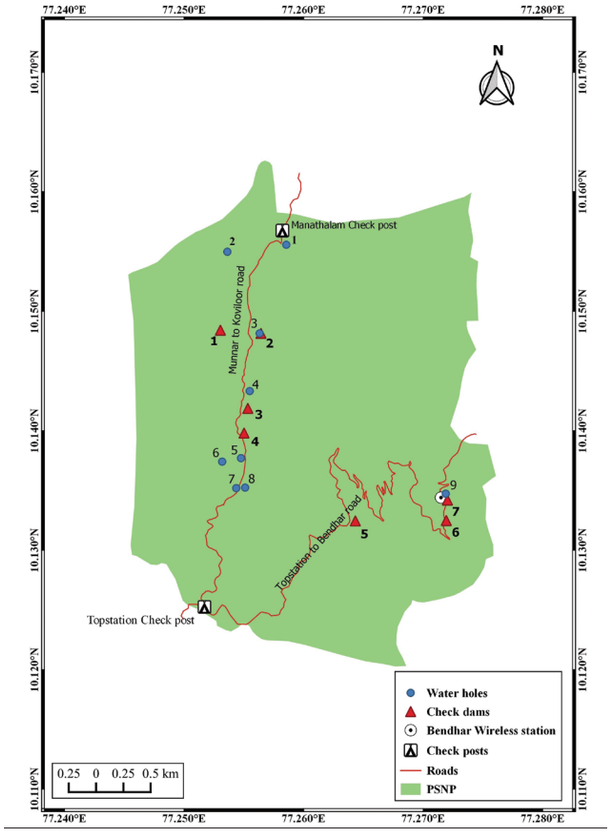


FIGURE 2.6: WATERHOLES AND CHECK DAMS IN PSNP

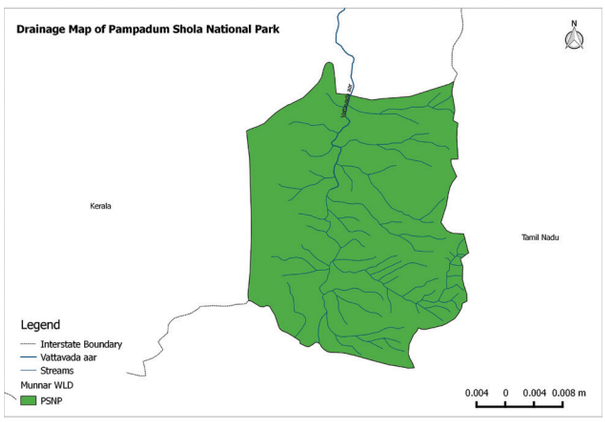
Water holes: 1. Manathalam, 2. Pattiyankal, 3. Putheri-1, 4. Plantation side, 5. Near R O Quarters, 6. NEC back side, 7. Pothinkandam left, 8. Pothinkandam right, 9. Bendhar.

Check dams: 1. Pattiyankal, 2. Pultheri-2, 3. Log house road, 4. Bison swamp, 5. Cement palam, 6&7 Bendhar-2 nos. (Near wireless station).

2.5.1 DRAINAGE

The Drainage map of the Park area is generated digitally by using SOI toposheets and Watershed atlas map of Kerala State Land Use Board and is given in **Figure: 2.7.** The water from the Park area is drained to Vattavada Aar, which flows towards the North and joins with Thalanji Aar which finally drains to Amaravathi Reservoir in Tamil Nadu.

FIGURE 2.7: DRAINAGE MAP OF PAMPADUM SHOLA NATIONAL PARK



2.6 RANGE OF WILDLIFE, STATUS, DISTRIBUTION AND HABITAT

The National Park encompasses different habitats for diverse flora and fauna. The most prominent classes include Angiosperms, Pteridophytes, Bryophytes, Lichens, Fungus, Mammals, Birds, Reptiles, Amphibians and a large number of Invertebrates. The presence of 351 species of plants, 31 species of Mammals, 114 species of Birds, 16 species of Reptiles, 17 species of Amphibians, 85 species of Butterflies, 20 species of Odonates and 16 species of Ants are recorded from the Park.

2.6.1 VEGETATION

Pampadum Shola National Park has Tropical Montane vegetation generally known as Shola forest. The term 'Shola' is a corrupt form of the Tamil word 'Colai' borrowed and incorporated into forest typology by Schimper (1903). In Tamil, the term ' Colai ' (Malayalam: Chola) refers to a cold place, a thicket, etc. The shola forests represent a continuation of the evergreen forests in response to the elevation gradient, the sequence being: Sub Tropical Hill Forests, Southern Montane Wet Temperate Forests and Grasslands. The Shola forests are of high ecological significance in protecting the water bodies originating which in turn offers sustainable water supply to the perennial rivers. They also help in retaining soil moisture and the release of rainwater. 'Shola forests' are tropical forest vegetation comprising Sub Tropical Hill Forests and the Montane Temperate Forests, generally present over 1,500 m from MSL. As per the Champion & Seth system of classification (1968), these two sub-types are belonging in group 8 and group 11 systems respectively. The value of the Shola forests in the context of biodiversity conservation hence demands serious attention.

2.6.1.1 THE BIO - GEOGRAPHIC CLASSIFICATION

The region lies in the bio - geographical zone of Western Ghats mountains (5b) (Rodgers et al., 2000) and belongs to the Eco-region of South Western Ghats Montane Forest. The Eastern side of the Park is lying in contiguity to Palani hills.

2.6.1.2 THE FOREST TYPES, COVER & FOOD FOR WILD ANIMALS

Roby and Sreenivasan (2019) conducted a rapid floristic exploration in PSNP and found 351 plant species belonging to Pteridophytes and Angiosperms. Angiosperms belong to 86 families and 213 genera, of these, 165 taxa (49%) are 'endemic'. The threatened category of plants (13%) includes, 5-Critically endangered, 11 Endangered, 21 Vulnerable. The most dominant tree species in this Shola are: *Cinnamomum perrotetti, Dysoxylum binectariferum, Gomphandra coriacea, Hydnocarpus alpina, Litsea udayanii, Mastixia arborea, Nostolachma crassifolia, Symplocos monantha, Syzygium sahyadricum* and *Turpinia cochinchinensis*. The shrubaceous layer comprises of *Andrographis affinis, Strobilanthes tristis* etc. Herbaceous layer mainly includes *Heracleum candolleanum, Vanasushava pedata, Arisaema leschenaultia, Arisaema psittacus, Arisaema sarracenioides* etc. Major woody climbers recorded from the Park are *Embelia ribes, Elaeagnus kologa, Gardneria ovata, Parthenocissus semicordata* var. *roylei* etc. List of Angiosperms recorded from PSNP is given as **Annexure 2.3.**

The Pteridophytes identified from the Park belongs to 13 families and 14 genera. *Pteris perrotteti* is

an endemic and Endangered fern present in the Park. Rare species such as *Asplenium zenkaranum, Crepidomanes bilabiatum, Cyathea crinita, Polystichum harpophyllum, Pteris argyraea* etc. are also present in the Park. Endemic and Endangered species like *Pteris perrotteti* and *Cyathea nilgirensis* are abundant in the evergreen patches of the forests. List of Pteridophytes recorded from the Park is given as **Annexure 2.4**. The major vegetation type is Southern Sub Tropical Hill Forests which merges with the Southern Montane Wet Temperate Forests (Champion and Seth, 1968) is seen towards the top. The highest peak of the Park is Vandaravu with an altitude of 2531m from MSL which is dominated by grass species and herbaceous plants. The major forest types found in the Park are:

1. SOUTHERN SUB TROPICAL HILL FORESTS (8A/C1)

Southern Sub Tropical Hill Forests is known as the transition belt of the Shola forest. Generally, the forest type is described as a 'stunted rain forest'.The vegetation is similar to Tropical Rain Forests, but not so luxurious. The trees are smaller and with less shapely boles, are often festooned with herbaceous and cryptogamic epiphytes. Strobilanthes spp. occurs as the undergrowth of the forest. Generally, they exhibit imperceptibly merged characteristics of tropical and temperate vegetation types, without any intervening zone differing from both (Champion and Seth, 1968).

FLORISTICS: -

I. *Syzygium densiflorum, Gomphandra coriacea, Turpinia cochinchinensis, Dysoxylum binectariferum, Gordonia obtuse, Hydnocarpus alpine, Cinnamomum perrotetti, Nostolachma crassifolia, Machilus macrantha, Canthium rheedei, Diospyros trichophylla, and Vernonia arborea,* etc.

II). Strobilanthes spp.

III). *Arisaema sarracenioides,* Impatiens spp.

2. SOUTHERN MONTANE WET TEMPERATE FORESTS (11 A/C1)

This forest type comprises of Southern Montane Wet Temperate Forest and Southern Montane Wet Temperate Grassland. Southern Montane Wet Temperate Forest is a closed forest patch with reduced tree height (12-15 m height) increased thickness of leaf, and complexity in a tree architecture. The other significant features are tree bark clothed with mosses and lichens, prolific growth of epiphytes and diversification among ferns. Besides, they possess a high level of endemism due to the restricted habitat.

FLORISTICS:-

I. *Mastixia arborea,* Ilex spp.*, Elaeocarpus recurvatus, Meliosma simplicifolia, Rhododendron arboreum* J. E. Smith ssp. *Nilagiricum, Daphniphyllum neilgherrense.*

II). *Vernonia anamallica, Vernonia bourneana, Vernonia fysonii,*

III). *Blumea oxyodonta,* Impatiens spp.

3. SOUTHERN MONTANE WET TEMPERATE GRASSLAND (11A/C1/DS2)

The grasslands cover the plateau and descending slopes. A total of 308 species were recorded from the grassland, out of which 51 are endemic to the Montane Grasslands of the Western Ghats. These high-altitude grasslands are dense in nature and consist of grasses, herbs and under shrubs. The dominant species of grasslands are *Chrysopogon zeylanicus, Arundinella fuscata, Dichanthium polyptychum, Eulalia pheothrix*, etc. The common non-grass species in the grasslands are Anaphallis sp., Swerita sp., *Hypericum mysurensis, Phlebophyllum kunthianum,* Eupatorium sp. Viola sp. and *Pteridium aquilinum*

The major grass species in the *grasslands are Andropogon lividus, Arundinella vaginata, Digitaria wallichiana, Arundinella mesophylla. Chrysopogon zeylanicus* and *Sehima nervosum* dominate the plateau and slopes. Unpalatable grass species *Cymbopogon flexousus* is also common. *Sehima nervosum* is more prevalent throughout the plateau. Moist valleys are characterized by Garnotia sps. Other dominant grasses are *Eulalia phaeothrix, Ropogon lividus, Arundinella purpurea, Agrostis peninsularis, Ichaemum indicum, Heteropogon* contortus and *Tripogon bromodies.*

The common herbs and shrubs in the grasslands include *Anaphalis lawii, A. bourneii, A. meeboldii, Swertia corymbosa, Polygala japonica, Curculigo orchiodies, Micromeria biflora, Bupeurum distichophyllum, Crotalaria fysonii, C. overlifolia, Ranunculus reniformis, Hydyotis swertiodes, Hedyotis swertiodes, Senciolavandlae folious, Parnassia mysorense, Pedicularis zeyalanica, Wahlenbergia gracilifolia, Impatiens pandata, I. modesta, Pheldophyllum kunthianum, Hypericum mysorense, Pteridium aquilinum, Ageratina Adenophora and Gaultheria sragrantissima* etc.

4. SOUTHERN MONTANE WET SHRUB (11A/C1/DS1)

Few scrub lands have been seen in open areas. This forest type is a degraded form of Southern Wet Temperate Forest. Generally, it's a low evergreen shrub of varying density often with bracken ferns and seedlings of stunted growth of Shola species.

5. PLANTATIONS

The Park is highly prone to invasive / exotic plantation of wattle, pine and eucalyptus. As per the previous Management Plan the Eco- Restoration Zone, plantations occupy an area 3.97 km^2,comprising of 165.77 ha (1.66 km^2) of eucalyptus, 214.35 ha (2.14 km^2) of wattle and 16.60 ha (0.17 km^2) of pine. The propagation of the invasive plantation of wattle poses a grave threat to the native habitats. The Moist tropical climate offers a conducive atmosphere for spreading the above species, by competing with indigenous vegetation, replaces grass communities, reduces native biodiversity and increases water loss from the area.

2.6.1.3 SPECIES & COMMUNITIES OF CONSERVATION IMPORTANCE; KEY AREAS

Several endangered species of fauna and flora are seen in the Park and require conservation measures for their long term survival and proliferation. The protection measures and conservation activities focus on the entire natural floral and faunal communities of the region with special emphasis on the removal of the invasive / exotic species.

2.6.2 ANIMALS & HABITATS

a) Mammals

The ecosystem of the Park offers a conducive habitat for small and large mammals. The list of Mammals recorded from the Park is given in **Annexure 2.5.** A total of 31 species of mammals belonging to 19 families were identified from Pampadum Shola National Park, of which 8 species are included in the order of Chiroptera. The biodiversity assessment of Chiroptera was done by Sreehari Raman in 2019. According to the IUCN Red List of the threatened species (IUCN, 2016), 10 species are included in Threatened category (Endangered–03 and Vulnerable–07) and 4 species are endemic to the Western Ghats. Out of the 31 species recorded from the Park area, 24 species are protected under the Wildlife (Protection) Act,1972.

b) Birds

Of the 231 species of birds recorded from Munnar Wildlife Division, a total of 114 birds are reported from the Park. The Park is a habitat of Endangered species like Rufous Babbler *(Argyas*

ubrufa), Vulnerable species like Nilgiri Pipit *(Anthus nilgiriensis)* and White Bellied Sholakili *(Sholicola albiventris),* Near Threatened species like Great Indian Hornbill *(Buceros bicornis),* Tytlers Leaf Warbler *(Phylloscopus tytleri)*, Nilgiri Fly Catcher *(Eumyias albicaudatus)* and Black and Orange Fly Catcher *(Phycedulla nigrorufa).* According to the Wildlife (Protection) Act ,1972, 13 species come under Schedule 1, 1 species under Schedule II, 90 under Schedule IV and 1 species under Schedule V. This includes 8 species endemic to the Western Ghats. In association with the Travancore Nature History Society (TNHS) Trivandrum, a series of scientific surveys were conducted by Munnar Wildlife Division and a final checklist of 114 birds is prepared. List of birds recorded from the Park is given in **Annexure 2.6.**

c) Reptiles and Amphibians

Diversity assessment of the Reptiles and Amphibians in the Park were conducted by Sandeep Das and Rajkumar in 2018 and reported a total of 16 species of Reptiles and 17 species of Amphibians. List of Reptiles and Amphibians recorded from the Park are given in **Annexure 2.7** and **Annexure 2.8** respectively. Amphibians recorded belonging to the order Anura under six families and Reptiles from the order Squamata under seven families. Among the Amphibians, majority of the species recorded are from the family Rhacophoridae (8 species), followed by Nyctibatrachidae (4 species).

Family Colubridae in Reptiles is the most represented (4 species) followed by the family of lizards Agamidae and Scincidae with 3 species each. 15 out of 17 Amphibian species recorded (93%) from the Park are endemic to the Western Ghats. Species including *Raorchestes dubois, Raorchestes chlorosomma, Raorchestes griet and Rhacophorus pseudo malabaricus* are under the Critically Endangered category of the IUCN Red List. Two species viz, Minervarya brevipalmata and Nyctibatrachus deccanensis are under Schedule IV of Wildlife (Protection) Act, 1972. Out of 16 species of Reptiles reported from the Park, 10 are endemic to Western Ghats. The species *Dravidogecko anamallensis, Ahaetulla dispar* and *Trimeresurus macrolepis* are included in the Near Threatened category of the IUCN Red List. Eight species of Reptiles (snakes) are protected under the Schedule IV category of the Wildlife (Protection) Act, 1972. Detailed and periodical surveys are required to prepare a comprehensive report and to document the species richness of the Park.

d) Butterflies

Systematic surveys were conducted by Munnar Wildlife Division, in association with Travancore Nature History Society (TNHS), Trivandrum since 2014, reported the presence of 85 species of Butterflies (Kalesh, 2019) in the Park. The survey checklist includes 6 species of Butterflies included in the IUCN Red List. The species *Parantica nilgiriensis* (Moore, 1877) Nilgiri Tiger is Near Threatened. The National Park has 8 species listed in the Schedules of the Wildlife (Protection) Act, 1972. *Pachliopta aristolochiae* (Fabricius, 1775). 5 species are listed under Schedule II and 2 species under Schedule IV. 12 species are endemic to the Western Ghats. A list of Butterflies recorded from the Park is given in **Annexure 2.9.**

e) Odonates

In association with the Travancore Nature History Society (TNHS) Trivandrum, a series of scientific surveys were conducted by Munnar Wildlife Division since 2016. As per the latest checklist, the total number of Odonate species found in the Park is 20 (Kalesh, 2019) and all of the above 20 species are included in the Red List of IUCN. Four species found in the Park, namely Coorg Bamboo Tail, Red Veined Darter, Davenport's False Spreadwing and Coorg

Torrent Hawk are endemic to the Western Ghats. A list of Odonates recorded from the Park is given in **Annexure 2.10.**

f) Ants

Ants survey was conducted in the Park during the year 2019-20. A total of 16 species belonging to five sub families were identified from this area. Among the species, most of them are represented in the sub family Formicinae (7 species), and the followings are in sub families of Myrmicinae (5 species), Dolichoderinae (2 species) and Ponerinae (2 species). A list of Ants recorded from the Park is given in **Annexure 2.11.**

2.6.2.1 VERTEBRATES - THEIR STATUS, DISTRIBUTION AND HABITATS; HABITAT QUALITY, QUANTITY AND KEY AREAS

The details of various categories of Vertebrates are given in **Annexure 2.5, Annexure 2.6, Annexure 2.7, and Annexure 2.8.** Since the Park is small in area, the resident population of these group is found less when compared with other Protected Areas. They are unevenly distributed across the Park and seen in different vegetation types. The Park acts as a connecting link between the Kannan Devan hills and the Palani hills and ensures the movement of wildlife between these two regions. The dominance of invasive species like wattle and eucalyptus poses a major threat to natural vegetation thereby substantially diminishing the availability of forage and adversely affecting the habitat of Vertebrates. The maintenance of the quality of the habitat free from the invasive plants and ensuring the sustainability of a healthy ecosystem is highly essential for the preservation of wildlife of the region. Eco-restoration programme focus on maintenance of habitat quality by removing exotic plants, planting of indigenous shola and grass species, preservation and development of waterholes, ensuring free movement of animals etc. are the main activities in this regard.

2.6.2.2 THE LIMITING FACTORS

The dry spell during the months of February-May and the very cold months of December-January limits the availability of food resources to a certain extent. However, the development of waterholes, maintenance of checkdams etc. are being done periodically to ensure continuous and sustainable water availability for wildlife.

2.6.2.3 IMPORTANT INVERTEBRATES, THEIR STATUS, DISTRIBUTION & HABITAT

Details of various categories of Invertebrates found in the Park are given in **Annexure 2.9, Annexure 2.10 and Annexure 2.11.** They are distributed across the Park and seen in different vegetation types. However, detailed surveys and studies are essential to have a comprehensive report on the species of Invertebrates, their distribution and habitat.

CHAPTER 3

History of Management and Present Practices

3.1 GENERAL

The forest area of Pampadum Shola was under the erstwhile Travancore Rajas before the advent of the British rule. In alignment with the colonial forest management policies, a detailed Forest Act was passed in 1893 and rules and regulations were framed by the Travancore Kingdom based on the Act. In 1896, the Forest Department was totally re-organised on the lines of the British Forest Administration and the forest area was divided into Divisions and Ranges. As the colonial forest policy greatly understood and appreciated the values of forests, Pampadum Shola area was notified as a Reserve Forest in 1901 and published in the Travancore Gazette. Being Shola forests, these areas were managed under the Protection Working Circle. They were managed for the purpose of conservation of water sources. Subsequently, these Sholas came under the jurisdiction of the Anjanad Range of High Range Division for a brief period.In 1946 they were made part of Muvattupuzha Division and in 1950 Muvattupuzha Division was amalgamated with Malayattoor Division. The Working plan of Malayattoor Forest Division for the period 1951-52 to 1966-67 was prepared by Sri. T.P Viswanathan. The Working Plan had placed the Shola under the Protection Working Circle. In 1963 the Shola Reserve became part of the Marayoor Range of the newly formed Munnar Forest Division. Most of the grasslands were converted to plantations of black wattle and eucalyptus during 1970s and 80s. During 80s and 90s, most of the lands in the Vattavada valley belonging to the local inhabitants were purchased by outsiders and these absentee landlords started large scale planting of eucalyptus which ultimately led to a situation of acute water scarcity in this relatively low rainfall area. The importance of the perennial water flow from the Pampadum Shola has to be viewed against this scenario.

The only public rights admitted were the right of way to the erstwhile Madras State, right of water and the right of cutting small timber for agricultural purposes. The road from Munnar to Kodaikanal which traverses a distance of 8.5 km through the Park was constructed by the British planters towards the end of the Second World War as an evacuation route from Madras Presidency to Cochin State on the apprehension of Japanese invasion. Later the Munnar to Kodaikanal road was blocked at the State border at Bendhar by Tamil Nadu Forest Department and is at present used only for protection purposes. Consequent to the tourism boom in Munnar during 1990s the other road namely Munnar-Koviloor road was upgraded and developed into a Highway. Planting and removal of wattle and eucalyptus were stopped after the declaration of the Reserve Forest as National Park. Identifying the ecological importance of this area the Kerala Government declared Pampadum Shola as National Park in December 2003 as per the **Notification No. 12875/F2/2003/F&WLD dated 14/12/2003.**

3.2 TIMBER OPERATIONS INCLUDING BAMBOO AND FIRE WOOD COLLECTION AND HARVESTING.

Pampadam Shola was declared as a National Park in 2003 and since then no timber operation of any sort has been carried out in these areas. Permission is being granted to the local communities for the collection of the invasive / exotic species such as wattle and eucalyptus as firewood.

3.2.1 SILVICULTURAL SYSTEMS AND TENDING OPERATIONS

No silvicultural system / tending operations were carried out in the Park after the declaration of National Park.

3.2.2 EVEN AGED SYSTEMS AND UNEVEN AGED SYSTEMS

Before the declaration of National Park, the area was administered by Munnar Territorial Division and subsequently by Marayoor Sandal Division. The exotic plantations present in the area were clear felled on attaining rotation. After the declaration of National Park no silviculture system were practiced.

3.2.3 FIREWOOD HARVEST AND COLLECTION

The inhabitants of the fringe area depend upon the Park to meet their requirement for fire wood. Permission is granted to collect dried twigs and branches of wattle and eucalyptus trees from the buffer area for their bonafide use. An average of 720 head loads of fire woods are collected by the fringe area inhabitants in a year.

3.3 NON-WOOD FOREST PRODUCT (NWFP) COLLECTION

The forest dependent tribals from Swamiyaralakudi, Valsapettykudi and Koodallarkudi of Anamudi Shola region, adjacent to the Park, are permitted to collect the NWFP from the area. Wild honey is the only NWFP collected from the permitted areas of the Park under the supervision of staff. NWFP collected by the tribes was marketed through local vendors in the previous years. From 2017, the Watchers EDC functioning in the Park is purchasing honey from tribes and selling it through the Top Station Eco-shop.

TABLE 3.1: LIST OF NWFP COLLECTED FROM THE PA

Sl. No.	Items	Quantity
1	Wild honey	42 Kg / annum

3.4 LEASES

There are no existing leases over the Park area.

3.5 OTHER PROGRAMME AND ACTIVITIES

There is an ongoing eco-tourism programme being implemented with the participation of forest-dependent local people. The eco-tourism activities are carried out by Eco-Development Committee (EDC) called Pampadum Shola Watchers EDC. Eco-restoration activities are also being implemented in the Park.

3.6 PROTECTION

3.6.1 LEGAL STATUS

The Pampadum Shola was notified as Reserve Forest in 1901. It was declared as a National Park as per **Notification No. 12875/ F2 / 2003/ F&WLD dated 14.12.2003.**

3.6.2 HUNTING

There is no history of game hunting in the Shola reserve. The area was formerly managed under the Protection Working Circle of the Malayattoor Forest and Munnar Forest Division. From the year 2006 onwards, the Park is under the jurisdiction of Munnar Wildlife Division. Even though there are human habitation along the outskirts, regular patrolling, perambulations, interior camping, frequent raids etc. by the department in potential areas helps to keep hunting, poaching etc. under check.

3.6.3 ILLEGAL ACTIVITIES

Instances of illegal activities common in the area were illegal entry to the forest area, collection of fire wood, cattle grazing etc. Intensive regular patrolling, perambulation, interior camping, and participatory forest management programme play an integral role in the suppression of illegal activities. Already an internal secret data system for offenders is there in place in the PA. This will be followed in this plan period also.

3.6.3.1 POACHING

Over the last 10 years, no cases were registered for poaching.

3.6.3.2 ILLEGAL CUTTING OF TREES

During the past ten years, only one case was registered for the illicit felling of trees from the Pampadum Shola National Park. List of cases registered in the last 10 years is given as **Table 3.2.**

TABLE 3.2`: DETAILS OF OFFENCE REGISTERED FOR THE LAST 10 YEARS

Sl. No.	PAs	Year	Type of offence	Status	Case No.
1	PSNP	2018	Illicit felling	Charged	OR-01/2018
2	PSNP	2020	Road Kill	Pending in Range	OR-01/2020

Details of cases booked from nearby ranges of Devikulam and Kanthaloor during 2013 to 2020 is given in the Table 3.3. A total of 333 cases were booked in Devikulam Range and 124 cases in Kanthaloor through these years while only two cases was booked in PSNP. This shows the protection efficiency of the PA.

TABLE 3.3: NUMBER OF CASES BOOKED IN NEARBY RANGES OF THE PA

		NUMBER OF CASES BOOKED IN		
SL. NO.	YEAR	PSNP	DEVIKULAM RANGE	KANTHALOOR RANGE
1	2013	Nil	58	10
2	2014	Nil	50	22
3	2015	Nil	39	21
4	2016	Nil	33	11
5	2017	Nil	43	20
6	2018	1	35	19
7	2019	Nil	39	14
8	2020	1	36	7
	Total	2	333	124

3.6.3.3 ILLEGAL REMOVAL OF NWFP, ENCROACHMENT AND OTHER ILLEGAL ACTIVITIES

a) NWFP

During the past ten years no cases of illegal removal of NWFP was reported from the National Park.

b) Encroachment

No cases of encroachment of forest were reported in the National Park area during the past ten years.

C) GANJA CULTIVATION

No ganja cultivation had been reported from the Park in the past ten years. The Park shares its Eastern and Southern boundaries with Tamil Nadu and hence highly prone to illegal activities such as ganja cultivation. The climate and terrain have the scope for ganja cultivation, but regular monitoring, interior camping and raids in the area helps to prevent all kinds of illegal activities in the Park.

3.6.4 LIVESTOCK GRAZING

No instances of livestock grazing were reported from the National Park during the past ten years.

3.6.5 WILD FIRES

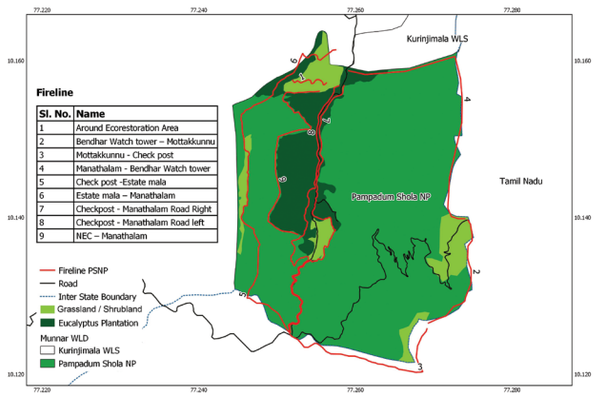
Only a single instance of forest fire was reported from the Park in the past ten years. 23 ha of black wattle plantation of Pattiyankal area were destroyed in a fire incident in 2015. Eleven firelines having a length of 98 km are maintained annually to protect the Park from fire incidents. Details of firelines maintained in the Park is given in **Table 3.4 & Figure 3.1**

TABLE 3. 4 : DETAILS OF FIRELINES

Sl. No.	Name of Firelines	Distance (Km)
1	Manathalam - Bendhar Watch tower	4.50
2	Bendhar Watch tower -Mottakkunnu	2.50
3	Mottakkunnu - Check post	3.00
4	Check post -Estate mala	2.00
5	Estate mala -Manathalam	4.00
6	Checkpost - Manathalam Road (Both side)	10.00
7	NEC -Manathalam	4.00
8	Around eco-restoration area	3.00
	Total	**33.00**

The fireline maintenance is being carried out depending on the allocation of fund. Fire camps are established in fire prone areas of Bendhar and Pattiyankal during the fire season. Participatory fire management activities are being done with the involvement of local communities from Vattavada, Koviloor and Oorkadu. During the fire season, a firefighting unit is functional with essential infrastructure like blower, chain saw, power sprayer, beater etc. Periodical fire awareness programme and training are being conducted for staff and local inhabitants in the fringe areas of the Park.

FIGURE 3. 1: MAP OF FIRELINES



3.6.6 INSECT ATTACK AND PATHOGEN PROBLEM

No instances of insect attack or pathogen problems were reported from the National Park in the past ten years. Drying of leaves of some Shola species like *Litsea wightiana, Mastixia arboria* etc. is noticed in the winter months due to cold stress. No studies were carried out so far on the role of pathogens or insects in the degradation of forest type in the Park.

3.6.7 WILDLIFE HEALTH

Periodic vaccination programme to the livestock in the human settlements in fringe areas of the Park is being undertaken with the help of line departments, to prevent the spread of diseases to the wildlife. The transportation of livestock through Munnar - Koviloor road is permitted only with the health certificate issued by the Veterinary doctor. No instances of the outbreak of diseases were reported from the Park in the last ten years. Regular immunization programme for livestock in the fringe areas were carried out to prevent the transmission of diseases to wildlife.

3.6.8 INTER AGENCY PROGRAMME AND PROBLEMS

As there are no settlements inside the Park other agencies are not operating inside. The Munnar - Kovilloor road that passes through the Park is maintained by PWD and is under the full control of Forest Department. Soil moisture conservation activity like establishing earthen check dam by laying geo- synthetic clay liner with the help of Soil Conservation Department and Horticulture Mission was done during the previous plan period.

3.7 TOURISM & CONSERVATION EDUCATION

a) Tourism

Accommodation, guided trekking and nature education programme were offered to the visitors of the National Park. Accommodation facilities for tourists were offered in two log houses, a mud house, dormitory and amenity centre. Advance bookings and permissions through online website of Munnar Wildlife Division and offline booking at Information Centre attached to the Office of Wildlife Warden, Munnar were also made available. An ethnic cafeteria and eco-shop are functioning at the Top Station check post. All the eco-tourism activities of the Park are carried out through the Pampadum Shola Watchers EDC. The accommodation facilities available are given in **Figure 3.2.**

FIGURE 3.2: ACCOMMODATION FACILITIES AND TREKKING

Log House

Mud House

Amenity Centre

Trekking Programme

A well-organised guided trekking programme is offered to the tourists and visitors. The 3.5 km trekking track starts from the Top Station check post and ends at nature education centre. Presently there is no proper waste Management Plan for the PA. All the garbage including plastics was collected with the help of EDC members in poly bags and dumped in the panchayath dumping yard.

The rates of accommodation and trekking are revised in the FDA General Body from time to time. An average of 2973 tourists visited the National Park every year from 2014 to 2017. But there was a steady decline in the revenue in 2018-19, 2019-20 due to the heavy damage caused to the roads of Idukki District during 2018, 2019 floods & rains and in the wake of Covid 19 pandemic in 2020. Peak season is from October to February and the Park will be closed in the wake of disasters, epidemics and fire incidents, in compliance with the rules and regulations issued by the Disaster Management Authority and the Government. The details of visitors and revenue generated from eco-tourism from 2014-15 to 2019-20 is given in **Table 3.5**

TABLE 3.5: DETAILS OF VISITORS AND REVENUE FOR THE LAST FIVE YEAR

Year	PSNP			Govt. Revenue (Rs.)	Income (AFDA) (Rs.)
	Indian	Foreigner	Total		
2014-15	2928	102	3030	99474	1067162
2015-16	3080	108	3188	104860	1178083
2016-17	2473	230	2703	135425	1287352
2017-18	1690	147	1837	260844	1646017
2018-19	1882	203	2085	101820	1574175
2019-20	1967	98	2065	384252	2536626

b) Conservation Education

The Park has all the basic facilities for conducting conservation education, that includes two dormitories with 20 person capacities, nature education centre and a mess hall. During the previous plan period as part of conservation education, the Park organise nature camps for school students, college students, non-governmental youth organisations, media persons and elected members.

During the previous plan period the Park provided two days camp for lower primary and upper primary students and three days camp for other groups. The maximum strength of the camp is forty. The Wildlife Warden, Munnar is the authorised officer for granting permissions for Nature camps for the school students and college students. For all other categories, the competent authority for granting permission is the Chief Wildlife Warden. 80% of the beneficiaries of nature camps were students from Idukki District. Paid nature camps were also conducted upon request of Associations, Clubs and various other bodies involved in the field of nature conservation. The participants were given sessions on conservation of forests and its importance in the present scenario, the importance of grassland shola ecosystem, the negative impact of exotic plantations, the need for conserving forest for water, forest flora, fauna, wildlife management, restoration programme, protection strategies etc. Opportunity for trekking, interaction with experts, participation in the Eco-restoration activities etc. were also offered to participants.

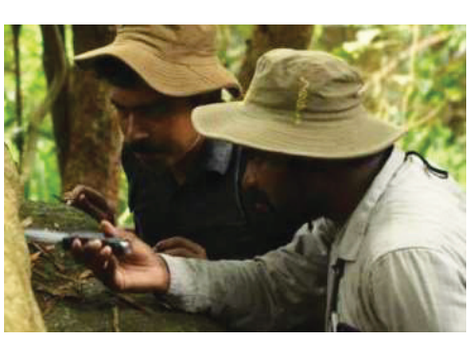
3.8. RESEARCH, MONITORING AND TRAINING

3.8.1. Research and Monitoring

The camera trap exercise conducted in 2019, identified the presence of 23 species of Mammals in the Park including tiger, Leopard, Wild Dog, Nilgiri Marten, Brown Palm Civet, Brown Mongoose, Stripe-necked Mongoose, Elephant, Gaur, Sambar, Barking Deer, Mouse Deer etc. Chiropteran biodiversity assessment was done in the year 2019 and identified 8 species of bats in the Park. In collaboration with the Travancore Nature History Society (TNHS) periodical surveys of Birds, Butterflies and Odonate biodiversity assessment were being conducted since 2016. Various surveys and studies recorded 114 species of Birds, 16 species of Reptiles, 17 species of Amphibians, 85 species of Butterflies and 20 species of Odonates. Assessment of the diversity of Ants was also assessed in the 2019-2020 period and identified 16 species of Ants from the National Park. A rapid flora exploration was conducted and identified 351 species of plants from the Park. All India tiger census was carried out in the Park in 2010, 2014, 2018 and all India Elephant census was done in 2012, 2017. Photographs of various studies / assessments / surveys carried out in the Park are given in **Figure 3.3.**

Scientific Research Organisations and institutions are conducting various research programme in the Park. Kerala Forest Research Institute - Peechi, Malabar Botanical Garden - Calicut, Jawaharlal Nehru Tropical Botanical Garden and Research Institute - Palode, Mahathma Gandhi University - Kottayam, University of Calicut - Thenhipalam and College of Forestry-Vellanikara are the major institutions conducting research in Pampadum Shola National Park. Details of the research works conducted by various institutions in the Park are given in **Annexure - 3.4.**

FIGURE 3.3: PHOTOGRAPHS OF BIODIVERSITY ASSESSMENT



Ant Biodiversity Assessment

Bat Biodiversity Assessment

3.8.2 TRAINING

Various training, awareness programme and capacity building programme were organised for the staff and local people periodically from time to time. These include awareness on forest fire, fire fighting techniques, bio diversity assessment, wildlife management, disaster mitigation, habitat improvement, sustainable management of the ecosystem, soil and moisture conservation, first aid, etc.

3.9. ECOSYSTEMS, HABITATS AND WILDLIFE CONSERVATION STRATEGIES AND THEIR EVALUATION

The strategy of conservation is primarily focused on the protection of Shola habitat and other native species. Rampant spreading of invasive / exotic plantations and fire are the major threats to conservation and habitat maintenance of the Park. Hence conservation strategies give major thrust to Eco-restoration activities including exotic removal, soil moisture conservation, fire prevention and nature education. As part of habitat / species monitoring, studies like mapping of vegetation, wildlife health monitoring, documentation of flora and fauna including RET and endemics, population monitoring of selected flora and fauna, mapping of water sources, drainage map, monitoring of burned areas, etc. were undertaken periodically. As part of habitat management, eradication of exotic species, restoration of the eradicated area, gully plugging and desilting of water holes etc. are being done on an ongoing basis. A wattle eradication and restoration programme was already started during the previous plan period itself. An extent of 12 Ha of fire burnt area in Pattiyankal was selected for eco-restoration. In the restoration area, felled / burnt logs were aligned in the contour. Regenerated wattle seedlings are continuously being removed and the area is planted with local grass species and other indigenous species.

Based on the recent study by Arsumani *et.al,* 2021 Grasslands suitable for restoration are classified into four major categories

Category-1. Lightly invaded Grasslands (LIG). These are large Grasslands that have young (small) invasive trees. This area is where these invasive exotic trees are moving into the Grasslands (height approximately 1m-3m).

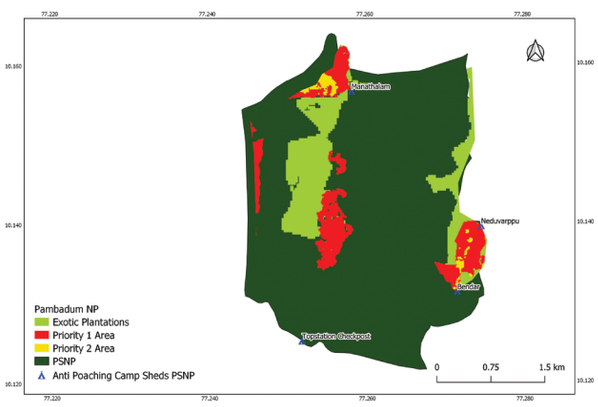
Category -2: Sparse mature exotic trees stands with grass cover (SMG). In some areas grass persist underneath large, but sparse mature exotic trees stands. These areas are also suited for starting restoration initiatives than areas devoid of natural grasss.

Category-3. Isolated exotic trees and sparse saplings in the grasslands (ITG). Isolated but matured exotic trees with isolated exotic saplings in the grasslands.

