MANAGEMENT PLAN OF MATHIKETTAN 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

MANAGEMENT PLAN OF MATHIKETTAN 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

PREFACE

Mathikettan Shola National Park is a unique Montane Evergreen Forest ecosystem and the vegetation resembles that of the Cardamom Hill Reserve. The forest patches of the region are the last relic of natural vegetation in the entire CHR areas. Various forest types are seen as continuous patches between the altitudes of 1200-1800 m in the area. The Shola-grassland patches lie dispersed in the higher altitude. The temperature experienced here ranges between 9˚C to 30˚C. The mixed vegetation and peculiar climatic conditions provide vital habitat for a large number of plants and animals. Most of the species found in the area belongs to endemic and threatened categories. The Park is an active corridor of wildlife movements especially elephants. The Galaxy frog *(Melanobatrachus indicus)* is one of the rarest frogs in India which is reported from this Mathikettan Shola National Park so this species is treated as the "**flag ship species"**.

On account of the ecological and geo-morphological significance of the region and its importance as an elephant corridor, the State Wildlife Advisory Board recommended declaring the area as a National Park. Accordingly, the Government of Kerala, **GO (MS).No. 50/2003/F&WLD dated 10th October 2003** notified 1281.74 ha in Block No 14 of Pooppara Village, Udumbanchola Taluk as Mathikettan Shola National Park.

Ganja cultivation and poaching were the main threats in Mathikettan Shola National Park which was prevented with effective protection activities by forest department. In the present Management Plan detailed site specific protection plan is proposed to protect the Park from these threats. Also plan provide to strengthen the eco-development activities to conserve the unique Shola Forest along with the rich flora and fauna wealth with focus on information dissemination and awareness creation.

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 prescription 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.

Lekshmi. R
Wildlife Warden
Munnar Wildlife Division

CREDITS

Cover Photo

SANDEEP DAS

Images Contributed by

SALISH J. MENACHERY

K. H. GIREESH

T. ANILKUMAR

Concept & Colour Scheme

LEKSHMI. R

T. ANILKUMAR

Design & Layout

ONE PIXELSIZE MEDIA

CONTENTS

PART I

THE PROTECTED AREA
THE EXISTING SITUATION

CHAPTER 1

Introduction of the area

1.1 NAME, LOCATION, CONSTITUTION AND EXTENT

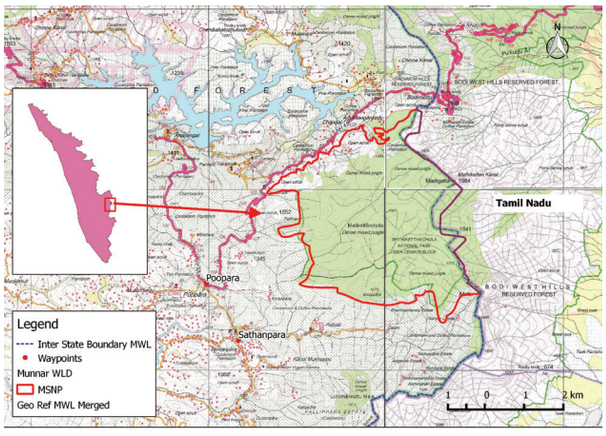
1.1.1 Name

The name of the Protected Area is **Mathikettan Shola National Park (MSNP)**. The first Management Plan of the Mathikettan Shola National Park was for the period from 2010-11 to 2019-20. The present plan is the second Management Plan, for the period from 2020-21 to 2029-30.

1.1.2 Location

Mathikettan Shola National Park is located in the High Range of Southern Western Ghats of Kerala and is a part of the Cardamom Hill Reserve (CHR). Cardamom Hill Reserve is a mid-elevation evergreen forest, extending from Periyar Tiger Reserve to Kannan Devan Hills, sharing its boundaries with forests under Thodupuzha range. Mathikettan Shola National Park is located in the North-East part of CHR, within the geographical limits of 9° 58′ 10.56″-10° 1′ 4.44″ North latitude and 77° 15′ 46.8″ -77° 15′ 24.84″ east longitude. Administratively, the Park falls in Poopara village of Udumbanchola Taluk in Idukki district, Kerala **(Figure 1.1).**

Figure 1. 1 : Location Map of MSNP



1.1.3 Constitution

Mathikettan area in the CHR is notified in the Travancore Government Gazette dated the 24th August 1897, and the area was constituted as a Reserve Forest under Section 18 of Regulation II of 1868. Subsequently, various Government orders or rules were issued for assigning the CHR area for cardamom cultivation. The provisions contained in G. O. (MS) 804/58/Rev. dated the 9th August 1958 were followed for the management of the CHR areas. As per the order, Cardamom Hill Reserve (CHR) was put under the dual control of the Departments of Revenue and Forest. The land area was vested with the Revenue Department and the tree growth was vested with the Forest Department of the State of Kerala. Afterward, vide G. O. (MS) No. 328/2002/RD dated the 17th October 2002, the Government transferred an extent of 1281.74 hectares of the CHR to the administrative control of the Forest Department. On account of the ecological and geo-morphological significance of the region and its importance as an elephant corridor, the State Wildlife Advisory Board recommended declaring the area as a National Park. Accordingly, the Government of Kerala, **GO (MS).No. 50/2003/F&WLD dated 10th October 2003 notified 1281.74 ha.** of Pooppara Village, Udumbanchola Taluk as Mathikettan Shola National Park (MSNP). Notification is given in **(Annexure 1.1).**

1.1.4 Extent

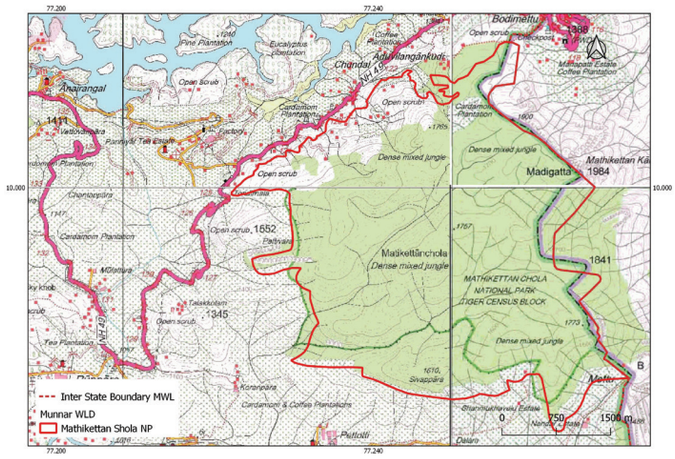
The extent of Mathikettan Shola National Park as per the **Notification GO(MS).No. 50/2003/F&WLD dated 10th October 2003 is 1281. 74 ha. (Figure 1.2)**

1.2 APPROACH AND ACCESS

Mathikettan Shola National Park lies on the way to Theni and Madurai route via NH85. The headquarters of the Park is at Pethotty, 4.5 km. from Santhanpara on the Munnar-Kumily State highway. The nearest

towns are Munnar (41 km) and Nedumkandam (33 km). The nearest railway stations are Aluva (125 km) and Theni (55 km).The nearest airports are Cochin International Air Port (124 km) and Madurai Airport (146 km).