Categoey-4: Fragmented grasslands enveloped by mature exotics. (GET) These are some small Grassland patches, that have been enveloped by exotic trees usually seen in marshes, on hillocks and near streams which had not yet been invaded. These small grasslands also should be of high priority for restoration.

As a comprehensive approach towards restoration, the category one (LIG) and four (GET) are placed under priority one, where with minimum investment and efforts, we can achieve restoration of large areas. Young saplings are easy to remove and this can be achieved with minimum resources.

FIGURE 3.4: MAP SHOWING ECO-RESTORATION PRIORITY AREAS



Priority included category 2 (SMG) and category three (ITG), where matured trees stand with some grass cover underneath and invaded areas with isolated matured exotic trees with isolated young saplings which do not require the large invest compared to starting a restoration programme in a vast matured invasive plants. In PSNP both priority 1 and priority 2 area exists and these areas are shown in the **figure 3.2**

The fire protection camps were established and firelines were cleared by the department in fire prone areas of the protected zone before the dry season. Controlled burning and such appropriate measures were carried out around plantations and fire gangs were engaged in sensitive places. Fire awareness campaigns were organized and necessary firefighting equipment were made available to manage exigencies. Fire control rooms and special fire response team constituted at the Division and Range Level are functional during fire seasons.

Periodical surveys and studies facilitating the conservation of flora and fauna were conducted and based on the reports appropriate interventions are being implemented from time to time. Lists of studies conducted by various institutions are given in **Annexure 3.4.** Annual maintenance of trek paths was being done as per the guidelines issued at various points. Wildlife safety boards and speed breakers were erected at areas of wildlife movement to facilitate the safe movement of wildlife.

As part of conservation education, the National Park organise nature camps for school students, college students, non-governmental youth organisations, media persons and elected members. The details are given in the conservation education part. The participants are given sessions on forest flora, fauna, forest conservation, wildlife management, restoration programme, protection strategies etc. Opportunity for trekking, interaction with experts, participation in the eco-restoration activities etc, are offered to the participants. Photographs of nature education camps conducted in the Park is shown in **Figure 3.5**

FIGURE 3.5: NATURE CAMP IN PSNP

3.10 ADMINISTRATIVE SET UP

Shola National Parks Range is one of the administrative units under the Wildlife Warden, Munnar Wildlife Division. Pampadum Shola National Park is one of the administrative units under the Assistant Wildlife Warden, Shola National Parks. There is no separate man power for the Park. A Section Forest Officer, 4 Beat Forest Officers and a tribal watcher are deputed for the management of the National Park from Kadavari Forest Station. The details of the staff deployed are given in **Table 3.6.**

TABLE 3.6: STAFF DETAILS OF PSNP

Sl No.	Category	Present staff strength
1	Assistant Wildlife Warden	1
2	Section Forest Officer	1
3	Beat Forest Officer	4
4	Tribal Forest Watcher	1

A) EXISTING ANTI-POACHING CAMP SHEDS

There are two anti-poaching camp sheds at Bendhar and Manathalam. These are used for camping by staff and watchers during their perambulation. Locations of the existing anti-poaching camp sheds are shown in **Figure 3.6.**

FIGURE 3.6: EXISTING ANTI-POACHING CAMP SHEDS

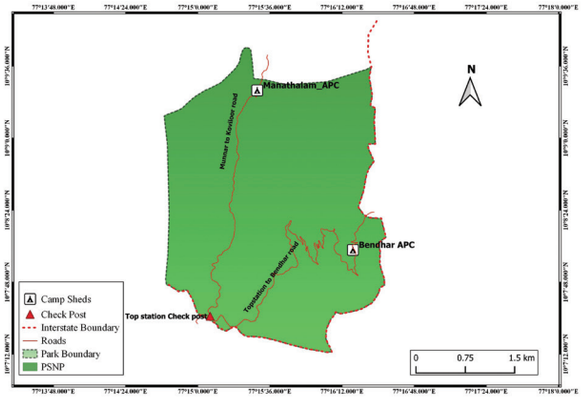
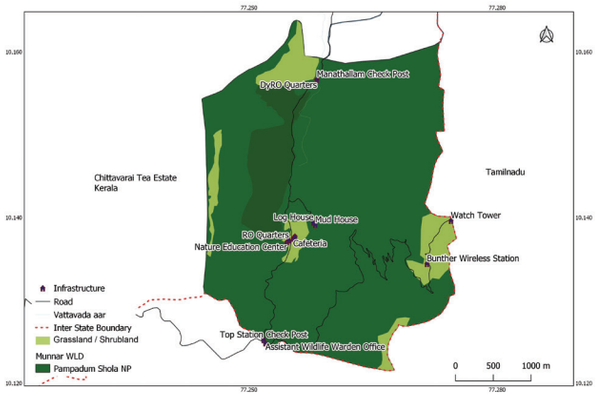


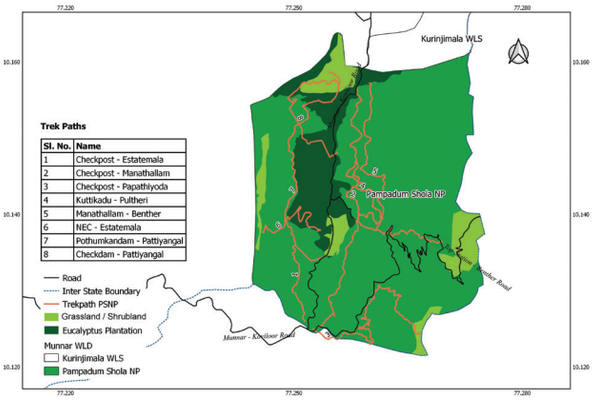
FIGURE 3.7: MAP OF THE BUILDINGS IN PAMPADUM SHOLA NATIONAL PARK



B) EXISTING BUILDINGS

The existing buildings in the Park include Office of the Assistant Wildlife Warden, Check post and Eco-shop building at Top Station check post and nature education centre, dormitories, staff quarters, amenity centre etc, at Bison swamp area. Two log houses and one mud house are there above to Bison swamp area. Location of these buildings is given in **Figure 3.7.**

C) TREK PATHS: FIGURE 3.8: MAP OF TREK PATHS AND ROADS



A total length of 37.00 Kms of trek paths was developed in the Park during the previous plan period. Details of existing trek paths are shown in **Table 3.7 & Figure 3.8.** These trek paths are used for perambulation purposes, patrolling and other protection purposes.

TABLE 3.7: TREK PATHS IN PSNP

Sl. No.	Name of Trek Paths	Distance (Km)
1	Checkpost - Manathalam	6.00
2	Pothumkandam - Pattiyankal	4.50
3	Checkpost - Estate mala	2.00
4	NEC - Estate mala	2.50
5	Check dam - Pattiyankal	3.00
6	Manathalam - Bendhar	6.00
7	Kuttikadu - Pultheri	4.00
8	Checkpost –Papathioda-Bendhar Mottakkunnu	7.00
	Total	35.00

3.11 COMMUNICATION

The Park lies 37 kms away from Munnar town. Telephone and mobile networks are not available in Pampadum Shola area. The only existing communication facility as on the date in the Park is wireless, which is fixed in the Top Station check post and Bendhar wireless station. Walkie-talkies are provided to the field staff for patrolling purposes. The office of the Wildlife Warden, Munnar is well connected with various modes of communication such as telephone, wireless sets, mobile phones, internet facility etc.

3.12 SUMMARY OF THREATS

a. **Exotic and Invasive species:** The presence of black wattle and eucalyptus plantations and their invasion into the natural vegetation is one of the top threats to the biodiversity of the Park. Exotic plantations occupy an area 3.97 km^2, comprising of 165.77 ha (1.66 km^2) of eucalyptus, 214.35 ha (2.14 km^2) of wattle and 16.60 ha (0.17 km^2) of pine. The invasion of exotic species like Eupatorium, Solanum, Lantana and Asclepias etc. and the rampant growth of seedlings of black wattle have an adverse impact on the native flora and fauna directly and indirectly. The extent of invasion of weeds in the Park is not mapped yet.

b. **Forest Fire:** One of the major potential threats to the National Park is forest fire. eucalyptus and black wattle plantation in the interstate boundary and the boundaries near to human settlements of Vattavada and Koviloor are potentially fire prone areas. These plantations are highly susceptible to fire. Control and management of fire in the hilly terrain, lying contiguous to other forests on all the boundaries are very hard therefore the fire prevention is one of the top priority areas.

c. **Ganja cultivation:** The hills and mountains of the district provide a fertile ground for cannabis cultivation, and it has seeped as a tradition of the region. On account of stringent protection measures, no instances of ganja cultivation were reported from the Park in the past ten years. Persistent problems in the economic viability of traditional agriculture and horticulture, ideal climate, soil and other conditions, motivation from illicit traders, interested groups etc. potentially serve as catalysts for ganja cultivation in the area. A high level of vigilance is essential to keep the potentially illegal activities under check.

d. **NWFP collection:** Wild honey is the only Non Wood Forest Produce collected from the Park area. Tribes of Anamudi Shola National Park are collecting honey and marketing is done by the EDC through Eco-shop. The unscientific collection practice of wild honey, if not regulated appropriately, is likely to be a threat.

e. **Illicit felling and removal of firewood:** The majority of families in the fringe area are depending on firewood for the purpose of domestic fuel. Twigs and branches of wattle and eucalyptus are used as firewood. Since the eradication of the above species is one of the main modes of interventions for eco-restoration of the area, the eradicated materials lying in the field is collected by the locals as firewood for their bonafide purpose. The collection of firewood is not a serious issue or threat in the present scenario.

f. **Encroachment:** 90% of the Park boundary is consolidated during the previous plan period and there are no encroachments at present.

g. **Poachers and smugglers:** This problem is not a matter of serious concern for this National Park in the present scenario.

h. **Human–animal conflict:** The local communities inhabiting in the fringe areas mainly depend on agriculture and horticulture for their livelihood. Cultivation of winter vegetables and fruits attracts wildlife to fringe areas thereby inviting the chances of human wildlife conflict. The elephants, wild boar, bonnet macaque and sambar deer are the most common animals involved in the human-animal conflict.

i. **Feral dogs:** The presence of feral dogs in the fringes of the Park is a threat to wildlife especially mammals.

j. **Wildlife diseases:** Chances for a disease outbreak in the Park require close monitoring and surveillance due to the presence of domesticated animals in human settlements in the fringe areas.

k. **Inadequate staff:** One of the major constraints in the management of the Park is inadequate man power. Manpower is deployed at present for protection, supervising developmental activities, visitor management and monitoring. The absence of specific manpower for protection activities is likely to result in shifting of responsibility, non accountability etc.

CHAPTER 4

The Protected Area and the Interface Land Use Situation

4.1 THE EXISTING SITUATION IN THE ZONE OF INFLUENCE

Vattavada, Koviloor and Oorkadu are the three villages locating adjacent to Pampadum Shola National Park. These villagers are basically Tamil speaking people and their main sources of livelihood are agriculture, horticulture and allied activities. Winter vegetables like cabbage, carrot, beans, potatoes and fruits like passion fruit, strawberry, plum etc. are cultivated in the fringe villages of the Park. These inhabitants primarily depend on the National Park for water. Some of the villagers are engaged as daily waged mazdoors in the protection and tourism activities of the National Park. Pampadum Shola Watchers EDC is the only one Eco-Development Committee now functioning in the Park which comprises of people from these villages.

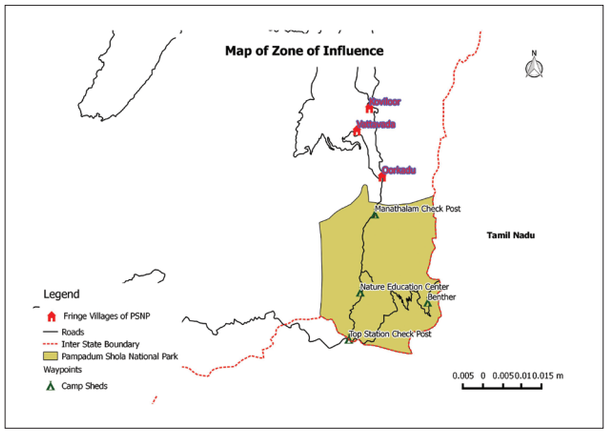
4.1.1 THE LOCATION, EXTENT, BOUNDARIES AND NATURAL ATTRIBUTES OF THE ZONE OF INFLUENCE.

Vattavada, Koviloor and Oorakadu are the three villages located adjacent to the Northern boundary of the National Park. These villages are located within 2.5 km from the boundary. Munnar-Koviloor road passing through the National Park is the only road for the villagers for access to the outside. The land use pattern is mainly for agriculture, horticulture and allied activities and their agricultural lands are located in the fringes of the National Park. The Zone of Influence is shown in Figure 4.1.

4.1.2 VILLAGES INSIDE AND OUTSIDE THE PARK, ETHNIC IDENTITIES, TRADITIONS, CUSTOMS, RELATIONSHIPS BETWEEN DISTINCT GROUP OF PEOPLE, RELATIONSHIP WITH RESOURCES, HABITATS AND AREA

The inhabitants of Vattavada, Koviloor and Oorkadu are mainly migrants from plains of Tamil Nadu who sought refuge in the mountains in search of better livelihood opportunities. Agriculture, horticulture and allied activities are the main sources of livelihood for the inhabitants of the villages. A major portion of the land area is occupied by the villages in two transecting mountain ranges and between these lies a vast central valley. Cultivation is being done on the stable terraced fields made all along the slopes of hills. Major crops include cereals viz. rice, wheat and finger millet, vegetables viz. cabbage, carrot, peas, beans, garlic and potato. These villages are geographically isolated from the rest of the State. On account of the geographical location, transportation, communication, education and health facilities are limited in these villages.

FIGURE 4.1: MAP OF ZONE OF INFLUENCE



4.1.3 THE STATE OF PEOPLE'S ECONOMY: VOCATIONS, LAND USE, USE OF FOREST AND NON-FOREST BASED NATURAL RESOURCES BY THE PEOPLE AND SEASONAL PATTERN.

Most of the families living in the fringe villages are socio-economically backward BPL families. People of Koviloor, Vattavada and Oorkadu live mostly in hamlets consisting of clusters of small houses. Most of the houses are small, constructed in the traditional ways using locally available clay, mortar, cement and other materials and roof with tiles, asbestos or tin roof sheets. These villagers, mainly the adult population are educationally backward. Women in these villages contribute mainly to livelihood activities and farming, but do not enjoy

economic independence. They contribute a significant portion to the labour force and are increasingly joining the labour market. Women and adolescent girls are engaged in high intensity to work either outside or home-based. Some women experience a shift in the occupational pattern after marriage and child birth, by completely transitioning out of work arena, while others remain double-burdened with active involvement in both work and family responsibilities. The villagers are mainly practicing contour cultivation with a seasonal rotation of crops. Farming and households depend solely on forests for water. The villagers are collecting the dried twigs and branches of eucalyptus and black wattle from the eco-restoration areas of the Park for their bonafide use. Wild Honey is the only NWFP collected from the Park which is collected seasonally from the selected areas by the tribes of Anamudi Shola National Park.

4.1.4 IMPLICATIONS OF LAND USE AND RESOURCES DEPENDENCY FOR THE CONSERVATION OF PA

Land use changes in Western Ghats over the last century caused by agriculture expansion, conversion to plantations and infrastructural projects have resulted in loss of forest and grassland (Kumar 1993, Jha et al 2000, Khan et al., 1997). Considerable areas of forest have been converted to plantations in the Western Ghats, particularly of tea, coffee, and eucalyptus and different species of Acacia. The area under plantations is large and growing. Tea plantations in the South Indian states increased by 17.7% in the period 1987-1998 from 74,765 ha to 87,993 ha (Tea Board 2002). Large areas of eucalyptus and acacia plantations also occur with tea as it is used as fuel wood for tea-curing in the factories. Extensive eucalyptus plantations have also been established by large tea companies and private farmers. The eucalyptus plantations raised and managed by corporate tea companies are used exclusively for the fuel requirements of tea factories and labour lanes. There is also a recent tendency to convert the vegetable farms to eucalyptus plantations which leads to disruption of local livelihoods, cultural drift, impoverishment of communities as well as ecosystem malfunctioning. Hindustan Newsprint Ltd. (HNL) and KFDC have also established short rotation eucalyptus plantations for industrial raw materials requirements on land taken on concessions from the forest department. The private eucalyptus plantations in the high altitude but low rainfall areas of Vattavada and Kanthalloor are reportedly causing acute water shortage in the valley bottoms.

Although tea gardens (14,000 ha) occupy one of the major cash crops in the landscape it retain several interspersed forest fragments (largely shola) in varying size that act as corridor or sheltered habitat for many floral as well as faunal components of the biological diversity especially the lower groups of the landscape. The management input in the tea garden also makes negative impact to the biological richness of the area.

There are no human settlements inside the Park and therefore there is no scope for use of forest land for other purposes. The villagers in the fringe areas are depending on forest for firewood, water etc. The tribes of Anamudi Shola National Park are collecting wild honey from the Park area. Collection of firewood at present is not adversely affecting the conservation of the Park, but it helps in the removal of biomass accumulation of invasive species which may cause forest fire in the dry season. The presence of eucalyptus plantations in private land in the fringes increases the likelihood of spreading fire to the Park.

4.1.5 PA MANAGEMENT PRACTICES AND THEIR IMPLICATIONS FOR PEOPLE

PA management programme and eco-tourism activities are giving alternate employment opportunities for local communities thereby improving the standard of living of the families. An Eco-Development Committee is presently functioning in PSNP known as Pampadum Shola Watchers

EDC. Forest department deploys them in Park management activities including visitor management, fire management and forest protection. Anamudi Forest Development Agency (AFDA) allocates Community Development Fund (CDF) to the Watchers EDC annually, for the developmental activities of the villagers and these activities have been monitored and controlled by EDC. Firewood collection is permitted from the Eco-restoration zone by the indigenous people for their bonafide use. Crop damage by the wild animals is reported from the surrounding villages. Crops along the fringe areas attract the wild animals especially wild boar and appropriate compensation for crop damage is given as per the standardised procedure followed by the department.

4.2 DEVELOPMENT PROGRAMS AND CONSERVATION ISSUES

Basic infrastructure development for tourists and staff engaged in the protection activities is already done during the previous plan period. Eco-friendly designs with zero pressure on the environment are selected for any kind of new infrastructure development. All such amenities are constructed in the Buffer zone designated for eco-tourism purposes. Trekking routes and nature walks are planned without causing any kind of hindrance to the wildlife. A plan for waste management of the Park is proposed in the present plan. Provision for eco-friendly signboards along the roadside and animal crossing areas are included in the present Management Plan.

4.2.1 AN EVALUATION OF GOVERNMENT AND NON-GOVERNMENTAL AGENCY ACTIVITIES, PROGRAMME FOR DEVELOPMENT, IMPLICATIONS FOR THE PA, PEOPLE AND THE ZI.

With the co-operation of various government departments and non-governmental agencies, the Forest Department is implementing various activities and programme for the development of the Park and the forest-dependent communities living in the fringe area. Three check dams were constructed in Pampadum Shola and the adjoined Kurinjimala Sanctuary, funded by State Horticulture Mission and Soil Conservation Department. The project aims to meet the drinking and irrigation needs of local people and also for wildlife. The Forest Department made substantial contributions for the betterment of educational facilities of the school-going children of the fringe villages by donating two smart classrooms at Government High School, Vattavada under Eco Development Programme (EDP) budget head. The social welfare programme and development interventions being implemented within the Park as well as for the general public of the fringe areas, in turn, augment the outlook towards the staff involved in forest protection and ensure better receptiveness and improve the relations with the stakeholder communities.

4.2.2 THE INTERPLAY OF MARKET FORCES AND THEIR IMPACT ON THE SUBSISTENCE ECONOMY OF THE LOCAL PEOPLE.

Agriculture Marketing Centre and training centre is established at Vattavada by the Agriculture Department, for optimising the marketability of farmer's products avoiding middlemen. The free movement of farm products is facilitated at the forest checking stations. EDC helps in the marketing of NWFP through the Eco-shops. Initiatives of the EDC in optimising avenues for marketing the farm products and NWFP, augments the communities of the fringe areas to get good and steady prices for their efforts. The above strategy helps to improve public relations and win support for various programme implemented by the Forest Department

4.2.3 A SUMMARY OF PROBLEMS FACED BY PEOPLE THAT AFFECT THE MANAGEMENT OF THE PA & THE ZI.

To summarize, human-wildlife conflict is one of the problems faced by the people living in close proximity to the Park. Though timely compensation is paid to the victims, stringent implementation

laws and regulations for the protection of wildlife create hostility towards wildlife. Frequent checking, patrolling, surveillance etc. create general apathy towards forest conservation. The annoyance in implementing rules for the sustainable management of the Park is often translated to the form of setting fire to forest and suppression of information on illicit practices etc. which in turn causes far-reaching consequences. Targeted interventions in surrounding villages to sensitize on the concepts of "peaceful co-existence", "sustainable utilisation of resources" and "living in harmony with wildlife" etc. are the need of the hour to bring about attitudinal change towards forest conservation.

Increase in the tourism, increase in the human habitation and cattle populations, cultivation practices etc. in turn increase pressure on forests. Livelihood and socio -economic conditions such as sustenance agriculture, cattle rearing, tourism etc. depend on water and other ecosystem services of the PA. Free availability of firewood reduces the expenditure on sources of energy or cooking, and domestic purpose. Poles from the forest plantations are used for making cattle sheds, fences, dwelling houses however increased trend of concrete houses is commonly seen in the recent years. People from the fringe areas are engaged as watchers for forest protection and allied works.

PART II

THE PROPOSED MANAGEMENT

CHAPTER 5

Vision, Objectives, Issues and Problems

5.1. THE VISION

Conservation of fragile Shola and grassland ecosystem for the sustainable maintenance of biological diversity, ecological services, livelihood security and nature education.

5.2. OBJECTIVES OF MANAGEMENT

- To conserve the rich biological diversity of the fragile and unique Shola grassland ecosystem, biotic communities, genetic resources and unimpaired natural processes.
- To restore and maintain the unique Shola-grassland ecosystem and the landscape with native species at densities sufficient to conserve ecosystem integrity and resilience in the long term.
- To maintain and improve the watersheds of the Park.
- To promote environmental conservation and awareness.
- To facilitate eco-tourism activities for the generation of revenue for sustainable management of the Park and to contribute to the local economy.
- To strengthen People-PA interface for the promotion of the abovesaid objectives.

5.3. PROBLEMS IN ACHIEVING OBJECTIVES AND STRATEGIES TO OVERCOME

OBJECTIVE 1: TO CONSERVE THE RICH BIOLOGICAL DIVERSITY OF THE FRAGILE AND UNIQUE SHOLA GRASSLAND ECOSYSTEM.

Sl. No.	Constraints	Strategies
1.	Inadequate data on the extent of vegetation types	1. Mapping the vegetation of the PA. 2. Mapping of endemic species, Critical Wildlife Habitat etc.
2.	Error in the notified extent of area	1. Notified area is 1.318 Sq. Km, Actual field area is 11.69 Sq. Km. Survey of the actual area is to be completed, erratum notification should be proposed and approved notification should duly be published during the plan period. 2. Boundary consolidation of the Park with cairns / pillars.
3.	Fire Management	1. A participatory fire Management Plan is proposed by involving KDHP, LSGD, Private plantations and indigenous peoples from Vattavada village and Koviloor village during fire season. 2. Establishment and timely maintenance of trek paths to inaccessible and difficult fire-prone areas.

		3. The width of the firelines / strips should be site specific and GPS locations to be documented. 4. Firebreaks, strips and patch wise control burning are proposed as fire protection tools. 5. Interstate boundary firelines / strips should be at least double the width. 6. Existing firelines / strips used for protection will be maintained in the present plan period. 7. In emergency situations, additional firelines / strips, firebreaks and trek paths (if any) to be examined and implemented by the Wildlife Warden in consultation with Field Director. 8. Creation of firebreaks / tree break inside the exotic plantations at convenient width and their periodic upkeep and maintenance. 9. Provision for fire proof suits and gadgets and other personal safety items for the staff / watchers engaged in fire protection. 10. Make sure the availability of water for fire management in the critical fire prone areas. 11. Prepare the map of fire prone zone based on the fire incidents in the previous years. 12. Prepare site specific plan for more fire prone areas like Bendhar and Pattiyankal.
4.	Inadequate wildlife health surveillance mechanism	1. Disease surveillance. 2. Wildlife surveys to monitor the biodiversity. 3. Detection of wildlife health by carcass examination, faecal matters etc. observing wildlife with symptoms of diseases. 4. Monitoring changes in animal behaviour, eating patterns, treatment of infected / sick animals. 5. Steps to prohibit environmental stress, pollutants and other harmful micro organisms in the PA. 6. Procurement of gadgets for rescue and rehabilitation of wildlife, especially snakes and other entrapped wild animals.

		7. Measures to control the population of domestic and feral dogs in and around the Park. 8. To keep records regarding the instances of attack of feral dogs on wildlife. 9. To safeguard spreading of diseases to wildlife, a collaborative preventive immunization and awareness programme recommended by KDHP in the peripheral domestic animals of the PA and ensure the immunization of domestic animals with the KDHP Veterinary Department on an ongoing basis. 10. Implement regular wildlife health monitoring. 11. Surveillance / tracking system for monitoring the sick and ailing animals. 12. Training / awareness to staff / watchers for identification and management of health issues in wildlife. 13. To bridge the skill gap and professional expertise and improve species literacy biodiversity applications assisted by modern technology is recommended.
5.	Absence of comprehensive information on the status of flora	1. Scientific study and documentation of flora and fauna. 2. Photographs of flora and fauna especially lower group animals present in the Park should be collected and documented. Necessary training may be imparted to protection staff designated for the purpose. Involvement of scientists and experts in the consolidation and verification of data collected. 3. Reports of all research work to be compiled and maintained for future reference at the office of the Wildlife Warden. 4. Technological support for easy tracking the movement of large mammals such as elephants and gaur in the Park (Drone, camera traps etc.). 5. Conduct population estimation of Indian Gaur in the Park.

		6. Conduct annual survey of Birds, Butterflies, Odonates etc. 7. The population estimation and habitat utilization study of Nilgiri Marten in the Park.
6.	Insufficient infrastructure including communication, arms, vehicles & staff accommodation facilities	1. Establish two wireless base stations one at NEC & one at Manathalam. 2. Establish a camp shed at Estate mala. 3. Renovation of the Office of AWW and NEC with amenities of electricity and internet connectivity. 4. Establish a Section Forest Office at Top Station check post.
7.	NWFP collection	1. Study on the threshold capacity of honey collection from the Park to ensure sustainability. 2. Identify the list of honey collectors and issue ID cards thereby prohibiting all kinds of illegal collection. 3. Define zone of collection and frame access rules for sustainable collection. 4. No NWFP collection from Critical Wildlife Habitat areas. 5. NWFP collection to be documented and monitored by EDC.
8.	Absence of separate manpower for conservation and management	1. 3 Beat Forest Officers are additionally of the Park required for the protection of the Park. 2. A post of the Lower Division Clerk has to be placed in the Range Office to perform the ministerial works.
9.	Inadequate welfare amenities for staff	1. A section forest office and quarters for women BFO's to be constructed.
10.	Unregulated vehicular traffic through the Park.	1. Night traffic regulation through Munnar - Koviloor road needs to be continued. 2. Study on the propensity of road kills inside the Park and necessary interventions to curb such mishaps.
11.	Potential ganja cultivation	1. Fringe EDC to be formed including people from Vattavada, Kottakamboor, and Koviloor to ensure support of local people for preventing all illegal activities. 2. Regular patrolling and surveillance.

12.	Presence of invasive / exotic species	1. A detailed study of the invasive species and its adverse impact to be conducted and a site-specific master plan to be prepared for the removal of invasive species in successive phases. 2. A checklist of exotic / invasive species present in and around the Park to be prepared and their extent to be mapped and updated periodically. 3. Feasibility analysis of making value added products out of invasive species.
13.	Poaching & Illicit felling	1. A camp shed to be constructed at Estate mala. 2. Regular upkeep and maintenance of trek paths and ensure regular perambulation by staff. 3. Prosecution of offences. 4. Training to staff in detection and management of offences.
14.	Insufficient information on judicious distribution of water sources for wildlife	1. Increase the storage capacity of the existing water holes. 2. Detailed feasibility study to be conducted before the construction of major check dams inside the Park.
15.	Zonation	1. The specific treatment plan for each zone has to be prepared and managed accordingly. 2. The Eco-restoration zone to be converted into the Core zone after the eco-restoration programme. 3. Selected areas of Buffer zone ear-marked as Tourism zone is to be maintained.
16.	Interstate boundary	1. Fire strips / breaks of the interstate boundary to be constructed at least double the width of the existing fireline. Firebreak / tree break to be taken at the places where exotic plantations are present at the interstate boundary. 2. Joint patrolling, sharing of information on

		offenders, joint raids along with Tamil Nadu Forest Department. 3. Regular upkeep and maintenance of patrolling routes passing through the interstate border for protection purposes. 4. Landscape approach for the removal of Wattle plantation in successive phases and restoration of natural vegetation at the interstate border in co-ordination with Tamil Nadu Forest Department.

OBJECTIVE 2: TO RESTORE AND MAINTAIN THE UNIQUE SHOLA GRASSLAND ECOSYSTEM, THE LANDSCAPE WITH NATIVE SPECIES AT DENSITIES SUFFICIENT TO CONSERVE ECOSYSTEM INTEGRITY AND RESILIENCE IN THE LONG TERM.

Sl. No.	CONSTRAINTS	STRATEGIES
1.	Inadequate information on extent of exotics.	1. Detailed study on the invasive / exotic species to be conducted. 2. Mapping the extent of invasive species in the Park. 3. Scientific and feasible plan of action for the eradication of invasive / exotic species.
2.	Eco-restoration.	1. Permission to indigenous people to collect the invasive / exotic species like eucalyptus and wattle for their bonafide use. 2. Plan for the eco-restoration of the Park is detailed in 6.3.2.1 3. Monitoring and scientific documentation of the eco -restoration activities. 4. Initiate the eco-restoration activities from the barely affected area to the highly affected areas. 5. Identification of the grass species ideal for eco-restoration and establishment of a grass nursery. 6. Establishment of permanent plots for monitoring succession and eco-restoration. 7. Scientific study about soil erosion and steps to combat the same. 8. Collaborate with NGOs for eco-restoration.

		9. Formation of EDC exclusively for eco-restoration for maintaining continuity and community participation in the programme. 10. Proposing one time removal of eucalyptus / wattle and pine plantations on an out rate sale and using the money from the sale for eco-restoration activities.

OBJECTIVE 3: TO MAINTAIN AND IMPROVE THE WATERSHEDS OF THE NATIONAL PARK

Sl. No.	CONSTRAINTS	STRATEGIES
1.	Inadequate data on hydrology.	1. Establish automatic weather stations. 2. Plan of action for weather data collection.
2.	Conservation of water within and outside the Park.	1. Earthen dams are recommended instead of concrete check dams. 2. Annual monitoring of silt accumulation in the check dams and water holes. 3. Regular desilting of the check dams and ponds. 4. Regular monitoring of water level in the check dam and water holes. 5. Establishment and conservation of adequate waterholes in the Park depending on the need / requirement during the plan period.

OBJECTIVE 4:TO PROMOTE ENVIRONMENTAL CONSERVATION AND AWARENESS.

Sl. No.	CONSTRAINTS	STRATEGIES
1.	Insufficient infrastructure.	1. Interpretation center at Top Station Check Post. 2. Centralized information centers at Munnar and Marayoor.
2.	Shortage of resource persons	1. Invite experts / volunteers with proficiency in different languages as resource persons. 2. Revise the rate of honorarium.
3.	Educational materials for different target groups like students, tourists, media persons, Politicians etc.	1. Documentaries, leaflets, pamphlets, interactive audiovisual systems, books, charts and maps etc. for catering to the educational needs of various age groups with multilingual content.

4.	Signage	1. Periodical upkeep of eco-friendly signage. 2. To design signage unique to the Park in different languages.

OBJECTIVE 5: TO FACILITATE ECO-TOURISM ACTIVITIES.

Sl. No.	CONSTRAINTS	STRATEGIES
1.	Quality of Human Resources	1. Trained resource personnel for managing eco-tourism. 2. Capacity building of watchers, for recording animal sightings and for identifying indirect shreds of evidence. 3. Appointment of eco-tourism Coordinator for co-ordinating eco-tourism programme.
2.	Awareness to stakeholders	1. Periodical training on identification of flora and fauna, wildlife monitoring, firefighting, first aid, tourism management, public relations etc.
3.	Shortage of equipment	1. Ensure the availability of binoculars, walkie-talkie, GPS etc. 2. Provision for periodical maintenance, upkeep, procurement of advanced equipment.
4.	Waste accumulation and plastic waste management	1. A scientific waste Management Plan for the National Park to be prepared and implemented.
5.	Responsible Tourism	1. Distribution of leaflets, pamphlets, notices etc. 2. Erecting information boards at strategic locations. 3. To ensure stakeholder participation in tourism. 4. Alternate income generation to the community through farm tourism and the sale of value-added products.
6.	Lack of co-ordination with local tourism initiatives / tour operators.	1. Revenue sharing / subsidized charges for tour operators promoting eco-tourism / eco-shop products etc. 2. Formulation of appropriate mechanisms in consultation with AFDA.
7.	Insufficient fund to meet the operating cost	1. Optimal use of existing tourism infrastructure for maximising the output and revenue.

OBJECTIVE 6:TO STRENGTHEN PEOPLE-PA INTERFACE.

Sl. No.	CONSTRAINTS	STRATEGIES
1.	Human-Wildlife Conflict	1. Maintenance of existing solar fencing / trenches and construction of new ones in appropriate places. 2. Timely payment of compensation. 3. Institution of crop insurance. 4. Appropriate habitat improvement programme within the Park. 5. Eco-restoration of plantations inside the PA.
2.	Lack of information on the extent of conflict.	1. Track the movements of wildlife. 2. Record and document the wildlife conflict.
3	Poor participation of stake holders	1. Conduct a feasibility study for the formation of fringe EDC. 2. The formation of EDC exclusively for eco-restoration is preferred for maintaining its continuity.
4.	Insufficient fund	1. The Convergence of funds (Local bodies / other line departments / Govt. of India projects / NGOs) through the FDA. 2. Optimizing the scope of Eco-restoration and livelihood promotion activities in coordination with line departments such as MNREGS, Department of Agriculture.
5.	Inadequate manpower for co-ordinating eco-development programme.	1. Appoint a Social worker from AFDA on contract basis.
6.	Insufficient data on stakeholder communities.	1. Conduct a socio-economic survey in the local community.
7.	Quality of human resources	1. Regular capacity building, training and workshops for field staff for active coordination to strengthen the eco- development activities. 2. Management training for executive and protection staffs.

	3. Training on legal matters and prosecution of offence to the protection staff. 4. Specific training for watchers to improve their functional capacity against desired objectives such as wildlife health monitoring, fire management, wildlife census, weed eradication etc.

CHAPTER 6

Strategies, Boundaries, Zonation, Zone Plans and Theme Plans

6.1. BOUNDARIES

6.1.1. LEGAL BOUNDARIES

The legal boundaries of the Park are already mentioned in 2.1.1. About 90% of the Park boundary is consolidated with permanent cairns / pillars during the previous plan period. 10% of the Northern boundary of the Park of approximate length of 1 Km needs to be consolidated during this plan period.

6.1.2 INTERNAL BOUNDARIES

The National Park is divided into two zones, Core zone and Buffer zone. The map showing the internal boundaries of the Park, differentiating the Zones is given in **Figure 2.1.**

i) **Core zone:** The Core zone is 7.79 Km^2 in area, protected without any human interference.

ii) **Buffer zone:** The Buffer zone is 3.97 Km^2 in area, and is divided into two zones Eco-restoration zone and Tourism zone.

   a) **Eco-restoration Zone:** All the plantation area inside the National Park is considered as Eco-restoration zone. This Eco-restoration zone shall be added to the Core zone after the eco-restoration activities.

   b) **Tourism zone:** The area around Top Station check post, nature education center, amenity centre and log house is considered as the Tourism zone. The Tourism zone shall stand as a Buffer zone even after the eco-restoration activities.

6.1.3 ECOLOGICAL BOUNDARIES

Pampadum Shola National Park is contiguous with the Kurinjimala Sanctuary and Vattavada region of the Marayoor Sandal Forest Division in the Northern side. The Southern and Eastern sides are bordered by the Kodaikanal Wildlife Sanctuary, Tamil Nadu. On the Western side are the forests and plantations of Kannan Devan Hills. Park provides habitat continuity with the Kodaikanal Wildlife Sanctuary, Munnar Territorial Division and Kurinjimala Sanctuary. A map showing the ecological boundaries of PSNP is depicted in Chapter 2. Pampadum Shola National Park plays a key role in connecting the Kannan Devan Hills of Kerala and the Palani Hills of Tamil Nadu.

6.1.4 EXTENT

As per the **Notification No.12875/F2/2003/F&WLD dated 14/12/2003 of Kerala Government the extent of PSNP is 131.80 ha** (Approx.) Whereas, as per the findings of GIS mapping conducted by FMIS, the extent of the area protected as the Park is 1168.59 ha.

6.2 ZONATION

The objectives of the zonation are to provide a geographical framework to manage the Park, with specific reference to priority management activities in different zones of the Park, appropriate types and levels of interventions in designated areas of the Park, assist in minimizing existing and potential conflicts. Zonation forms the basis for assessing the suitability of future activities and development proposals. The approved functional zonation is the main basis for decision making on activities within the Park. In order to achieve the objectives, the Park is divided into the following zones:

1. **Core zone**
2. **Buffer zone**

a) Eco-restoration Zone

b) Tourism zone

The Eco- restoration zone and Tourism zone are parts of the Buffer zone.

6.3 ZONE PLANS

6.3.1 PLAN FOR CORE ZONE

The Core zone of the Protected Areas is a zone of specific interest for observing natural, environmental and development processes without any human impact. The protection regime completely excludes economic and recreation impact on the protected ecosystems. Admissible activities include scientific research, environmental monitoring and specific conservation measures. The extent of the core area is 7.79 km^2 and the core area acts as a reference point of the ecosystem to be preserved in the Park. Information from the core area may be used to assess the sustainability of activities and the maintenance of environmental quality in surrounding areas. The focus of intervention is to ensure total protection of natural resources. The permitted activities mentioned in the respective chapters of this Management Plan, shall be allowed to be implemented.

In the Core zone, the following activities will be carried out during the plan period:

- Protection from illegal activities, which are detailed in **"Theme Plan for Protection" in section 6.4.1**
- Fire protection activities including controlled burning and participatory fire management as given in **"Theme plan for Fire management"** under **section 6.4.2**
- Watershed and Habitat management activities as detailed in**"Theme Plan for Watershed and Habitat management"** under **section 6.4.3** and **6.4.4**
- Research studies to facilitate improved protection and management of Core zone are detailed in **Chapter 9**.

6.3.2 PLAN FOR BUFFER ZONE

The Buffer zone is the area unsuitable to be included in the Core zone due to specific circumstances. The zone can also act as a buffer for the Core zone and provide conditions for conservation of natural ecosystem while allowing strictly regulated restoration activities and activities for economic uses. Together the Eco-restoration zone and the Tourism zone constitute the Buffer zone of the Park. Of the total area of National Park 34% is the Buffer zone.

6.3.2.1 PLAN FOR ECO-RESTORATION ZONE

As per the previous Management Plan, the Eco-restoration zone containing plantations occupies an area of 3.97 km^2, comprising of 165.77 ha (1.66 km^2) of eucalyptus, 214.35 ha (2.14 km^2) of wattle and 16.60 ha (0.17 km^2) of pine. The plantation areas inside the Park are selected as the Eco-restoration zone and are shown in **Figure 2.1.** During this plan period approximately 20% of the plantation area will be eco-restored and converted to Core zone. The eco-restoration of the Park focuses mainly on the eradication of black wattle and eucalyptus plantations, establishment and maintenance of Shola and Grassland Nursery, facilitating the regeneration of the Shola trees by selective removal of invasive / exotic species etc. For restoration and maintenance of the originality of the shola grassland ecosystem and landscape the following strategies and activities are proposed during this plan period.

- Wildlife Warden shall move a site specific proposal for removal of plantations from the Park and to improve habitat and restore the original vegetation.
- Fine tune techniques of restoration by studying eco-restoration works in similar habitats especially in Kodiakkanal and Valpara in Anamala Tiger Reserve of Tamil Nadu,
- Assisted regeneration of indigenous species can be done in exotic removed area.
- Monitoring regeneration status and soil erosion.
- Establishment of a permanent plot for monitoring succession and eco-restoration.
- No activities other than those activities prescribed in the approved site specific plan shall be carried out. If any modification is required, prior approval from the Chief Conservator of Forest & Field Director (Periyar Tiger) Kottayam has to be obtained.

The above prescriptions are from the report of committee constituted to study the feasibility of felling and removal of Teak and other plantations species in the Protected Areas and eco-restoration of such areas to natural forest (May 2020) which is submitted to Government for the approval. More over to these activities a one-time removal of exotic plantations in the Park shall be proposed by Wildlife Warden. The legal hurdles for commercial exploitation in the Protected Areas should be taken up in the higher level. One-time removal of eucalyptus / wattle / pine plantations and its outright sale and the revenue generated from this will be used for the eco-restoration activities. The activities proposed during the present Plan period for eco-restoration of the plantation are as detailed as below:

1. ECO-RESTORATION OF BLACK WATTLE INFESTED AREAS

Wattle infestations compete with and replace indigenous vegetation, deplete water resources, reduce stream flow, disrupt catchment areas and pose an intensified fire hazard, thus threatening the survival of indigenous biodiversity. A major hurdle in the eco-restoration activity of the eradication of black wattle is the disposal of biomass from the wattle removed areas and the chances of profuse regeneration of the wattle. Photograph showing the profuse regeneration of black wattle after removal is shown in **Figure 6.1.**

FIGURE 6.1: PROFUSE REGENERATION OF BLACK WATTLE AFTER ERADICATION

Forest fire mainly occurs in the wattle removed area due to the large quantities of biomass accumulation in the field during the felling of wattle as part of eradication. A wattle eradication and restoration programme is already in place in the extent of 12 ha. at fire burnt Pattiyankal area of the Park. In the restoration area, felled / burnt logs were aligned in the contour. Regenerated wattle seedlings are continuously being removed and the area is planted with local grass species and other indigenous species. The species used for eco-restoration in Pattiyankal is shown in **Table 6.1.**

TABLE 6.1: SPECIES USED FOR PATTIYANKAL ECO-RESTORATION

Sl. No.	Species	Family	Local/Englishname	Endemism
1	*Zoysia matrella*	Poaceae	Cherappullu, Mascarene grass	Indo-Malesia, Australia
2	*Axonopus compessus*	Poaceae	Kaalappullu, carpet grass, buffalo grass	Native to America
3	*Poa annua*	Poaceae	Kolappullu, Annual Meadow Grass	Cosmopolitan
4	*Centella asiatica*	Apiaceae		
5	*Plantago erosa*	Plantaginaceae	Nilachakka, Njalamboori	Pantropical
6	Drymaria cordata ssp. Diandra	Caryophyllaceae	Pipili	India, Srilanka, Bhutan, Nepal, Cosmodia
7	*Jancus inflexus*	Juncaceae		Indo-Malesia
8	*Carex myosurus*	Cyperacea		Indo-Malesia, China
9	*Taraxacum javanicum*	Asteraceae		India, Sri Lanka, Indonesia
10	*Oxalis corniculata*	Oxalidaceae	Puliyarila	Cosmopolitan
11	*Eleusine indica*	Poaceae	Maharanchini	India, Sri Lanka, Old World Tropics

The strategy proposed for restoration of wattle infested areas is as follows:- Wattle plantations shall be cut and removed from the field and shall be stacked at a common place. The soil in the wattle removed area usually contains a large quantity of dormant high resistant seeds, the follow up of which is the most significant part of eradication. As the dried biomass is highly predisposed to fire, during the dry season it poses another severe threat to the forest area. The seeds of wattle are scarified by fire and causes alarming regeneration of the species. The debris shall be burnt during pre-burning before the fire season. The wattle removed areas with observable natural regeneration of indigenous species are already in the process of conversion to natural vegetation. In the case of areas, where wattle eradication process have started earlier are characterised with profuse regeneration of wattle seedlings. The above said area shall be divided into 5 ha plots and watchers shall be engaged for removal of wattle seedlings and for planting indigenous Shola and Grass species. This shall be continued for 5 years to restore the original natural vegetation. A landscape approach for the removal of wattle plantation in phases and restoration of natural vegetation at the interstate border in co-ordination with Tamil Nadu Forest Department has to be explored. Since it is a long term process, a separate EDC to carry out eco-restoration work exclusively, is recommended for ensuring the continuity of operations. The Wildlife Warden shall submit a detailed project proposal and site specific plan for the removal of exotics in the National Park in phases. People along the fringe areas shall be permitted to collect the dry biomass of invasive / exotic species for their bonafide use as subject to Section 29 of the Wildlife (Protection) Act, 1972.

II. Eco-restoration of eucalyptus plantations

Eucalyptus is another major exotic species present in the Park. Girdling and selective felling of eucalyptus trees have already been started in the Park during the previous plan period and the same shall be continued. The regeneration of the Shola trees needs to be facilitated and enhanced by the selective removal of eucalyptus trees form the plantation which shall be carried out by the following steps:-

- Identify the areas having high regeneration of Shola seedlings.
- Open up the canopy for enhancing the Shola trees regeneration by selective girdling / felling.
- Plant Shola tree species, if necessary.
- Periodic removal of exotic herbs and shrubs as and when required.
- Protect the area from forest fire and grazing.
- Replanting of damaged seedlings shall be done in the monsoon.
- Open up the area depending on the regeneration of Shola trees in the following years.
- Monitor regeneration status and soil erosion.
- Establishment of a permanent plot for monitoring succession and eco-restoration.

Regeneration of a number of native species is also noticed along with the eucalyptus plantation. The native species regenerating in the eucalyptus plantation areas is shown in **Table 6.2.**

TABLE 6.2: NATIVE SPECIES REGENERATING IN THE EUCALYPTUS PLANTATION

Sl. No.	Species	Family	Local Name
1	*Acronychia pedunculata*	Rutaceae	Chakkimaram
2	*Litsea wightiana*	Lauraceae	Pattuthali
3	*Neolitsea cassia*	Lauraceae	Keezhambazham
4	*Cinnamomum sulphuratum*	Lauraceae	Kattukaruva
5	Cinnamomum sp.	Lauraceae	
6	*Phoebe wightii*	Lauraceae	Chudala
7	*Clerodendrum infortunatum*	Verbinaceae	Perivelam
8	*Maesa indica*	Myrsinaceae	Kattuvizhal
9	*Bhesa indica*	Celastraceae	Penali
10	*Elaeagnus kologa*	Elaeagnaceae	Kattumunthiringa
11	*Toddalia asiatica*	Rutaceae	Kanthammullu
12	Syzygium sp.	Myrtaceae	
13	*Symplocos cochinchinensis*	Symplocaceae	Pachotti
14	*Daphniphyllum neilgherrense*	Daphniphyllaceae	Kozhikkulamavu
15	*Macaranga indica*	Euphorbiaceae	Malavatta

III) Nursery Management

Establishment of a Shola-grassland nursery is an indispensable element for the eco-restoration activities. Indigenous grass and Shola species can be exclusively raised in the nursery during the plan period for planting in the wattle eradicated areas. The following points shall be strictly adhered to:

(I) The works of the nursery shall be documented in an eco-restoration register.

(II) The progress of the work shall be monitored qualitatively and quantitatively.

(III) Protect the nursery from wild animals.

The annual time plan for the eco-restoration activities are given in the **Table: 6.3**

TABLE 6.3: ANNUAL TIME PLAN FOR ECO RESTORATION

Period	Activity
Pre-Monsoon (March-April)	1. Nursery Activities. 2. Irrigate the previous year planted Shola trees. 3. Preparation of land for planting. 4. Eradication of invasive / exotic species. 5. Collection of seeds for sawing.
Monsoon (May-Sept)	1. Restoration activities (Planting). 2. Provision for tree guard for planted trees & protect the planted grass species from herbivores. 3. Eradication of invasive / exotic species.
Post Monsoon (Oct-Nov)	1. Eradication of invasive / exotic species. 2. Nursery activities (collection of seeds & Grass species) 3. Maintenance of planted seedlings and grasses.
Winter/ Summer (Dec-Feb)	1. Eradication of invasive / exotic species. 2. Irrigation of planted seedlings. 3. Nursery activities (Collection of seeds).

IV. ECO-RESTORATION OF AREAS INFESTED WITH INVASIVE WEEDS

Invasive weeds such as Eupatorium and Bracken fern are commonly seen in the Park. The current practice of removal of such species is by uprooting / cutting before flowering and burning the dried matter to eliminate the chances of regeneration. An estimation of the infestation of weeds in the Park shall be conducted during the present plan period and appropriate steps shall be taken for their eradication. Weed eradication shall be included in the Annual Plan of Operation and shall be monitored regularly.

6.3.2.2 PLAN FOR TOURISM ZONE

The sustainable management of the Park is linked with the generation of adequate revenue for day-today activities, meeting the manpower requirements and other budget allocations for Park maintenance. Eco-tourism focuses on generating revenue by providing avenues to live in harmony

with nature, travel to destinations rich in scenic beauty, flora, fauna, and natural heritage. It purports to educate the travelers, provide funds for conservation, directly benefit the economic development and empowerment of local communities. In addition to this, eco-tourism also aims at the promotion of concepts of eco-friendly living, recycling, energy efficiency, water conservation, stakeholder partnership and responsible tourism for the local communities. The areas around the Top Station check post, nature education centre, amenity centre and log house are considered as Eco-Tourism zone. This zone is designated to manage visitors and provide amenities for inspirational, educational, cultural and recreational purposes at a level that will not cause significant biological or ecological degradation to the natural resources. All the activities in this zone shall be implemented as per the plan of action described in **Chapter 7, Eco-Tourism, Interpretation and Conservation Education.** All the activities prescribed in the protection and restoration zone will be implemented in the Tourism zone.

6.4 THEME PLAN

6.4.1 THEME PLAN FOR PROTECTION

Major threats to the Park are the presence of invasive / exotic alien species and fire. In order to protect the natural resources of the Park, the following strategies and activities are proposed in this protection plan.

A proposal for the declaration of Eco-sensitive Zone (ESZ) 0 to 1 km from the notified boundary (excluding interstate boundary) of the Park is submitted to MoEF. ESZ covers an extent of 5.16 km^2 area around the Park which partially includes Vattavada and KDHP Villages. After the final notification of ESZ, a Zonal Master Plan will be prepared within two years for the management of ESZ.

The Wildlife Warden and the Assistant Wildlife Warden will be responsible for overall control of the Park. The Chief Conservator of Forests and Field Director, (Project Tiger) Kottayam and Chief Wildlife Warden will be responsible to implement and review the protection plan. This protection plan will serve as a guideline with effective strategies to mitigate spatial and temporal threats and the problems in achieving the objectives of management. Strategies identified in order to tackle the threats and strengthen the conservation are given below;

6.4.1.1 CONSOLIDATION AND MAINTENANCE OF BOUNDARY

The Park covers the entire area of Block no. 63 of Vattavada Village of Devikulam Taluk, Idukki District. There is an error in the extent of the area mentioned in the notification and in the actual field area. The notified area is 131.80 ha. (Approx.) whereas, as per the findings of GIS mapping conducted by FMIS, the extent of the area protected as the Park is 1168.59 ha. Since the fund / resource allocation is depending upon the notified area, necessary correction in the area is to be made by issuing an appropriate erratum notification. The extent of the area in the notification “131.80 ha” is to be corrected as “1168.59 ha.” About 90% of the field boundary is consolidated with permanent cairns / pillars during the previous plan period. 10% of the Northern boundary of the Park, of approximate length of 1 km needs to be consolidated during the present plan period.

6.4.1.2 REORGANIZATION OF ADMINISTRATIVE UNITS

The staff of Kadavari Forest Station is presently deployed for the management of the Park. In order to effectively manage the Park, separate manpower has to be created including the post of Lower Division Clerk to the office of Assistant Wildlife Warden (for performing the ministerial works) and 3 Beat Forest Officers (one for the eco-tourism and nature education programme, one for the Eco-restoration programme and one for the protection and management of the Park). The details is

given in **Table. 6.4**

TABLE 6.4. DETAILS OF STAFF STRENGTH

Sl No.	Category	Present Staff Strength	Proposed Staff Strength
1	Assistant Wildlife Warden	1	0
2	Section Forest Officer	1	0
3	Beat Forest Officer	4	3
4	Lower Division Clerk	0	1
5	Tribal Watcher	1	0

6.4.1.3 ANTI-POACHING CAMP SHEDS [EXISTING & PROPOSED]

There are two anti-poaching camp sheds at Bendhar and Manathalam. Periodical maintenance and improvement of the existing anti poaching camps / chowkies (temporary camp sheds) and patrolling camps shall be carried out as and when required. In addition to the existing camp sheds, a new permanent camp shed is proposed at Estate mala. Additional camp sheds may be established at appropriate locations depending on the need of the situation, during the plan period. The camping schedule will be in accordance with the HoFF's circular (HF-1/189/2020, Dated: 15.09.2020) regarding the functioning of anti poaching camp sheds.

All basic amenities for the staff in all the existing and proposed anti-poaching camp sheds shall be ensured during the plan period. Regular interior patrolling, ganja raids and camping as envisaged in the previous Management Plan shall be continued during the present plan period with necessary improvisation. Wildlife Warden shall take action to permanently man the anti-poaching camp sheds with suitable staff and amenities.

6.4.1.4 OFFICIAL AND RESIDENTIAL BUILDINGS

The existing official and residential buildings are to be maintained periodically. The basic amenities such as lighting, drinking water etc. to be improved in the existing buildings. A staff quarters / barracks for the front line staff at Manathalam, a section office building at Top Station check post are additionally proposed during the present plan period. New Buildings and renovation of existing buildings depending on the need of the situation are also proposed during the plan period. Furniture, additional storage facilities, furnishings and supplies shall be ensured in all the official and residential buildings during the plan period.

6.4.1.5 PATROLLING SCHEDULE

The entire area of the Park is divided into 2 patrolling units and a perambulation schedule is prepared and communicated to staff in advance on a monthly basis for implementation. As per the previous Management Plan, the Park area is divided into 2 patrolling units namely, Bendhar and Estate mala. The patrolling team consists of 2 staff (one-armed) and 3 watchers. Each unit shall be completely perambulated once in 2 weeks. The Assistant Wildlife Warden and Wildlife Warden also undertake frequent patrolling and make sure that the monthly perambulation plan is followed by the designated staff. Frequent special boundary perambulation is to be arranged by the Wildlife Warden / Asst. Wildlife Warden. The staff on duty shall maintain a movement register and wildlife monitoring register. The Assistant Wildlife Warden and the Wildlife Warden shall carry out frequent inspections and ensure that perambulation works are carried out properly. During Monsoon period special patrolling

and camping for 3-4 days will be carried out in the Park as part of protection plan. Moreover, that inter-state patrolling and camping shall also be carried out during the present plan period.

6.4.1.6 INTERSTATE CO-ORDINATION

The Park shares an interstate boundary with Tamil Nadu at a total length of 14 kms. In addition to perambulation and monitoring of the region, frequent sharing of information between the officials of neighbouring Forest Divisions within and outside the State is essential. It is proposed to conduct an interstate meeting of the Range Officers once in a month. Clear and maintain the interstate boundary annually.

6.4.1.7. STRATEGIES FOR ADDRESSING SPECIFIC ISSUES IN THE PARK

I) Plantations of Exotics:

Presence of invasive / exotic plantations is the major issue to be addressed during the present plan period. Strategies for addressing the issue are already described in 6.3.2.1 .Plan for Eco-restoration zone.

II) Collection of NWFP and Firewood:

The NWFP collected from the Park is wild honey. No scientific studies were carried out on the permissible limit of NWFP to be collected from the Park. This issue is dealt separately in the **Chapter 8** Eco-development. Firewood collection is permitted only from the invasive / exotic plantation areas. Permission is granted only for the collection of firewood for the bonafide use of people living in the fringe area.

6.4.1.8 FIRE

Fire prevention is a priority area during the present plan period. This issue is dealt separately under Theme Plan for 'Fire Protection'.

6.4.1.9 PRESENCE OF ROAD THROUGH THE PARK

The Munnar-Koviloor road is passing through the Park. Increase in the vehicular movement is noticed in the above road on account of the development of tourism and an increase in number of vehicles in the fringe villages viz, Vattavada, Koviloor and Kottakamboor etc. Increasing vehicle movement is a potential threat to the wildlife habitat and for the free movement of animals in the coming years. Speed regulations, and restrictions on the movement of vehicles during night, signage showing speed limit and wildlife movement, reflectors and appropriate signaling system on roads, fines for violations of the Park rules, night patrolling etc. are proposed during the present plan period in the above said road.

6.4.1.10 WEEDS

Species such as Eupatorium and Bracken fern are considered as the commonly seen weeds in the Park. No studies have been conducted on the extent and distribution of weeds in the Park. An estimation of the infestation of weeds in the Park shall be conducted during the present plan period and appropriate steps shall be taken for their eradication either by cutting or by uprooting. Weed eradication shall be included in the Annual Plan of Operation and shall be monitored regularly.

6.4.1.11 REAL ESTATE PRESSURE ON THE FRINGE LANDS

There is a potential threat due to the pressure of real estate mafia on the fringe area of the Park. The fringe area is notorious for the illegal possession of Government land, land grabbing by politicians and pressure groups for tourism and farming purpose. The private land in the area is characterized

by the large scale felling and extraction of wattle and eucalyptus accelerating the degradation. Such interventions along the fringe in this fragile ecosystem will exert pressure on the habitat conservation, free wildlife movement and species propagation. Moreover, social factors like reverse migration of people of the State, economic decline, a shift in the employment patterns etc. are likely to increase pressure on the land. Consequently, there is a likelihood of an increase in the commercial exploitation of land and natural resources for various purpose and other illegal activities in the region. Hence awareness programme shall be given to the local communities to sensitize the permitted, regulated and non-permitted activities within the Eco-sensitive zone.

6.4.1.12. POTENTIAL THREAT OF POACHING

The fringe areas of the Park are farmlands and the availability of easy food is likely to attract the wildlife of the area to the fringe areas and there is the likelihood of instances of trapping, poisoning and electrocution etc. of wildlife. The shift in the food pattern from a vegetarian diet to non-vegetarian also acts as a triggering factor to trap, or kill wild animals for meat. However, the possibility of poaching cannot be ruled out in the coming years. Appropriate measures, such as regular perambulation and interior camping, awareness creation among the public etc. shall be adopted.

6.4.1.13 TOUGH TERRAIN

This issues related to conservation of difficult and inaccessible areas will be tackled through the creation of new trek paths for effective protection and improving the camping facilities like uniform, tents, field gears including GPS, compass, binoculars, digital camera, torches, drone etc.

6.4.1.14 WILDLIFE HEALTH MONITORING

Wildlife health monitoring was not seriously undertaken in the previous plan period. But in this plan period disease surveillance, wildlife surveys, detection of wildlife health by carcass / faecal examination, observing wildlife with disease symptoms, monitoring in animal behaviour, eat patterns, treatment of sick / infected animals, procurement of gadgets for rescue and rehabilitation of wildlife, immuisation of cattle etc. shall be done in the present plan period.

6.4.1.15 INFRASTRUCTURE DEVELOPMENT

I. Improvement of Facilities in Existing Camping Stations: The existing camping stations and anti-poaching camp sheds shall be improved with basic amenities such as solar power lantern, cots, beds and mattress, kitchen utensils, drinking water, essential furniture, supplies etc.

II. Check Posts and Chain Gate: At present, there are two check posts in the Park, one each at Top Station and Manathalam. Top Station check post is notified and this check post is permanently manned for keeping vigil round the clock. All adequate facilities for staff at the check posts such as buildings, power supply, drinking water and other basic amenities shall be provided. In addition, a chain gate is also maintained at Top Station-Bendhar patrolling route to check illegal entry and unauthorized movement of vehicles to the Park. Establishment of new barricades / chain gates in strategic locations if found necessary for preventing illegal entry, regular upkeep and maintenance of the existing check posts, display boards etc. are proposed during the plan period.

III. Roads:

The road to Vattavada (Koviloor- Munnar Road) of 4.8 Km is passing through the Park. Timely maintenance of this road is undertaken by the PWD. Provision for adequate street lights, boards with reflectors, speed breakers etc, shall be installed at appropriate locations. Strict regulations on vehicular movement shall be continued. The Top Station-Bendhar patrolling route shall be maintained for protection purpose only. Necessary drainage, culvert, barricades etc. are proposed during the

plan period. The roads will be maintained based on the recommendations of the Sub-committee on guidelines for roads in Protected Areas. **(Annexure: 6.1)**.

IV. Trek Paths:

A total length of 37.00 Kms of Trek paths mentioned in **Table 3.7** is developed in the Park during the previous plan period. These trek paths are used for perambulation, patrolling and protection purpose. Periodical maintenance of the existing trek paths shall be done as per the availability of funds. New trek paths shall be taken only after obtaining the approval from CCF & Field Director (PT) in emergency situations.

V. Communication Facilities:

At present, there is a wireless station at Bendhar. The base station at Top Station check post and a mobile wireless set and three walkie-talkies are presently available. Upgrading of tele / mobile / internet communication facilities, provisions to start technological support for strengthening the communication infrastructure etc. are proposed during the current Plan period.

VI. Vehicle:

At present, the Assistant Wildlife Warden with headquarters at Top Station has a Bolero and the Section Forest Officer has Mahindra Thar. Maintenance of these vehicles / replacement of old vehicles shall be carried out as and when required during the plan period.

VII. Arms and Ammunition:

At present, the Assistant Wildlife Warden is provided with 1 Revolver and the Park is provided with 5 Rifles. Proper maintenance of arms and ammunition carried out during the previous plan period shall be continued in the current plan period. Timely training shall be given to the staff in weapon handling.

VIII. Deployment of Staff:

No separate posts are created for the management of Pampadum Shola National Park. Necessary manpower is deployed from Kadavari Station for the day to day functioning of the Park and management of eco-tourism. This results in insufficient manpower and declining sense of accountability. All vacant posts have to be filled up regularly. For effective protection of the Park, an additional of 3 Beat Forest Officers and a Lower Division Clerk is proposed. Appointment of necessary manpower on contract basis is found as the viable and productive option for the management of eco-tourism. Hence such viable and suitable options are proposed to ensure necessary manpower during the current plan period.

Capacity building traning of the staff for the efficient management of the Park shall be considered a priority area in the current plan. Training to be imparted to staff on various topics such as identification of plants and animals, identification of health issues in wildlife, unarmed combat, survival skills, usage of firearms, first aid, swimming, driving, life skills, public relations, team work, wildlife crime detection, intelligence gathering, preparation of offence reports, legal literacy, GIS, application of technology in conservation etc. Selected staff to be trained as 'handlers' as part of intelligence gathering. Exposure training to staff on identification of plants and animals shall be periodically provided. In addition to the above, local community members from EDCs with aptitude shall be identified and trained for front office management, stakeholder relations, tourism facility management, housekeeping, communication, reporting etc.

IX. Intelligence gathering and co-ordination:

The Wildlife Warden, Assistant Wildlife Warden and staff are responsible to establish and maintain liaison with NGOs, people's representatives, EDC members, tribal heads, interstate officers, Crime Control Bureau officials, Line Departments etc. in sharing information. The Assistant Wildlife Warden is responsible to establish various channels of credible and reliable information. Confidential sources and agents shall be identified, trained and placed in a position to get reliable information for the smooth functioning of the Park. The appropriate reward system is proposed to informants. Necessary approval for the introduction of reward system to the informants depending on the type of crime and information shall be obtained by the Wildlife Warden during the plan period. Legal support shall be made available as and when required.

6.4.2 THEME PLAN FOR FIRE MANAGEMENT

The Park is located in the physical proximity of several human settlements, fire protection is one of the major areas of concern. Fire Management Plans shall be prepared annually before the onset of fire season. While preparing a fire plan, the natural features such as existing roads, trek paths, rivers etc. will be considered. Annual fire protection measures shall be in accordance with the approved fire Management Plans. The potential fire-prone areas in the Park are Bendhar and Pattiyankal areas where maximum areas of exotic plantations are found. The fire-prone areas in the Park are given in **Figure 6.2.**

6.4.2.1 GENERAL GUIDELINES FOR PREPARATION OF FIRE MANAGEMENT PLAN

- Identify the cause and consequences of fire at PA level.
- Prepare fire Management Plans on an annual basis.
- Identify the fire prone areas. Plot every instance of fire with the extent of the area burnt in the last five years.
- A journal shall be kept at the Range Office wherein the (1) Date of occurrence of fire (2) Location of occurrence of fire (3) Area burnt etc shall be recorded. The fire prone areas shall be given special attention.
- Identify the factors causing fire and necessary steps to counter them.
- Purchase of necessary firefighting equipment.
- Provide adequate training to field staff and firefighting squad in fighting fire and self-defence.
- Create a fire response team including youth from nearby village.

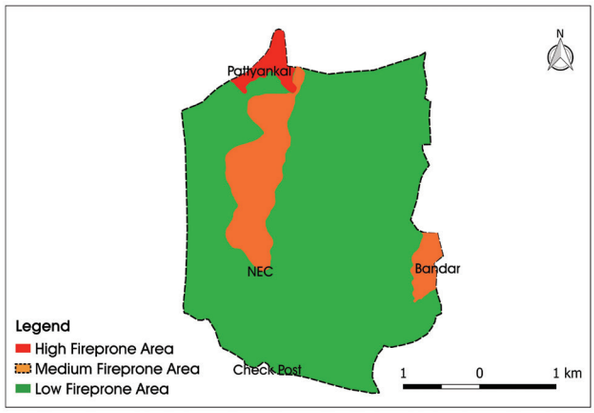


FIGURE 6. 2 : FIRE PRONE AREAS OF PSNP

- Develop proper monitoring protocols and document the results and effectiveness of fire protection measures taken annually.
- The existing firelines shall be cleared annually before the fire season. They shall be periodically monitored to check the status of accumulation of debris in the firelines. New firelines shall be taken according to the needs of the situation.

- Awareness to the forest fringe dwellers and motorists shall be done regularly along with distribution of pamphlets and brochures about prevention of forest fire.
- Resources like manpower, vehicles, wireless, equipment etc. available with adjoining divisions (Munnar Forest Division, Marayoor Forest Division & Tamil Nadu Forest Department) and other departments like Police, Fire Force etc. shall be relied on in exigencies. Fire safety measures shall be described in the plan.

6.4.2.2 FIRE MANAGEMENT STRATEGIES

Following measures are proposed to prevent extensive fire: -

(I) Firelines: The Assistant Wildlife Warden shall ensure that firelines given in Table 3.4 are maintained properly. Necessity of additional firelines shall be examined by the Wildlife Warden and shall be carried out depending upon the need / exigency of the situation after obtaining approval from CCF & Field Director (PT). The schedule for maintenance of firelines as given in **Table 6.5** shall be borne in mind while executing the fire Management Plan.

- Firelines shall be taken as per the guidelines issued by the KFD.
- No fireline shall be taken on the edge of the Shola forest. The fireline around the Shola shall be taken giving the reasonable space for the extension of Shola forest.

TABLE 6. 5 : SCHEDULE FOR MAINTENANCE OF FIRELINES

Sl. No	Period	Activity
1	December 1- January 15	Taking of firelines. The materials cut shall be left on the middle of the firelines to dry
2	January 15 - February 15	1st burning of the cut materials left on the firelines
3	March 15 - March 30	1st sweeping of the firelines for leaves and un-burnt materials and leaving them on the middle of the fireline
4	April 1 - April 15	2nd burning of the cut materials left on the firelines
5	May 1- May 15	2nd sweeping of the firelines for leaves and un-burnt materials and leaving them on the middle of the fireline
6	May 16 - May 30	3rd burning of the cut materials left on the firelines

The burning activity shall be carried out in early morning or evening hours when the temperature and wind flow is comparatively low. When the burning activity is carried out, it should be ensured that fire protection watchers are posted on either side of the fireline to ensure that fire doesn't spread to the forest.

(II) Controlled pre-burning: Controlled burning shall be carried out all around and in between the plantations and in grasslands of at least 30 m width by clearing a strip of 5 m on both sides as shown in **Figure 6.3.** Controlled burning is done to prevent the rapid spread of fire and is to be completed

before January 15. The above process is beneficial for wildlife since summer showers will enable the growth of new green grasses. The areas proposed for controlled burning is given in **Table 6.6**.

FIGURE 6. 3 : DIAGRAM SHOWING CONTROLLED PRE-BURNING AND STRIP BURNING

Guidelines for Controlled pre-burning

- All the areas to be burned shall be identified and recorded in the fire plan.
- Controlled burning shall be normally carried out during the months of December-January.
- Controlled burning shall be carried out all around and in between the plantations and in grasslands.
- The burning activity shall be carried out in early morning or evening hours when the temperature and wind are comparatively low.
- Before burning, steps shall be taken to drive out animals and birds.
- The fire should be set opposite to the wind direction to control the speed and intensity.
- On hill slopes, fire is to be set from the top-down direction for better control.
- Controlled burning shall be carried out in the presence ofan adequate number of experienced staff, with the aid of all safety measures and equipment.

Table 6. 6 : Areas Proposed for Control Burning in PSNP

Sl No	Area	Distance (KM)
1	Pattiyankal-Estatemala	7
2	NEC-Manathalam	4
3	Top Station-Neduvarpu	10
4	Manathalam-Bendhar	5

(III) Fire Protection Mazdoors: Fire watchers shall be engaged throughout the fire season for efficient fire protection activities. In addition to the fire watchers, fire gangs shall be engaged at Pattiyankal and Bendhar. During emergencies, additional mazdoors shall be engaged for fire protection works.

(IV) Firebreak Creation: Exotic plantations present in the Park are continuous and highly prone to fire. Effective prevention of fire in these exotic plantations can only be achieved through creation of firebreaks by removing exotic trees from the border areas to a 30 meter width and should regularly be weeded before fire season.

(V) Participatory Fire Management: Responsible participation of all the stakeholders is a significant element in the management of forest fire. Local bodies, KDHP, farmers, resort / homestay owners adjacent to Park, Devikulam Range, Kanthallor Range are the main stakeholders of the Park.

- Panchayath level Jagratha Samithi's shall be formed in Vattavada Panchayath. The Samithi shall include representatives from all the stakeholders of the Park.
- Regional Jagratha Samithi's shall be formed at Vattavada and Koviloor, including representatives of all stakeholders.
- Various awareness programme are proposed among the public against the incidents of a forest fire, its early detection and also to get early information regarding instances of a forest fire. Public meetings, rallies, street plays, advertisements in popular media, boards, banners, notices, stickers, short films, competitions etc. can be constructively used to raise awareness and improve community participation.
- Fringe EDC shall be formed including all stakeholders around the Park for strengthening the fire prevention measures.
- Fire protection and fire management operations are being carried out by involving the Estates functioning in the boundaries and adjoining areas of the Park. Firebreaks are made in plantations functioning under KDHP in Estate mala. Fire awareness programme are conducted in co-ordination with Estate authorities in the above areas.

(VI) Awareness & Training: Awareness campaigns and trainings are essential components for fire prevention. The focus shall be given to the settlements and elected representatives of Vattavada Panchayath. The appropriate mode of intervention like public meetings, rallies, street plays, advertisements in popular media, boards, banners, notices, stickers, short films, competitions etc, can be constructively used to raise awareness. EDC based awareness campaigns highlighting fire prevention and containment measures among children and youth in the locality shall be held during the fire season. Development of innovative programme such as short films, videos, movies with area specific bi-lingual audio visual content is proposed for awareness building among different stake holders.

(VII) Training Programme: Training programme for staff, watchers and other members of the community involved in fire protection shall be organized.

(VIII) Fire watch towers and communication network: The present infrastructure and communication facilities shall be made use for fire protection, to prevent fire incidents and to mobilize additional forces in necessity. If necessary, temporary sheds shall be erected in the fire prone areas during the fire season with sufficient manpower round the clock for constant surveillance.

(IX) Firefighting equipment: Equipment like gumboots, fire-resistant suit, blower etc. shall procured and made available to the fire camps.

(X) Impact Monitoring: Incidents of fire shall be documented and reported promptly to the Field Director and the Chief Wildlife Warden. Controlled burning areas shall be monitored to assess their impact and streamline future activities. The Wildlife Warden shall review the fire plan every year after the fire season. The gaps in fire protection shall be identified and suitable measures to strengthen the same shall be taken at all levels.

6.4.3 THEME PLAN FOR WATERSHED MANAGEMENT

The quality and utilization of habitat by the wild animals depend on the availability of water resources within their reach. There are several natural water bodies like streams, nullahs, marshy areas, swamps in the Park area. In addition to the natural sources, artificial sources such as check dams and ponds are also created in the Park.

Surface water repositories play a critical role in Protected Areas and wildlife corridors, particularly in the hot months. They maximize water retention in the soil and are crucial to ecosystem health from becoming focal points of wildlife movement. Seasonal depletion of water bodies over years is a natural phenomenon in the landscape in recent years been accentuated by climate change. Regular mechanism is to be provided to monitor the water level and replenish these water holes and prevent them from drying out. Camera traps need to be placed around the water holes to record animal presence. Depending on the need additional water holes may be constructed wherever necessary. Management interventions (other than protection) in natural water holes must be kept to the barest minimum to allow ecological processes to play out. The impact on the vegetation of aggregating herbivores around water holes needs to be minimized. Artificial water holes help alleviate the effects of water shortage in the natural sources, and the location of the artificial water holes is to be distributed in such way as to make sure the water availability in the Park area and minimize potential human animal conflict.

A total of 7 check dams and 9 ponds exist in the Park. Communities residing at Kottakambur, Koviloor and Vattavada also depend on the water from the Park for drinking and irrigation purposes. Check dams were mostly constructed using LSGD funds for providing drinking water projects for the local community. However, these water sources are meeting the needs of wild animals also. The following guidelines shall be followed for the management of the check dams and ponds in the Park.

(I) General Guidelines for Management of Ponds and Check Dams

- The existing check dams and ponds shall be de-silted and maintained properly. Desilting shall be carried out before the beginning of monsoon.
- The silt removed from the structures shall be dumped and arranged in such a manner to raise the height of the structures and thereby increasing the water holding capacity. Under no circumstances the silt and mud removed be dumped as such nearby, it will then be washed back into the structures during rains thereby nullifying the purpose of desilting.
- Desilting works and other cleaning works shall be entrusted to the forest dependent communities through EDC which helps in employment and uplifting their livelihood.
- A gradual slope or approach shall be provided around the water hole / check dam to enable easy drinking water accessibility for the wild animals.
- The nearby streams and rivulets shall lead into the water holes as feeder drains. A small path can be dug depending upon the conditions prevailing in the ground. This can help in improving the drainage network and ensure the availability of water everywhere.
- In many cases, it can be seen fallen trees or driftwood lying in the water hole or check dams. Once decayed, they affect the quality of water and can block the normal flow of water. These fallen trees and drift wood shall be removed and left to decay in the forest.
- The check dams and water holes that dry up in December and January may be deepened in order to store more water to increase the availability throughout the year.
- Soil & moisture conservation works may be taken up on a priority basis in the vicinity and surrounding streams, water holes and check dam which dries up in a lean period.

- The impact of soil and moisture conservation work may be measured from the recharging water in streams, ponds and check dams that dry otherwise in the lean period. Assistant Wildlife Warden shall maintain a proper record for this purpose.
- Journal on check dam and pond management should be maintained at Range / Section level.

(II) General Guidelines for Identifying Suitable Sites for Construction of Ponds and Check Dams

- Brushwood check dams or shallow ponds shall be constructed based on the requirements.
- All new constructions shall be away from the existing ones.
- Ponds and check dams shall be constructed away from the Park boundary and from human settlements to rule out the possibility of poisoning the water and chances of poaching.
- Location identified shall ensure that only minimal to zero trees are cut / felled / destroyed / submerged for the purpose.
- Areas prone to soil erosion shall be avoided.
- Maintenance of the existing check dams and ponds.

To provide a judicious distribution of water sources for wildlife and to fulfil the water needs of the local people, detailed information needs to be generated during the plan period. The following activities are proposed as part of water resource management:-

- Mapping of water sources - water holes, check dams, streams and other natural sources with seasonality.
- Installation of an automatic weather station for the regular recording of weather data.
- Initiation of dialogue with local bodies and beneficiaries for water sharing and watershed conservation.
- Conduct a feasibility study to retain water in crucial locations inside and outside the Park.
- Implementation of suitable measures for maintaining and improving watersheds like bring back original vegetation in restoration zone, soil and moisture conservation measures etc.

The awareness level and practices of local communities are not conducive to water conservation. Water harvesting structures are not adequate and soil erosion is evident in steep slopes. The line departments involved in the soil and moisture conservation, groundwater conservation, etc. have poor linkages with KFD. Hence the following strategies are proposed to overcome these drawbacks:

Collect available maps from FMIS, LUB, CESS, CWRDM, IFP etc and prepare micro drainage maps of the Park.