Figure 1. 2 : Map of Mathikettan Shola National Park



1.3 STATEMENT OF SIGNIFICANCE

Mathikettan Shola National Park is a unique Montane Evergreen Forest ecosystem and the vegetation resembles that of the CHR. Mathikettan region is a part of Cardamom Hill Reserve (CHR) reported in the Travancore Government journal 24th August 1897, in which the region was created as a Reserve Woodland underneath section 18 of Regulation II of 1068. The forest patches of the region are the last relic of natural vegetation in the entire CHR areas. Various forest types are seen as continuous patches between the altitudes of 1200-1800 m in the area. The Shola-Grassland patches lie dispersed in the higher altitude. The temperature experienced here ranges between 9˚C to 30˚C. The mixed vegetation and peculiar climatic conditions provide vital habitat for a large number of plants and animals. Most of the species found in the area belong to endemic and threatened categories. Hence, this unique feature of the Park offers ample academic opportunities for study and research on the biodiversity of Montane vegetation. The region also serves as a field laboratory for activities like conservation education, research, monitoring, and participatory management. The Park is an active animal corridor (especially for elephant) and it assumes special significance as a 'stepping stone' for future corridor connectivity to be established between Periyar Tiger Reserve and High Ranges.

I) Biodiversity value

The Park has rich diversity of flora and fauna and several species belongs to the endemic and threatened category. During a rapid plant exploration, a total of 324 (Angiosperms–300 and Pteridophytes–24) plant species belonging to Pteridophytes and Angiosperms were identified from the Park. Angiosperms of 85 families and 200 genera have been recorded from the Park. Of these, nearly 144 taxa (48%) are 'endemic'. Of the 9% of plants recorded as threatened, 4 are Critically Endangered, 7 are Endangered, 17 are Vulnerable. *Impatiens elegans, Vernonia heynei, Myriactis wightii* and *Ilex gardneriana* are the four critically endangered species recorded from MSNP. The Park also harbours many species of Orchids, Balsams and Strobilanthes.

The faunal diversity of the Park includes 36 species of Mammals (except rats, shrews and moles), 108 species of Birds, 16 species of Reptiles, 27 species of Amphibians, 121 species of Butterflies, 23 species of Odonates and 20 species of Ants.

The Galaxy frog is one of the rarest frogs in India which is reported from this area **(Figure 1.3)**. It was described in 1878 by Beddome based on specimens collected from Anamalai Hills. In 2004, the frog was assessed as Endangered due to its limited distribution and degradation of its habitat (Biju et al., 2004). This strikingly coloured and beautifully patterned frog appears to have a very specific microhabitat. Their limited distribution makes them more vulnerable to threats. Nixon and

Bhupathy conducted a study on reptiles of Mathikettan Shola National Park in 2004 and they found two individuals of Galaxy frog. After 15 years, Galaxy frog was again reported during the herpeto-faunal survey conducted in Mathikettan Shola in December 2019 and this was the second record of the species from the Park. This shows that the Park supports the unique habitat for the rare frog. Hence Mathikettan Shola National Park treats this Galaxy frog (*Melanobatrachus indicus*) as **"flag ship species"**.

FIGURE 1. 3 : PHOTOGRAPH OF GALAXY FROG *(Melanobatrachus indicus)*

II) ECONOMIC VALUE

The Park provides a perennial supply of water to the majority of people in Santhanpara and Pooppara region, for meeting their agricultural needs and drinking water requirements. Three streams namely Uchinikuthipuzha, Mathikettanpuzha, and Njandar, the tributaries of Panniyar River, originate from this National Park. The Park is the source of livelihood for indigenous people. The eco-tourism programme in MSNP generate revenue for conservation and protection activities.

III) Aesthetic values

The high altitude forests, scenic beauty and visual grandeur are characteristic features of this Park. The view of Anayirangal dam from the Choondal area is mesmerizing. The lush green Shola patches are mind blowing for the tourists who are visiting the Park. The Park is ideal for bird watching and trekking. The clear blue sky, clean air, stretch of green meadows, and thick foliage teeming with flora and fauna make it a dream destination for tourists.

IV) Scientific values

Due to its rich diversity and endemism of flora and fauna, the Park offers ample opportunity for research, education and nature interpretation. The diversity of lower forms of flora and fauna of the Park is not explored much. Two new species *Peperomia ekakesara* in the family Piperaceae and Memecylon idukkianum in the family Melastomataceae were described by Shyam et al. from MSNP in the year 2018 and 2019. The diversity of rats, shrews and moles inside the National Park is not studied or explored yet. There is ample scope for research and exploration surveys in Mathikettan Shola National Park.