- Create awareness among the local communities for the efficient use of water resources.
- Address the problem of water shortage for humanuse through FDA.
- Assess the shortage of water sources within Park and develop an appropriate measure to address the same through FDA, MNREGS
- Develop rainwater harvesting structures in crucial locations using funds from various projects / plans / local bodies.
- Construction of brushwood check dams using poles / trunks of eucalyptus / wattle.
- Soil and moisture conservation measures shall be taken up in areas with high soil erosion.

The Wildlife Warden shall prepare a status paper on water resources and seasonality calender and propose a programme for the development of water holes and check dams accordingly during the current plan period.

6.4.4 THEME PLAN FOR HABITAT MANAGEMENT

The Park is a home for wild animals to meet their vide variety of requirements for species survival and propagation such as food, fodder, shelter, conducive situation for copulation, breeding cover, preservation of gene pool, etc. Hence improving the quality of the habitat shall promote the wildlife population of the area. As part of habitat / species monitoring, studies like mapping of vegetation, wildlife health monitoring, documentation of flora and fauna including RET and endemics, population monitoring of selected flora and fauna, habitat utilization and movement pattern of elephants, invasive / exotic species that have negative impact on ecosystem, spatial and temporal distribution of water sources, mapping of water sources, drainage map, monitoring of burned areas, the impact of controlled burning on the habitat utilization and distribution of small animals like amphibians, quantification of firewood, Eco-restoration in plantation areas, regeneration status of RET and endemic flora, monitoring Shola etc, shall be taken up on priority basis during the plan period.

The Tribal Rights Act 2006 defines Critical Wildlife Habitats (CWHs) as areas that are "required to be kept as inviolate for the purposes of wildlife conservation." Such areas are determined for each protected area by a committee which has scientists, local people, and a representative from the Ministry of Tribal Affairs. In order to notify a CWH, the Act requires State governments to establish that the presence of right-holders is causing irreversible damage to wildlife and their habitats, and that co-existence between rights holders and wildlife was not a reasonable option. Identification of the CWH is to be conducted in the Management Plan period. Committee is already constituted and notification process to be completed as per the guidelines of the National Tiger Conservation Authority (NTCA). Harvesting of NWFP shall be restricted from the CWH areas.

(I) Maintenance of Swamps

A marshy area or swamp is there in the Park dominated by grasses and sedges. Small streams originate from these areas and as such are always wet and moist which in turn helps in keeping fresh and green vegetation all throughout. This area is unique in terms of microhabitats for amphibians and microfauna.

Prescriptions for management of Marshy Areas (Swamps)

- Invasive weeds and tree saplings shall be removed. Weeds shall be eradicated before the flowering season.
- Surrounding forests and drainage systems to the swamp shall be protected from all kinds of biotic interference.
- The treatment areas shall be monitored to evaluate management interventions.

(II) Supplementation of Animal Nutrients

In an ecosystem, nutrient supplementing area provides sodium calcium, iron, phosphorus and zinc required in the spring time for bones, muscles and growth for the wildlife. All trace elements like copper, magnesium and cobalt are retained in these area for the metabolism of most mammals. Animals regularly visit these areas in the ecosystem which are composed of primarily common salt (sodium chloride). It provides sodium, calcium, iron, phosphorus etc. Salt licks occur naturally in certain locations in the forest where mineral salt are found on the ground surface. Shortage of sodium in the plants which are eaten by wildlife could motivate the game to eat a lot of soil at the lick (Ayeni, 1972). The shortage is as a result of water soluble sodium salts being leached out during heavy rain following long period of desiccation. Some plants even substitute potassium ions for sodium ions

uptake from soil without showing mineral deficiency symptom (Buckman and Brandy 1960). Many plants are also rich in sodium and potassium, but with the depletion of such forest sources animals tend to wander around fringe area settlements and tourism facilities which increases negative human animal interactions and pose threat to wildlife. Thus nutrient supplementing area may be set up in appropriate location to provide essential nutrition for their survival. It also eliminates the chances of wildlife straying around human settlements and tourism facilities for substitutes. If it is found necessary this can be implemented in this plan period on an experimental basis.

Prescriptions for the Supplementation of Animal Nutrients

Nutrient supplementing areas shall be created near the vicinity of water holes and check dams, away from areas of human habitation.

- Regular monitoring of these and its consumption by wild animals can be useful for effective management interventions.
- Installation of camera traps near water holes and check dams.

CHAPTER 7

Eco-Tourism, Interpretation and Conservation Education

7.1 GENERAL

Eco-tourism and other forms of sustainable travel have much scope in the Pampadum Shola National Park. The boom of tourism in Munnar and other tourism centers of Idukki made a large scale inflow of tourists and their desire to explore natural locations made eco-tourism desirable and ideal for the region. Eco-tourism was one of the major components adopted in the previous Management Plan for the sustainable management of the conservation activities of the Park.

Eco-tourism activities implemented in the Park includes low impact travel to enjoy the scenic beauty and weather, trekking through designated areas in the Buffer zone, stay in the exotic locations, ethnic food, nature education, opportunity to buy authentic products from the eco-shop, etc. In addition to the components of traditional tourism, the eco-tourism implemented in the Park provides educational opportunities for the travelers / tourists on the physical landscape, ecological significance and need for conservation. Eco-tourism is a major source of funds for the livelihood development of local communities without causing harm to the environment and natural resources.

Based on the agreement signed between State Forest Development Agency and M/S Stesalit Systems Ltd. a carrying capacity assessment of the present level of eco-tourism activities, was carried out in the year 2019 **(Table 7.1)**. The study aimed at estimating the carrying capacity for different eco-tourism activities offered at Shola National Park based on the formula provided in the 2011 MoEF&CC - Guidelines for Eco-tourism in and around Protected Areas.

TABLE 7.1: CARRYING CAPACITY OF PSNP OORAKADU TRAIL

Eco-tourism Programmes	Physical Carrying Capacity (PCC)	Real Carrying Capacity (RCC)	Effective Permissible Carrying Capacity (EPCC)
Pampadumshola (Oorakadu Trail)	144 person / day	67 person / day	67 person / day

The current Plan continues to emphasize conservation, providing enriching personal experiences and environmental awareness to tourists, nature education, low impact travel / trek, and propose necessary interventions for improved social and cultural participation of the local communities, increased avenues for income generation to local community, diversification of products, procurement of vehicle for eco-tourism operation, allocation of necessary manpower exclusively for eco-tourism operations and optimization of income from the tourism infrastructure. All the activities undertaken in connection with eco-tourism during the current plan shall be in strict adherence to the basic principles set forth such as;

- Minimize the impact of tourism on the Park, roads and the Protected Area.
- Build respect and awareness on the environment, ecology, conservation of forest and wildlife and cultural practices.
- Ensure that the tourism provides positive experiences for both the visitors and the local communities.
- Provide a direct financial resource for conservation and protection activities of the Park.
- Provide avenues for alternate employment, economic benefits, empowerment and other benefits for local communities.

7.2 OBJECTIVES

- To promote environmental conservation awareness.
- To facilitate eco-tourism activities as a source of funds for the protection and management of the Park.
- Livelihood development of local communities without causing harm to the environment and natural resources.
- Income generation of local communities through the sale of various products.

7.3 ISSUES AND PROBLEMS

- Absence of information centre and interpretation centre for the PA.
- Inadequate resource persons for co-ordinating nature education programme, conservation education and interpretation.
- Absence of exclusive staff for eco-tourism. The protective staff is engaged for the tourism purpose and this is an additional burden for the protective staff and it reduces their productivity and accountability.
- Insufficient awareness programme for the local community in their local language.
- Absence of scientific waste management system.
- Semi-skilled and inexperienced guides.
- Lack of toilets, fresh rooms, cloak room facility for tourists visiting the Park.
- Absence of promotional activities, schemes etc. for optimizing the output from eco-tourism.

7.4 STRATEGIES

- Implement a scientific waste management plan for the Park.
- Engage EDC watchers for the removal of litter from the Park.
- Legal enforcement of rules and fine to control littering in National Park.
- Establish centralized information centers at Munnar and Marayoor.
- Documentaries, books, guides, charts, maps, interactive games etc. for various age groups.
- Promotion of nature education and interpretation.
- Promotion of paid nature camps for clubs, organizations, groups etc. for optimizing the revenue.
- Annual maintenance, proper upkeep of furniture, equipment, vehicles etc. and other facilities of the nature education centre and up-gradation of the same from time to time.
- Develop appropriate and eco-friendly hoardings and signage at strategic locations.
- Engage trained resource persons, experts for conducting nature camps and co-ordinating extension activities through AFDA.
- Capacity building and training to guides and staff for visitor management and general awareness on flora and fauna of the Park.
- A post of Eco-tourism officer is recommended for the overall monitoring of eco-tourism activities at the Division level.

- Procure enough vehicles, equipment and supplies for the smooth conduct of eco-tourism such as solar light, tents, torches, binoculars, hiking pole etc. from time to time.
- Create awareness among local communities / visitors to the Park.
- More leaflets and pamphlets will be issued and the information board may be erected at strategic locations.
- Provide customized packages for various groups depending on their need for optimizing the income from tourism with strict adherence to the principles.
- Design and incorporate appropriate nature based tourism programme including the components like exposure to the cultural and sociological conditions of community and to the local cuisine of the fringe villages for ensuring livelihood security of forest dependent community.
- Annual Maintenance / up-gradation and subscription of website and business promotion through the appropriate medium.
- Encourage the participation of nature education groups / tourists in groups etc, in the eco-restoration programme.
- Benefit sharing mechanism with tour operators for the benefit of local people / forest dependent communities.
- The power sources for all the facilities should be from renewable sources of energy.
- Additional 4 EDC members to be engaged in trekking activities during peak time.
- Recommends the setting up of committee including the Asst Wildlife Warden, Ecotourism Manager, President and Secretary of the EDC to form a monitoring protocol for the effective management of eco-tourism facilities during this plan period.
- Streamlining and optimal use of the existing eco-tourism facilities are recommended instead of opening new sites / new programme.
- Training to staff and guides for the smooth conduct of eco-tourism.

The Wildlife Warden shall conduct an annual review of environmental conservation awareness programme and eco-tourism activities.

7.4.1 IDENTIFICATION OF ZONE

Tourism zone is already identified and designated from an area of the Buffer zone. **(Figure 2.1)**.

7.4.2 INFRASTRUCTURE DEVELOPMENT

The basic infrastructure necessary for the eco-tourism programme were established in the previous plan period. This includes amenities such as a mud house with two double rooms, two log houses with two double rooms, an amenity centre with 14 beds, a well equipped nature education centre with an interpretation hall with 50 seats, two dormitories with total 40 bed, cafeteria, eco-shop, website etc. During the plan period the following activities are prescribed:

- Annual maintenance, proper upkeep of furniture, equipment, vehicles etc. and other facilities of the nature education centre and up-gradation of the same from time to time.
- Develop appropriate and eco-friendly hoardings and signage at strategic locations, centralized information centers at Munnar and Marayoor, toilet facilities, fresh rooms, cloak room, cafeteria etc. for the tourists at Top Station check post and Manathalam.

- Vehicles for eco-tourism.
- Establish an interpretation centre for the Park.
- New infrastructure development should be in accordance with eco-tourism guidelines.

7.4.3 REGULATIONS, MONITORING AND EVALUATION

As per the carrying capacity assessment carried out in the year 2019, the estimated carrying capacity of the Park is 67 persons / day, which is greater than the current utilization rates. For the successful and long-term management of eco-tourism, regular feedback from all the participants involved is necessary. Through this process, shortcomings can be sorted out. Regular monitoring of the performance of the eco-tourism operations will be conducted against the visitor volume, the economic benefits, number of nature camps conducted, community participation etc. Regular meetings of EDCs shall be conducted. Periodical evaluation of the impact of tourist on the Park, visitor volume and seasonality in the different parts of the Park, socio-economic impacts of eco-tourism, visitor satisfaction etc.

7.4.4 INTERPRETATION AND PUBLICITY ACTIVITIES

- Green day celebrations and activities by involving local peoples and students from nearby schools.
- Establish an interpretation centre for the visitors with a nominal entry fee.
- Ensure the availability of documentaries, books, guides, brochures, pamphlets, charts, maps, interactive games etc. for various age groups.
- Erect eco-friendly signage conveying the importance of the Park, directions etc. along the roadside.

7.4.5 CONSERVATION EDUCATION

- Engage resource persons for the conservation education.
- Prepare a proper time table for the nature education camps including the activities.
- Create a feedback form for the evaluation of the camp.
- The Wildlife Warden should monitor the nature education camp and evaluate the feedback forms.
- Establish a library for the nature education camp participants.
- Ensure the availability of documentaries, power point presentations etc. for the conservation education.
- Procurement of computer and LCD projector for awareness creation.

7.5 KEY AREAS OF TOURISM POTENTIAL FOR DEVELOPMENT AND PROMOTION OF ECOTOURISM

Tourism zone was already demarcated for tourism, interpretation and conservation education programme **(Figure 2.1).**

7.6 PRESCRIPTIONS FOR ECO-TOURISM LOCATIONS

- The existing facilities shall be maintained during this plan period.

- Special focus shall be for maintaining and establishing safety measures for these locations.
- It is suggested to prepare an eco-tourism plan separately for each eco-tourism centre specifying requirements of basic facilities, semi-permanent eco-friendly infrastructures, training, awareness and capacity building of staff etc.
- No permanent construction works are prescribed in the eco-tourism sites.
- A total ban on plastics (bags, bottles etc) shall be enforced in the eco-tourism sites. Fine may be imposed for discarding plastic waste in the ecotourism sites and warning boards be erected against all waste deposition. Aproper mechanism for waste collection shall be developed for all ecotourism sites. Recycling and management of wastes shall be done in accordance with the waste Management Plan of the Park. CCTV cameras shall be installed at various locations for intensification of surveillance. Legal action shall be taken against the defaulters. Suitable sign / direction / information boards shall be erected in ecotourism sites and on the sides of major routes.

CHAPTER 8

Eco-development

8.1 GENERAL

The economic well being and improvement of quality of life of the communities are vital components for the successful implementation of the Plan. The responsible participation of local communities is inevitable in the protection of forest resources from fire, illegal grazing, poaching, hunting, extraction of minerals, felling, exploitation of natural wealth, etc. The major hurdles in maintaining the people PA interface for the conservation of the Park and strategies to overcome the same are described in this chapter.

There are no forest dwelling communities inside the Pampadum Shola National Park. The people of Vattavada settlement and tribal of Anamudi Shola National Park are mainly depending on the Park for their day today life. Presently only one EDC is functioning in the Park. The EDC members mainly involved in the protection and tourism activities of the Park. Honey is the only NWFP collected from the Park area by the tribes of Anamudi Shola National Park. Local people are collecting the dried twigs, branches of exotic species like eucalyptus and black wattle as firewood for their bonafide use.

8.2 OBJECTIVES

To strengthen People-PA interface.

8.3 SPECIFIC ISSUES

- Human-Wildlife conflict
- Firewood collection
- NWFP collection

8.4 BROAD STRATEGIES TO STRENGTHEN THE PEOPLE PA INTERFACE

- Identification of the needs / aspirations, natural and cultural resources of the local community is required to evolve appropriate measures to strengthen the People - PA interface. Channelizing / pooling the fund from various sources for the development of fringe communities, the formation of a fringe EDC, organizing and conducting diverse / manifold programme to improve the relations with stakeholders etc. are recommended during the plan period. For mitigating the specific issues following strategies are proposed.
- Eco-development activity as per micro plan

8.4.1 HUMAN WILDLIFE CONFLICT

- Undertake appropriate habitat improvement programme within the Park for improving the availability of forage and water.
- Awareness programme in co-ordination with Agriculture and Horticultural Departments on safe farming practices and crops to reduce damage by wildlife.
- Timely assessment of damages caused by wildlife and payment of compensation on time.
- Solar power fencing, trenches, early elephant warning systems etc. by pooling of resources of LSGD, MNREGS.
- Introduction of crop insurance with the support of line departments.
- Undertake studies on the magnitude of human wildlife conflict and take necessary steps.
- Vaccination of domestic animals
- For procurement of gadgets for rescue and rehabilitation of wild animals

8.4.2 FIREWOOD COLLECTION

- Study the impact of firewood from the Park and take appropriate measures.
- Prevent the collection of indigenous species as fuel wood.
- Permission for the removal of exotic species with mutual commitment as part of removal of the invasive plantation from the Park area in successive phases.
- Awareness building on alternate energy sources to reduce dependency on forests.
- Provide alternate energy sources for reducing the demand for the fuel wood in co-ordination with line departments / NGOs / LSGD / Clubs

8.4.3 NWFP Collection

- A study on the threshold capacity of the NWFP of the Park.
- Define the zone of collection and frame access rules for sustainable collection.
- Evolve scientific / sustainable practices for the collection of NWFP from the Park.
- Documentation of NWFP collection.
- Training involving peer educators and stakeholders.
- Periodical monitoring and evaluation of NWFP collection.
- Infrastructure development for processing, storage and value addition of NWFP.
- Branding, sales promotion etc. of products through Eco-shops.

8.5 VILLAGE LEVEL SITE SPECIFIC STRATEGIES

- Feasibility study and formation of fringe EDCs.
- Identify and implement the programme for the development of livelihood options in the community.
- General activities / programme to improve public participation.
- Training to staff on eco-development micro-planning and visits to other sites

8.6 MONITORING AND EVALUATION

As per the previous Management Plan, the progress of the EDC activities shall be monitored periodically based on the defined performance indicators. The monitoring indicators prescribed are;

a) Ecological: Biodiversity assessment, qualitative and quantitative evaluation of water sources, area under invasive species etc.

b) Social: Dependency of the people on the Park, access to basic amenities, an alternative source of income, quality of education and livelihood.

c) Institutional: Working of the EDC, Conflict resolution mechanism, the involvement of line agencies.

The Monitoring of developmental activities shall be done in order to assess the performance in terms of the above mentioned indicators.

On the evaluation of the measures to strengthen the People - PA interface during the previous plan period it is found that participatory approaches were followed during negotiation and implementation phases. Responsible participation of the community depends more on the direct engagement

of the local leadership from the community. To enhance participation and People - PA interface, programme should be more frequently evaluated during community meetings and consensus on need based interventions can be arrived at. People-PA interface and responsible participation do not occur automatically. The initial resistance faced in gaining the community trust was reconciled during the previous Management Plan period. A gradual and ongoing effort is required in the current plan period to convince local communities on the possible benefits of a good People-PA interface. Regular meetings and workshops, improved participation in community celebrations, special occasions, etc. are important in strengthening personal and working relationships with them. Quality of People-PA interface determines the degree of trust of the community in the activities of the Park. The quality of People-PA interface is reflected in the attitude of the community towards regulations, restrictions, prohibitions, inspections, participation in meetings and activities, motivation to involve in the conservation activities, number of violations, offenses reported etc.

CHAPTER 9

Research, Monitoring and Training

9.1 GENERAL

Research, monitoring and training play an integral role in the conservation of the Protected Area. Research and monitoring have a key role in facilitating scientific interventions for effective conservation. It also helps to assess the success or failure of the activities / strategies / programme prescribed in the Management Plan. The Park is having habitat continuity with the Kannan Devan Hills and the Palani Hills. The habitat of the Park is primarily Shola forest while the Western side is characterized by the uncontrolled growth of invasive / exotic plantations of Black Wattle (*Acacia mearnsii),* Eucalyptus *(Eucalyptus granids),* and pine *(Pinus caribaea)*. The grasslands are seen on the upper reaches of the Park. During a rapid plant exploration, a total of 351 plant species belonging to Pteridophytes and Angiosperms were identified from the study area. Of these, nearly 164 taxa (49%) are 'endemic'. The threatened category of plants (13%) recorded from the PA includes 5 Critically Endangered, 11 Endangered and 21 Vulnerable species. The details of the permission granted for research in the Shola National Park is Annexed in **Annexure-3.4.** The habitat utilization and population dynamics of the flagship species, Nilgiri Marten (*Martes gawtkinsii*) in the Park is not studied yet. In order to accomplish the plan objectives, the following research, monitoring and training strategies are proposed.

9.2 RESEARCH AND MONITORING

9.2.1 Habitat Improvement

- Map the extent of the invasive / exotic species inside the Park.
- Identify the invasive / exotic species present in and around the National Park.
- Standardise suitable site / species specific method for the eradication of invasive / exotic species.
- Study the natural regeneration of the invasive / exotic species affected areas in the Park.
- Eco-friendly techniques and measures for the eradication of invasive / exotic plantations of the Park.
- Identify the suitable species for restoration including grass species.
- Standardize the procedure for collection of seeds, germination and hardening seedlings of the selected species for eco-restoration.
- Establish permanent plots for the long term monitoring of the eco-restoration area.
- Study the impact of NWFP collection from the Park and make recommendations for sustainable collection.
- Study the impact of fire wood collection from the PA.
- EIA study before the construction of new check dams inside the National Park.
- Study the regeneration of NWFP.
- Planting the NWFP species in the homesteads.
- Scientific and sustainable collection of NWFP and recommendations.

9.2.2 Biodiversity Assessment.

- Detailed studies on Bryophytes, Pteridophytes, Gymnosperms and Angiosperms present in the Park.

- Research / studies on the Threatened taxa present in the Park.
- Assessment of small mammals like rats, shrews and moles are needed, because the diversity of this category in the Park is unknown to the world.
- Daily monitoring of wildlife and documentation.
- Annual camera trap exercise to be conducted in the landscape level which will help to identify the movement pattern of large mammals.
- Conduct detailed study regarding the small life forms inside the Park.
- Population estimation and assessment of all taxa at appropriate intervals.
- Conduct annual survey of Mammals, Birds, Reptiles, Amphibians, Butterflies, Odonates etc.
- Study the population dynamics and habitat utilization of Nilgiri Marten in the PA.
- Photographs of flora and fauna especially lower group animals present in the PA should be collected and an album containing such details to be kept.
- Establish a temporary rescue center for wildlife in distress.
- Livelihood promotion programme for local communities.
- Study and recommendations on the effectiveness of EDCs.
- Studies on the impact of climate change and habitat shift of various species may be carried out during the plan period. Future conservation efforts can be identified based on the sensitivity and habitat suitability for the most vulnerable species.
- Study and document of traditional knowledge of indigenous communities.

9.3 MONITORING

- Monitor the movement of large mammals present in the Park.
- Regular monitoring of wildlife mortality.
- Develop a health monitoring protocol for wildlife in the Park and regular monitoring is recommended.
- Regular monitoring of water resources, check dams and its documentation.
- Annual Monitoring of the impact of forest fire in the Park.
- Monitor the regeneration and habitat use by the wildlife in the eco-restoration areas.
- Radio-collaring and monitoring of problematic animals.
- Install automatic weather stations at lower and higher camp and collect data regularly.
- Annual wildlife population estimation.
- The NWFP collected from the PA must be documented monthly or seasonally, a sample of the NWFP must be collected and the weight must be documented.
- Record maintenance of researches, surveys, studies etc. at the Division level.
- Participation of local communities in conservation and protection activities.
- Monitoring of strategies adopted for fire prevention.
- Monitoring of strategies for optimizing income from eco-tourism.
- Qualitative and Quantitative analysis of habitat for studying the climate change.

- Study on the effectiveness of eco-restoration programme in the PA.
- Study on the suitable species, propagation and management in the eco-restoration areas.
- Habitat usage of eco-restoration areas by wildlife.
- Study the impact of eco-restoration on soil and water.
- Establish Surveillance cameras in the restoration area.

9.4 TRAINING

- Training for staff and EDC members on intelligence gathering, identifying wildlife article, collection and handling of biological materials, identification of flora and fauna, wildlife census techniques, animal health monitoring, weapon handling, modern firefighting methods, participatory forest management, unarmed combat, acts and rules etc.
- Training to stake holders on scientific / sustainable collection of NWFP and value addition.
- Training for staff and EDC members on animal rescue operations and first aid.
- Training to EDC members on micro planning, accounting and management.
- Training to staff on weapon handling, firefighting, census techniques etc.
- Training to different target groups like students, media persons, politicians and local peoples on nature awareness, water conservation and biodiversity.
- Research, monitoring and training programme are documented and records shall be (Hard copy and Soft Copy) maintained at the office of the Wildlife Warden. A Resource room / library for proper systematic maintenance and upkeep of documents, and information gathered through surveys, census, research, studies, monitoring and evaluation reports etc. is proposed. Engage necessary staff for the systematic maintenance and upkeep of the resource room.
- To bridge the skill gap and professional expertise and improve species literacy biodiversity applications assisted by modern technology is recommended. This will facilitate the conduct of surveys, population estimation, biodiversity assessment of specific areas, facilitate nature education, increased awareness on the native biodiversity etc. that fit to the working conditions of the PA.

CHAPTER 10

Organisation and Administration

10.1 STRUCTURE AND RESPONSIBILITIES

10.1.1 STRUCTURE

The organizational structure of the Park is as shown below:

10.1.2 Responsibilities

- The Pampadum Shola National Park is functioning under the Wildlife Warden, Munnar who is responsible for the implementation of the Management Plan .The Wildlife Warden shall maintain a pocket field guide with schedule of operations for the implementation of Management Plan and furnish it to Assistant Wildlife Warden and Section Forester Officer.
- The Wildlife Warden shall make arrangements to supply the control forms to the Assistant Wildlife Warden and Section Forester Officer and compile the information about the Park.
- The Wildlife Warden, Munnar shall prepare Annual Plans of Operations and Schedule of Operations, in the first week of April every year.
- The Wildlife Warden shall not deviate from the prescriptions of the Management Plan without the prior permission in writing of the Chief Wildlife Warden.
- The Wildlife Warden shall also take action to review the Management Plan after five years.

10.2 STAFF AMENITIES

The following staff amenities are currently existing in Pampadum Shola National Park **(Table 10.1)**. The wireless station of Munnar Wildlife Division is located at Bendhar area. Two check posts are

functioning at the entry and exit points of Pampadum Shola National Park for the checking of vehicular movement through Munnar-Kovilloor road. The office and quarters of Assistant Wildlife Warden of Shola National Park are at Pampadum Shola National Park. Besides, 1 SFO quarters and a watcher's accommodation are also available in Pampadum Shola National Park.

TABLE 10.1: STAFF AMENITIES OF PAMPADUM SHOLA NATIONAL PARK

Sl No.	Name of building	Latitude	Longitude	Remarks
1	Assistant Wildlife Warden Office	10° 7′ 29.68″	77° 15′ 7.14″	Functioning as Shola office and accommodation for staffs
2	Assistant Wildlife Warden Quarters	10° 8′ 14.14″	77° 15′ 17.75″	Accommodation for Asst. Wildlife Warden
3	Section Forest Officer Quarters	10° 8′ 15.52″	77° 15′ 19.7″	Accommodation for Section forest officer
4	Forest Check Post-Top Station	10° 7′ 30.93″	77° 15′ 6.14″	Gate is functioning at Top Station
5	Forest Check Post-Manathalam	10° 9′ 24.44″	77° 15′ 30.1″	Gate functioning at Manathalam
6	Watchers Quarters	10° 9′ 24.3″	77° 15′ 29.63″	Accommodation for watchers
7	Bendhar Wireless Station	10° 8′ 3.87″	77° 16′ 17.38″	Wireless station

BUDGET

BUDGET OF PAMPADUM SHOLA NATIONAL PARK FROM 2020-21 TO 2030-31

Para. of Management plan	Activity	Financial requirements										Total Lakh
		1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	
6.3.2.1	Removal of plantation of exotic/ invasive species for improvement of habitat and restoration of original vegetation	20	30	30	40	40	40	20	20	15	15	**270**
6.3.2.1	Assisting regeneration of indigenous species	7.5	5	5	5	5	7.5	7.5	7.5	7.5	7.5	**65**
6.3.2.1	Establishment of permanent plots and monitoring successions and eco-restoration	2	2	2	2	2	2	2	2	2	2	**20**
6.3.2.1	Establishment of nursery for Eco-restoration work	15	15	15	15	15	10	10	10	10	10	**125**
6.4.1.5	Engaging protection Mazdoors	30	30	30	40	40	40	40	40	45	45	**380**
6.4.1.3	Ganja raids	1	1	1	1	1	1	1	1	1	1	**10**
6.4.1.4	New electricity / solar connection for all building in PSNP and internet connectivity	2	4	1	1	1	1	1	1	1	1	**14**
6.4.1.13	Uniform for protection mazdoors	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	**17.5**
6.4.1.1	Survey of boundaries and construction cairns / pillars	6	6	0	0	0	0	0	0	0	0	**12**
6.4.1.13	Purchase of equipment, tents, composes, GPS, binoculars, Range Finder, Digital camera, Camera trap, radio colour, field kit for staff and watchers	3	3	2	1	1	1	1	1	1	1	**15**

6.4.1.15. II	Erection of chain gates at Manathalam, Pattiyankal, Bendhar road at Top station and maintenance	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	**15**
6.4.1.15. III	Maintenance of Top station-Bendhar road	25	25	5	5	5	5	5	5	5	10	**95**
6.4.1.15. IV	Maintenance of trek paths	7	7	7	8	8	8	9	9	9	10	**82**
6.4.1.15. VI	Purchase of new vehicles and maintenance	3.5	4.5	4.5	4.5	4.5	4.5	15	4.5	4.5	20	**70**
6.4.1.15. VII	Purchase of arms and ammunition	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5**
6.4.1.15. IX	Intelligence gathering and rewards to informers	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5**
6.4.1.15. IX	Legal support in special cases	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5**
6.4.1.13	Supply of field kit, torches etc. to staff	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	**15**
6.4.1.3	Conducting anti-poaching at different areas in the National Park	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	**25**
6.4.1.3	Construction of new anti-poaching camp shed at Estate mala	0	15	0	0	0	3	0	0	0	3	**21**
6.4.1.3	Construction of patrol camp shed and watch tower, maintenance of existing patrol camp sheds and watch tower	3	3	3	5	5	5	4	4	4	5	**41**
6.4.1.4	Construction / maintenance of Section office cum residents for the forester at Manathalam and women BFO quarters	10	25	0	0	3	0	0	5	0	0	**43**
6.4.1.4	Maintenance of the outpost at Top station for accommodating Check post staff	3	3	0.5	0.5	2	0.5	0.5	0.5	1	1	**12.5**

6.4.1.3	Engaging mazdoors for anti-poaching activities	15	15	15	15	15	15	15	15	15	15	**150**
6.4.1.4	Maintenance of Range Office at Top station and residents at NEC for Range Officer	3	3	2	2	4	4	4	5	5	5	**37**
6.4.1.6	Clearance or maintenance of Interstate boundary	8	8	8	8	8	10	10	10	10	10	**90**
6.4.2.2 (I)	Creation of firelines and maintenance	8	8	8	8	8	10	10	10	10	10	**90**
6.4.2.1	Mapping of fire prone areas	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5**
6.4.2.1	Preparation of fire Management Plan	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	**3**
6.4.2.2(IX)	Purchase of firefighting equipment's (gum boots, fire resistant suit etc.)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	**15**
6.4.2.2 II	Control burning	4	4	4	5	5	5	5	6	6	6	**50**
6.4.2.2 IV	Creation of firebreaks	25	25	25	30	30	30	30	35	35	35	**300**
6.4.2.2 III	Engaging firewatchers during fire season	7	7	7	7	7	8	8	8	8	8	**75**
6.4.2.2 V	Participating fire management	3	3	3	3	3.5	3.5	3.5	3.5	4	4	**34**
6.4.2.2 VI	Awareness of staff and EDC during fire season	0.5	0.5	0.5	0.5	0.75	0.75	0.75	0.75	0.75	0.75	**6.5**
6.4.1.15 V	Purchase and maintenance of wireless system	5	5	1	1	1	1	1	1	1	5	**22**
6.4.1.4	Overhead and office expenses	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5	**22.5**
6.4.1.15 I	Building maintenance	5	5	5	5	5	6	6	6	6	6	**55**
6.4.2.2 VIII	Fire watch tower 1 No. (Pattiyankal) and maintenance	0	10	0	0	0	2	0	0	0	2	**14**

6.4.3	Conduct feasibility studies to retain water in crucial location inside and outside protected area	0.5	0.5	0.5	0	0	0	0	0	0	0	**1.5**
6.4.3 I	Maintenance and creation of water holes/check dams	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	**35**
6.4.3 I	Mapping of water resources and preparation of drainage map	0	0.75	0	0	0	1	0	0	0	0	**1.75**
6.4.3 II	Installation of metrological station	5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**9.5**
6.4.3 I	Soil and moisture conservation measures (Gully plugging, brush wood checkdam / bunds)	5	5	5	4	4	4	4	4	4	4	**43**
6.3.2.1	Monitoring regeneration status and soil erosion	0	1.5	0	0	1	0	0	0	1	0	**3.5**
6.4.4	Mapping vegetation type in the National Park	1	2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**7**
6.4.4	Wildlife health monitoring	2	2	2	2.5	2.5	2.5	3	3	3	3	**25.5**
7.4	Construction / maintenance information centre at Munnar	0	30	0	0	0	5	0	0	0	5	**40**
7.4	Construction of interpretation centre at Top station	0	20	0	0	0	0	2	0	0	0	**22**
7.4	Educational and awareness materials	0.75	0.75	0.75	0.75	0.75	1	1	1	1	1	**8.75**
7.4	Awareness camps (including nature awareness camps)	3	8	8	8	10	10	10	10	10	10	**87**
7.4.5	Procurement of LCD, Computer for awareness camping	2	0.1	0.1	0.1	0.1	2	0.15	0.15	0.15	0.15	**5**
7.4	Annual subscription of website	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1	**7.1**

7.4	Training to staff and guides on tourism	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	**7.5**
7.4	Purchase of solar lights, touches, . sleeping bags, tents, binoculars etc	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	**15**
7.6	Waste management system	5	1	1	1	1	1	1	1	1	1	**14**
7.4.	Maintenance of existing eco-tourism facilities	3	5	2	2	2	5	2	2	2	5	**30**
7.4.4	Erection of signage's at strategic location	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	**17.5**
7.4.4	Develop educational material like leaflets, brochures, pamphlets, posters, movies etc.	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	**15.5**
8.5	Constitution of EDCs and preparation of micro plans	0	2	0	0	0	0	1	0	0	0	**3**
8.4	Eco-development activity (as per micro plan)	4	4	4	4	4	5	5	5	5	5	**45**
8.4.1	Vaccination of domestic animals	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5**
8.5	Training to staff on eco-development microplanning and visits to other sites	1	0	0	0	1	0	0	1.5	0	0	**3.5**
8.5	Preparation of micro plans for new EDC and renewal of existing micro plan of watchers EDC	1	1	0	0	0	1.5	1.5	0	0	0	**5**
8.4.1	Construction of elephant proof trenches/ solar fences at Koviloor, Kottakamboor and Vattavada	10	10	10	5	5	5	5	7.5	7.5	7.5	**72.5**
8.4.1	Compensation against wildlife damage	3	3	3	5	5	5	6	6	6	6	**48**
8.4.1	Study the extent of wildlife damage problem	0	2	0	0	0	0	2.5	0	0	0	**4.5**

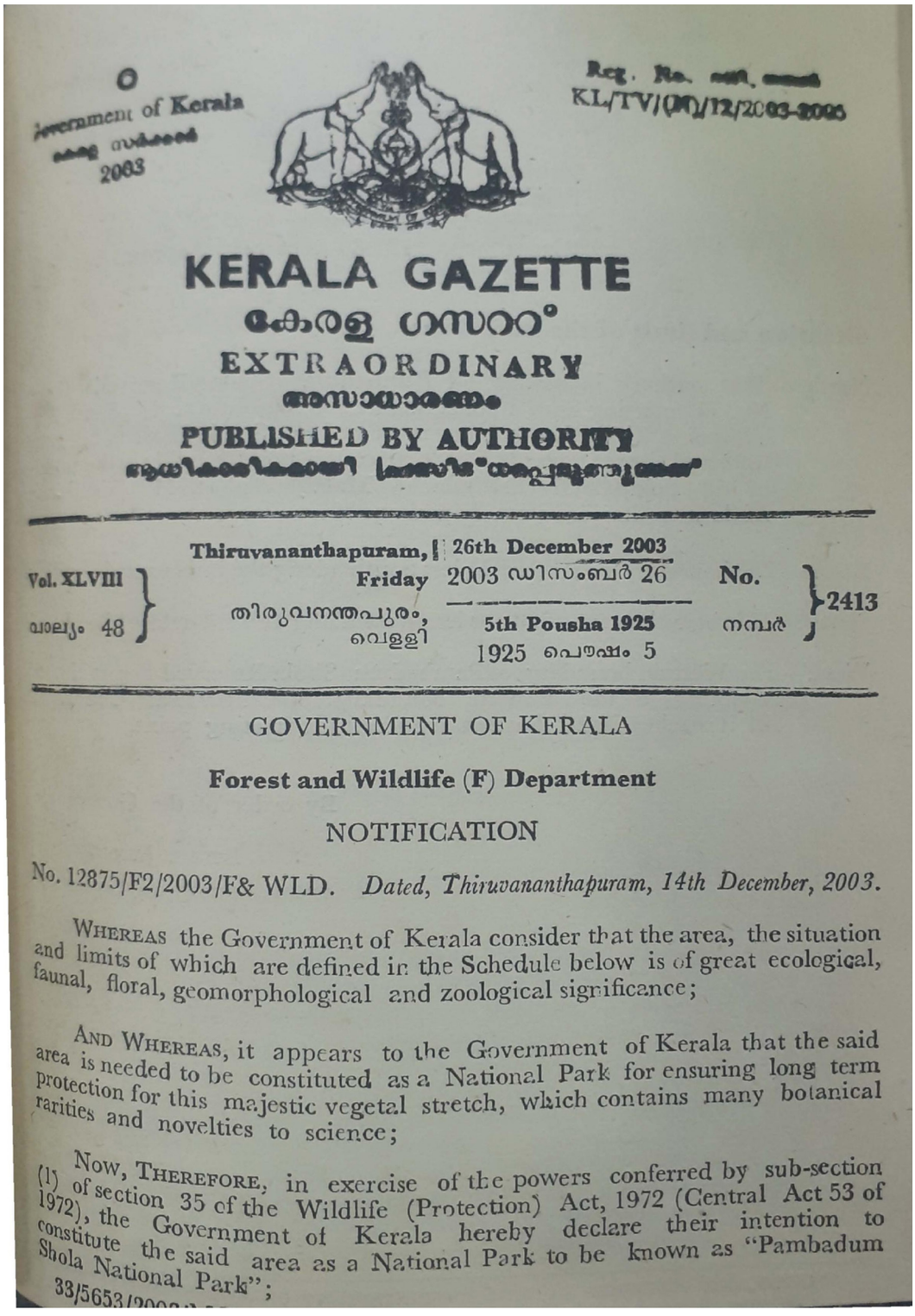
8.4.1	For procurement of gadgets for rescue and rehabilitation of wild animals	1.5	0.1	2	2	2	2	2	3	3	3	**20.6**
8.4.2	Purchase and maintenance of renewable energy system	3	3	3	3	2.5	2.5	2.5	2.5	3	3	**28**
9.2.1	Study, extent and impact of firewood collection	0.3	0	0	0	0	0.5	0	0	0	0.5	**1.3**
9.2.2	Document flora and fauna including RET and endemic and its periodic survey	0	0	2	0	0	0	0	2.5	0	0	**4.5**
9.2.2	Study and document of traditional knowledge of indigenous communities	0	0.5	0	0	0	0	0	0	0.5	0	**1**
9.2.1	Study and identify invasive species that have negative impact on ecosystem	0	1.5	0	0	0	1.5	0	0	0	2	**5**
9.2	Wildlife census	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	**7.5**
9.2.1	Study on elephant movements and connectivity	1	1	1	1	1	1	1	1	1	1	**10**
9.2.2	Habitat monitoring of Nilgiri marten and study of ecology and behaviour	1	3	2	0	0	0	0	0	0	0	**6**
9.4	Training to staff on weapon handling, firefighting, census techniques etc.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	**5**
9.4	Training to staff and EDC members on wildlife health monitoring, firefighting etc.	1	1	1	1	1	1	1	1	1	1	**10**
9.4	Capacity building of local communities for eco-tourism programme	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	**15**
9.4	Capacity building staff and guides in managing eco-tourism	1.5	0	1.5	0	1.5	0	1.5	0	1.5	0	**7.5**

9.4	Meeting with stake holders	0.5	0.5	0.5	0.5	0.5	0.5	0.75	0.75	0.75	0.75	**6**
9.2.1	study, extent and impact of NWFP collection	0.3	0	0	0	0	0.5	0	0	0	0	**0.8**
9.2.1	Training of scientific collection of NWFP and value addition	0.5	0	0	0	0	0.5	0	0	0	0	**1**
9.2.1	Regeneration of NWFP and medicinal plants in Red-data book	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	**15**
9.2.1	Planting of NWFP species in Homesteads	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	**17.5**
	Grand Total	**322.15**	**395**	**263.25**	**284.75**	**294.1**	**310.25**	**293.75**	**297.25**	**289.85**	**325.95**	**3076.3**

ANNEXURE

ANNEXURES 1.1

NOTIFICATION OF NATIONAL PARK



Government of Kerala
2003

Reg. No. KL/TV/(N)/12/2003-2005

KERALA GAZETTE

കേരള ഗസറ്റ്

EXTRAORDINARY

അസാധാരണം

PUBLISHED BY AUTHORITY

Vol. XLVIII വാല്യം 48

Thiruvananthapuram, Friday
തിരുവനന്തപുരം, വെള്ളി

26th December 2003
2003 ഡിസംബർ 26

5th Pousha 1925
1925 പൌഷം 5

No. നമ്പർ 2413

GOVERNMENT OF KERALA

Forest and Wildlife (F) Department

NOTIFICATION

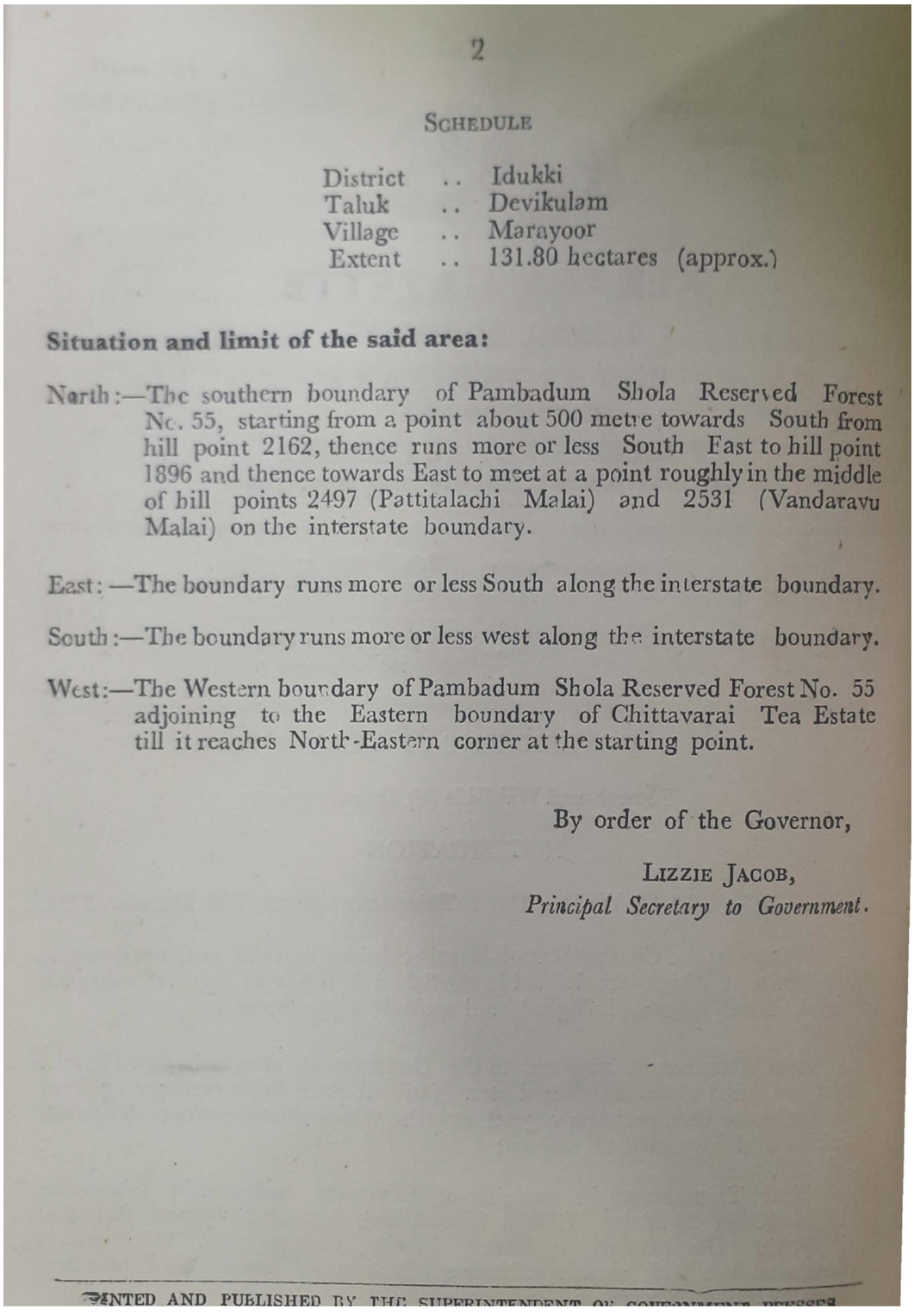
No. 12875/F2/2003/F& WLD. *Dated, Thiruvananthapuram, 14th December, 2003.*

WHEREAS the Government of Kerala consider that the area, the situation and limits of which are defined in the Schedule below is of great ecological, faunal, floral, geomorphological and zoological significance;

AND WHEREAS, it appears to the Government of Kerala that the said area is needed to be constituted as a National Park for ensuring long term protection for this majestic vegetal stretch, which contains many botanical rarities and novelties to science;

NOW, THEREFORE, in exercise of the powers conferred by sub-section (1) of section 35 of the Wildlife (Protection) Act, 1972 (Central Act 53 of 1972), the Government of Kerala hereby declare their intention to constitute the said area as a National Park to be known as "Pambadum Shola National Park";

33/5653/2003



2

SCHEDULE

District .. Idukki
Taluk .. Devikulam
Village .. Marayoor
Extent .. 131.80 hectares (approx.)

Situation and limit of the said area:

North:—The southern boundary of Pambadum Shola Reserved Forest No. 55, starting from a point about 500 metre towards South from hill point 2162, thence runs more or less South East to hill point 1896 and thence towards East to meet at a point roughly in the middle of hill points 2497 (Pattitalachi Malai) and 2531 (Vandaravu Malai) on the interstate boundary.

East:—The boundary runs more or less South along the interstate boundary.

South:—The boundary runs more or less west along the interstate boundary.

West:—The Western boundary of Pambadum Shola Reserved Forest No. 55 adjoining to the Eastern boundary of Chittavarai Tea Estate till it reaches North-Eastern corner at the starting point.

By order of the Governor,

LIZZIE JACOB,
Principal Secretary to Government.

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ANNEXURE 2.1

AVERAGE ANNUAL RAIN FALL DATA DURING THE LAST DECADES COLLECTED FROM NEIGHBOURING ESTATES OF PSNP

Division	2019/20	2018/19	2017/18	2016/17	2015/16	2014/15	2013/14	2012/13	2011/12	2010/11	2009/10
O.C.	1203.87	1542.79	1287.17	891.28	1057.4	837.43	991.87	602.74	826.77	838.96	857.25
North	1141.91	1383.03	992.31	698.24	885.19	1223.26	735.58	496.57	822.7	827.27	935.99
N.C.	1284.55	1585.97	1122.21	629.92	1009.65	1321.81	823.21	516.12	1070.86	798.06	999.99
South	1182.76	1507.23	1130.95	818.13	1231.9	1323.08	918.71	547.37	1004.82	839.97	909.57
Chittavurrai	1203.2725	1504.755	1133.16	759.3925	1046.035	1176.395	867.3425	540.7	931.2875	826.065	925.7

ANNEXURE 2.2

LOCATION OF EXISTING WATER HOLES AND CHECK DAMS INSIDE OF NATIONAL PARK

Sl No.	Name of water bodies	Geo-coordinates		Dry Months
		Latitude	Longitude	
Ponds				
1	Manathalam	10.15568333	77.25855556	October - May
2	Pattiyankal	10.15498	77.25362	October - May
3	Pultheri-1	10.1481528	77.25632222	November - May
4	Plantation Side	10.1433306	77.25535833	October - May
5	Near R.O Quarters	10.1377083	77.25476111	October - May
6	NEC Back	10.1374167	77.25318889	October - May
7	Pothinkandam- Left	10.1351472	77.25440556	January - May
8	Pothinkandam- Right	10.1352417	77.25510833	March - May
9	Bendhar (Near wireless station)	10.1346611	77.27189722	Permanent
Check dams				
1	Pattiyankal	10.14843056	77.25304444	August - May
2	Pultheri-2	10.1482278	77.25642778	October - May
3	Log house road	10.1418722	77.25533611	March - May
4	Bison Swamp	10.1396667	77.25484722	Permanent
5	Cement Palam	10.1324583	77.26433056	December - May
6	Bendhar-1	10.13250278	77.27193611	November- May
7	Bendhar-2 (near wireless station)	10.13420556	77.27203333	Permanent

ANNEXURES 2.3

ANGIOSPERMS OF PAMBADUM SHOLA NATIONAL PARK

Sl. No.	Scientific Name	Family	Local Name	IUCN and END
1.	*Andrographis affinis* Nees	Acanthaceae		Endemic to WG
2.	*Rungia apiculata* Bedd.	Acanthaceae		
3.	*Rungia laeta* Clarke	Acanthaceae		Endemic to SWG
4.	*Strobilanthes anamallaica* Wood	Acanthaceae		Endemic to SWG
5.	*Strobilanthes andersonii* Bedd.	Acanthaceae		Endemic to SWG
6.	*Strobilanthes cuspidatus* (Benth.) Anders.	Acanthaceae	Kannarakurinji	Endemic to SWG
7.	*Strobilanthes foliosus* (Wight) Anders.	Acanthaceae	Vettilakurinji	Endemic to PI
8.	*Strobilanthes gracilis* Bedd.	Acanthaceae	Thokakurinji	Endemic to SWG
9.	*Strobilanthes kunthianus* (Nees) Anders. ex. Benth.	Acanthaceae	Neelakurinji	Endemic to PI
10.	*Strobilanthes micranthus* Wight	Acanthaceae	Kallankurinji	Endemic to SWG
11.	*Strobilanthes neilgherrensis* Bedd.	Acanthaceae		Endemic to SWG
12.	*Strobilanthes neoasper* Venu & Daniel	Acanthaceae		Endemic to WG
13.	*Strobilanthes papillosus* Anders.	Acanthaceae		Endemic to SWG
14.	*Strobilanthes pulneyensis* Hook. f.	Acanthaceae	Chonayamkallu-kurinji	Endemic to SWG
15.	*Strobilanthes rubicundus* (Nees) Anders	Acanthaceae		Endemic to SWG

16.	*Strobilanthes tristis* (Wight) Anders.	Acanthaceae		Endemic to SWG
17.	*Strobilanthes urceolaris* Gamble	Acanthaceae	Panjikkurinji	Endemic to SWG
18.	*Strobilanthes zenkerianus* Anders.	Acanthaceae		Endemic to SWG
19.	*Thunbergia tomentosa* Wall. ex Nees	Acanthaceae		
20.	*Achyranthes bidentata* Blume	Amaranthaceae	Nayaruvichedi	
21.	*Celosia pulchella* Moq.	Amaranthaceae		
22.	*Indobanalia thyrsiflora* (Moq.) Henry & Roy	Amaranthaceae		Endemic to SWG
23.	*Ancistrocladus heyneanus* Wall. ex Graham	Ancistrocladaceae	Modiravalli	
24.	*Meiogyne ramarowii* (Dunn) Gandhi	Annonaceae	Panthalmaram	Endemic to SWG
25.	*Bupleurum mucronatum* Wight & Arn.	Apiaceae		
26.	*Bupleurum wightii* Kozo-Polj.	Apiaceae		
27.	*Heracleum candolleanum* (Wight & Arn.) Gamble	Apiaceae	Kattugeerakam	Endemic to SWG
28.	*Heracleum ceylanicum* Gardn. ex. Clarke	Apiaceae		
29.	*Heracleum sprengelianum* Wight & Arn.	Apiaceae	Kattumalli	Endemic to WG
30.	*Hydrocotyle conferta* Wight	Apiaceae		VU, Endemic to SWG
31.	*Hydrocotyle sibthorpioides* Lam.	Apiaceae		
32.	*Pimpinella pulneyensis* Gamble	Apiaceae		Endemic to SWG
33.	*Vanasushava pedata* (Wight) P.K. Mukh. & Constance	Apiaceae		VU, Endemic to SWG

34.	*Ilex gardneriana* Wight	Aquifoliaceae		CR,
35.	*Ilex walkeri* Wight & Gard. ex Thw.	Aquifoliaceae		
36.	*Ilex wightiana* Wall. ex Wight	Aquifoliaceae	Vellodi	
37.	*Arisaema leschenaultii* Blume	Araceae	Pambucholam	Endemic to SWG
38.	*Arisaema peltatum* C.E.C. Fisch.	Araceae		Endemic to SWG
39.	*Arisaema psittacus* Barnes	Araceae	Pambucholam	Endemic to SWG
40.	*Arisaema sarracenioides* Barnes & C.E.C. Fisch.	Araceae		Endemic to SWG
41.	*Arisaema tylophorum* C.E.C. Fisch.	Araceae		Endemic to WG
42.	*Aralia leschenaultii* (DC.) J. Wen	Araliaceae		Endemic to SWG
43.	*Polyscias acuminata* (Wight) Seem.	Araliaceae		Endemic to WG
44.	*Schefflera racemosa* (Wight) Harms	Araliaceae	Ettilamaram	
45.	*Ceropegia decaisneana* Wight	Asclepiadaceae		VU, Endemic to WG
46.	*Ceropegia maculata* Bedd.	Asclepiadaceae		
47.	*Gymnema montanum* (Roxb.) Hook. f.	Asclepiadaceae		
48.	*Hoya pauciflora* Wight	Asclepiadaceae		
49.	*Hoya wightii* Hook. f.	Asclepiadaceae	Ellodiyan	Endemic to SWG
50.	*Tylophora mollissima* Wight & Arn.	Asclepiadaceae		Endemic to SI
51.	*Tylophora tetrapetala* (Dennst.) Suresh	Asclepiadaceae	Nanjaippan	

52.	*Ageratum conyzoides* L.	Asteraceae	Kumminnipacha	
53.	*Anaphalis beddomei* Hook. f.	Asteraceae		VU, Endemic to SWG
54.	*Anaphalis bournei* Fyson	Asteraceae		Endemic to SWG
55.	*Anaphalis lawii* (Hook. f.) Gamble	Asteraceae		Endemic to PI
56.	*Anaphalis subdecurrens* (DC.) Gamble	Asteraceae		
57.	*Blumea oxyodonta* DC.	Asteraceae		
58.	*Chaetoseris cyanea* (D. Don) C. Shih	Asteraceae		
59.	*Cirsium wallichii* DC. var. *wightii* (Hook. f.) Vivek.	Asteraceae	Chakkumullu	
60.	*Cissampelopsis corymbosa* (Wall. ex DC.) Jeffrey & Chen	Asteraceae		
61.	*Conyza canadensis* (L.) Cronq.	Asteraceae		
62.	*Dichrocephala integrifolia* (L. f.) O. Ktze.	Asteraceae		
63.	*Emilia scabra* DC.	Asteraceae	Poosha-thala	Endemic to India
64.	*Gnaphalium polycaulon* Pers.	Asteraceae		
65.	*Gynura travancorica* W. W. Smith	Asteraceae	Koppuchedi	Endemic to SWG
66.	*Hypochoeris glabra* L.	Asteraceae		
67.	*Launaea acaulis* (Roxb.) Babc. ex Kerr.	Asteraceae		
68.	*Myriactis wightii* DC.	Asteraceae		CR
69.	*Phyllocephalum scabridum* (DC.) Kirkman	Asteraceae		Endemic to WG

70.	*Picris hieracioides* L.	Asteraceae		
71.	*Senecio lavandulaefolius* DC.	Asteraceae		Endemic to India
72.	*Vernonia anamallica* Bedd. ex Gamble	Asteraceae		VU, Endemic to SWG
73.	*Vernonia arborea* Buch.-Ham.	Asteraceae	Kadavari	
74.	*Vernonia bourneana h* W. W. Smit	Asteraceae		Endemic to SWG
75.	*Vernonia fysonii* Calder	Asteraceae	Kaliyamman-pathiri	Endemic to SWG
76.	*Vernonia heynei* Bedd. ex Gamble	Asteraceae		CR, Endemic to SWG
77.	*Vernonia salvifolia* Wight	Asteraceae		EN, Endemic to SWG
78.	*Vernonia travancorica* Hook. f.	Asteraceae	Karana,Thempu	Endemic to WG
79.	*Youngia japonica* (L.) DC.	Asteraceae		
80.	*Balanophora fungosa* J. R. & G. Forst. ssp. *indica* (Arn.) Hansen	Balanophoraceae	Nilamchakka	
81.	*Impatiens campanulata* Wight	Balsaminaceae	Thottachinungi	Endemic to SWG
82.	*Impatiens clavicornu* Turcz.	Balsaminaceae		Endemic to WG
83.	*Impatiens cordata* Wight	Balsaminaceae	Thottachinungi	Endemic to WG
84.	*Impatiens cuspidata* Wight & Arn.	Balsaminaceae	Thottachinungi	Endemic to WG
85.	*Impatiens elegans* Bedd.	Balsaminaceae		CR, Endemic to SWG
86.	*Impatiens goughii* Wight	Balsaminaceae		Endemic to WG
87.	*Impatiens hensloviana* Arn.	Balsaminaceae		

88.	*Impatiens jerdoniae* Wight	Balsaminaceae		Endemic to WG
89.	*Impatiens latifolia* L.	Balsaminaceae		Endemic to SWG
90.	*Impatiens maculata* Wight	Balsaminaceae		Endemic to SWG
91.	*Impatiens pandata* Barnes	Balsaminaceae		EN, Endemic to SWG
92.	*Impatiens parasitica* Bedd.	Balsaminaceae		Endemic to SWG
93.	*Impatiens phoenicea* Bedd.	Balsaminaceae		EN, Endemic to SWG
94.	*Impatiens tangachee* Bedd.	Balsaminaceae	Kannipoovu	Endemic to WG
95.	*Impatiens uncinata* Wight	Balsaminaceae		Endemic to SWG
96.	*Impatiens wightiana* Bedd.	Balsaminaceae		EN, Endemic to SWG
97.	*Begonia floccifera* Bedd.	Begoniaceae	Kalthamara	Endemic to SWG
98.	*Mahonia leschenaultii* (Wall. ex Wight & Arn.) Takeda ex Gamble	Berberidaceae	Mullumanjanathi	Endemic to SWG
99.	*Cardamine africana* L.	Brassicaceae		
100.	*Cardamine hirsuta* L.	Brassicaceae		
101.	*Sarcococca coriacea* (Hook.) Sweet	Buxaceae	Mattu-vadi	Endemic to PI
102.	*Campanula alphonsii* Wall. ex A. DC.	Campanulaceae		VU, Endemic to WG
103.	*Viburnum coriaceum* Blume	Caprifoliaceae	Mottumookkan	
104.	*Spergula arvensis* L.	Caryophyllaceae		
105.	*Euonymus crenulatus* Wall. ex Wight & Arn.	Celastraceae	Dhanthapatri	Endemic to SWG

106.	*Microtropis ramiflora* Wight	Celastraceae		
107.	*Cyanotis papilionacea.* (Burm. f.) Schult. f	Commelinaceae		
108.	*Cyanotis thwaitesii* Hassk.	Commelinaceae		
109.	*Argyreia daltonii* Clarke	Convolvulaceae		Endemic to SI
110.	*Argyreia elliptica* (Roth) Choisy	Convolvulaceae	Adumbuvalli	
111.	*Argyreia imbricata* (Roth) Sant. & Patel	Convolvulaceae		Endemic to SI
112.	*Cuscuta krishnae* Udayan, Robi & Manudev	Convolvulaceae		Endemic to SWG
113.	*Mastixia arborea* (Wight) Bedd.	Cornaceae	Kattukarpooram	Endemic to SWG
114.	*Zehneria maysorensis* (Wight & Arn.) Arn. var. *umbellata* (Chakrav.) Kumari	Cucurbitaceae		EN, Endemic to SWG
115.	*Bulbostylis barbata* (Rottb.) Kunth ex Clarke	Cyperaceae		
116.	*Carex filicina* Nees	Cyperaceae		
117.	*Schoenoplectus mucronatus* (L.) Palla	Cyperaceae		
118.	*Scleria pergracilis* (Nees) Kunth	Cyperaceae		
119.	*Daphniphyllum neilgherrense* (Wight) K. Rosenth	Daphnyphyllaceae	Kozhikkulamavu	
120.	*Drosera peltata* Smith	Droseraceae	Azhukanni	
121.	*Diospyros trichophylla* Alston	Ebenaceae		VU
122.	*Elaeagnus kologa* Schult.	Elaeagnaceae	Kattumunthiringa	
123.	*Elaeocarpus munronii* (Wight) Mast.	Elaeocarpaceae	Kalrudraksham	Endemic to SWG

124.	*Elaeocarpus recurvatus* Corner	Elaeocarpaceae	Cholarudralksham	VU, Corner Endemic to SWG
125.	*Elaeocarpus variabilis* Zmarzty	Elaeocarpaceae	Kotlampazhamaram	Endemic to WG
126.	*Gaultheria fragrantissima* Wall.	Ericaceae	Kolgate-chedi	
127.	*Rhododendron arboreum.* J. E. Smith ssp. *nilagiricum* (Zenk.) Tagg	Ericaceae	VU, Kattupoovarasu	Endemic to SWG
128.	*Eriocaulon brownianum* Mart. ex Wall.	Eriocaulaceae	Buttonpoovu	
129.	*Acalypha brachystachya* Hornem.	Euphorbiaceae		
130.	*Aporusa fusiformis* Thw.	Euphorbiaceae		
131.	*Drypetes venusta* (Wight) Pax & Hoffm.	Euphorbiaceae	Choota	Endemic to SWG
132.	*Drypetes wightii* (Hook. f.) Pax & Hoffm.	Euphorbiaceae	Vellakasavu	VU, Endemic to SWG
133.	*Excoecaria oppositifolia* Griff. var. *crenulata* (Wight) Chakrab. & Gangop.	Euphorbiaceae	Era	
134.	*Glochidion candolleanum* (Wight & Arn.) Chakrab. & Gangop.	Euphorbiaceae	Chathakkadambu	
135.	*Glochidion ellipticum* Wight	Euphorbiaceae	Kulachan	
136.	*Casearia ovata* (Lam.) Willd.	Flacourtiaceae	Malampavatta	
137.	*Casearia rubescens* Dalz.	Flacourtiaceae		Endemic to SWG
138.	*Hydnocarpus alpina* Wight	Flacourtiaceae	Malamarotti	
139.	*Scolopia crenata* (Wight & Arn.) Clos	Flacourtiaceae	Mullukara	
140.	*Exacum wightianum* Arn.	Gentianaceae	Thavalakkalchedi	Endemic to SWG
141.	*Gentiana quadrifaria* Blume var. *zeylanica* (Griseb.) Kusnezov	Gentianaceae		

142.	*Swertia corymbosa* (Griseb.) Wight ex Clarke	Gentianaceae	Avalpoovu	Endemic to PI
143.	*Swertia minor* (Griseb.) Knobl.	Gentianaceae		Endemic to SWG
144.	*Aeschynanthus perrottetii* A.DC.	Gentianaceae	Elichuzhien	Endemic to WG
145.	*Didymocarpus tomentosa* Wight	Gentianaceae		Endemic to PI
146.	*Rhynchoglossum notonianum* (Wall.) Burtt	Gentianaceae		
147.	*Laurembergia coccinea* (Blume) Kanitz	Haloragaceae		
148.	*Mahoicum japonicum* Thunb. ex Murr.	Hypericaceae		
149.	*Hypericum mysurense* Heyne ex Wight & Arn.	Hypericaceae	Avaramkola	
150.	*Apodytes dimidiata* Meyer ex Arn.	Icacinaceae	Karineeli	
151.	*Gomphandra coriacea* Wight	Icacinaceae	Chottamaram	
152.	*Nothapodytes nimmoniana* (Graham) Mabb.	Icacinaceae	Peenari	
153.	*Juncus bufonius* L.	Juncaceae		
154.	*Juncus inflexus* L.	Juncaceae		
155.	*Anisochilus argenteus* Gamble	Lamiaceae	Sheethakkoraali	VU, Endemic to SI
156.	*Isodon coesta (Buch.-Ham.* ex D. Don) Kudo	Lamiaceae		
157.	*Isodon lophanthoides* (Buch. -Ham. ex D.Don) H.Hara	Lamiaceae		Endemic to WG
158.	*Isodon nilgherricus* (Benth.) H.Hara	Lamiaceae		Endemic to SWG
159.	*Leucas hirta* (Heyne ex Roth) Spreng.	Lamiaceae		Endemic to PI

160.	*Leucas lanceifolia* Desf.	Lamiaceae		Endemic to PI
161.	*Leucas vestita* Benth.	Lamiaceae	Hanumanpal	Endemic to SWG
162.	*Micromeria imbricata* (Forssk.) C.Chr.	Lamiaceae		
163.	*Plectranthus barbatus* Andr.	Lamiaceae	Panikoorka	
164.	*Pogostemon benghalensis* (Burm. f.) O. Ktze.	Lamiaceae	Bhoothachedayan	
165.	*Pogostemon mollis* Benth.	Lamiaceae		Endemic to WG
166.	*Pogostemon wightii* Benth.	Lamiaceae		Endemic to SWG
167.	*Scutellaria violacea* Heyne ex Benth.	Lamiaceae		
68.	*Scutellaria wightiana* Benth.	Lamiaceae	Kattuthulasi	Endemic to PI
169.	*Actinodaphne bourdillonii* Gamble	Lauraceae	Malavirinji	Endemic to SWG
170.	*Actinodaphne salicina* Meisner	Lauraceae		EN, Endemic to SWG
171.	*Apollonias arnottii* Nees	Lauraceae	Karamavu	Endemic to SWG
172.	*Beilschmiedia wightii* (Nees) Benth. ex Hook. f.	Lauraceae	Nagaramaram	EN, Endemic to SWG
173.	*Cinnamomum perrottetii* Meisner	Lauraceae		VU, Endemic to SWG
174.	*Cinnamomum wightii* Meisner	Lauraceae	Shanthamaram	Endemic to SWG
175.	*Cryptocarya beddomei* Gamble	Lauraceae	Chembalava	VU, Endemic to SWG
176.	*Litsea oleoides* (Meisner) Hook. f.	Lauraceae	Matthi	Endemic to SWG
177.	*Litsea udayanii* Robi	Lauraceae		Endemic to SWG

178.	*Litsea wightiana* (Nees) Hook. f.	Lauraceae	Pattuthali	Endemic to SWG
179.	*Litsea wightiana* (Nees) Hook. f. var. *tomentosa* Gamble (Meisner)	Lauraceae		Endemic to SWG
180.	*Neolitsea cassia* (L.) Kosterm.	Lauraceae	Keezhambazham	
181.	*Neolitsea fischeri* Gamble	Lauraceae	Varimaram	VU, Endemic to SWG
182.	*Neolitsea scrobiculata* (Meisner) Gamble	Lauraceae	Mulakunari	Endemic to WG
183.	*Machilus macrantha* Nees	Lauraceae	Kulamavu	
184.	*Machilus macrantha* Nees var. *brevifolia* M.Gangop.	Lauraceae		Endemic to SWG
185.	*Phoebe wightii* Meisner	Lauraceae	Chudala	Endemic to PI
186.	*Asparagus gonoclados* Baker	Liliaceae	Sathavari	Endemic to WG
187.	*Chlorophytum heynei* Rottl. ex Baker	Liliaceae		
188.	*Dianella ensifolia* (L.) DC.	Liliaceae		
189.	*Disporum leschenaultianum* D. Don	Liliaceae		
190.	*Lilium wallichianum* Schult. & Schult. f. var. *neilgherrense* (Wight) Hara	Liliaceae	Thathapoovu	Endemic to SWG
191.	*Lobelia heyneana* Schult.	Lobeliaceae		
192.	*Lobelia nicotianifolia* Roth ex Roem. & Schult.	Lobeliaceae	Kattupukayila	
193.	*Fagraea ceilanica* Thunb.	Loganiaceae	Vellarimodakam	
194.	*Gardneria ovata* Wall.	Loganiaceae		
195.	*Dendrophthoe memecylifolia* (Wight & Arn.) Danser	Loranthaceae		Endemic to SWG

196.	*Helixanthera obtusata* (Schult.) Danser	Loranthaceae		Endemic to WG
197.	Taxillus tomentosus (Heyne ex Roth) Tieghem	Loranthaceae		
198.	*Rotala indica* (Willd.) Koehne	Lythraaceae		
199.	*Magnolia nilagirica* (Zenk.) Figlar	Magnoliaceae	Kattuchempakam	
200.	*Abelmoschus angulosus* Wall. ex Wight & Arn.	Malvaceae	Kattukasthuri	
201.	*Medinilla beddomei* Clarke	Melastomataceae		Endemic to SWG
202.	*Medinilla malabarica* Bedd.	Melastomataceae		VU, Endemic to SWG
203.	*Medinilla sahyadrica* Sujanapal & Sasidh.	Melastomataceae		Endemic to SWG
204.	*Memecylon wightii* Thw.	Melastomataceae		
205.	*Osbeckia aspera* (L.) Blume	Melastomataceae		
206.	*Osbeckia leschenaultiana* DC.	Melastomataceae	Nailangi	Endemic to SWG
207.	*Sonerila brunonis* Wight & Arn.	Melastomataceae		
208.	*Sonerila devicolamensis* Nayar	Melastomataceae		Endemic to SWG
209.	*Sonerila grandiflora* R. Br. ex Wight & Arn.	Melastomataceae		VU, Endemic to SWG
210.	*Aglaia apiocarpa* (Thw.) Hiern	Meliaceae		VU
211.	*Aglaia perviridis* Hiern	Meliaceae	Karakil	VU
212.	*Aphanamixis polystachya* (Wall.) Parker	Meliaceae	Chemmaram	
213.	*Dysoxylum binectariferum* (Roxb.) Hook. f. ex Bedd	Meliaceae	Akil	

214.	*Dysoxylum ficiforme* (Wight) Gamble	Meliaceae	Puvilakil	VU
215.	*Trichilia connaroides* (Wight & Arn.) Bentv.	Meliaceae	Thirivembu	
216.	Cocculus laurifolius DC.	Menispermaceae	Aadukolli	
217.	*Cyclea fissicalyx* Dunn	Menispermaceae		EN, Endemic to SWG
218.	*Stephania japonica* (Thunb.) Miers	Menispermaceae	Paasichedi	
219.	*Ficus laevis* Blume var. *macrocarpa* (Miq.) Corner	Moraceae	Peyathi	Endemic to SWG
220.	*Ficus talbotii* King	Moraceae	Vellayal	
221.	*Ardisia rhomboidea* Wight	Myrsinaceae		Endemic to SWG
222.	*Embelia ribes* Burm. f.	Myrsinaceae	Vizhalari	
223.	*Maesa indica* (Roxb.) DC.	Myrsinaceae	Kattuvizhal	
224.	*Rapanea capitellata* (Wall.) Mez	Myrsinaceae		
225.	*Rapanea thwaitesii* Mez	Myrsinaceae	Cheeramaram	EN, Endemic to WG
226.	*Eucalyptus globulus* Labill.	Myrtaceae	Yukkalimaram	
227.	*Eucalyptus grandis* Hill ex Maid.	Myrtaceae	Grandis	
228.	*Rhodomyrtus tomentosa* (Sol. ex Ait.) Hassk.	Myrtaceae	Cherukotlam-pazham	
229.	*Syzygium densiflorum* Wall. ex Wight & Arn.	Myrtaceae	Kurunjaval	VU, Endemic to SWG
230.	*Syzygium hemisphericum* (Wight) Alston	Myrtaceae	Tholnjaval	
231.	*Syzygium sahyadricum* Sujanapal, Robi & Sasidh.	Myrtaceae		VU,, Endemic to SWG

232.	*Chionanthus mala-elengi* (Dennst.) P. S. Green ssp. *linocieroides* (Wight) P. S. Green	Oleaaceae		EN, Endemic to SWG
233.	*Chionanthus ramiflorus.* Roxb	Oleaaceae	Kaattuchakkalathi	
234.	*Jasminum brevilobum* A. DC.	Oleaaceae	Kattumulla	Endemic to PI
235.	*Ligustrum perrottetii* A. DC.	Oleaaceae	Kathikodimaram	Endemic to WG
236.	*Olea paniculata* R. Br.	Oleaaceae		
237.	*Circaea alpinia* L. ssp. *imaicola* (Asch. & Magn.) Kitamura	Onagraceae		
238.	*Oenothera laciniata* Hill	Onagraceae		
239.	*Aerides ringens* (Lindl.) C.E.C. Fisch.	Orchidaceae		
240.	*Brachycorythis splendida* Summerh.	Orchidaceae		Endemic to SWG
241.	*Bulbophyllum acutiflorum* A. Rich.	Orchidaceae		Endemic to SI
242.	*Bulbophyllum fischeri* Seidenf.	Orchidaceae		
243.	*Bulbophyllum fuscopurpureum* Wight	Orchidaceae		Endemic to SWG
244.	*Calanthe triplicata* (Willem.) Ames	Orchidaceae		
245.	*Cymbidium aloifolium* (L.) Sw.	Orchidaceae		
246.	*Dendrobium anamalayanum* Chandra.	Orchidaceae		Endemic to SWG
247.	*Dendrobium nanum* Hook.f.	Orchidaceae		Endemic to SWG
248.	*Habenaria perrottetiana* A. Rich.	Orchidaceae		Endemic to SI

249.	*Oberonia sebastiana* Shetty & Vivek	Orchidaceae		Endemic to SWG
250.	*Aeginetia pedunculata* Wall.	Orobanchaceae		
251.	*Christisonia tubulosa* (Wight) Benth. ex Hook. f.	Orobanchaceae	Yellow Ghost Flower	Endemic to SWG
252.	*Biophytum intermedium* Wight	Oxalidaceae		
253.	*Biophytum sensitivum* (L.) DC. var. *candolleanum* (Wight) Edgew. & Hook.f.	Oxalidaceae	Mukkutti	
254.	*Parnassia mysorensis* Heyne ex Wight & Arn.	Parnassiaceae		
255.	*Decaloba leschenaultii* (DC.) M.Roem.	Passifloraceae	Seemavellari	Endemic to PI
256.	*Pinus patula* Schl. & Cham.	Pinaceae		
257.	*Peperomia heyneana* Miq.	Piperaceae		
258.	*Peperomia tetraphylla* (G.Forst.) Hook. & Arn.	Piperaceae		
259.	*Piper mullesua* Buch.-Ham. ex D. Don	Piperaceae		
260.	*Piper schmidtii* Hook.f.	Piperaceae		Endemic to SWG
261.	*Piper wightii* Miq.	Piperaceae		Endemic to SWG
262.	*Pittosporum napaulense* (DC.) Rehder & Wilson	Pittosporaceae	Kasumaram	
263.	*Plantago erosa* Wall.	Plantaginaceae	Njaramboori	
264.	*Polygala arillata* Buch.-Ham. ex D. Don	Polygalaceae		
265.	*Clematis gouriana* Roxb. ex DC.	Ranunculaceae		
266.	*Clematis munroiana* Wight	Ranunculaceae		Endemic to WG

267.	*Clematis wightiana* Wall. ex Wight & Arn.	Ranunculaceae		Endemic to WG
268.	*Rhamnus wightii* Wight & Arn.	Rhamnaceae	Kokkuvalli	
269.	*Photinia integrifolia Lindl.* var. sublanceolata Miq.	Rosaceae	Choluvan	
270.	*Prunus ceylanica* (Wight) Miq.	Rosaceae	Attanaripongu	
271.	*Rosa leschenaultiana* Red. & Thory ex Wight & Arn.	Rosaceae	Kaatturosa	Endemic to SWG
272.	*Rubus ellipticus* Smith	Rosaceae	Mullippazham	
273.	*Rubus glomeratus* Blume	Rosaceae	Mulluvettila	Endemic to PI
274.	*Rubus niveus* Thunb.	Rosaceae	Karimcheechi	
275.	*Canthium rheedei* DC.	Rubiaceae	Edalimaram	Endemic to PI
276.	*Hedyotis devicolamensis* Deb & Dutta	Rubiaceae		Endemic to SWG
277.	*Ixora notoniana* Wall. ex G. Don	Rubiaceae	Iramburippi	Endemic to SWG
278.	*Lasianthus parvifolius* Wight	Rubiaceae		Endemic to SWG
279.	*Lasianthus venulosus* (Wight & Arn.) Wight	Rubiaceae		Endemic to SWG
280.	*Mussaenda tomentosa* Wight ex Wall.	Rubiaceae	Pattam	Endemic to SWG
281.	*Neanotis longiflora* (Hutch.) Lewis	Rubiaceae		Endemic to SWG
282.	*Ophiorrhiza grandiflora* Wight	Rubiaceae		Endemic to SWG
283.	*Psychotria anamalayana* Bedd.	Rubiaceae		Endemic to SWG
284.	*Psychotria macrocarpa* Hook. f.	Rubiaceae		VU, Endemic to SWG

285.	*Psychotria nilgiriensis* Deb & *Gangop. var. astephana* (Hook. f.) Deb & Gangop.	Rubiaceae	Pavadakkambu	Endemic to SWG
286.	*Saprosma foetens* (Wight) K. Schum.	Rubiaceae	Theenari	Endemic to SWG
287.	*Tarenna alpestris* (Wight) Balakr.	Rubiaceae		Endemic to SWG
288.	*Acronychia pedunculata* (L.) Miq.	Rutaceae	Orilatheeppetti-maram	
289.	*Murraya paniculata* (L.) Jack.	Rutaceae	Naaragamulla	
290.	*Meliosma pinnata* (Roxb.) Maxim. ssp. *barbulata* (Cufod.) Beus.	Sabiaceae	Thakiri	
291.	*Meliosma simplicifolia* (Roxb.) Walp.	Sabiaceae	Kallavi	
292.	*Isonandra perrottetiana* A. DC.	Sapotacaeae	Karimpala	Endemic to SWG
293.	*Xantolis tomentosa* (Roxb.) Rafin.	Sapotacaeae	Mullupala	
294.	*Solanum capsicoides* All.	Solanaceae	Rakthachunda	
295.	*Solanum giganteum* Jacq.	Solanaceae		
296.	*Solanum mauritianum* Scop.	Solanaceae		
297.	*Solanum pseudo-capsicum*. L	Solanaceae	Jerusalem cherry	
298.	*Solanum violaceum* Ortega ssp. *multiflorum* (Clarke) Matthew	Solanaceae	Cheruvazhuthana	
299.	*Turpinia cochinchinensis* (Lour.) Merr.	Staphyleaceae	Pambaravetti	
300.	*Symplocos anamallayana* Bedd.	Symplocaceae		EN, Endemic to SWG
301.	*Symplocos monantha* Wight	Symplocaceae		Endemic to SWG
302.	*Eurya japonica* Thunb.	Theaceae	Kooramar	

303.	*Eurya nitida* Korth.	Theaceae	Arruttuvarai	
304.	*Gordonia obtusa* Wall.ex Wight & Arn.	Theaceae	Kattukarana, Karikkova	
305.	*Ternstroemia gymnanthera* (Wight & Arn.) Bedd.	Theaceae		
306.	*Gnidia glauca* (Fresen.) Gilg	Thymeleaceae	Nanju	
307.	*Celtis philippensis Blanco* var. wightii (Planch.) Soep.	Ulmaceae	Paalpatani	
308.	*Celtis tetrandra* Roxb.	Ulmaceae	Poochakkuru-maram	
309.	*Debregeasia longifolia* (Burm. f.) Wedd.	Urticaceae	Poonoolmaram	
310.	*Debregeasia wallichiana* (Wedd.) Wedd.	Urticaceae		
311.	*Elatostema sessile* J.R. Forst. & J.G.A. Forst.	Urticaceae		
312.	*Elatostema wightii* Hook. f.	Urticaceae		Endemic to SWG
313.	*Girardinia diversifolia* (Link) Friis	Urticaceae	Aanachoriyanam	
314.	*Lecanthus peduncularis* (Wall. ex Royle) Wedd.	Urticaceae		
315.	*Pellionia heyneana* Wedd.	Urticaceae	Nilampatti	
316.	*Pilea melastomoides* (Poir.) Blume	Urticaceae	Narali	
317.	*Pouzolzia auriculata* Wight	Urticaceae	Parapodukki	
318.	*Pouzolzia wightii* Bennett v ar. *scabra* (Wight) C.E.C. Fisch.	Urticaceae	Naralikola	Endemic to SI
319.	*Procris crenata* Robins.	Urticaceae	Tambu	
320.	*Vaccinium leschenaultii* Wight	Vacciniaceae	Kalavu	Endemic to SWG

321.	*Vaccinium neilgherrense* Wight	Vacciniaceae	Manalamaram	Endemic to SWG
322.	*Valeriana leschenaultii* DC.	Valerianaceae		Endemic to SWG
323.	*Callicarpa tomentosa* (L.) L.	Verbenaceae	Naikumbil	
324.	*Clerodendrum infortunatum* L.	Verbenaceae	Vattapparuvalam	
325.	*Viola betonicifolia* J.E. Smith	Violaceae		
326.	*Korthalsella japonica* (Thunb.) Engl.	Viscaceae		
327.	*Viscum angulatum* Heyne ex DC.	Viscaceae		
328.	*Parthenocissus semicordata* (Wall.) Planch. var. *roylei* (King) Raiz. & Saxena	Vitaceae		
329.	*Tetrastigma leucostaphylum* (Dennst.) Alston ex Mabb.	Vitaceae	Seenkaikkodi	
330.	*Xyris capensis* Thunb.	Xyridaceae		
331.	*Alpinia abundiflora* Burtt & R.M. Smith	Zingiberaceae	Kattuelam	
332.	*Amomum hypoleucum* Thw.	Zingiberaceae		
333.	*Globba schomburgkii* Hook.f.	Zingiberaceae		
334.	*Hedychium venustum* Wight	Zingiberaceae		Endemic to WG
335.	*Zingiber wightianum* Thw.	Zingiberaceae	Malayinchi	

WG- Western Ghats; **SWG**- Southern Western Ghats; **SI**- South India; **PI**- Peninsular India; **VU**- Vulnerable; **CR**- Critically Endangered; **EN**- Endangered; **END**-Endemism.