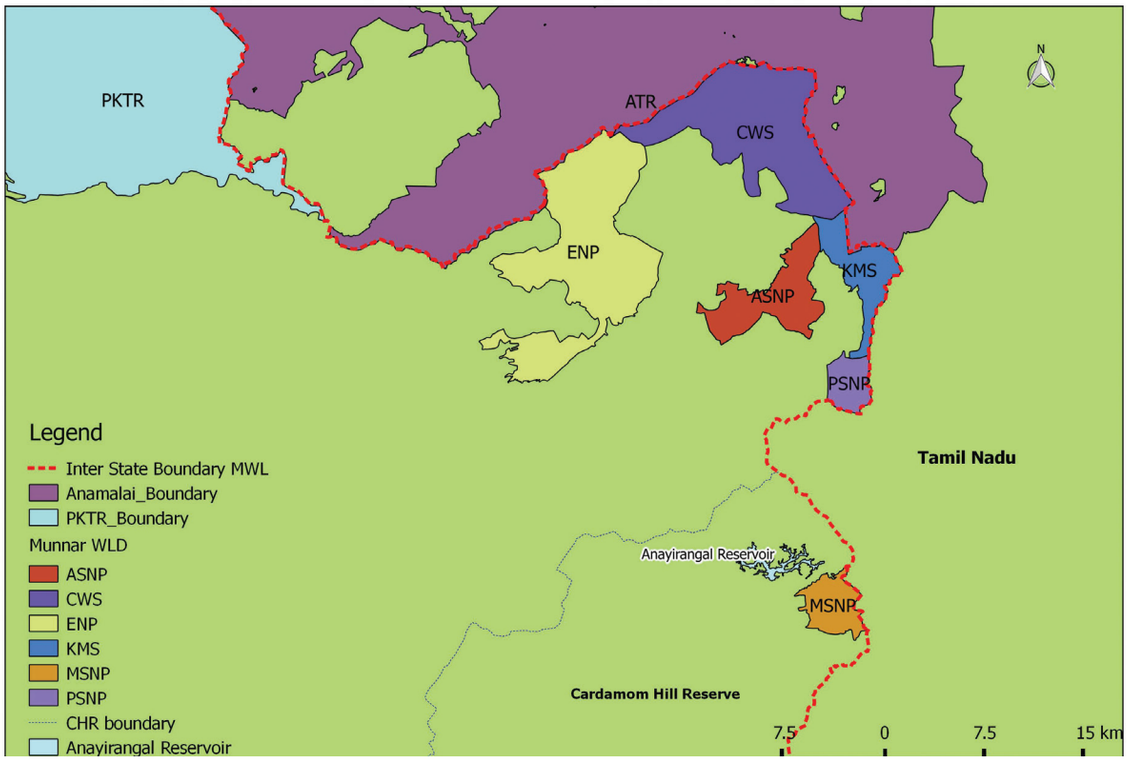
V) Socio-Economic value

Local communities around the area depend on tourism, horticulture, sale of NWFP, work in plantations etc. as a source of livelihood. The eco-tourism activities are designed to offer a wide spectrum of activities for the visitors and to provide means of sustainable livelihood for local communities. The private tour operators also depend on the tourist inflow to the region as alternate livelihood options. One Muthuvan settlement, known as 'Aduvilathankudi' is situated outside the National Park. The Park plays a significant role in sustaining them and their culture.

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

The Park is situated in the Cardamom Hills of Southern Western Ghats, which is one of the 36 biodiversity hotspots in the world. The landscape is undulating with hillocks of varying heights. The Park is the abode of several endemic species of flora and fauna. It is the last remnant of the original forests of CHR. The Park have an ecological connectivity with Munnar Hills and Theni forest division. The watershed areas of Panniyar river provide a perennial supply of water for meeting all the agricultural and drinking requirements of the people of Santhanpara and Poopara villages. A map showing the ecological boundaries of the Park is given in **Figure 1.4**. The Park serves as a corridor for elephants and other large mammals. It also forms part of the 'High Range Circle Landscape Conservation Unit' which comprises of several Protected Areas of the Anamudi Elephant Reserve.

FIGURE 1. 4 : LOCATION MAP OF MSNP



CHAPTER 2

Background Information & Attributes

2.1 BOUNDARIES

2.1.1 External Boundaries

North: Boundary commences from the point, where the interstate boundary between Kerala and Tamil Nadu meets the Southern boundary of survey No. 32 Pooppara Village of the resurvey minor circuit and runs west parallel to Bodimettu - Pooppara road, along the Southern boundary of survey No. 17, 16, 13, 14, 8, 22, thence turning South along the Eastern boundary of block 13 and survey numbers 34, 35, 36, 37, thence along the Western boundary of survey No. 38 to reach a point where the Northernmost extremely of survey No. 38 meets the Resurvey Minor Circuit.

West: Thence the boundary turns South and follows the Resurvey Minor Circuit along the Eastern boundary of block No. 13 till it meets the Northern boundary of survey No. 65 and turn South along the Eastern boundary of survey No. 65 till it meets the boundary of survey No. 64 on the line demarcating the area handed over after eviction.

South: Thence the boundary turns east along the Northern boundary of survey No. 64, 63, turns South along the Eastern boundary of survey No. 78, 71, 72, 73, 74, 174, 192, 193, 195, 197 and turn South along the Eastern boundary of survey no. 198, 199, again turns North-East along the Northern boundary of survey No. 205, 207, 208, 209, 210, 211, 212 to meet the interstate boundary.

East: Thence the boundary runs north along the interstate boundary till it reaches the starting point.

The external boundaries are already surveyed and 90% of the boundary is consolidated with permanent cairns / pillars by the end of the previous plan period. The boundary consolidation of will be done in this Plan period.

2.1.2 Internal boundaries

There are no well-defined internal boundaries regarding vegetation type, the extent of cardamom and coffee planted inside the forest. The Wildlife Warden may initiate action for mapping of vegetation and mapping the extent of cardamom and coffee. The National Park is divided into two zones, namely the Core zone and Buffer zone.

Core zone: The Core zone is in area 11.59 Km^2, protected without any human interference.

Buffer zone: The Buffer zone of the National Park is 1.23 Km^2 in the area, and this zone act as the Tourism zone of the Park. Choondal and Trek path from Choondal to Check post is designated as Buffer zone. The zone acts as a buffer for the Core zone and provides conditions for the conservation of the natural ecosystems while allowing strictly regulated restoration activities, nature education, eco-tourism activities.

The zone will perform the functions of

1. Promoting environmental conservation awareness
2. People-PA interface
3. Eco-tourism

2.1.3 Ecological Boundaries

Mathikettan Shola National Park is part of the Cardamom Hill Reserve Forest (CHR) **(Figure 1.3)**. The Eastern side of the Park is contiguous with the forests of the Theni Forest Division, Tamil Nadu. The Southern, Western and Northern sides are bounded by cardamom plantations of CHR.

2.2 GEOLOGY ROCK AND SOIL

The underlying rock formation consists principally of gneiss of granite nature, very often foliated and composed of quartz, feldspar and biotite. The soil is deep in general but in ridges and hilltops, the soil is shallow. The soil in forests 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 upper and lower slopes of the Park. The analysis was carried out for estimation of particle size separates, soil pH, organic carbon, N, P, K, Ca and Mg as per standard procedures in ASA (1965) and Jackson (1958). The presence of gravel was found. The physical and chemical properties reported in the analysis are shown in **Table 2.1**

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

Location	Sand (%)	Silt % (%)	Clay (%)	Soil (pH)	Organic Carbon	Av. N (%)	Av. P ppm	Av. K (%)	Av. Ca (%)	Av. Mg (%)
Upper slope	67	11	22	4.9	3.3	0.028	10	0.231	0.044	0.0276
Lower slope	62	13	25	4.9	4.05	0.037	11	0.243	0.046	0.0168

Source: Kerala Forest Research Institute Extension Project Report No. 15.

Upper slope: The soils are very dark brown, granular, porous and friable, low in gravel content, rich in organic matter and all nutrients, scattered faunal voids mainly termite channels and chambers, very strongly acid and loam.

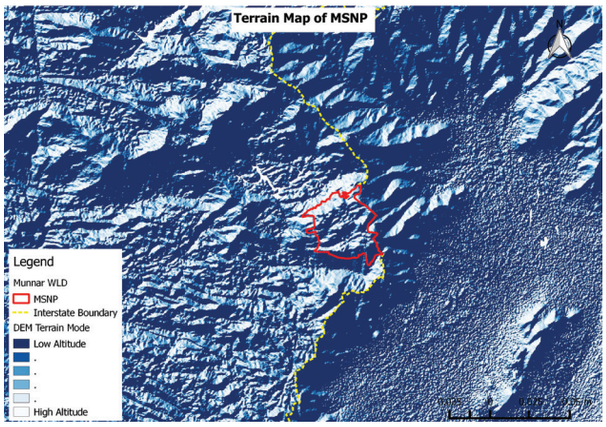
Lower slope: The soils are very dark brown, granular, porous and very friable, low in gravel content, rich in organic matter and all nutrients, root mat and disintegrating organic debris, very strongly acid and clay loam.

The conversion of Shola for the cultivation of cardamom and coffee, without taking into consideration of the uniqueness of the ecosystem, the terrain and drainage, considerable damage has occurred to the ecosystem. The ecosystem, in general, is very fragile and any non-forestry operation can affect the equilibrium.

2.3 TERRAIN

Generally, the Park lies as a slope towards the West on the rolling plateau of CHR hills. The area is characterised by the presence of undulating terrain, having low to steep slopes. The altitude of the Park ranges between 1250 m to 1982 m. The highest point of Park is 1982 m, at Madigatta on the Eastern border of the Park adjoining to Tamil Nadu. Thence the terrain is descending towards the areas under the Theni Forest Division, marked by the presence of huge cliffs on the Eastern side of the Park. The forest is seen as a continuous patch from 1200 m up to 1500 m. Above 1500 m the forests are seen as small patches dispersed among the grasslands. The Park serves as the watershed of Panniyar river. Steep slopes are present in the Eastern and Northern boundaries of the Park **(Figure 2.1).**

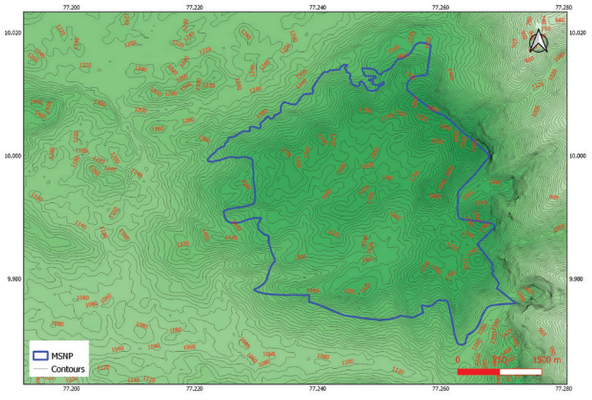
FIGURE 2. 1 : TERRAIN MAP OF MSNP



2.3.1 Contour

Contour map of the Park is prepared by using Quantum GIS 3.4 Madeira and 30 Meter STRM Tile which is given as **Figure 2.2**

Figure 2.2: Contour map of MSNP



2.4 CLIMATE

MSNP is situated in the Cardamom Hills of Southern Western Ghats, sharing the Eastern boundary with the Theni Forest division of Tamil Nadu. The Park receives rains from both South-West and North-East monsoons. The coldest month are January and February. Mountain ranges create barriers that alter wind and precipitation patterns and influence the rainfall in the region. .

2.4.1 RAINFALL PATTERN AND DISTRIBUTION

The rainfall pattern of Mathikettan Shola National Park is illustrated on the basis of data collected from the Indian Cardamom Research Institute (ICRI), Myladumpara, from 2009 to 2019. The rainfall in this area is influenced by South-West and North-East Monsoons. Around 63 percent of the annual rainfall is received during the South- West Monsoon **(Figure 2.3 & 2.4)**. The South-West Monsoon is followed by the North-East Monsoon from October to November. Occasional summer rains are also received in Park **(Annexure 2.1)**.

FIGURE 2.3: MONTH WISE RAINFALL DETAILS IN MILLIMETRE

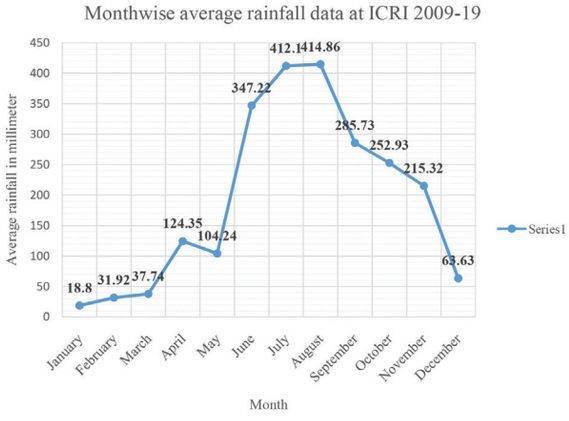
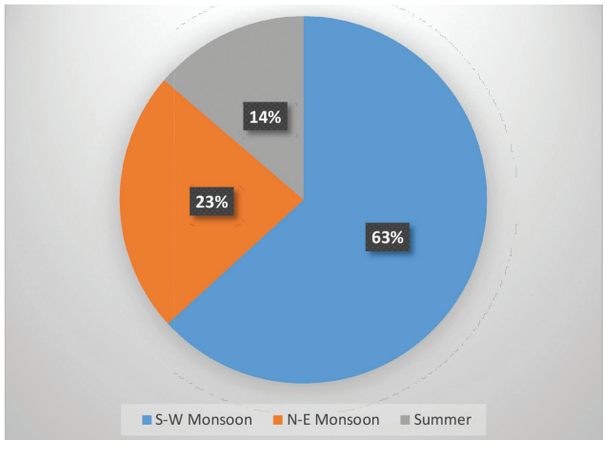


Figure 2.4: The seasonal rainfall precipitation during the last ten years near to MSNP