ANNEXURE 2.4

FERNS OF PAMBADUM SHOLA NATIONAL PARK

Sl.No.	Name	Family	Status
1.	*Adiantum raddianaum*	Adiantaceae	Common
2.	*Asplenium aethiopicum*	Aspleniaceae	Common
3.	*Asplenium zenkaranum*	Aspleniaceae	Rare
4.	*Cyathea crinita*	Cyathiaceae	Rare
5.	*Dicranopteris linearis*	Gleicheniaceae	Common
6.	*Crepidomanes bilabiatum*	Hymenophyllaceae	Rare
7.	*Lepisorus nudus*	Polypodiaceae	Common
8.	*Leptochilus axillaris*	Polypodiaceae	Common
9.	*Nephrolepis auriculata*	Lomariopsidaceae	Common
10.	*Odontosoria chinensis*	Lindsaeaceae	Common
11.	*Polystichum harpophyllum*	Dryopteridaceae	Rare
12.	*Pteridium aquilinum*	Dennstaedtiaceae	Common
13.	*Pteris argyraea*	Pteridaceae	Rare
14.	*Pteris perrotteti*	Pteridaceae	Endangered, Endemic
15.	*Pyrossia lanceolata*	Polypodiaceae	Common
16.	*Selaginella chrysocaulos*	Selaginellaceae	Common

ANNEXURE 2.5

MAMMALS OF PAMBADUM SHOLA NATIONAL PARK

Sl. No.	Scientific Name	Family	Common Name	IUCN	END	WPA
1	*Elephas maximus*	Elephantidae	Asian elephant	EN		Sch. I (Part I)
2	*Macaca radiata*	Cercopithecidae	Bonnet macaque	LC		Sch. II (Part I)
3	*Herpestes fuscus*	Herpestidae	Brown mongoose	LC		Sch. II (Part II)
4	*Paradoxurus jerdoni*	Viverridae	Brown palm civet	LC	WG	Sch. II (Part II)
6	*Funambulus sublineatus*	Sciuridae	Dusky-Stripped Palm Squirrel	VU	WG & SL	Sch. IV
7	*Bos gaurus*	Bovidae	Gaur	VU		Sch. I (Part I)
8	*Moschiola indica*	Tragulidae	Indian chevrotain (Mouse deer)	LC		Sch. I (Part I)
9	*Hystrix indica*	Hystricidae	Indian crested porcupine	LC		Sch. IV
10	*Lepus nigricollis*	Leporidae	Indian / black naped Hare	LC		Sch. IV
11	*Prionailurus bengalensis*	Felidae	Leopard cat	LC		Sch. I (Part I)
12	*Panthera pardus*	Felidae	Common leopard	VU		Sch. I (Part I)
13	*Ratufa indica*	Sciuridae	Malabar giant squirrel	LC		Sch. II (Part II)
14	*Trachypithecus johnii*	Cercopithecidae	Nilgiri langur	VU	WG	Sch. I (Part I)
15	*Martes gwatkinsii*	Mustelidae	Nilgiri marten	VU	WG	Sch. II (Part II)
16	*Rusa unicolor*	Cervidae	Sambar deer	VU		Sch. III
17	*Melursus ursinus*	Ursidae	Sloth bear	VU		Sch. I (Part I)
18	*Viverricula indica*	Viverridae	Small indian civet	LC		Sch. II (Part II)

19	*Muntiacus muntjak*	Cervidae	Southern reed muntjac (Barking Deer)	LC		Sch. III
20	*Herpestes vitticollis*	Herpestidae	Stripe-necked mongoose	LC		Sch. II (Part II)
21	*Panthera tigris*	Felidae	Tiger	EN		Sch. I (Part I)
22	*Sus scrofa*	Suidae	Wild boar	LC		Sch. III
23	*Cuon alpinus*	Canidae	Wild dog	EN		Sch. II (Part I)
24	*Cynopterus sphinax*	Pteropodidae	Short-nosed fruit bat	LC		Sch. V
25	*Rousettus leschenaulti*	Pteropodidae	Fulvous fruit bat	LC		Sch. V
26	*Rhinolophus indorouxii*	Rhinolophidae	Rufous horse-shoe bat	DD		
27	*Rhinolophus beddomei*	Rhinolophidae	Lesser woolly horse-shoe Bat	LC		
28	*Rhinolophus lepidus*	Rhinolophidae	Blyth's horse-shoe bat	LC		
29	*Hipposideros pomona*	Hipposideridae	Anderson leaf-nosed bat	LC		
30	Kerivoula spp. 1	Vespertilionidae				
31	Pipistrellus spp.1	Vespertilionidae				

LC- Least Common; **DD-** Data Deficient; **VU-** Vulnerable, **EN-** Endangered, **IUCN**-International Union for Conservation of Nature and Natural resources; **END-** Endemism; **Sch.-** Schedule; **WG-** Western Ghats, **SL**- Sri Lanka

Rats, Shrews and moles are not included in this list.

ANNEXURE 2.6

BIRDS OF PAMBADUM SHOLA NATIONAL PARK

No	English Name	Species name	IUCN	END	WPA
1	Indian Spot-Billed Duck	*Anas poecilorhyncha* (Forster, JR, 1781)	LC		Sch. IV
2	Indian Peafowl	*Pavo cristatus* (Linnaeus, 1758)	LC		Sch. I
3	Grey Junglefowl	*Gallus sonneratii* (Temminck, 1813)	LC		Sch. II
4	Nilgiri Wood Pigeon	*Columba elphinstonii* (Sykes, 1832)	VU	WG	Sch. IV
5	Spotted Dove	*Streptopelia chinensis* (Scopoli, 1786)	LC		Sch. IV
6	Laughing Dove/ Little Brown Dove	*Streptopelia senegalensis* (Linnaeus, 1766)	LC		Sch. IV
7	Orange-Breasted Green Pigeon	*Treron bicinctus* (Jerdon, 1840)	LC		Sch. IV
8	Pompadour / Grey-Fronted Green Pigeon)	*Treron pompadora* (Gmelin, 1789)	LC		Sch. IV
9	Emerald Dove	*Chalcophaps indica* (Linnaeus, 1758)	LC		Sch. IV
10	Mountain / (Nilgiri Imperial Pigeon)	*Ducula badia* (Raffles, 1822)	LC		Sch. IV
11	White- Rumped Needletail	*Zoonavena sylvatica* (Tickell, 1846)	LC		
12	Indian Swiftlet/ Edible Nest Swiftlet	*Aerodramus unicolor* (Jerdon, 1840)	LC		Sch. I
13	Alpine Swift	*Tachymarptis melba* (Linnaeus, 1758)	LC		
14	Indian House Swift (Little Swift)	*Apus affinis* (Gray, JE, 1830)	LC		
15	Greater Coucal	*Centropus sinensis* (Stephens, 1815)	LC		Sch. IV
16	Purple Moorhen (Grey-Headed Swamphen)	*Porphyrio porphyrio LC* (Linnaeus, 1758)		Sch. IV	

17	Indian Pond Heron	*Ardeola grayii* (Sykes, 1832)	LC		Sch. IV
18	Cattle Egret	*Bubulcus ibis* (Boddaert, 1783)	LC		Sch. IV
19	Little Egret	*Egretta garzetta* (Linnaeus, 1766)	LC		Sch. IV
20	Red-Wattled Lapwing	*Vanellus indicus* (Boddaert, 1783)	LC		Sch. IV
21	Common Sandpiper	*Actitis hypoleucos* (Linnaeus, 1758)	LC		Sch. IV
22	Black-Winged Kite (Black-Shouldered Kite)	*Elanus caeruleus LC* (Desfontaines, 1789)		Sch. I	
23	Oriental Honey Buzzard	*Pernis ptilorhynchus* (Temminck, 1821)	LC		Sch. I
24	Crested Serpent Eagle	*Spilornis cheela* (Latham, 1790)	LC		Sch. I
25	Changeable Hawk Eagle (Crested Hawk Eagle)	*Nisaetus cirrhatus* (Gmelin, JF, 1788)	LC		Sch. I
26	Black Eagle	*Ictinaetus malaiensis* (Temminck, 1822)	LC		Sch. I
27	Booted Eagle	*Hieraaetus pennatus* (Gmelin, JF, 1788)	LC		Sch. I
28	Crested Goshawk	*Accipiter trivirgatus* (Temminck, 1824)	LC		Sch. I
29	Common Buzzard (Eurasian Buzzard)	*Buteo buteo* (Linnaeus, 1758)	LC		Sch. I
30	Brown Fish Owl	*Ketupa zeylonensis* (Gmelin, JF, 1788)	LC		Sch. IV
31	Malabar Trogon	*Harpactes fasciatus* (Pennant, 1769)	LC		Sch. IV
32	Great Indian Hornbill	*Buceros bicornis* (Linnaeus, 1758)	NT		Sch. I
33	Malabar Grey Hornbill	*Ocyceros griseus* (Latham, 1790)	LC	WG	Sch. I
34	Lesser Golden-Backed Woodpecker (Black-Rumped Flameback)	*Dinopium benghalense* (Linnaeus, 1758)	LC		Sch. IV

35	Scaly bellied/Streak-Throated Woodpecker	*Picus xanthopygaeus* (Gray, JE & Gray, GR, 1847)	LC		Sch. IV
36	Greater Golden-Backed Woodpecker (Greater Flameback)	*Chrysocolaptes lucidus* (Tickell, 1833)	LC	Sch. IV	
37	Brown-Capped Pygmy Woodpecker	*Dendrocopos moluccensis* (Vigors, 1832)	LC		Sch. IV
38	White-Cheeked Barbet	*Psilopogon viridis* (Boddaert, 1783)	LC		Sch. IV
39	Coppersmith Barbet/ Crimson Breasted Barbet	*Psilopogon haemacephalus* (Statius Müller, 1776)	LC		Sch. IV
40	Chestnut-Headed Bee-Eater	*Merops leschenaulti* (Vieillot, 1817)	LC		
41	Common Kingfisher/ Small Blue Kingfisher	*Alcedo atthis* (Linnaeus, 1758)	LC		Sch. IV
42	White-Throated Kingfisher (White- Breasted Kingfisher)	*Halcyon smyrnensis* (Linnaeus, 1758)	LC		Sch. IV
43	Common Kestrel (Eurasian Kestrel)	*Falco tinnunculus* (Linnaeus, 1758)	LC		Sch. IV
44	Malabar Parakeet (Blue-Winged Parakeet)	*Psittacula columboides* (Vigors, 1830)	LC	WG	Sch. IV
45	Vernal Hanging Parrot	*Loriculus vernalis* (Sparrman, 1787)	LC		Sch. IV
46	Small Minivet	*Pericrocotus cinnamomeus* (Linnaeus, 1766)	LC		Sch. IV
47	Scarlet Minivet (Orange Minivet)	*Pericrocotus flammeus* (Forster, JR, 1781)	LC		Sch. IV
48	Golden Oriole	*Oriolus kundoo* (Sykes, 1832)	LC		Sch. IV
49	Pied/Bar-Winged Flycatcher-Shrike	*Hemipus picatus* (Sykes, 1832)	LC		Sch. IV
50	Large Woodshrike / Malabar Woodshrike	*Tephrodornis virgatus* (Raffles, 1822)	LC		Sch. IV
51	Common Iora	*Aegithina tiphia* (Linnaeus, 1758)	LC		Sch. IV
52	Black Drongo	*Dicrurus macrocercus* (Vieillot, 1817)	LC		Sch. IV

53	Ashy Drongo	*Dicrurus leucophaeus* (Vieillot, 1817)	LC		Sch. IV
54	Long-Tailed Shrike/ Rufous Backed shrike	*Lanius schach* (Linnaeus, 1758)	LC		
55	Indian Jungle Crow/ Large-Billed Crow	*Corvus macrorhynchos* (Wagler, 1827)	LC		Sch. IV
56	Black-Naped Monarch	*Hypothymis azurea* (Boddaert, 1783)	LC		Sch. IV
57	Tickell's/ Pale-Billed Flowerpecker	*Dicaeum erythrorhynchos* (Latham, 1790)	LC		Sch. IV
58	Plain Flowerpecker/ Nilgiri Flowerpecker	*Dicaeum concolor* (Jerdon, 1840)	LC		Sch. IV
59	Purple-Rumped Sunbird	*Leptocoma zeylonica* (Linnaeus, 1766)	LC		Sch. IV
60	Small /Crimson-Backed Sunbird	*Leptocoma minima* (Sykes, 1832)	LC	WG	Sch. IV
61	Asian Fairy-Bluebird	*Irena puella* (Latham, 1790)	LC		Sch. IV
62	Golden-Fronted Leafbird	*Chloropsis aurifrons* (Temminck, 1829)	LC		Sch. IV
63	Jerdon's Leafbird	*Chloropsis jerdoni* (Blyth, 1844)	LC		Sch. IV
64	Nilgiri Pipit	*Anthus nilghiriensis* (Sharpe, 1885)	VU	WG	Sch. IV
65	Grey Wagtail	*Motacilla cinerea* (Tunstall, 1771)	LC		Sch. IV
66	White-Browed Wagtail/ Large Pied Wagtail	*Motacilla maderaspatensis* (Gmelin, JF, 1789)	LC		Sch. IV
67	White Wagtail	*Motacilla alba* (Linnaeus, 1758)	LC		Sch. IV
68	Common Rosefinch	*Erythrina erythrina* (Pallas, 1770)	LC		Sch. IV
69	Grey-Headed Canary-Flycatcher	*Culicicapa ceylonensis* ceylonensis (Swainson, 1820)	LC		Sch. IV
70	Grey tit/Cinereous Tit / Indian Great Tit	*Parus cinereus* (Vieillot, 1818)	LC		Sch. IV

71	Black-Lored Tit / Indian Black-Lored Tit	*Machlolophus xanthogenys* (Vigors, 1831)	LC		Sch. IV
72	Franklin's/ Grey-Breasted Prinia	*Prinia hodgsonii albogularis* (Walden, 1870)	LC		Sch. IV
73	Booted Warbler	*Iduna caligata* (Lichtenstein, MHK, 1823)	LC		Sch. IV
74	Blyth's Reed Warbler	*Acrocephalus dumetorum* (Blyth, 1849)	LC		Sch. IV
75	Red-Rumped Swallow	*Cecropis daurica* (Laxmann, 1769)	LC		
76	Pacific Swallow / Hill Swallow	*Hirundo tahitica* (Gmelin, 1789)	LC		
77	Black Bulbul (Square-Tailed Bulbul)	*Hypsipetes leucocephalus* (Gmelin, 1789)	LC		Sch. IV
78	Red-Whiskered Bulbul	*Pycnonotus jocosus* (Linnaeus, 1758)	LC		Sch. IV
79	Red-Vented Bulbul	*Pycnonotus cafer* (Linnaeus, 1766)	LC		Sch. IV
80	Yellow-Browed Bulbul	*Acritillas indica* (Jerdon, 1839)	LC		Sch. IV
81	Tytler's Leaf Warbler	*Phylloscopus tytleri* (Brooks, WE, 1871)	NT		Sch. IV
82	Tickell's Leaf Warbler	*Phylloscopus affinis* (Tickell, 1833)	LC		Sch. IV
83	Green Leaf Warbler	*Seicercus nitidus* (Blyth, 1843)	NE		Sch. IV
84	Greenish Leaf Warbler	*Seicercus trochiloides* (Sundevall, 1837)	LC		Sch. IV
85	Large-Billed Leaf Warbler	*Seicercus magnirostris* (Blyth, 1843)	LC		Sch. IV
86	Western Crowned Leaf Warbler	*Seicercus occipitalis* ((Blyth, 1845))	LC		Sch. IV
87	Oriental White-Eye	*Zosterops palpebrosus* (Temminck, 1824)	LC		Sch. IV
88	Indian Scimitar Babbler	*Pomatorhinus horsfieldii* (Sykes, 1832)	LC		Sch. IV

89	Black Headed/Dark-Fronted Babbler	*Rhopocichla atriceps* (Jerdon, 1839)	LC		Sch. IV
90	Spotted/ Puff-Throated Babbler	*Pellorneum ruficeps* (Swainson, 1832)	LC		Sch. IV
91	Quaker Tit Babbler/ Brown-Cheeked Fulvetta	*Alcippe poioicephala* (Jerdon, 1841)	LC		Sch. IV
92	Rufous Babbler (South of Palghat Gap)	*Argya subrufa hyperythrus* (Sharpe. 1883)	EN		
93	Velvet-Fronted Nuthatch	*Sitta frontalis* (Swainson, 1820)	LC		
94	Common Myna	*Acridotheres tristis* (Linnaeus, 1766)	LC		Sch. IV
95	Jungle Myna	*Acridotheres fuscus* (Wagler, 1827)	LC		Sch. IV
96	Grackle/ Hill Myna (Southern Hill Myna)	*Gracula religiosa* (Linnaeus, 1758)	LC		Sch. I
97	Indian Robin	*Saxicoloides fulicatus* (Linnaeus, 1766)	LC		Sch. IV
98	Oriental Magpie Robin	*Copsychus saularis* (Linnaeus, 1758)	LC		Sch. IV
99	Asian Brown Flycatcher	*Muscicapa dauurica* (Raffles, 1822)	LC		Sch. IV
100	Brown-Breasted Flycatcher	*Muscicapa muttui* (Layard, EL, 1854)	LC		Sch. IV
101	White-Bellied Blue Flycatcher	*Cyornis pallidipes* (Jerdon, 1840)	LC	WG	Sch. IV
102	Tickell's Blue Flycatcher	*Cyornis tickelliae* (Blyth, 1843)	LC		Sch. IV
103	Verditer Flycatcher	*Eumyias thalassinus* (Swainson, 1838)	LC		Sch. IV
104	Nilgiri Flycatcher	*Eumyias albicaudatus* (Jerdon, 1840)	NT	WG	Sch. IV
105	White-Bellied Sholakili	*Sholicola albiventris* (Blandfords, 1868)	VU		Sch. IV
106	Indian Blue Robin	*Larvivora brunnea* (Hodgson, 1837)	LC		Sch. IV

107	Malabar Whistling Thrush	*Myophonus horsfieldii* (Vigors, 1831)	LC		Sch. IV
108	Black-and-Orange Flycatcher	*Ficedula nigrorufa* (Jerdon, 1839))	NT	WG	Sch. IV
109	Blue-Capped Rock Thrush	*Monticola cinclorhyncha* (Vigors, 1831)	LC		Sch. IV
110	Pied Bushchat	*Saxicola caprata* (Linnaeus, 1766)	LC		Sch. IV
111	Scaly Thrush (Nilgiri Thrush)	*Zoothera dauma* (Latham, 1790)	LC		Sch. IV
112	Orange-Headed Thrush	*Geokichla citrina citrina* (Latham, 1790)	LC		Sch. IV
113	Nilgiri Blackbird	*Turdus merula simillimus* (Jerdon, 1839)	NE		Sch. IV
114	Indian Blackbird (Migratory)	*Turdus merula nigropileus* (Lafresnaye, 1840)			

LC: Least Concerned; **NT-** Near Threatened; **VU-**Vulnerable; **EN-**Endangered; **NE-** Not Evaluated; **WG-**Western Ghats; **IUCN-**International Union for Conservation of Nature and Natural resources; **END-**Endemic; **Sch.:** Schedule

ANNEXURE 2.7

REPTILES OF PAMBADUM SHOLA NATIONAL PARK

Sl. No.	Scientific Name	Family	Common Name	IUCN Status/END	WPA
1	*Calotes ellioti* (Günther, 1864)	Agamidae	Elliot's Forest Lizard	LC, Endemic to WG	
2	*Calotes calotes* (Linnaeus, 1758)	Agamidae	Common Green F orest Lizard	NE	
3	*Slea anamallayana* (Beddome, 1878)	Agamidae	Anamalai Spiny Lizard	LC, Endemic to WG	
4	*Hemidactylus cf frenatus* (Schlegel, 1836)	Gekkonidae	Asian House Gecko	LC	
5	*Dravidogecko anamallensis* (Gunther, 1875)	Gekkonidae	Anamalai Gecko	NT, Endemic to WG	
6	*Eutropis carinata* (Schneider, 1801)	Scincidae	Common Keeled Skink	LC	
7	*Ristella travancorica* (Beddome, 1870)	Scincidae	Beddome's Cat Skink	LC, Endemic to WG	
8	*Kaestlea travancorica* (Beddome, 1870)	Scincidae	Travancore Ground Skink	LC, Endemic to WG	
9	*Uropeltis rubromaculatus* (Beddome, 1867)	Uropeltidae	Red-spotted Shieldtail	Endemic to WG	Sch. IV
10	*Uropeltis maculata* (Beddome, 1878)	Uropeltidae	Red-sided Shieldtail	Endemic to WG	Sch. IV
11	*Coelognathus helena* (Daudin, 1803)	Colubridae	Common Trinket Snake	NE	Sch. IV
12	*Ptyas mucosa* (Linnaeus, 1758)	Colubridae	Indian Rat Snake	NE	Sch. II
13	*Lycodon travancoricus* (Beddome ,1870)	Colubridae	Travancore Wolf Snake	LC	Sch.IV
14	*Ahaetulla dispar* (Gunther, 1864)	Colubridae	Gunthr's Vine Snake	NT, Endemic to WG	Sch. IV
15	*Calliophis nigrescens* (Gunther,1862)	Elapidae	Striped Coral Snake	LC, Endemic to WG	Sch. IV
16	*Trimeresurus macrolepis* (Beddome, 1862)	Viperidae	Large Scaled Green Pit Viper	NT, Endemic to WG	Sch. IV

IUCN -International Union for Conservation of Nature and Natural resources; **END-** Endemism; **Sch.-** Schedule **VU -** Vulnerable, **NT-** Nearly Threatened, **NE-** Not Evaluated, **LC-** Least Concern, **WG-** Western Ghats

ANNEXURE 2.8

AMPHIBIANS OF PAMBADUM SHOLA NATIONAL PARK

Sl. No.	Scientific Name	Family	Common Name	IUCN Status/END	WPA
1	*Duttaphrynus microtympanum* (Boulenger 1882)	Bufonidae	Small-eared Toad	VU, Endemic to WG	
2	*Minervarya brevipalmata* (Peters, 1871)	Dicroglossidae	Short-webbed Frog	DD, Endemic to WG	
3	*Micrixalus frigidus* Biju et al., 2014	Micrixalidae	Cold Stream Torrent Frog	NE, Endemic to WG	
4	*Micrixalus nigraventris* Biju et al., 2014	Micrixalidae	Black-bellied Torrent Frog	NE, Endemic to WG	
5	*Nyctibatrachus acanthodermis* Biju et al., 2011	Nyctibatrachidae	Spinular Night Frog	NE, Endemic to KL	
6	*Nyctibatrachus anamallaiensis* (Myers,1942)	Nyctibatrachidae	Anamallai Night Frog	NE, Endemic to WG	
7	*Nyctibatrachus deccanensis* Dubois, 1984	Nyctibatrachidae	Anamallai Night Frog	VU, Endemic to WG	
8	*Nyctibatrachus poocha* Biju et al., 2011	Nyctibatrachidae	Meowing Night Frog	NE, Endemic to WG	
9	*Indirana leptodactyla* (Boulenger , 1882)	Ranixalidae	Boulenger's Leaping Fr	EN, Endemic to WG	
10	*Ghatixalus asterops* Biju et al., 2008	Rhacophoridae	Ghat Tree Frog	DD, Endemic to WG	
11	*Raorchestes beddomii* (Gunther, 1876)	Rhacophoridae	Beddome's Bush Frog	NT, Endemic to WG	
12	*Raorchestes chlorosomma* (Biju & Bossuyt, 2009)	Rhacophoridae	Green-eyed Bush Frog	CR, Endemic to WG	
13	*Raorchestes dubois* (Biju & Bossuyt, 2006)	Rhacophoridae	Kodaikanal Bush Frog	VU, Endemic to WG	
14	*Raorchestes griet* (Bossuyt, 2002)	Rhacophoridae	Griet Bush Frog	CR, Endemic to WG	
15	*Raorchestes jayarami* (Biju & Bossuyt, 2009)	Rhacophoridae	Jayaram's Bush Frog	NE, Endemic to WG	

16	*Raorchestes munnarensis* (Biju & Bossuyt, 2009)	Rhacophoridae	Munnar Bush Frog	CR, Endemic to WG	
17	*Rhacophorus pseudomalabaricus* Vasudevan & Dutta, 2000	Rhacophoridae	Malabar False Tree frog	CR, Endemic to WG	

CR - Critically Endangered; **EN**- Endangered; **VU** –Vulnerable; **LC** –Least Concern; **DD** –Data Deficient; **NE** –Not Evaluated; **END**- Endemism, **IUCN**-International Union for Conservation of Nature and Natural resources, **WPA**- Wildlife Protection Act; **Sch.**-Schedule; **WG**- Western Ghats, **KL**- Kerala.

ANNEXURE 2.9

BUTTERFLIES OF PAMBADUM SHOLA NATIONAL PARK

Sl. No.	Subspecies scientific Name	Family	Common Name	IUCN Status/ Endemism	WPA
1	*Pachliopta aristolochiae aristolochiae* (Fabricius, 1775)	Papiionidae	Indian Common Rose		
2	*Graphium teredon* (Felder & Felder, 1865)	Papiionidae	Narrow-banded Bluebottle	Endemic to SI	
3	*Papilio demoleus demoleus* Linnaeus, 1758	Papiionidae	Northern Lime Swallowtail		
4	*Papilio helenus daksha* Hampson, 1888	Papiionidae	Sahyadri Red Helen		
5	*Papilio polymnestor* polymnestor Cramer, [1775]	Papiionidae	Indian Blue Mormon		
6	*Papilio buddha* Westwood, 1872	Papiionidae	Malabar Banded Peacock	Endemic to WG	Schedule II
7	*Catopsilia pomona pomona* (Fabricius, 1775)	Pieridae	Oriental Lemon Emigrant		
8	*Catopsilia pyranthe pyranthe* (Linnaeus, 1758)	Pieridae	Oriental Mottled Emigrant		
9	*Eurema blanda silhetana* (Wallace, 1867)	Pieridae	Sylhet Three-spot Grass Yellow		
10	*Eurema brigitta rubella* (Wallace, 1867)	Pieridae	Small Grass Yellow	LC	
11	*Eurema hecabe hecabe* (Linnaeus, 1758)	Pieridae	Oriental Common Grass Yellow		
12	*Eurema laeta laeta* (Boisduval, 1836)	Pieridae	Indian Spotless Grass Yellow		
13	*Colias nilagiriensis* Felder & Felder, 1859	Pieridae	Nilgiri Clouded Yellow	Endemic to WG	
14	*Delias eucharis* (Drury, 1773)	Pieridae	Indian Jezebel		
15	*Prioneris sita* (Felder & Felder, 1865)	Pieridae	Painted Sawtooth	Endemic to SI and SL	Schedule IV

16	*Pieris canidia canis Evans,* 1912	Pieridae	Sahyadri Cabbage White		
17	*Appias albina swinhoei* (Moore, 1905)	Pieridae	Sahyadri Common Albatross		
18	*Appias lyncida latifasciata* Moore, 1881	Pieridae	Sahyadri Chocolate Albatross		Schedule II
19	*Appias wardii* (Moore, 1884)	Pieridae	Sahyadri Albatross	Endemic to WG	Schedule II
20	*Hebomoia glaucippe australis Butler,* 1898	Pieridae	Sahyadri Great Orange-tip		
21	*Elymnias caudata Butler,* 1871	Nymphalidae	Tailed Palmfly	Endemic to SI and SL	
22	*Melanitis leda leda* (Linnaeus, 1758)	Nymphalidae	Oriental Common Evening Brow		
23	*Melanitis phedima varaha* Moore, 1857	Nymphalidae	Sahyadri Dark Evening Brown		
24	*Lethe drypetis todara* Moore, 1881	Nymphalidae	Dakhan Treebrown	Endemic to SI and SL	
25	*Lethe europa europa* (Fabricius, 1775)	Nymphalidae	Dakhan Bamboo Treebrown		
26	*Lethe rohria neelgheriensis* (Guérin-Méneville, 1843)	Nymphalidae	Common Treebrown		
27	*Telinga davisoni* (Moore, [1891])	Nymphalidae	Palni Bushbrown	Endemic to WG	
28	*Telinga oculus Marshall,* 1881	Nymphalidae	Red-disc Bushbrown	Endemic to WG	
29	*Ypthima ceylonica Hewitson,* 1865	Nymphalidae	White Four-ring	Endemic to PI and SL	
30	*Ypthima chenu* (Guérin-Méneville, 1843)	Nymphalidae	Nilgiri Four-ring	Endemic to WG	
31	*Ypthima tabella Marshall & de Niceville,* 1883	Nymphalidae	Sahyadri Baby Five-ring	Endemic to WG	
32	*Ypthima ypthimoides* (Moore, 1881)	Nymphalidae	Palni Four-ring	Endemic to WG	
33	*Rohana parisatis atacinus Fruhstorfer,* 1913	Nymphalidae	Sahyadri Black Prince	LC	

34	*Ariadne ariadne indica* (Moore, 1884)	Nymphalidae	Indian Angled Castor		
35	*Charaxes bharata Felder* & Felder, [1867]	Nymphalidae	Indian Nawab		
36	*Charaxes psaphon imna* Butler, 1870	Nymphalidae	Indian Plain Tawny Rajah		
37	*Cyrestis thyodamas* indica Evans, 1924	Nymphalidae	Common Map		
38	*Acraea terpsicore* (Linnaeus, 1758)	Nymphalidae	Tawny Coster		
39	*Cethosia mahratta Moore*, 1872	Nymphalidae	Sahyadri Lacewing	Endemic to WG	
40	*Argynnis castetsi castetsi* (Oberthür, 1891)	Nymphalidae	Palni Fritillary	Endemic to WG	
41	*Cirrochroa thais thais* (Fabricius, 1787)	Nymphalidae	Sahyadri Yeoman	Endemic to SI and SL	
42	*Cupha erymanthis maja* Fruhstorfer, 1898	Nymphalidae	Sahyadri Rustic		
43	*Libythea laius lepitoides* Moore, 1903	Nymphalidae	Sahyadri Lobed Beak		Schedule II
44	*Libythea myrrha rama* Moore, 1872	Nymphalidae	Sri Lankan Club Beak		
45	*Euthalia lubentina lubentina* (Cramer, [1777])	Nymphalidae	Sahyadri Gaudy Baron		Schedule II
46	*Athyma inara Westwood,* 1850	Nymphalidae	Color Sergeant		
47	*Athyma selenophora kanara* (Evans, 1924)	Nymphalidae	Staff Sergeant		
48	*Moduza procris procris* Fruhstorfer, 1906	Nymphalidae	Sahyadri Commander		
49	*Neptis hylas varmona* Moore, 1872	Nymphalidae	Indian Common Sailer		
50	*Neptis jumbah nalanda Fruhstorfer,* 1908	Nymphalidae	Nalanda Chestnut-streaked Sailer		
51	*Hypolimnas bolina jacintha* (Drury, 1773)	Nymphalidae	Oriental Great Eggfly		

52	*Hypolimnas misippus* (Linnaeus, 1764)	Nymphalidae	Danaid Eggfly		Schedule I, II
53	*Junonia almana almana* (Linnaeus, 1758)	Nymphalidae	Oriental Peacock Pansy	LC	
54	*Junonia hierta hierta* (Fabricius, 1798)	Nymphalidae	Oriental Yellow Pansy	LC	
55	*Junonia iphita iphita* (Cramer, [1779])	Nymphalidae	Chocolate Pansy		
56	*Junonia lemonias lemonias* (Linnaeus, 1758)	Nymphalidae	Chinese Lemon Pansy		
57	*Kaniska canace viridis* Evans, 1924	Nymphalidae	Sahyadri Blue Admiral		
58	*Vanessa indica pholoe* (Fruhstorfer, 1912)	Nymphalidae	Sahyadri Red Admiral		
59	*Vanessa cardui* (Linnaeus, 1758)	Nymphalidae	Painted Lady		
60	*Danaus chrysippus* chrysippus (Linnaeus, 1758)	Nymphalidae	Oriental Plain Tiger		
61	*Danaus genutia genutia* (Cramer, [1779])	Nymphalidae	Oriental Striped Tiger		
62	*Euploea core core* (Cramer, [1780])	Nymphalidae	Indian Common Crow	LC	
63	*Parantica nilgiriensis* (Moore, 1877)	Nymphalidae	Nilgiri Tiger	NT, Endemic to WG	
64	*Tirumala limniace exoticus* (Gmelin, 1790)	Nymphalidae	Oriental Blue Tiger		
65	*Tirumala septentrionis dravidarum Fruhstorfer,* 1899	Nymphalidae	Dakhan Dark Blue Tiger		
66	*Azanus jesous gamra* (Lederer, 1855)	Lycaenidae	Syrian Babul Blue		
67	*Caleta decidia* (Hewitson, 1876)	Lycaenidae	Angled Pierrot		
68	*Castalius rosimon rosimon* (Fabricius, 1775)	Lycaenidae	Continental Common Pierrot		
69	*Catochrysops strabo strabo* (Fabricius, 1793)	Lycaenidae	Oriental Forget-me-not		

70	*Celatoxia albidisca* (Moore, [1884])	Lycaenidae	White-disc Hedge Blue	Endemic to WG	
71	*Celastrina lavendularis lavenduris* (Moore, 1877)	Lycaenidae	Sri Lankan Plain Hedge Blue		
72	*Chilades lajus lajus* (Stoll, [1780])	Lycaenidae	Indian Lime Blue		
73	*Jamides celeno celeno* (Cramer, [1775])	Lycaenidae	Oriental Common Cerulean		
74	*Lampides boeticus* (Linnaeus, 1767)	Lycaenidae	Pea Blue		Schedule II
75	*Prosotas dubiosa indica* (Evans, [1925])	Lycaenidae	Indian Tailless Lineblue		
76	*Udara akasa mavisa* (Fruhstorfer, 1917)	Lycaenidae	Sahyadri White Hedge Blue		
77	*Zizeeria karsandra* (Moore, 1865)	Lycaenidae	Dark Grass Blue		
78	*Zizina otis indica* (Murray, 1874)	Lycaenidae	Indian Lesser Grass Blue		
79	*Zizula hylax hylax* (Fabricius, 1775)	Lycaenidae	Indian Tiny Grass Blue		
80	*Tagiades gana silvia Evans,* 1934	Hesperiidae	Dakhan Suffused Snow Flat		
81	*Spialia galba* (Fabricius, 1793)	Hesperiidae	Indian Grizzled Skipper		
82	*Aeromachus dubius dubius* Elwes & Edwards, 1897	Hesperiidae	Sahyadri Dingy Scrub Hopper		
83	*Iambrix salsala luteipalpis* (Plötz, 1886)	Hesperiidae	Southern Chestnut Bob		
84	*Borbo cinnara* (Wallace, 1866)	Hesperiidae	Rice Swift		
85	*Caltoris kumara kumara* (Moore, 1878)	Hesperiidae	Sahyadri Blank Swift		

WG- Western Ghats, **SI-** South India, **PI-** Peninsular India, **SL-** Sri Lanka, **IUCN-**International Union for Conservation of Nature and Natural resources; **END-** Endemism; **Sch.-** Schedule
NT- Near Threatened, **LC-** Least Concern.