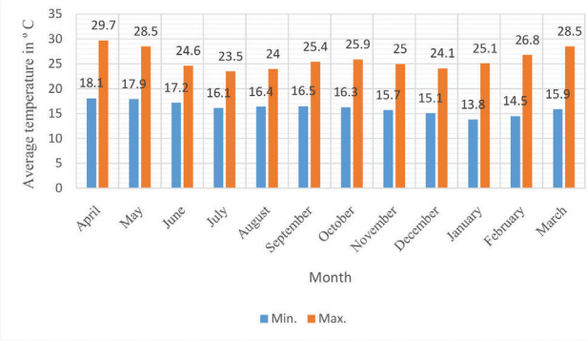
2.4.2 TEMPERATURE, A SUMMARY OF THE YEAR ROUND PATTERN

Analysis of the temperature data of the last 10 years, recorded at the Indian Cardamom Research Institute (ICRI), Myladumpara shows that the maximum temperature ranges from 25.4˚C to 27˚C and the mean minimum temperature ranges from 13.3˚C to 17.5˚C. The average minimum and maximum temperature during the last ten years are given in **Annexure 2.2.**

The Summer season starts in March and extend up to May, temperature reaches its peak during the month of April. The average maximum temperature is 29.7 ˚C. The temperature declines after summer showers, and monsoon season starts from June and extent up to September. The temperature again rises up slightly in September-October.

Generally, the winter season starts in December and lasts up to February. During winter season the minimum temperature experienced at the night and maximum at the day. The graphical representation shows that January is the coldest month in a year, and the average minimum temperature is 13.8˚ C. The lowest minimum temperature recorded in this area was 9.19˚C in January (2019) and the maximum temperature was 25.3˚ C in April (2014) **(Figure 2.5).**

FIGURE 2. 5 : MONTH WISE TEMPERATURE DETAILS OF MSNP



2.4.3 HUMIDITY: A SUMMARY OF THE YEAR-ROUND PATTERN

During South-West and North-East monsoons, the humidity of the area is maximum and it varies from 80%-90%. Humidity is low during summer season.

2.4.4 WIND SPEEDS: A SUMMARY OF THE YEAR-ROUND PATTERN

Higher elevations of the Park experience heavy winds.

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

Dry weather resembling mild drought prevails during the period from February to May. Many streams and water sources get dried up, mild to the moderate scarcity of water and food for wildlife is observed. Fire is the most potential threat during the dry season. Strong winds occasionally are known to cause damage to the trees. No other natural hazards, disasters, no instances of loss of lives, economic loss and other consequences reported from the area.

2.4.7 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 is achieved through strong co-ordination with various line departments such as Health, Police, Fire Force, Motor Vehicles, Animal Husbandry, Excise, Tribal Development, Agriculture, Education, Revenue, PWD, LSGD etc. Participation of Non-Government agencies such as WTI, WCS, WWF, SPCA, SACON, TNHS, local clubs and organizations plays a substantial role in reaching out the message of conservation to the public and enhances their responsible participation in the 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

The Park serves as a watershed of Panniyar river. Many streams originating from the Park joins and forms Uchinikuthipuzha, MathikettanPuzha and Njandar and flows Eastwards and joins with Panniyar river. Most of the streams on Northern side of the Park are non-perennial. Others are more or less perennial in nature. The local people depend on the Park for drinking and irrigation purpose. 18 check dams and 4 water holes are present in the Park. The locations of water bodies given in **Figure 2.6.** and its seasonality is annexed in **Annexure 2.3**. The drainage map of the Park was also generated digitally by using SOI top sheets and watershed atlas maps of Kerala State Land Use Board is shown in **Figure: 2.7**

FIGURE 2. 6 : MAP OF WATER HOLES AND CHECK DAMS INSIDE OF NATIONAL PARK

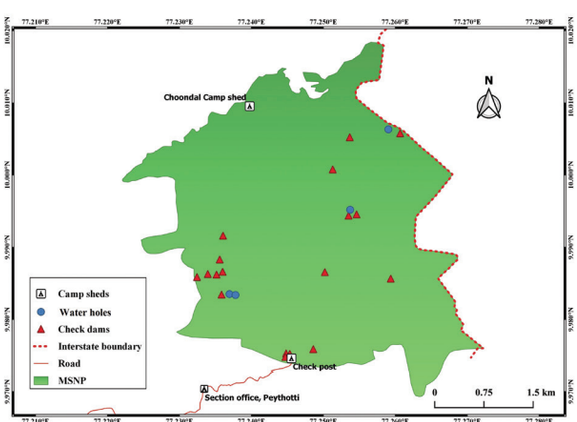
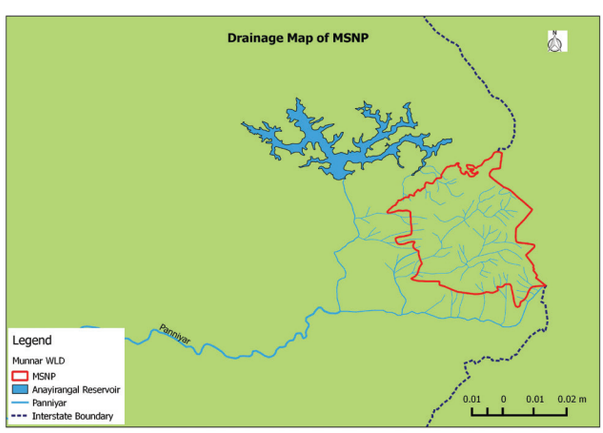


FIGURE 2.7: DRAINAGE MAP OF MSNP



2.6 RANGE OF WILDLIFE, STATUS, DISTRIBUTION AND HABITAT

The National Park offers a wide range of habitats supporting diverse flora and fauna. Presently 324 species of plants, 36 species of Mammals (excluding rats, shrews and moles), 108 species of Birds, 16 species of Reptiles, 27 species of Amphibians, 121 species of Butterflies, 23 species of Odonates and 20 species of Ants are reported from the Park. Rainfall and terrain are important factors that influence animal movements and hold active corridors.

The Park is an active corridor of elephant movement, especially towards Anayirangal Dam. The elephants from MSNP move to Anayirangal area via the following three main routes: (a) Through Thalakkulam, Thondimala, Choondal and Panthadikkulam, (b)Through Thalakkulam and Moolathara (c) Through Kallapuzha, Shankarapandimettu, Puthappara, Moolathara and Kozhippennakudi. The elephants also move towards South to Chakkulathimedu and down to Tevaram of the plains of Tamil Nadu.

2.6.1 VEGETATION

The dominant vegetation type of the area is Southern Subtropical Hill Forests. Most of the areas were planted with cardamom and coffee earlier. Regeneration of the Shola species and grass is found even in regions where massive afforestation activities had carried out previously. The trees commonly seen in the area are *Bhesa indica, Calophyllum austroindicum, Syzygium gardneri, Chionanthus ramiflours, Litsea wightina,* etc. *Patches of Pteridium aquilinum, Gaultheria fragrantissima*, etc. Regeneration of temperate species such as *Rhododendron arboreum, Vaccinium leschnaultii, Eurya nitida, Microtropis ramiflora, Pittosporum tetraspermum, Symplocos cochinchinensis,* Rubes

spp., are commonly found in centers of initial colonization. Regeneration of *Strobilanthes kunthiana, Hypericum mysorense,* Osbeckia spp. etc. is common in Scrubland regions.

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 is a part of the eco-region of South Western Ghats Montane Forest.

2.6.1.2 THE FOREST TYPES, COVERS AND FOOD FOR WILD ANIMALS.

A floristic exploration on Mathikettan Shola National Park was conducted by Roby and Sreejith, in 2019. During the rapid plant exploration, 324 species belonging to 24 Pteridophytes and 300 Angiosperms were identified from the Park. Angiosperms including 85 families and 200 genera were recorded from the Park. Of these, 9% of the plants are in the threatened category, of which 4 species are Critically Endangered, 7 are Endangered and 17 are Vulnerable. Kattumala, located in the Eastern border of the Park adjoining Tamil Nadu is rich in rare and endemic species. The most dominant tree species in this Shola are; *Bhesa indica, Cinnamomum perrotetti, Dysoxylum binectariferum, Gomphandra coriacea, Hydnocarpus alpina, Litsea udayanii, Mastixia arborea, Nostolachma crassifolia, Symplocos monantha, Syzygium densiflorum* and *Turpinia cochinchinensis.* 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 *Elaeagnus kologa, Gardneria ovata, Embelia adnata, Embelia ribes* etc. **(Annexure 2.4).** Mathikettan Shola National Park harbours a wide variety of Pteridophytes. *Pteris cretica* is a critically endangered fern present in the Park, which is previously reported from Avalache of Nilgiri district. The rare species such as *Asplenium zenkaranum, Cyathea crinita, Crepidomanes bilabiatu, Polystichum harpophyllum, Pteris perrotteti, Pteris argyraea, Pteris multiaurita, Pyrrosia beddomei, Selaginella involvens, Deparia patersoni, Huperzia phlegmaria, Phymatosorus beddomei* are also present in the Park. The endemic and endangered species like *Pteris perrotteti* and *Cyathea nilgirensis* are abundant in the evergreen patches of the Park **(Annexure 2.5).**

A) Southern Sub-tropical Hill Forest:

Southern Subtropical Hill Forests is known as the transition belt of the Shola forest. Generally, this 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 and are often festooned with herbaceous and cryptogamic epiphytes. Strobilanthes spp., occur as the undergrowth of the forest. Generally, they appear as imperceptibly merged characteristics of tropical and temperate vegetation types, without any intervening zone with characteristics differing from both (Champion and Seth, 1968).

B) WEST COAST TROPICAL EVERGREEN FORESTS:

It is the climax vegetation in Kerala and is best represented at an altitude range of 600 to 1200 m. Earlier records indicate that these forests extended right from the sea level onwards but due to heavy demographic pressures almost all the coastal forests have disappeared except for sacred groves preserved on religious grounds. Phytosociologically, the forest type is reaching a height of 0-45 m and is found at places where the minimum rainfall is at least 2000 mm/year. In undisturbed areas, stratification is conspicuous and at least three to four strata of vegetation are met with. Most of the trees are buttressed up to about 15m with festooning of trees with mosses, lichens, aroids, ferns, orchids etc. Common trees of the top storey include species like *Artocarpus heterophyllus, Bischofia*

javanica, Calophyllum calosa, Calophyllum polyanthum, Canarium strictum, Cullenia exarillata, Drypetes elata, Dysoxylum malabaricum, Elaeocarpus tuberculatus, Holigarna spp.*, Messua ferrea, Palaquium ellipticum, Persea macrantha,* Polyalthia spp., *Vateria indica,* etc. The second storey of the forest formation is about 20 m height dominated by species like *Aglaia elagboidea, Actinodaphne malabarica, Baccaurea courtallensis,* Cinnemomum spp., Garcinia spp., Syzigium spp. The third storey is generally less than 15 m height and is represented by small trees like *Agrostachys meeboldii,* Evonymus spp., Syzigium spp., Memecylon spp., *Turpinia malabarica*. Ecologically, these forests are most advanced and encountered in 'climax' conditions. Floral richness is high and these forests need preservation for both tangible and intangible benefits.

C) WEST COAST SEMI-EVERGREEN FORESTS:

It is transition type vegetation between evergreen and moist deciduous forests due to disturbances in wet evergreen forest. It is often encountered in places where evergreen forests are subjected to heavy extractions. Ideal altitude limit of the vegetation is 600-800m and at certain places it extends up to 900m. If given adequate protection for nearly a century it can progress towards evergreen forests. The top storey of the forest type is composed of an a mixture of both evergreen and deciduous species. Prominent evergreen trees are *Artocarpus heterophyllus, Bischofia javanica, Calophyllum elatum, Hopea wightiana, Mesua ferrea, Knema attenuata, Myristica dactyloides,* etc. while the deciduous elements are *Acrocarpus fraxinifolius, Bombax malabarica, Chukrasia tabularis, Dalbergia latifolia, Grewia tilifolia, Lagerstroemia microcarpa, Terminalia bellerica, Toona ciliata,* etc.

D) SOUTH INDIAN MOIST DECIDUOUS FORESTS

From a commercial point of view this is the most productive forest type. The trees are of average height of 35 m and during the dry season from February to April, they are devoid of foliage. Buttressed trees are comparatively few in number and the dominant species are *Albizia procera, Bombax malabarica, Dalbergia latifolia, Tectona grandis, Terminalia paniculata, T. tomentosa, T. bellerica, Tetramelos nudiflora* and *Xylia xylocarpa. Bamboos* and Reeds are quite common and layering of trees is not quite distinct. Giant lianas like *Enatada scandens* and *Spatholobus roxhurghii* are also quite frequent. Ground flora consists of many species of medicinal plants.