ANNEXURE 2.10

ODONATES OF PAMBADUM SHOLA NATIONAL PARK

Sl. No	Scientific names	English Names	END	IUCN
1	*Aciagrion approximans krishna Fraser,* 1921	Violet-Striped Slender Dartlet		LC
2	*Anax immaculifrons Rambur,* 1842	Blue Darner		LC
3	*Aethriamanta brevipennis* (Rambur, 1842)	Scarlet Marsh Hawk		LC
4	*Bradinopyga geminata* (Rambur, 1842)	Granite Ghost		LC
5	*Caconeura ramburi* (Fraser,1922)	Coorg Bambootail	WG	DD
6	*Diplacodes trivialis* (Rambur,1842)	Ground Skimmer		LC
7	*Ischnura rubilio Selys,* 1876	Golden Dartlet		LC
8	*Orthetrum chrysis* (Selys, 1891)	Brown-Backed Red Marsh Hawk		LC
9	*Orthetrum glaucum* (Brauer, 1865)	Blue Marsh Hawk		LC
10	*Orthetrum pruinosum* (Burmeister,1839)	Crimson-Tailed Marsh Hawk		LC
11	*Orthetrum sabina* (Drury, 1770)	Green Marsh Hawk		LC
12	*Orthetrum taeniolatum* (Schneider,1845)	Ashy Marsh Hawk		LC
13	*Orthetrum triangulare* (Selys, 1878)	Blue-Tailed Forest Hawk		LC
14	*Pantala flavescens* (Fabricius, 1798)	Wandering Glider		LC
15	*Paragomphus lineatus* (Selys,1850)	Common Hooktail		LC
16	*Sympetrum fonscolombii* (Selys, 1840)	Red-veined Darter	WG	LC
17	*Trithemis aurora* (Burmeister, 1839)	Crimson Marsh Glider		LC
18	*Indolestes gracilis* (Hagen, 1862)	Davenport's False Spreadwing	WG	LC
19	*Ischnura senegalensis* (Rambur, 1842)	Senegal Golden Dartlet		LC
20	*Macromia ellisoni Fraser,* 1924	Coorg Torrent Hawk	WG	LC

LC-Least Concern; **DD**-Data Deficient; **IUCN**-International Union for Conservation of Nature and Natural resources; **WG**-Western Ghats, **PI**-Peninsular India.

ANNEXURE 2.12

ANTS OF PAMBADUM SHOLA NATIONAL PARK

SL. No.	Species Name	Sub Family
1	Camponotus sp1.	Formicinae
2	Camponotus sp2.	Formicinae
3	Camponotus sp3.	Formicinae
4	*Cardiocondyla parvinoda* Forel, 1902	Myrmicinae
5	Crematogaster sp.	Myrmicinae
6	Hypoponera sp.	Ponerinae
7	Leptogenys sp.	Ponerinae
8	*Myrmoteras brachygnathum* Moffett, 1985	Formicinae
9	Nylanderia sp.	Formicinae
10	Pheidole sp.	Myrmicinae
11	Plagiolepis sp.	Formicinae
12	*Polyrhachis punctillata fergusoni* Forel, 1902	Formicinae
13	*Tapinoma melanocephalum* (Fabricius, 1793)	Dolichoderinae
14	*Technomyrmex albipes* (Smith, F., 1861)	Dolichoderinae
15	Tetramorium sp1.	Myrmicinae
16	Tetramorium sp2.	Myrmicinae

ANNEXURE 3.1

Government of India, Ministry of Environment and Forest vide letter No. F(c) A/11.6/172/Misc/KER dt. 02-05-2005

To

No. F(C)A/11.6/172/MISC/KER
The Principal Secretary to Dated: 02.05.2005 Government of Kerala

Forest & Wildlife Department
Secretariat
Thiruvananthapuram.

Sub: Approval for the Management Plan for the Captive Plantation of M/s. Hindustan Newsprint Limited for the period from 2005-06 to 2009-10 - reg.

Ref: 1) State Govt.'s Letter No. 2893/B1/2005/F&WLD dated 14.03.2005

2) This office letter of even no. dated 20.04.2005

3) CCF(Planning), Kerala Letter No. Plg1-163/2005 dated 28.04.200

Sir,

Kindly refer to the subject and references cited above. I am directed to inform you that the draft Management Plan for captive plantations of Hindustan Newsprint Limited for the period 2005-06 to 2009-10 furnished by State Government has been examined by this office and the State Govt. was requested by this office that a reconciliation of the area may be done and the statement indicating the actual extent and location of the leased area, status of land leased to M/s. Hindustan Newsprint Limited may be furnished to this office. The CCF(P) vide letter at Sl.No. 3 above has furnished a statement showing reconciliation of area. The statement furnished by Chief Conservator of Forests (P) above has been examined by this office and found to be adequate.

The Management Plan has been examined along with the area reconciliation details furnished by Chief Conservator of Forests (P), with reference to the provisions of the F(C) Act, 1980 and National Forest Policy, 1988. After careful consideration, I am directed to convey in-principle approval of Central Government to the Management Plan of M/s. Hindustan Newsprint Limited for the period 2005-06 to 2009-10 subject to the following conditions:

i) The modified copy of the Management Plan incorporating the reconciliation of area figures as furnished by Chief Conservator of Forests (Planning) vide letter as Sl. No. 3 above, shall be furnished to this office within a period of one month. The actual implementation of the prescriptions of Management Plan shall be undertaken only after the modified plan is forwarded to this office.

ii) No clear felling should be carried out in hilly areas having slope more than 30 degrees.

iii) The controlled burning of debris in plantations felled for regeneration will not be undertaken.

v) Fodder/fruit trees which attract birds and animals should be retained and nurtured.

vi) The felling of trees in areas having slope more than 30 degrees and along the bank of river/ streams shall not be undertaken.

vii) The felling of standing trees other than eucalyptus shall not be undertaken in pursuance of the directions of the Hon'ble High Court of Kerala vide order dated 05.03.1998 in W.P. No.314/1995.

viii) No permanent building, road, bridges etc. should be constructed on the forest land. However, temporary operational facilities like nurseries, protection sheds, kutcha approach roads for plantation/extraction path can be prepared as per the standard practices without resorting to felling of trees. The temporary structures when not needed may be removed / demolished and the area should be reverted to its normal condition.

ix) It may be ensured that non non-forestry activity is permitted/allowed in forest area in violation of the provisions of Forest (Conservation) Act, 1980.

x) The plantation areas harvested in a year shall be regenerated next year as per the prescriptions. However, if there is a shortfall in area regenerated in a year vis-à-vis the area harvested in previous year then report to that effect shall be made to this office and further clearance of plantation shall not be undertaken unless specifically permitted by this office. The detailed report indicating area harvested in a year and area to be regenerated shall be sent to this office by 30th June of each year.

xi) The maintenance of forest boundary and firelines shall be taken up each year in accordance with the established practice and annual expenditure incurred thereon shall be reported to this office by 30th June of each year.

I am further directed to inform you that prior approval of Central Govt. shall be obtained if any deviation is to be made from the prescriptions of approved Management Plan. It may also be ensured that provisions of Forest (Conservation) Act, 1980 and guidelines issued there under are strictly followed while implementing the Management Plan prescriptions. The Central Govt. reserves the right to review, modify or withdraw this approval if any of the conditions of approval are not implemented or amendment to plan is necessitated keeping in view the provisions of Forest (Conservation) Act, 1980, guidelines issued there under or general instructions issued by Central Govt. for the scientific management of forests. This Management Plan will be due for revision in the year 2010-2011 and timely steps may please be initiated for revision of Management Plan.

Yours faithfully –

sd-

(K.S.P.V. Pavan Kumar)
Deputy Conservator of Forests (C)

Copy to:

1) The Director General of Forests & Special Secretary to Govt. of India, Ministry of Env. & Forests, Paryavaran Bhavan, CGO Complex, New Delhi - 3.

2) The Principal Chief Conservator of Forests, Forest Department, Govt. of Kerala, Forest Head Quarters, Vazhuthacaud, Thiruvananthapuram.

3) The Managing Director, Hindustan Newsprint Limited, Newsprint Nagar, Kottayam, Kerala.

(K.S.P.V. Pavan Kumar), Deputy Conservator of Forests (C)

Annexure 3.2

Government of Kerala GO (Ms) No 42/93/F&WLD dt. 11-06-93

GOVERNMENT OF KERALA

Abstract

Forest Department - Production of eucalyptus for industrial Use-Making forest area available to M/s. Hindustan Newsprint Ltd. For captive Plantation - Orders issued. Forest & Wildlife © Department.

G.O. (Ms) No. 42/93/F&WLD Dated, Thiruvananthapuram, 11-6-1993

Read: - Letter No. G3-21796/89 dated 5/11/1992 from the Chief Conservator of Forests.

ORDER

There are a few major Wood-based industrial units in Kerala, which have been receiving substantial supplies of eucalyptus wood from the existing eucalyptus plantations of the Forest Department of the State. It has however been found from experiences that the annual eucalyptus crops harvested from the plantations of the Forest Department are not adequate to meet the actual requirements of the industries. The question as to how this problem of short supply of raw-material can be solved has been engaging the attention of the government for some time.

It has been suggested that the above problem can be solved to a considerable extent if the industrial units which utilize the eucalyptus as raw-material are themselves permitted to cultivate it on their own in the most scientific and efficient manner with the objective of achieving maximum productivity, to freely harvest their own product and to use it for their own purpose.

M/s. Hindustan Newsprint Limited, Vellur, Kottayam district is a public sector industrial unit belonging to the Government of India which is utilising about 1.5 lakhs tonnes of eucalyptus annually as raw-material for producing newsprint. They have come forward with a proposal to cultivate eucalyptus on their own in the forest land of Kerala for being used as raw-material in their factory. The Chief Conservator of Forests has also recommended this proposal.

After having examined the matter in all its aspects, the Government are [leased to order as follows:

(i) An area of 5600 ha of existing plantation of eucalyptus Grandis belonging to the Forest Department will be made available to M/s. Hindustan Newsprint Ltd., Vellur, for the present for the purpose of their own captive plantation to meet the raw-material requirement of their existing plant.

(ii) If M/s. Hindustan Newsprint Ltd. Vellur take over Punalur Paper Mill, which is now closest, and make it operational, the following additional areas will also be made available to them in future for captive plantation.

(iii) An area of 4400 ha of existing eucalyptus plantation of the Forest Department for the raw-material requirement of the major expansion project of Ms/ H.N.L. which is now under active consideration.

b. An area of 1000 ha of existing eucalyptus plantation of the Forest Department for the raw-material requirement of Punalur Paper Mill.

(iii) The Forest area (ie. Existing eucalyptus plantation) which is made available to M/s. HNL for captive plantation as mentioned above will continue to be Reserve Forest belonging to the State; its control protection and administration will remain with the State's Forest Department; and the role of M/s. HNL will be confined to the cultivation and harvesting of the eucalyptus crop subject to the guidance and supervision of the Chief Conservator of Forests.

(iv) The price of the existing eucalyptus trees standing in the area, which is allotted to them, will be collected from M/s. HNL at the time of making the area available to the Company-for which the Chief Conservator of Forests will (in consultation with the Chief Executive of M/s. HNL) estimate the value of the standing trees and get it approved by the Government.

(v) As and when the eucalyptus planted by M/s. HNL is harvested in future, they will pay a royalty of Rs. 150/- (rupees. One hundred and fifty only) to the Forest Department of the State for every metric tonne of eucalyptus wood at 50% moisture content.

(vi) The above arrangement will be valid for a period of twelve years from 1993-94 to 2005-2006 and will be reviewed thereafter.

(vii) The Chief Conservator of Forests will take immediate action to take immediate action to identify the area of 5600 ha of existing eucalyptus grandis plantation to be made available to m/s. HNL and make the area available to the Company for cultivation as early as possible.

(By Order of theGovernor) –

sd-

R. RAMACHANDRAN NAIER,

Commissioner & Secretary to Govt.

To

The Chief Conservator of Forests (Protection) The Chief Conservator of Forests (Development)

The Executive Director, HNL NewsPrint Nagar, Vellur, Kottayam district. The Executive Director, HNL, Newsprint Nagar, Vellur, Kottayam district. The Accountant General (this issues with the concurrence of the Finance Department)

The Finance Department (Vide No. 2219/AWAI/93/Find) The Industries © Department.

Copy to the Forest (B) Dept. For further necessary action. Copy to the Forest (D) Dept. For further necessary action.

Forwarded/By Order

ANNEXURE 3.3

GOVT. OF KERALA AGREEMENT WITH HNL 04-10-2007

THIS AGREEMENT is executed on this the 4th day of OCTOBER Two Thousand Seven BETWEEN the Governor of Kerala (hereinafter referred to as the Government" which expression shall, where the context so admits, include his successors in office and assigns) of the ONE PART and the Hindustan Newsprint Limited, registered under Indian Companies Act, 1956 and having its Registered office at Newsprint Nagar, Velloor, Vaikom Taluk, Kottayam District; Kerala (hereinafter referred to as "Company" which expression shall, where the context so admits, include its successors and assigns) of the

OTHER PART:

WHEREAS an agreement was entered into on the 7th day of October, 1974 between the parties hereto (hereinafter called "the Principal Agreement") under which the company was permitted to establish a pulp/newsprint/paper mill and other allied Plants in Kottayam District of Kerala State, for the manufacture of pulp, newsprint, paper and other allied products of paper/boards and allied products of different qualities "(hereinafter referred to as "the products") from eucalyptus grandis, eucalyptus tereticornis and other pulp woods, reeds and other cellulosic material grown in the forests of Kerala) all of which are hereinafter collectively called "the raw materials");

AND WHEREAS as per Clause 8 of the Principal Agreement it shall be in force for a period of 30 years starting from 07.10.1974 subject to renewal of further terms and conditions to be negotiated between the parties.

AND WHEREAS, Government of Kerala has issued necessary order for renewing the long term agreement for a further period of twenty years on expiry of the Principal Agreement on Octover6, 2004, as per GO(MS) NO. 20/2006/ID dated, Thiruvananthapuram, 21.02.2006;

AND WHEREAS, based on the Government Order referred above, Company has executed the Agreement with Government of Kerala on the 8th day of May Two Thousand Six for a period of 20 years starting from October 7, 2004, subject to renewal for further term on conditions to be mutually agreed between the parties;

AND WHEREAS, the Government of Kerala as per Clause 4(1) of the Principal Agreement has undertaken to make available annually to the Company 150000 tonnes (One Lakh and Fifty Thousand Tonnes) of eucalyptus wood at 50% moisture content consisting of not less than 100000 (One Lakh) tones of eucalyptus grandis variety at 50% moisture content from the State Plantations of eucalyptus grandis and eucalyptus tereticornis including the yield from the plantations reserved viz Pamba, Kottayam. Punalur, Thenmala and Thiruvananthapuram Forest Divisions, for the purpose and not permit harvesting eucalyptus grandis therefrom by any party other than the Company;

AND WHEREAS, the Government as per Clause 4(i) of the renewed long term agreement, has undertaken to make available annually to the Company, 50000 MT of eucalyptus wood (Grandis and hybrid) and 100000 MT of Acacia, Mangium and other pulpwood species at 50% M.C. from the State Forest Department's plantations, 75000 MT of reeds at 50% moisture content and 75000 MT of bamboo in net weight from the forest as near to the mill as possible;

AND WHEREAS, the Company as per Clause 5 of the Principal Agreement agreed to pay to the Government of Kerala royalty for the raw materials supplied to the Company @Rs.11/- (Rupees Eleven) per tonne of green wood of eucalyptus grandis and eucalyptus tereticornis (Both with 50% moisture) provided that the Government may at the end of every 5 years from the commencement of manufacture of products revise these rates in consultation with the Company and the Company shall be bound to pay at the rate so revised by the Government from time to time;

AND WHEREAS, the Company commenced commercial exploitation of eucalyptus grandis from the reserved areas from 1982 and continues every year thereafter.

AND WHEREAS, the Government has revised the rates at the rate of Rs.335/-(Rupees Three Hundred and Thirty Five) per MT of green wood of eucalyptus grandis and eucalyptus tereticornis with effect from 01.10.1991, subject to revision as and when found necessary by Government;

AND WHEREAS, it has become necessary for the Company to get assured regarding the sustained supply of eucalyptus Grandis for production of Newsprint un interruptedly as per existing capacity, both the parties have agreed to go for Captive Plantations at the Company's cost in the Forest lands permitted by the Government;

AND WHEREAS, the Government vide Order No. G.O. (MS) 42/93/F&WLD dated 11.06.1993 (hereinafter referred to as 'said order', which shall from part of this agreement as if incorporated herein) were pleased to order an area of 5600 ha of existing plantation of eucalyptus belonging to the Forest Department to be made available to Hindustan Newsprint Limited, for the purpose of raising Captive Plantations at the company's cost for producing the raw materials requirement of their existing plant subject to the terms and conditions contained therein and hereinafter mentioned;

AND WHEREAS, the Chief Conservator of Forests has been instructed to take action to identify an area of 5600 ha of existing eucalyptus grandis plantations to be made available to Hindustan Newsprint Limited, and issue orders permitting cultivation of the area with pulpwood crop;

AND WHEREAS, as per Clause 4(v) of the renewed long term agreement for a period of 20 years, the Government of Kerala agreed to supply forest raw materials to the Company at such prices as may be recommended from time to time by the expert Committee constituted under section 4 of the Kerala Forest Product (Fixation of Selling Price) Act, 1978 provided that the price will be fixed after consultation with the Company; AND WHEREAS, the Captive Plantation Agreement entered into between the Company and the Government of Kerala on the 26th day of April, 2000 for a period of 12 years from 1993-94 to 2005-06 expired in 2006;

AND WHEREAS, the Government of Kerala as per Clause 4(iv) of the renewed long term agreement for a period of 20 years, agreed to renew the existing Captive Plantation Agreement entered into between the Company and the Government of Kerala on its expiry in 2006 for a further period of 14 years or till such period as the Company continues as a Central Public Sector Undertaking, whichever is earlier;

AND WHEREAS, the parties hereto have therefore agreed to enter into the agreement (hereinafter referred to as second supplemental agreement) on terms and conditions herein contained.

NOW THESE PRESENTS WITNESS AND IT IS HERE BY MUTUALLY AGREED AS FOLLOWS

1. The Company hereby agrees that the land permitted for raising Pulpwood Plantations will not be utilized for any purpose other than permitted and the Company will have no claim from Government for the expense incurred for plantation activities undertaken.

2. The establishment of the Kerala Forest Department in the areas proposed for raising plantation will be continued for all works other than works taken up by the Company for raising the plantations.

3. The forest areas permitted for raising Captive Pulpwood Plantations will continue to be Reserve Forest belonging to the State, and its control, protection and administration will remain with the State Forest Department, and the role of the Company will be confined to the cultivation, maintenance and harvesting of the pulpwood crop subject to the guidance and supervision of the Chief Conservator of Forests governed by the terms and conditions hereinafter mentioned.

4. The Government will continue to have the ownership of the land where Captive plantations are raised by the company without any change in legal status. The Government agree that the produce available from the Captive Plantation will be permitted to be extracted only by the Company against the agreed quantity and it will not be allotted to any other party without the prior consent of the Company.

5 (a) The Company agrees that the area where Captive Plantation is found to be a failure shall be resumed to the Department and proportionate rent for such area till it is resumed shall be paid to the Government.

(b) The Company agrees to pay lease rent fixed by Government from time to time for areas, for which permission was given for raising plantations irrespective of whether the area is planted or not by the Company, except in the cases where the reasons for not raising the plantation are beyond the control of the Company.

The period of agreement shall be for 14 years from 01.04.2006 or till such period as the Company continues as a Central Public Sector Undertaking whichever is earlier. The agreement can be renewed thereafter by mutual consent with appropriate changes. 7 (a) When cutting, converting and stacking of pulpable wood are completed n a strip, the Company shall furnish a list in duplicate to the Range Officer / Deputy Range Officer concerned showing the details of pulpable wood stacks. The same shall be verified by the Range Officer / Deputy Range Officer concerned and necessary passes for the removal shall be issued by the Range Officer / Deputy Ranger Officer concerned. The extension of period of passes shall also be allowed by the Range Officer / Deputy Range Officer concerned; For piece-meal transport of raw materials covered by the departmental passes, subsidiary pass books in Form No. IV of Kerala Forest Produce Transit Rules 1975 can be had on application from the Deputy Conservator of Forests / Assistant Conservator of Forests concerned on payment of value and tax thereof. No subsidiary pass shall be issued for produce not covered by current departmental passes.

A subsidiary pass for each lorry load shall be issued taking care that all columns therein are duly filled up by the nominee of the Company approved by the Deputy Conservator of Forests / Assistant Conservator of Forests concerned. The counterfoils of the used up passes together with all unused shall be returned to the Deputy Conservator of Forests / Assistant Conservator of Forests within thirty days from the date of expiry of the working season.

(b) The pulpwood on arrival at the premises of the Company at Velloor shall be weighed in the presence of the Forest officers stationed at the Mill Site and the Company shall maintain records thereof and copy of such records shall be sent to the concerned DFOs.

(c) The Company agrees that the Pulpwood extracted from the Captive Plantations shall not be sold or utilized for any purpose other than as raw material for their own use within the State except with specific permission of the Government.

(d) The Company agrees that no burning other than that required Silviculturally, be done in the areas and that all natural tree growth and animals available in the area shall be retained as such.

8. The Government agree to permit the Company for insuring the entire plantations raised and maintained by them against untoward happenings like fire, theft etc. and further agree that the company can receive the insurance claim, if any, in full from the insurance Company for the claims put forth by the Company without any liability to the Government;

9. The Company shall pay the lease rent for every hectare of area permitted to raise Captive Plantations.

10. Both the Government and the Company shall be responsible for the protection of the and against encroachment. The actual areas for Captive Plantations will be verified by a Joint Inspection by officers of the Government and of the Company and surveyed and demarcated.

11. The Company shall abide by Section 29 of Kerala Forest Act with reference to fire protection (for fire incidents and damages if any, that occur within the Captive Plantations, Company only shall be liable and responsible).

12. Company shall furnish a lost of Company's staff, agents and Workmen to the concerned DFO and get his approval. The Government agree that the Company can engage these approved agents, staff and workmen for the purpose of the work and utilize the existing roads, water source or any other natural resources available within the area permitted for the purpose of the plantation, free of charge. The Government also agree that the Company can improve existing roads and other facilities for extraction of the crop and also construct semi-permanent structures if required for facilitating effective supervision without damaging and detrimenting the natural growth, for the purpose of the cultivation and harvest of the pulpwood with the prior permission of the concerned DFO in writing. Any or all structures constructed in the work area shall be demolished / handed over to the Government at the expiry of the Agreement period.

13. The Government agree that the Company can resort to mechanization activities required for raising and harvesting the captive plantation, without damaging natural tree growth.

14 (a) The Company shall be responsible for the safety of forest wealth in the area permitted for raising captive plantation. If any forest tree is lost, rendered useless or otherwise destroyed during the agreement period, the Company shall be liable to pay the value of such wealth as assessed by the concerned Divisional Forest Officer at the scheduled rate, or the rate for standing timber notified from time to time by the Government under Section 3 of the Kerala Forest Product (Fixation of Selling Price) Act. 1978 whichever is higher.

(b) Company shall ensure for the protection and conservation of biodiversity of the area adjoining to the captive plantation.

(c) The Company agrees that violation of this agreement shall forfeit the right of the Company for raising the captive plantation in the area and the Government is at liberty to withdraw the permission given to the Company for raising the plantations in such areas and that such areas shall be taken by the Government with all improvements made, without paying any compensation to the Company in respect thereof.

15. The existing check post if any in the area will continue to function under the control of the Forest Department.

16. In the case of any penalty imposed by Divisional Forest Officer for the infringement of Acts and Rules in force due to omissions and commissions by the Company, the staff, agents or workmen engaged by the company, the Company is at liberty to refer the matter to Conservator of forests whose decision therein shall be final.

17. The Government agree that the employees with valid identity cards of the Company and approved by the concerned DFO's and vehicles owned and used by the company will be permitted to enter the plantation areas.

The Company shall engage only the approved Agents, staff and workmen in the plantation and shall provide identify cards to all the persons showing the name, age and address. They shall produce the identity cars on demand by any forest officer. The Company will be held responsible for all acts and omissions of such agents, staff or workers causing damage to the areas. The Divisional Forest Officer is at liberty to direct the Company to withdraw any of their agents or workers and the Company shall abide by such directions. Any produce collected by persons who are not authorized shall be liable for confiscation and appropriation by the Divisional Forest Officer in such manner as he deems fit and such persons shall be dealt with under the relevant Acts and Rules in force. Duly accredited representative of the Company shall be present in the area during the period of agreement.

18. The Government agree that the yield obtained at the time of every harvest from the captive plantation shall be accounted against the committed quantity of pulpwood to be supplied by government against that year.

19. All the Shola Forests in the area within or adjoining (within 2 chain belt around) the area allotted to the Company shall be protected by the Company.

    (a) Government reserves its right to take any part of the area for puclic purpose, without paying compensation.

20. The Company shall at all times comply with the provisions of the Kerala Forest Act and the Rules framed there under and such other laws and rules and regulations as are applicable from time to time.

21. The Company shall be liable and responsible for payments, if any, to the agents, staff and workers engaged/employed by the Company including all claims as per the Workmen Compensation Act and such claims/payments shall be settled by the Company. All payments due to Government from the company by virtue of the agreement, if not paid within the time allowed, shall be recovered from the company and their properties movable and immovable under the provisions of the Revenue Recovery Act for the time being in force as if they were arrears of land revenue and in such other manner as the Government may deem fit.

22. On expiry of the agreement period the Company shall vacate the areas after preparing a joint mahazar with the concerned Range Officers indicating liabilities, if any, on part of the company. A copy of the joint mahazar shall be furnished to the Company.

23. The Government agree that the barks, lops and tops obtainable from the captive plantations during extraction of the plantation shall be the property of the Company and the Company is free to use or dispose if of at their option.

24. The external boundaries of the Captive Plantations will be demarcated by granite Stones/ concrete blocks marked CP/HNL.

25. The value of pulpwood crop raised by Forest Department available in the area permitted for raising captive plantations shall be paid by the Company to the Government as per valuation approved by the Government.

26. No standing trees (except eucalyptus trees and plants) shall be cut and removed by the Company without the permission for the Hon'ble High Court from the areas ear-marked for Captive Plantation by the Company as directed by the Hon'ble High Court in writ appeal No.314/95 filed by Kerala Forest

Protective Staff Association represented by its Kottayam District Committee President.

27. Any dispute, doubt, difference or ambiguity which may at any time arise between the parties hereto, touching on or arising out of or in respect of this Agreement or the subject matters hereof, shall be referred to a committee consisting of the Principal Secretary/Secretary (F&WL), the Principal Chief Conservator of Forests (General) and the Managing Director, HNL and their decision shall be final and binding on the parties.

IN WITNESS WHEREOF

SHRI C.S. Yalakki, CCF (Pot) for and on behalf of the Governor of Kerala and Sri. N. P. Prabhu M D. for and on behalf of Hindustan Newsprint Limited have hereunto been affixed on the day, month and year first above written.

THE SCHEDULE OF PROTERTY ABOVE REFERRED TO signed by Shri. C.S. Yalakki, CCF (Prot) for on behalf of this Governor of Kerala

Sd/-
C.S. YALAKKI, IFS
Chief Conservator of Forests

In the presence of Witness: (Protection) Forest Headquarters
Thiruvananthapuram.

1. S. SreeRekha, U.D. Clerk, O/o. CCF (P) sd/-

2. Suji Stantly, U.D. Clerk, O/o. CCF (P) sd/-

Signed by Shri. **N.P. PRABHU MD** for on behalf of Hindustan Newsprint Limited

Sd/-
N.P. PRABHU

In the presence of witnesses; Managing Director

HINDUSTAN NEWSPRINT LTD.,
NEWSPRINT NAGAR - P.O.,
KOTTAYAM DIST. - KERALA - 686 610

1. P. Govindankutty Sd/-
Manager (Forestry & Liaison) HNL, Trivandrum

2. M.K. Sasindran Nair Sd/-
Senior Inspector GOI, HNL, Thiruvananthapuram.

ANNEXURE 3.4

LIST OF RESEARCH PROGRAMMES CONDUCTED AT PAMBADUM SHOLA NATIONAL PARK

Sl. No.	Title of project	Principal Investigator	Duration	Institution
1	Ecology and Conservation of fresh water Swamp ecosystem of the Western Ghats, Kerala Region.	DR. Rajendra Prasad	2016-2018	TBGRI, Palode
2	Antivirals from medicinal plants of Western Ghats selected based on the traditional Knowledge (TK) or ethnobotanical information	DR. S.R. Suja	2015-2018	TBGRI, Palode
3	Bio-processing of two coded anti-diabetic medicinal plants based on ethnobotanical leads with special reference to diabetic complications- A molecular pharmacology approach.	DR. S.R. Suja	2015-2018	TBGRI, Palode
4	Understanding the evolution of endemism in the Amphibians of the Western Ghats.	DR. P.S. Easa	2016-2018	Asia Biodiversity conservation Trust, Thrissur
5	A study on the diversity and habitat preference of Odonates in Pambadum Shola National Park, Munnar, Kerala.	DR. Sylas V. P.	2016-2017	M.G University
6	Assessment of Ecotourism Sustainable Practice in Munnar, Kerala: Multifactorial analysis of the destination.	Prof. Prodyut Bhatacharya	2017-2019	University School of Environment Management, Guru Govind Singh Indraprastha University, New Delhi
7	Diversity, conservation and sustainable utilisation of fungi of Western Ghats	Dr. D.H. Biju	2013-2017	TBGRI, Palode
8	Spatio-temporal patterns in Human-wildlife conflict in Kerala	Dr. P. O Nameer	2016-2019	College of Forestry, KAU, Thrissur
9	Diversity and distribution of polypores in forest ecosystem of Kerala	Dr. K. Vidyasagaran	2016-2019	College of forestry, KAU, Thrissur.
10	Pollination Biology of selected taxa of the tribe Commelineae (Commelinaceae)	Prof. Santhosh Nampy	2016-2019	University of Calicut

11	Biodiversity studies in Curculionoidea	B. Ramesha	2016-2019	College of e Agriculture, Kasargod
12	Molecular systematics of the Didymocarpus henckelia genetic complex (Gesneriaceae) in India	Dr. K. Narayanan Nair	2016-2018	National Botanical Research Institute, Lucknow
13	BTGS-Plant growt promoting and biocontrol microbes for high quality bamboo planting stock production (R&D) project	Dr. G E. Mallikarjuna Swamy	2016-2018	KFRI, Thrissur
14	Revision of the genus Grewia L. (Malvaceae- Grewioideae) from India	DR. Mayur D. Nandikar	2016-2019	Naorpji Godrej Centre for Plant Research, Maharashtra
15	Identification and mapping Montane Shola Grassland for conservation action	Dr. Robin Vijayan	March-December 2017	IISER, Tirupathi
16	Spiders (Arachnida: Araneae) in the cloud forests of the sky islands in Western Ghats: taxonomical and ecobiogeographical approach	Dr. Mathew M.J	2015-2017	Sacred Heart college, Thevara, Cochin
17	A survey to verify the occurrence of Eurasian Otter (Lutra lutra) in Kerala	Dr. Ajith Kumar	2017-2018	Wildlife Biology and Conservation National Centre for Biological Science, Bangalore
18	Survey and documentation of economical and ethnobotanical uses of endemic trees of India	Dr. Sujana K.A	2016-2019	Centre Botanical laboratory, BSI, West Bengal
19	Taxonomy and barcoding of south Indian Carabidae Coleoptera: Carabidae	Dr. Sabu K Thomas	2015-2016	Dept. Of Zoology. St. Joseph's college, Devagiri, Calicut
20	Taxonomic analysis of the genus Fimbristylis in South India	DR. R. Prakash Kumar	2015-2018	Malabar Botanical Garden, Calicut
21	Assessment of Amphibian diversity of Kerala	K.P Laladhas	2017	Kerala State Biodiversity Board
22	Taxonomic studies on the fern family Dryopteridaceae of southern India	Dr. K P. Rajesh	2017-2019	The Zamorin's Guruvayurappan college, Calicut

23	Filed gene bank development of selected medicinal, aromatic and spice plants and characterisation of germplasm	Dr. Sam P Mathew	2017-2018	JNTBGRI, Palode
24	Study on the Millipede fauna in southern Western Ghats of Kerala	Dr. Sudhikumar A. V.	2018-2020	Dept. Zoology, Christ college, Irinjalakuda
25	Monitoring global change impact in Sahyadri (Western Ghats)	Dr. A Krishna Kumar	2018-2020	National Centre for Earth Science studies, GOI
26	Small carnivores of selected Protected Areas of Kerala	Dr. P O Nameer	2018-2019	Dept. Wildlife Science, KAU
27	Restoration and reassessment of selected IUCN listed endangered trees in the Western Ghats	Dr. P A Jose	Up to 2021	KFRI, Thrissur
28	Sustainable tourism development of Protected Areas in the Western Ghats region of Kerala	` Dr. Bindu V T	2018-2020	Dept. of Tourism Management, Avinashilingam Institute for Home science and Higher education for women, Coimbatore
29	Understand the diversity, systematic biogeography and conservation of Garcinia spp., Aristolochia spp., Coscinium fenestratum, Decalepis spp., Trichpous zylanicus, Hemidesmus Indicus, Costus spp.,	Dr. V Sundaresan	2018-2019	Centre Institute of Medicinal and Aromatic Research Centre, Bangalore
30	Ecosystem requirements of Hornbills (Great Pied, Malabar Pied, Indian Grey and Malabar Grey Hornbill) and assess the status and distribution of selected mammals in Anjunad and adjoining landscape, Western Ghats	Dr. P. Balasubramanian and Dr. P V. Karunakaran	2019-2020	Landscape Ecology Division, SACON
31	Anatomical profiling of selected Strobilanthes species in Kerala	Dr. Hari.N	2017-2020	Dept. of Botany, CMS college, Kottayam
32	Hydrological Investigation in the High Range Mountain Landscape, Kerala	Dr. Dinil Sony. C	May-December 2019	CWRDM

33	Changing climate and Eco hydrology of Shola grassland ecosystem in Southern Western Ghats	Dr. Mahesh Mohan	2015-2018	Environment Science, MG University, Kottayam
34	Studies on taxonomy, phytogeography and conservation of South Indian *Habenaria* (Orchidaceae)	Dr. K Prasad	2014-2016	BSI
35	Sociology / new area, sub filed-socio-cultural transformation of Muthuvan and Malapulayan hill tribes of Marayur and Munnar in Idukki district of Kerala	Dr. A. Sridharan	2015-2016	Puthuvai Hospital ,Chennai
36	Phytogeography and conservation of the *Spondias* L. of southern Western Ghats	Dr. C. Anilkumar	2015-2018	JNTBGRI, Palode
37	Study on the echo-calls, ecology, ecosystem services of Michochiropteran Bats of forest and agro-ecosystem of Idukki landscape of Kerala, Southern Western Ghats, India	Sri. Tijo K Joy	January-September 2016	Sarah Tucker College, Tirunelveli
38	Examining connectivity of Protected Areas in the Western Ghats of Kerala and suggesting potential corridors	Dr. Uma Balakrishnan	2015	National Centre for Biological Sciences, Bangalore
39	Taxonomic and molecular studies on the genus *Arisaema* C. Martius (Araceae) in India	Dr. Santhosh Nampy	2014-2017	Dept. Botany, University of Calicut
40	Plant metabolomics studies in the genus *Embelia* found in Kerala	Dr. A V Raghu	2015-2017	KFRI, Thrissur
41	Versatility of forest litter bacteria isolated from virgin Tropical Rainforest and their degradation potential of organic debris in grey water	Dr. Mahesh Mohan	2014-2017	MG University, Kottayam
42	A study on the biodiversity of ants in Kerala State	DR. Kalesh S	2015-2017	Travancore Natural History Society, Thiruvanthapuram
43	A comprehensive systematic study of the genus *Jasminium* L. from Kerala	Dr. Devipriya V	2015-2018	Dept. of Botany, Sree Narayana College, Kollam

44	Molecular cahracterisation and screening for molecular markers associated with essential oil production in selected members of *Jasminium* L. from Kerala	Dr. Devipriya V	2015-2018	Dept. of Botany, Sree Narayana College, Kollam
45	Bio-cultural diversity, environment and sustainable development	Sathyanarayanan	Dr. 2014-2015	Anthropological Survey of India, Southern Regional Centre, Mysore
46	Taxonomic studies on the Blowflies (Diptera: Calliphoridae) from Western Ghats	Dr. Meenakshi Malhothra	2015-2018	Dept. of Zoology and Environmental Sciences, Punjabi University, Patiala
47	Development and maintenance of conservatories: Wild Fruit Plants	Sri S.M Shareef	2012-2014	JNTBGRI, Palode
48	Phytogeography of King Cobras *(Ophiophagushannah)* across the sub-continent	Dr. Karthik Shankar	2015-2017	Centre for Ecological Sciences, IIS, Bangalore
49	Biodiversity of foliar Mycobionts of Myristica swamps of Kerala-A Critically Endangered ecosystem of Western Ghats	Dr. Archana G R	2015-2017	St. Gregorious college, Kottarakkara
50	Saving 10 Rare, Endemic and Threatened (RET) tree species of Western Ghats, India	Sri V. V Sivan	2015-2017	M.S. Swaminathan Research Foundation, Community Agro biodiversity Centre
51	Analysis of inter specific variations in the genus Leea D.Royen ex. L. from Kerala	Dr. Devipriya	2015-2017	Dept. of Botany, Sree Narayana College, Kollam
52	Taxonomy seed morphology and ecology of Great Hornbill dispersed Rain forest trees of Southern Western Ghats, Kerala	Dr. A.K. Pradeep	2014-2020	Dept. of Botany, University of Calicut
53	Establishment of aquatic plant conservatory, Lower plant conservatory and Angiosperm conservatory	Dr. R. Prakash Kumar	2011-2015	Malabar Botanical Garden, Calicut
54	Population studies and gene flow system of endemic and endangered	Sri. P.S. Jothish	2015-2019	JNTBGRI, Palode

55	A A study on the Jasmine Varieties of Western Ghats producing high essential oil content with special emphasis on commercialization of essential oil for perfumery by rural women for their empowerment.	Dr. S.R. Suja	2015-2018	JNTBGRI, Palode
56	Survey and documentation of the faunal wealth of Kerala State	Dr. P.M. Sureshan	2014-2018	ZSI
57	Litter degradation and diversity of litter degrading bacteria in Pambadum Shola National Park	Dr. Mahesh Mohan	2018	MG University
58	Angiosperm diversity of Idukki district	Prof. Santhosh Nampy	2017-2019	Dept. of Botany, University of Calicut

ANNEXURE 6.1

Recommendations of the Sub-Committee on Guidelines for Roads in Protected Areas.