E) SOUTHERN MONTANE WET TEMPERATE FORESTS

The forest types comprise Southern Montane Wet Temperate forest (Shola forest) and Southern Montane Wet Temperate Grassland (Grassland). They are closed forest patches in which the tree height become reduced (12-15 m height) and the leaf thickness and complexity in tree architecture increases. The other significant features are tree bark clothed with mosses and lichens, prolific growth of epiphytes and good diversification among ferns. Besides, they possess high level of endemism due to the restricted habitat. *Mastixia arborea,* Ilex spp, *Elaeocarpus munronii, Meliosma simplicifolia, Rhododendron arboretum* J. E. Smith ssp*. Nilagiricum, Daphniphyllum neilgherrense. Vernonia anamallica, Vernonia bourneana, Vernonia fysonii, Blumea oxyodonta,* Impatiens spp. are the common species in this type of forest.

F) SOUTHERN MONTANE WET GRASSLANDS

The high altitude natural grasslands are located along the Northern and Eastern boundaries of the Park. These high altitude grasslands consist of grasses, herbs and 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 *Strobilanthes kuthiana, Rhododendron arboretum* J. E. Smith spp. Nilagiricum, Anaphallis spp., Swerita sp., *Hypericum mysurensis, Phlebophyllum kunthianum,* Eupatorium sp. Viola sp. and *Pteridium aquilinum.* The

extent of vegetation types as well as information on the RET species are not available at present.

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 invasive species.

2.6.2 ANIMALS AND HABITATS

A) MAMMALS

The mammalian diversity of the Park was enumerated with the help of camera trap exercise. The Bat biodiversity assessment in 2019 was done by Sreehari Raman (Chiropterologist) by Herp trap and passive bat detector methods. The animal sightings register was also cross verified for diversity assessment of the species. Accordingly, a total of 36 species of Mammals were identified from the Park. Of which 14 species are included in the order of Chiroptera. According to IUCN Red list of threatened species (IUCN, 2016), around 10 species are included in threatened category of which 3 are Endangered and 7 are Vulnerable. Of the 36 species, 4 are endemic to Western Ghats. **(Annexure 2.6).**

The most widely distributed mammalian species in the Park are Sambar deer, Indian Crested Porcupine, Barking Deer, Mouse Deer, Brown Mongoose, Stripe-Necked Mongoose, Brown Palm Civet etc. Frequent movement of Gaur, Elephant, Tiger and common Leopard is observed in various areas of the Park.

B) BIRDS

Among the 231 species of Birds recorded in Munnar Wildlife Division, a total of 108 species of Birds are seen in the Park **(Annexure 2.7)**. 99 species are Least Concerned, 2 are Not Evaluated, 3 are Near Threatened, 2 are Vulnerable and 1 species belongs to Endangered category of IUCN Red list. Among, the Birds identified from the Park 9 species are endemic to Western Ghats. During the last five years, a series of surveys of migratory and non-migratory birds were conducted by the Park authorities in collaboration with Travancore Nature History Society (TNHS), Trivandrum.

C) REPTILES

16 species belonging to eight families under 14 genera were recorded from Mathikettan Shola National Park **(Annexure 2.8)**. 12 out of the 16 Reptiles reported are endemic to Western Ghats, which makes the Park one of the suitable place for endemic reptiles. As per the IUCN Red List the species *Trimeresurus macrolepis* and *Dravidogecko anamallensis* falls under the Near Threatened category. More than half of the Reptile (all snake species) species recorded are protected under Schedule IV of the Wildlife (Protection) Act, 1972. The presence of high degree of endemic and rare Reptiles like the Uropeltids, Calliophis and Ristella's makes the Park one of the hot spot of endemic Reptiles in the Western Ghats.

D) AMPHIBIANS

27 species Amphibians belonging to 9 families under 14 genera were recorded from the Park. The family Rhacophoridae represents the most number of species (14) **(Annexure 2.9)**. Nixon and Bhupathy recorded one of India's rarest and endangered frog *Melanobatrachus indicus* in 2004 from Mathikettan Shola. Recent survey also recorded the species, which suggests that the Park is home

for this rarest frog in the Western Ghats. Record of *Melanobatrachus indicus* from multiple locations proves that Park is one of the suitable areas for the endangered and endemic frog.

High degree of endemism is reported in Amphibians present in the Park. 25 species out of the total 27 species reported are endemic to Western Ghats. 12 species belong to various IUCN threatened categories and 3 species are protected under the Wildlife (Protection) Act, 1972. Five species viz, *Rhacophorus pseudomalabaricus, Raorchestes munnarensis, Raorchestes ponmudi, Raorchestes sushili* and *Raorchestes chlorosomma,* are included in the Critically Endangered (CR) category of IUCN Red List.

E) BUTTERFLIES

Butterfly Surveys were conducted in MSNP in collaboration with the Travancore Nature History Society (TNHS) from 2016 onwards. A total number of 121 butterfly species were recorded from the Park (Kalesh, 2019) **(Annexure 2.10).** This includes 5 species listed under the Red List of IUCN and 1 species that are endemic to the Western Ghats.

F) ODONATES

A systematic survey was conducted from 2016 onwards in collaboration with the Travancore Nature History Society (TNHS). A total number of 23 Odonate species were recorded from the Park (Kalesh 2019) **(Annexure 2.11).** This includes 23 species listed under the Red List of IUCN, 2 species that are endemic to Western Ghats and one to Peninsular India.

G) ANTS

Ants survey was conducted on MSNP during the year 2019-20 and 20 species belonging to five sub families were identified from the Park **(Annexure 2.12).** Among the species, most of them belong to the sub family Formicinae (9 species), followed by sub families of Myrmicinae (4 species) and Ponerinae (4 species).

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

Various categories of vertebrates found in the Park is given in **Annexure 2.6, 2.7, 2.8 and 2.9.** Since the Park is small in area, the resident population of these groups is small when compared to other Protected Areas. However, the Park acts as a connecting corridor between the Kannan Devan hills and Palani hills which ensure the movement of the wildlife of these two regions. The quality of the habitat is good and healthy and offers an abode for the wildlife of the region.

2.6.2.2 THE LIMITING FACTORS

The dry spell from February-May and the very cold months of December and January limits the availability of food resources to a certain extent. However, artificial sources of water are created to meet the water requirements of wildlife in the dry season.