In pursuance to the decision taken by the Standing Committee of the NBWL in its 28th Meeting held on 20th March 2013, a sub-committee under the chairmanship of Dr. M.K. Ranjitsinh, Member, National Board for Wildlife, was constituted by the Ministry of Environment and Forests vide O.M. No. 6-62/2013-WL dated 26th June 2013. The terms of reference of the sub-committee are as follows:

- To frame a comprehensive guideline for construction/repair or roads passing through PA in the country
- Design best practices for such roads passing through PAs so as to have better wildlife conservation

The 1st meeting of the sub-committee was convened on 2nd July, 2013.The second meeting of the sub-committee was convened on 6th August, 2013. The list of participants-who attended both the meetings are given in **Annexure-1.**

PREAMBLE

Background

Roads are an essential part of India's development, providing vital connectivity and transportation across the country. Yet, when they intersect natural areas (as opposed to being situated in already-modified human-dominated landscapes), roads have wide-ranging and complex impact on natural areas and wild species inhabiting these areas. Within India's Protected Areas, the extensive impact of roads remains poorly understood, except in the obvious and serious instance of wild animal mortality due to road accidents. Elsewhere, it was been well-established that roads have detrimental ecological effects in both terrestrial and aquatic natural ecosystems. Roads further fragment the already highly fragmented natural habitats. They break forest contiguity, impinge on forests and well-worn migratory paths of animals, break tree cover and canopy, slice vegetation—all of which gravely impact wildlife. Roads cause soil erosion and landslides. Crucially, roads are the first step to ancillary development and an increasing human footprint in the area, thus leading to

accelerated developmental, tourist and hunting pressures, increase in pollution, litter, and various disturbances. Unless great vigilance and checks are provided, roads provide conduits for illegal extraction of timber and forest produce and for poaching, particularly at night, from vehicles. It is very difficult to provide the requisite surveillance and it is well-established that PAs have suffered loss of vegetative cover and poaching after construction of roads. In PAs in the mountainous region , construction of roads and their widening has grave consequences, including landslides and erosion, as the debris from road cuts on hillsides is invariably tipped over the sides. A background paper on linear intrusions into natural areas, including roads, commissioned by the National Board for Wildlife in 2011, provides an exhaustive review of the current state of knowledge on this topic[1], and a companion document[2] provides detailed guidelines by which their negative impact on natural habitats and wild species, can be minimised.

BASIC PRINCIPLES

We wish to reiterate a point articulated clearly and emphatically in the **National Wildlife Action Plan – 2002-2016,** which states that the "*Ministry of Surface Transport... to plan roads, highways, expressways in such a manner that all national parks and sanctuaries are by-passed and integrity of the PA is maintained. Wildlife corridors also need to be avoided, or mitigative measures (such as restricting night traffic) need to be employed.*" This principle must serve as the cornerstone of any road plan that is being conceived in the vicinity of any wildlife or Protected Area, and envisages the Ministry of Surface Transport to work in coordination with the Ministry of Environment & Forests, and other relevant authorities and experts. Further, we believe that this principle must apply to all other roads being planned by any other agency at the national, state, or local levels. The implication of this action point articulated in the National Wildlife Action Plan (NWAP) is also that plans be made proactively by relevant agencies to realign existing roads passing through protected areas, in a way that PAs are bypassed and, subsequently, decommission roads that intersect PAs.

[1] Raman, T. R. S. 2011. Framing ecologically sound policy on linear intrusions affecting wildlife habitats: Background paper for the National Board for Wildlife. Available from: envfor.nic.in/assets/Linear%20intrusions%20background%20paper.pdf

[2] NBWL. 2011. Draft guidelines for linear infrastructure intrusions in natural areas: roads and powerlines. Available from: http://envfor.nic.in/assets/FIRSTDraft%20guidelines%20roads%20and%20powerlines.pdf

If there are viable alternative alignments—as observed in a number of cases—to roads that otherwise intersect PAs, those within PAs must gradually be phased out and eventually decommissioned, while the alternate road should be improved. This must be done in active coordination with the relevant ministries, departments and authorities, as noted above.

In planning roads, within and in the vicinity (defined here as roads that are situated inside and within 1 km radial distance) of protected areas, we recommend that following fundamental principles must be followed in order of priority: Avoidance, Realignment, Restoration.

1. ***Principle of Avoidance*:** The foremost option would be to altogether avoid areas that are within or in the vicinity of any Protected Area and to find alternatives that are socially and ecologically more appropriate.
2. ***Principle of Realignment:*** This follows as a corollary of the first principle. Road projects must investigate and demonstrate that they have considered other alternative routes that avoid natural areas of high ecological value. This must be an integral feature of a project proposal and implementation documents. Realignments must also be developed in a transparent manner through consultation with local communities affected by the routing and subject to ecological and wildlife considerations.

   User agencies seeking clearances for roads must demonstrate as to how they have taken these factors into account, before their proposals can be considered for approval by the SC-NBWL.
3. ***Principle of Restoration:*** In natural areas, existing roads that are in disuse (e.g., old logging roads), or evaluated to be inefficient or detrimental to their objects, shall be targeted for decommissioning and subsequent ecological restoration, as the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.

The Deputy Inspector General of Forests (WL) briefed the committee regarding the existing guidelines for roads within Protected Areas, viz.:

(i) Decision of the Standing Committee of IBWL, as per decision taken during the meeting held on 14.6.2000. This held that roads that have already been tarred should continue to be maintained and repaired properly, in the current form. No roads inside the National Parks and Sanctuaries should be widened or upgraded.

(ii) During the meeting of 14th October 2011, it indicated that "*No widening of existing roads shall be permitted, and the status of finishing of the surface of the repaired road(s) shall remain same as that of the original road(s), i.e.,*

untarred roads shall remain untarred after repairs, and only originally tarred roads shall be repaired and tarred."

Recommendations

: The committee recommends the following:

1. The *status quo* of the roads passing through National Parks and Core Critical Tiger Habitats (CTH) shall remain the same. The roads could be maintained and repaired in the best manner possible in their current form and present width. No widening or upgradation is to be allowed. If it is an existing tarred road, it shall be maintained as such and no widening of the tarred surface or the widening of the road itself, may be done.
2. For Wildlife Sanctuaries and Conservation Reserves, the same norms as in the case of National Parks and Core, Critical Tiger habitats, shall apply. However, in case of Sanctuaries and Conservation Reserves, culverts and metalling in sections of roads that become impassable or 'all weather roads' for approach/connectivity to villages within the Protected Areas, can be considered for approval in the Standing Committee of NBWL. If necessary in such cases, required maintenance could be taken up by the Forest Dept. on the recommendation of the Standing Committee of NBWL. It may be stressed again, that the width and status of the existing roads shall remain the same and no upgradtion will be allowed. In considering such proposals, the method of such road construction/improvement such as blasting, borrow-pit digging, etc., the impact upon movement of animals from one habitat to another/wildlife corridors, access of water, etc. would be criteria for consideration.
3. Where roads approaching / passing by National Parks/Core-Critical Tiger Reserve/Wildlife Sanctuary are within a radius of 1 km thereof, or within the Eco-Sensitive Zone, whichever of the two is lesser, would be treated on same basis/guidelines as are applicable to the Protected Areas category that it is in proximity of.
4. Presently, as Community Reserves are outside the purview of Section 29 of Wildlife (Protection) Act, 1972, the committee decided not to delve into the matter of roads passing through such PAs.

1. The committee recommended that, no change of current ownership and maintenance of roads passing through the Protected Areas should be permitted. However, in specific cases where such a transfer is required to better manage

roads so as to cause minimal impacts on wildlife, as in the case of transfer of certain PWD /other roads which pass through PAs, back to the concerned Forest Dept. such transfers could be considered.

5. Roads being managed by the Forest Department for the purpose of patrolling and tourism, were of equal concern like other roads inside Protected Areas. It was noted that there was a large network of such roads in several National Parks/Tiger Reserves/Wildlife Sanctuaries. No new roads should be constructed by the concerned Forest Departments and if so required to be constructed, the approval of the National Tiger Conservation Authority (in case of Tiger Reserves) and concerned State Boards for Wildlife in case of non-Tiger Reserve for other PAs., must be obtained. The concerned authority should be able to demonstrate and justify the grounds for construction of the new roads within PAs, in the conservation interest of the concerned PA.

6. The committee also agreed that the Wildlife Institute of India should formulate guidelines - for making roads by the Forest Departments, for protection purposes, in Protected Areas, Critical Wildlife Habitats and designated corridors.

Management of roads within PAs:

Mitigation: For existing roads, repairs and maintenance of existing roads, and for repairing roads that are impassable during monsoon/all-weather roads as described in the recommendations above, it is imperative that mitigation measures are included in the project planning, design, budget, implementation, and monitoring stages. This requires measures to minimise detrimental effects of roads on ecology, wildlife, local communities and users. This shall be considered only for existing structures and for new cases, where the options given earlier have been comprehensively considered and overruled, with adequate justification. These are also subject to requisite approvals from the state authorities and boards, the Ministry of Environment and Forests and its statutory bodies, such as the National Board for Wildlife, Forest Advisory Committee, and the National Tiger Conservation Authority, as relevant to each case.

An exhaustive set of management measures have been recommended in the NBWL's draft guideline document mentioned above (pages 8-13, and 17-21). While fully endorsing these recommended management measures, for ready reference, some of the key management considerations applicable for already existing roads, are herewith highlighted:

- Ban on night traffic (dusk to dawn) is essential to save animals from disturbance from the constant flow of traffic, and thus allow them passage. It is recommended that night traffic bans should be initiated and applied in Core Critical Tiger Habitats, National Parks and Sanctuaries. There are such existing bans in various Tiger Reserves and NPs. Night passes may be provided for villagers/communities living within the PAs.
- Strong regulations controlling timing and traffic volumes need to be built in for all roads through Protected Areas and critical habitats.
- Speed reduction is a must to reduce wild animal mortality, and can be achieved through imposed speed limits and speed breakers.
- Vehicles should not be allowed to stop within PAs.
- No use of horns within the PA, and no littering.
- Speed restrictions and other guidelines that spell out rules and avoidance of disturbance to wildlife and habitats along roads in PAs, must be prominently conveyed through well-designed signboards, at entry and exit points and all other relevant locations.
- Establishment of check posts by the forest department, at both entry and exit points.
- Wherever possible, natural animal crossings existing across roads should be retained or encouraged. For instance, overlapping tree canopy in closed canopy evergreen/semi evergreen forests is an essential attribute for the movement of arboreal species. Passage to waterholes and daily movements of animals must also be safeguarded.
- Underpasses: well-designed tunnels, culverts, pipes, and other structures can function as underpasses below roads and bridges, for a wide-range of terrestrial and aquatic species. Underpasses can also be deployed below railway lines/highways for passage of large bodied animals, viz elephants, tigers.
- During maintenance works on existing roads, the underlying principle should be that work must be carried on in a speedy manner, with minimal disturbance to wildlife and with adherence to all rules and regulations that govern wildlife and PAs.
- No work should be allowed between 6 pm to 8 am(just before dusk to just after dawn)
- The labour force required for road maintenance must have their camps outside, the concerned PA
- No firewood cutting or fuel collection from within the PA
- Waste/debris should not be dumped in the PA/or adjoining rivers/nullas/waterbodies
- No taking of any material like sand, gravel etc from the PA. All materials for construction, road maintenance etc should be brought from outside
- No vegetation/tree should be cut or damaged/ during the maintenance.

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LIST OF PARTICIPANTS ATTENDING THE FIRST MEETING OF THE SUB-COMMITTEE CONSITUTED TO FRAME GUIDELINES FOR ROADS WITHIN PROTECTED AREAS, HELD ON 2nd JULY 2013.

1	Dr. M.K. Ranjitsinh Member, NBWL	Chairman
2	Ms. Prerna Bindra Member, NBWL	Member
3	Shri S.W.H. Naqvi Pr. Chief Conservator of Forests (WL) and Chief Wildlife Warden, Maharashtra	Member
4	Shri. G.P. Verma Chief Conservator of Forests, Madhya Pradesh	Member
5	Shri H.S. Negi Inspector General of Forests, NTCA	Member
6	Shri Vivek Saxena Deputy Inspector General of Forests (WL), MoEF	Member-Secretary

***ANNEXURE-II**

LIST OF PARTICIPANTS ATTENDING THE SECOND MEETING OF THE SUB-COMMITTEE CONSITUTED TO FRAME GUIDELINES FOR ROADS WITHIN PROTECTED AREAS, HELD ON 6th AUGUST 2013.

1	Dr. M.K. Ranjitsinh Member, NBWL	Chairman
2	Ms. Prerna Bindra Member, NBWL	Member
3	Shri. Jitendra Agarwal Addl. Principal Chief Conservator of Forests (WL), Madhya Pradesh	Member
4	Shri A.K. Mishra Chief Conservator of Forests (WL) Representing the Chief Wildlife Warden, Maharashtra	Member
5	Dr. Asha Rajvanshi Scientist-G, Wildlife Institute of India, Dehradun	Member
6	Dr.M.D. Madhusudan NCF, Mysore and Member, NBWL	Member
7	Shri Vivek Saxena Deputy Inspector General of Forests (WL), MoEF	Member-Secretary

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ANNEXURE 10.1

LIST OF CONTROL FORMS

FORM - 1

CREATION OF NEW ARTIFICIAL WATERHOLES

Sl. No	Category	Year	Location	Cost	Performance
1	2	3	4	5	6

Category : Masonry anicut, earthen bund, lined depression, bore well and pump, reservoir, spring fed, tanker fed, guzzler, aquifer; permanent or temporary.

Location : By compartment or by a named feature and name given if any.

Performance : Successful, partially successful, failure (give reasons for the latter two).

FORM - 2

MAINTENANCE OF WATERHOLES: NATURAL

Sl. No	Category	Perennial or seasonal	Location	Year	Nature of work	Cost	Performance
1	2	3	4	5	6	7	8

Category : Spring, seep, natural depression, a flowing stretch, reservoir.

Location : By compartment or by a named feature and name given if any.

Nature of work : Desilting, provision of apron, any other category.

Performance : Successful, partially successful, failure (give reasons for the latter two).

FORM - 3

MAINTENANCE OF WATERHOLES: ARTIFICIAL

Sl. No	Category	Perennial or seasonal	Location	Year	Nature of work	Cost	Performance
1	2	3	4	5	6	7	8

Category : Masonry anicut, earthen bund, lined depression, bore well and pump, spring fed, guzzler, aquifer etc.

Location : By compartment or by a named feature and name given if any.

Year : Year of maintenance, with year of establishment in parenthesis.

Nature of work : Desilting, grouting, repairing leaks, repair to mechanical parts, closing anicut openings, any other work.

Performance : Successful, partially successful, failure (give reasons for the latter two).

FORM - 4

RESTORATION OF HABITAT: WEED CONTROl

Sl. No	Location & name of site	Year	Extent of area(Ha)	Species of weed	Operation	Total Cost	Cost/ha	Remarks
1	2	3	4	5	6	7	8	9

Location : By compartment, site name or land feature.

Operation : Uprooting, cutting, burning, ploughing, manual or by using animals or machinery.

Remarks : Measure of success and or problem faced.

FORM - 5

RESTORATION OF HABITAT: PRESCRIBED BURNING

Sl. No	Location & name of site	Year	Extent of area (Ha)	Area treated (ha)	Period	Total Cost	Cost/ha	Remarks
1	2	3	4	5	6	7	8	9

Location : By compartment or name of site.

Period : Date of starting operation and completion.

Remarks : Mention resultant structure e.g. a mosaic, % burnt, % intact problems encountered in conducting the operation - e.g. fire escape.

FORM - 6

RESTORATION OF HABITAT: SOIL CONSERVATION MEASURES - INITIAL OPERATIONS AND SUBSEQUENT MAINTENANCE

Sl. No	Location & name of site	Year	Extent of area (Ha)	Area treated (ha)	Operations	Total Cost	Cost/ ha	Remarks
1	2	3	4	5	6	7	8	9

Location : By compartment, name of site or landmarks.

Extent of area : Total area identified for such treatment. In case of streams or gullies, the length involved.

Area treated : If linear feature then quote length; otherwise area.

Operation : Structures involved such as gully plugs, trench-cum-mound, terracing, spursand bunds etc. quote quantity nos. and cmt. of earthwork.

Remarks : Mention if initial work or maintenance.

FORM - 7

RESTORATION OF HABITAT

Sl. No	Location	Year	Extent of area (ha)	Description of site	Regulations or protection measures	Response	Remarks
1	2	3	4	5	6	7	8

Location : By compartment or landmarks.

Description : % tree, shrub, ground cover, main species, impact of factors causing perturbations.

Regulations & protection measures : Social fencing, power or other kind of fencing, enforced protection by patrolling, fire protection etc.

Response : To be recorded annually. Consider trend of regeneration, vegetation. cover, change in structure and composition, wildlife use index.

Remarks : Site problems or any other useful information, including alternatives if area being used by people for specific purposes.

FORM - 8

ANIMALS: MEASURING TRENDS IN POPULATIONS

Sl. No	Species	Population estimation methodology	Adult		Sub-adults		Yearlings	Fawns	Cubs	Total	Remarks
			Male	Female	Male	Female					
1	2	3	4	5	6	7	8	9	10	11	12

Population estimation : e.g. pugmark, line transect, scan, roadside counts etc., area covered, sampling intensity, data treatment, extrapolation where involved. In case of indices of density. or dung count mentions those figures under the remarks column; use details as pertinent. Describe age classes for each species.

Remarks : Operational problems, protection problems, any other useful information. Indices of density or dung count details to be recorded here.

FORM - 9

ANIMALS: NEW RECORDS

Sl. No	Species	Location	Year	How discovered	Details of number, age, sex	Habitat description	Remarks
1	2	3	4	5	6	7	8

Animal will include vertebrates and invertebrates

How discovered : Sighting, dead specimen, reliability of sighting, captured specimen, incontrovertible other evidence.

Number, age, sex etc. : As applicable to vertebrates

Habitat description : Broad habitat description such as vegetation, and elements such as water, large old trees, den trees, snags, down log material. Use microhabitat descriptors only if relevant.

FORM - 10

ANIMALS: MORTALITY OTHER THAN THAT ATTRIBUTABLE TO AN OFFENCE

Sl. No	Species	Location	Year	Sex and age	Number	How discovered	Cause of mortality	Remarks
1	2	3	4	5	6	7	8	9

Location : By compartment, landmark etc.

Sex and age : As per parameters for age class. Sex, if possible to identify.

How discovered : Carcass, complete or partial. Skull or any other recognizable remains collected where only some remains of an animal are found.

Cause of mortality : If known e.g. territorial fight, accident, possible disease (following post-mortem results), old age causes difficult to determine, predation etc.

Remarks : Any other useful information.

FORM - 11

ANIMALS: MORTALITY ATTRIBUTED TO POACHING OR AN ACT OF VANDALISM

Sl. No	Species	Location	Cause of mortality, number, sex and age class	Remarks
1	2	3	4	5

Location : By compartment or landmarks.

Cause of mortality : Whether the animal was intact or remains found, article or trophy to be recorded. Cause if known such as animal snared, shot or poisoned etc.

Remarks : Any other useful information, especially matters of illegal trade.

FORM - 12

ANIMALS: PREDATION ON DOMESTIC LIVESTOCK BY WILD CARNIVORES

Sl. No	Range	Month	Category of livestock killed	Location	Numbers	Compensation paid (Rs.)	Carnivore involved	No. of cases undecided	Remarks
1	2	3	4	5	6	7	8	9	10

Category of live : Buffalo, cow, bullock (adult, sub-adult, calf), camel, horse, donkey, stock killed sheep, goat, poultry etc.

Location : Comptt. no. or landmark where killed and the village of the owner.

Carnivore involved : Indicate species responsible for the kill if identity is confirmed.

No. of cases undecided : Either in progress or dropped.

Remarks : Record observations like - attended or unattended animal, killed in forest or waterhole or in the pen/shed, field and whether kill was in area closed to livestock trespass.

FORM - 13

ANIMALS: KILLING OF A HUMAN BY WILDLIFE OR INJURY CAUSED

Sl. No	Range	Month	No. of incidents	No. of people killed, age & sex	Number	How discovered	Cause of mortality	Remarks
1	2	3	4	5	6	7	8	9

Location, circumstances and species: Location by comptt. no., the village to which the person belongs and a description of the site and activity such as - open grassy patch, cutting grass; or under a mahua tree collecting flowers etc. Mention species on proof.

FORM - 14

ANIMALS: WILDLIFE DAMAGE TO PRIVATE OR PUBLIC PROPERTY

Sl. No.	Range	Month	The category of property	Extent of damage	Species evolved and number	Remarks
1	2	3	4	5	6	7

Location : By comptt. no., village survey no., name of village or landmark.

Category of property : eg. agriculture field-wheat, huts in a village, any kind of vehicle.

Extent of damage : Crop damage by area, estimated loss of produce and monetary loss. Similar yardsticks for other items like partial or total destruction of huts and belongings with estimated monetary loss

Remarks : Any relevant information or circumstances eg. a wild elephant was provoked by people.

FORM - 15

PLANTS: NEW RECORDS

Sl. No	Range	Kind of produce	Species	Quantity realised (Rs.)	Revenue	Free of change quantity	Agency involved	
							Local people	Outsiders
1	2	3	4	5	6	7	8	

Kind of produce: Mention name, can be biological or geomorphic in origin.

Species : If applicable.

Quantity : Use the appropriate unit.

Local people : Applies to people within TUZ & ZI (buffer). This return normally applies to TUZ & buffer. If practice exists within the PA, make a special mention.

FORM - 16

NWFP COLLECTION: PLANTS AND OTHER PRODUCE

RAANGE:

Sl. No	Year	Kind of produce	Species	Quantity realised (Rs.)	Revenue	Free of change quantity	Agency involved	
							Local people	Outsiders
1	2	3	4	5	6	7	8	

Kind of produce **:**Mention Name, can be biological or geomorphic in origin.

Species : If applicable.

Quantity : Use the appropriate units.

Local people : applies to people within TUZ & ZI (buffer). This return normally applies to TUZ &(buffer). If practice exists within the PA, make a special mention.

FORM - 17

GRAZING OF DOMESTIC LIVESTOCK

YEAR:

Sl.	Grazing unit No.	List of villages in the unit	Village-wise listed population of cattle	Capacity of the unit(cattle units) an number of cattle grazed	Total cattle unit grazed		Remarks
					Legal	Illegal	
1	2	3	4	5	6	7	8

Remarks : (1) Mention number of cattle immunized against FMD, RP, anthrax as the case might be and the number of cattle without the prophylactic cover.

(2) If grass is allowed to be cut for cattle being stall-fed, mention the village and number of such cattle.

FORM - 18

INTER-AGENCY PROGRAMMES: AGENCIES AND SCHEMES (GOVERNMENT)

YEAR:

Sl. No	Name of agency	Central/ State	/Number and name of scheme operated	Physical & financial targets		Area & location	Remarks
				Given	achieved		
1	2	3	4	5	6	7	8

Name of the scheme : To include all activities in the Govt. Sector, ie. Construction use of resources, development processes etc. Mention name of schemes, projects or normal operations. This will address all departments in the management area and those activities outside but capable of influencing the management area.

Remarks : Success, adverse impacts, incompatibility with PA management objectives or failures should be mentioned. Detailed notes to go in the PA book.

FORM - 19

PROGRAMMES OF NGOS

YEAR:

Sl. No	Name of agency	HQ location	Nature of the scheme operated	Physical & financial targets		Area & location	Remarks
				Given	achieved		
1	2	3	4	5	6	7	8

Remarks : Success or adverse impacts, incompatibility with PA management objectives or failures should be mentioned. Detailed notes to go in the PA Book. These programmes and activities could be within the management area or those that are outside the management area but are capable of influencing the state of the management area - either complementing efforts or adversely impacting.

FORM - 20-A

CONSTRUCTION OF INFRASTRUCTURE: ROADS AND BRIDGES (NEW)

RANGE:

Sl. No	Year	Category	Surface	Name or number	Length covered	Cross, drainage works, bridges with type	Total cost and status
1	2	3	4	5	6	7	8

Category of road: National/State highway, district road etc. public road or open only to managers should be stated.

Surface type : Block topped, metal, earth etc. Applies to roads.

Name or number: As the case may be.

Cross drainage type : eg. for culverts - box, hume pipe culverts etc.

Bridge type : Wooden trestle, suspension, metal multi span, masonry arch etc.

Status : Work completed or ongoing. State also the agency responsibility; state whether operational or non-operational.

FORM - 20-B

MAINTENANCE OF INFRASTRUCTURE: ROADS AND BRIDGES (EXISTING)

RANGE:

Sl. No	Year	Category	Surface	Name or number	Length covered	Cross, drainage works, bridges with type	Total cost and status
1	2	3	4	5	6	7	8

Category of road: national/State highway, district road etc. Public road or open only to managers should be stated

Surface type : Black toped, metal, earth etc. Applies to road.

Name/number : as the case may be

Cross drainage type : eg. for culverts-box, humepipe culverts etc.

Bridge Type : Wooden trestle, suspension, metal multi span, masonry arch etc.

FORM - 21-A

CONSTRUCTION OF INFRASTRUCTURE: BUILDINGS (NEW)

RANGE:

Sl. No	Year	Nature of the building	Location	Type of construction	Number	Total cost	Status
1	2	3	4	5	6	7	8

Nature of the building : eg. residential(Guard), office, store, chauki, watch tower, tourist facility, hide, barrier, patrolling camp (temporary or permanent) etc.

Location : By compartment or village or landmark as appropriate.

Type of construction : Masonry (brick/stone), log or wooden, metal, local material etc.

Status : Completed or ongoing.

FORM - 21-B

MAINTENANCE OF INFRASTRUCTURE: BUILDINGS (EXISTING)

RANGE:

Sl. No	Year	Nature of the building	Location	Type of construction	Number	Total cost	Status
1	2	3	4	5	6	7	8

Nature of the building : eg. residential(Guard), office, store, chauki, watch tower, tourist facility, hide, barrier, patrolling camp (temporary or permanent) etc.

Location : By compartment or village or landmark as appropriate.

Type of construction: Masonry (brick/stone), log or wooden, metal, local material etc.

Status : Completed or ongoing.

FORM - 22-A

DEVELOPMENT OF INFRASTRUCTURE: COMMUNICATION (NEW)

RANGE:

Sl. No	Year	Name of facility	Location	Number	Cost	Advantage gained	Remarks
1	2	3	4	5	6	7	8

Type of facility : eg. telephone, wireless

Location : Staff Hq. location, village, landmark etc.

Advantage gained : Area's served, staff locations connected etc.

Remarks : Record status - complete, ongoing, functional, non-functional.

FORM - 22-B

MAINTENANCE OF INFRASTRUCTURE: COMMUNICATION (EXISTING)

RANGE:

Sl. No	Year	Name of facility	Location	Number	Cost	Advantage gained	Remarks
1	2	3	4	5	6	7	8

Type of facility : eg. telephone, wireless

Location : Staff Hq. location, village, landmark etc.

Advantage gained : Area's served, staff locations connected etc.

Remarks : Record status - complete, ongoing, functional, non-functional.

FORM - 23-A

DEVELOPMENT OF INFRASTRUCTURE: VEHICLES (NEW)

RANGE:

Sl. No	Year	Kind of vehicle	Number	HQ if any	Intended use	Cost	Remarks
1	2	3	4	5	6	7	8

Kind of vehicle : Jeep, trailer, tractor, truck, minibus, tanker, motorcycle, bicycle, boat (paddle or motor), launch, car, riding elephant, ponies, etc.

Intended use : Management support, patrolling/ant poaching, tourism etc.

Remarks : Any other useful information. Mention written off vehicles, retired or dead animals.

FORM - 23-B

MAINTENANCE OF INFRASTRUCTURE: VEHICLES (EXISTING)

RANGE:

Sl. No	Year	Kind of vehicle	Number	HQ if any	Intended use	Cost	Remarks
1	2	3	4	5	6	7	8

Kind of vehicle : Jeep, trailer, tractor, truck, minibus, tanker, motorcycle, bicycle, boat (paddle or motor), launch, car, riding elephant, ponies, etc.

Intended use : Management support, patrolling/ant poaching, tourism etc.

Remarks : Any other useful information. Mention written off vehicles, retired or dead animals.

FORM - 24-A

DEVELOPING INFRASTRUCTURE: CONSTRUCTION OF BOUNDARIES FENCES, CPTS, EPTS, ENCLOSURES,

ENCLOSURES (NEW)

YEAR:

Sl. No	Category of construction	Range	Location	Length (Mt)	Number	Specification	Remarks
1	2	3	4	5	6	7	8

Category : Kind of boundary eg. comptt, block, zone etc. In case of fences: power fence, others

Location : By compartment or suitable landmark.

Numbers : In case of exclosures, enclosures, number of pillars etc. as applicable.

Specifications : As applicable to the construction: dry rubble, chain link, local material, height, area, depth, width etc.

Remarks : Any other relevant information.

FORM - 24-B

DEVELOPING INFRASTRUCTURE: CONSTRUCTION OF BOUNDARIES FENCES, CPTS, EPTS, ENCLOSURES,

ENCLOSURES (EXISTING)

YEAR:

Sl. No	Category of construction	Range	Location	Length (Mt)	Number	Specification	Remarks
1	2	3	4	5	6	7	8

Category : Kind of boundary eg. comptt, block, zone etc. In case of fences: power fence, others

Location : By compartment or suitable landmark.

Numbers : In case of exclosures, enclosures, number of pillars etc. as applicable.

Specifications : As applicable to the construction: dry rubble, chain link, local material, height, area, depth, width etc.

Remarks : Any other relevant information.

FORM - 25-A

DEVELOPING INFRASTRUCTURE: FIRELINES (NEW)

RANGE:

Sl. No	Year	Fireline Category or width	Name of points connected	Length (Mt)	Cost	Remarks
1	2	3	4	5	6	7

Category : Main or subsidiary etc. Record width

FORM - 25-B

DEVELOPING INFRASTRUCTURE: FIRELINES (EXISTING)

RANGE:

Sl. No	Year	Fireline Category or width	Name of points connected	Length (Mt)	Cost	Remarks
1	2	3	4	5	6	7

Category : Main or subsidiary etc. Record width

FORM - 26

TOURISM

Total number of visitors all categories : Year :

Name of complex : Total revenue earned:

Sl. No.	The category of visitors by month & number					Indian		Revenue	Day visitors		Staying overnight	
	Adult			Children	Foreigners	Rural	Urban		No	Reve-nue	No	Reve-nue
	Month	Male	Female									
1	2	3	4	5	6	7	8	9	10	11	12	13

Column 2 to 5 will be written in three successive lines for the month pertinent, one below then other. First line information pertains to foreign tourists. Put a tick (_/) in col. 6. Second and third line details rural and urban tourists respectively. Put a tick (_/) in Col. 7, Column 8 as applicable

FORM - 27

OUTBREAK OF FIRES

RANGE:

Sl. No	Year	Location	Extant (ha)	Dates		Reason/s	Estimated loss	Remarks
				Detected	Controlled			
1	2	3	4	5		6	7	8

Location : By compartments.

Reasons : Established or suspected.

Estimated loss : eg. number of trees damaged, stacked firewood/timber/bamboo destroyed/ damaged by volume and cost, wild animals dead, particulars of sensitive sites affected, other property or life destroyed.

Remarks : State particularly problems encountered in detection and suppression and any other useful information. State also whether the extent of fire has been mapped.

FORM - 28

OFFENCE CASES DETECTED

RANGE:

Sl. No	Year	Category	Numbers	No. of cases detected		No. of cases under procests	No. of cases compo-unded	Remarks
				Successful	Failure			
1	2	3	4	5		6	7	8

Category : eg. illegal cutting of trees, illegal firewood, illegal NWFP, poaching, encroachment, illegal cattle grazing etc. category be codified by letters of alphabet.

Remarks : Any other useful information. This should also include the number of cases pending decision with the Department. The cases under column 8 pertain to area of non-PA status under management which do not involve an endangered species (Schedule-I).

FORM - 29

INCENTIVES AND AWARDS

RANGE:

Sl. No	Year	No. of recipients of incentives s for detecting offences	Amount paid (Rs.)	Kind of award	No. of recipient	Remarks
1	2	3	4	5	6	7

Kinds of award : eg. a medal like the Shaurya Chakra, any other such awards instituted by theState or Central Government, includes citations, extra increments etc.

Remarks : Any other useful information. If an award carries cash, mention the amount.

FORM - 30

RESEARCH PROJECTS UNDER IMPLEMENTATION THROUGH PA MANPOWER WITH OR WITHOUT COLLABORATION WITH OTHER AGENCIES

RANGE:

Sl. No	Year	Title	Completed	Ongoing	New	Status	Financial outlay (Rs.)	Expenditure incurred (Rs.)	Remarks
1	2	3	4	5	6	7	8	9	10

Completed : State date of completion and the status of the project report

Ongoing : State since when the project is under operation and expected period of completion

New : State the date of commencement and duration.

Status : State the progress towards achievement of objectives; or project which has been dropped or held in abeyance etc.

Remarks : Any other relevant information. If the project is in collaboration with any other agency or is a contractual arrangement, state the situation and the name of the collaborating agency. If animal/plant specimen are being collected, state authority and where the collections are being housed.

FORM - 31

SURVEY AND INVENTORIES

RANGE:

Sl. No	Year	Title of survey, inventory activity	Completed	Ongoing	New	By PA	By other agency	Remarks
1	2	3	4	5	6	7	8	9

Completed : State date of completion of field work and the status of the report

Ongoing : State since when is it under operation & when is it expected to be completed.

New : State the date of commencement and duration.

By PA personnel: Will include collaboration or contractual arrangement. State the case as relevant.

Other agency : State the name of the agency.

Remarks : If specimen of plants /animals are being collected, state where the collection is being housed and authority. Any other useful information.

FORM - 32

THE MONITORING PROGRAMME

RANGE:

Sl. No	Year	Title of the programme	Date of initiation	Responsible agency	Technique	Status of collaboration and analysis of data	Remarks
1	2	3	4	5	6	7	8

Technique : PCQ, belt transect, line transect and plots, pugmarks etc. by the title of the technique.

Status of collaboration : Write only if applicable.

FORM - 33

ECO DEVELOPMENT PROGRAMME: TARGETS AND IMPLEMENTATION

RANGE: Year:

Sl. No	Nature of the programme	Sector (Central or State) or NGO sponsored	Target set		Achievements		Village (buffer or enclave)	Remarks
			Physical	Financial	Physical	Financial		
1	2	3	4	5	6	7	8	9

Nature of the programme : eg. pasture development, fodder plantations, establishing biogas units, livestock improvement, establishment and development of sericulture, revival of local skills such as handicraft, water harvesting systems, adult's education etc.

Village : Site where programme is being implemented – whether buffer or inside PA.

Remarks : State problems, state failures and reasons thereof, reasons for not attaining targets, for non-implementation or deviation etc. State whether it is on the right tracks in context of achievement of objectives.

Approval of Management Plan

PRINCIPAL CHIEF CONSERVATOR OF FORESTS
(WL) & CHIEF WILDLIFE WARDEN
KERALA

Forest Headquarters
"Vanalakshmi"
Thiruvanathapuram-14
Phone: 0471-2321610
E.Mail: cww.for@kerala.gov.in

No.WL4-2008/12 **Dated: 31.05.2021**

To

The Chief Conservator of Forests &
Field Director (Project Tiger)
Kottayam.

Sir,

Sub : Kerala Forest & Wildlife Department – Approval of Management Plan of Mathikettan Shola, Anamudi Shola and Pampadum Shola National Park - reg.

Ref: : Letter No. A1-490/2019/2184 dated 28.05.21 of CCF (WL) & FD (PT), Kottayam.

The draft Management Plan of Mathikettan Shola National Park, Anamudi Shola National Park and Pampadum Shola National Park was submitted to this office requesting for its approval. After examination of the said Management Plans by the Advisory Committee constituted for the purpose, observations of the Members of the Committee was communicated to the Chief Conservator of Forests & Field Director, Project Tiger, Kottayam and Wildlife Warden, Munnar for their incorporation in the Management Plan.

As per the reference, CCF (WL) & FD (PT), Kottayam has furnished the compliance of incorporating the suggestions and inputs given by the Advisory Committee in the draft Management Plan. In this context, the approval is hereby granted for the Management Plan of Mathikettan Shola National Park, Anamudi Shola National Park and Pampadum Shola National Park for the period from 2020-21 to 2029-30 subject to the following conditions.

1. The provision of the Forest (Conservation) Act, 1980 and directives issued from time to time by Hon'ble Supreme Court of India and also the guidelines issued by Government of India thereunder should be strictly adhered to while implementing the approved Management Plan.
2. All proposed works in this Management Plan shall be carried out as per the prescriptions.
3. For the deviations from the prescriptions of the Plan, if any, to be made only with the prior approval of the Chief Wildlife Warden.
4. The mid-term review of approved Plan should be carried out for appropriate mid-course alterations, if any, as required.

Yours faithfully,

Principal Chief Conservator of Forests (Wildlife) &
Chief Wildlife Warden

MANAGEMENT PLAN OF PAMPADUM SHOLA NATIONAL PARK 2020-21 TO 2029-30