2.6.2.3 IMPORTANT INVERTEBRATES, THEIR STATUS, DISTRIBUTION & HABITAT

The Park is home to various species of insects. Various categories of invertebrates present in the Park are given in **Annexure 2.10**, **2.11** and **2.12**. Invertebrates are distributed across the Park and seen in different vegetation types. Although most of them are found throughout the year, there are seasonal variations in the spawning, propagation etc. Studies on status, distribution & habitat of various invertebrates in the Park have to be done for a comprehensive database.

CHAPTER 3

History of Management & Present Practices

3.1 GENERAL

The area notified as the Mathikettan Shola National Park was formerly a part of the Cardamom Hills Reserve, notified by the Travancore Government under section 18 of Regulation II of 1868 and published in the Official Gazette dated the 24th August 1897. Over a period of 100 years, the dual imperatives of policy and politics led to large-scale deforestation, encroachment and alteration of the forests of CHR. Various Government orders / rules were issued for assigning the CHR area for cardamom cultivation and food production.

The provisions contained in G. O. (MS) 804/58/Rev dated the 9th August 1958 were followed for the management of the CHR areas. As per the order, Cardamom Hill Reserve (CHR) was put under the dual control of the Departments of Revenue and Forest. The land area was vested in the Revenue Department and the tree growth was vested in the Forest Department of the State of Kerala. Afterward, vide G. O. (MS) No. 328/2002/RD dated the 17th October 2002, the Government transferred an extent of 1281.74 hectares of the CHR to the administrative control of the Forest Department. On account of the ecological and geo-morphological significance of the region and its importance as an elephant corridor, the State Wildlife Advisory Board recommended declaring the area as a National Park. Accordingly, the Government of Kerala, GO (MS).No. 50/2003/F&WLD dated 10th October 2003 notified 1281.74 ha in Block No 14 of Pooppara Village, Udumbanchola Taluk as Mathikettan Shola National Park.

3.2 TIMBER OPERATIONS INCLUDING BAMBOO AND FIREWOOD

The area was planted with cardamom and coffee. No timber operations have been carried out in these areas and the previous Management Plan prescription also stipulated this. The local people are not dependent on the National Park for firewood.

3.2.1 SILVICULTURAL SYSTEM AND TENDING OPERATIONS

No silvicultural system practiced in the Park after the declaration of National Park.

3.3 NON WOOD FOREST PRODUCE (NWFP) COLLECTION

There are many human settlements adjoining to the boundary of this National Park. Aduvilanthankudi is a Muthuvan tribal settlement in the North-Eastern boundary of the Park. The tribes collect Wild honey, Badraksham, Wild Pepper etc. as NWFP from Mathikettan Shola National Park.

TABLE 3.1: LIST OF ITEMS COLLECTED FROM THE PARK

Sl. No.	Items	Quantity/Year
1	Wild Honey	85 Kg
2	Badraksham *(Elaeocarpus tuberculatus)*	Minimal
3	Wild Pepper	Minimal

3.4 LEASES

No part of the National Park is leased to any organization / body.

3.5 OTHER PROGRAMS AND ACTIVITIES

A Tribal Eco-Development Committee "Aduvilanthankudi EDC" is currently functioning in this National Park. Aduvilanthankudi is the only Muthuvan tribal settlement located adjacent to the

North-Eastern boundary of the Park. EDC members are engaged in tourism, protection, participatory fire management activities etc. The removal of coffee and the monitoring of natural regeneration in the old coffee plantations are operational in the Park. For the well-being of tribes and other fringe dwellers various programme like medical camps, the supply of essential amenities, drinking / irrigation water projects, etc. are being implemented in co-ordination with line departments and Non-Governmental Organisations.

3.6 PROTECTION

Aduvilathankudi is a settlement of Muthuvan tribes, situated along the North-Eastern boundary of MSNP. There are about 52 families in this settlement. The 90% boundary consolidation of the Park is completed and demarcated with cairns. The Park was notorious for ganja cultivation and is very prone to poaching due to the presence of human habitation along the North-Eastern border.

The Section office of the MSNP is located at Pethotty. Considering the magnitude of problems, the present staff strength is insufficient to manage the protection activities. Presently four antipoaching camps are functioning in the Park. The details are given in **(Figure 3.2 & Annexure 3.2).** MSNP is divided into 4 patrolling units and in these units frequent patrolling, perambulation and raids are conducted under the guidance of Wildlife Warden and Assistant Wildlife Warden as a part of protection initiatives.

3.6.1 LEGAL STATUS

Mathikettan Shola is part of CHR and was declared as National Park on 10th October 2003 as per the Notification **GO (MS).No. 50/2003/F&WLD** under Section 35(I) of Wildlife (Protection) Act, 1972.

3.6.2 HUNTING

Two cases were booked from the Park in 2019. Since there are human habitations and plantations along the outskirts of the Park there are chances of hunting for bush meat. Regular patrolling perambulations, interior camping and frequent raids etc. done by the department staffs in the potential areas helps to keep hunting, poaching under check. Details are given in the **Table 3.2.**

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 are there in place in the PA.

3.6.3.1 POACHING

During the past ten years, two cases were registered against attempt for poaching **Table 3.2.**

TABLE 3. 2 : LIST OF CASES REGISTERED IN MSNP

Sl. No.	PAs	Year	Type of offence	No. of accused	Case No.
1	MSNP	2019	Tresspass with weapons	3	OR-01/2019
2	MSNP	2019	Tresspass with weapons	2	OR-04/2019

Details of cases booked in nearby Devikulam range of Munnar Territorial Division during 2013 to 2020 is given in the **Table 3.3.** A total of 333 cases where registered in Devikulam Range during these years (2013-2020) while only two cases in MSNP, this shows the protection efficiency of the PA.

TABLE 3.3: LIST OF CASES BOOKED IN NEARBY RANGES OF MSNP

Sl. No.	Year	Number of cases booked in	
		MSNP	Devikulam Range
1	2013	Nil	58
2	2014	Nil	50
3	2015	Nil	39
4	2016	Nil	33
5	2017	Nil	43
6	2018	Nil	35
7	2019	2	39
8	2020	Nil	36
	Total	**2**	**333**

3.6.3.2 ILLEGAL CUTTING OF TREES

There is no report on illegal felling of trees from the Park during the past 10 years.

3.6.3.3 ILLEGAL REMOVAL OF NWFP, ENCROACHMENT AND OTHER ILLEGAL ACTIVITIES

There is no report of illegal removal of NWFP, encroachment and other illegal activities from the Park after the declaration of the National Park.

3.6.4 LIVESTOCK GRAZING

Livestock grazing is not a serious issue inside the National Park.

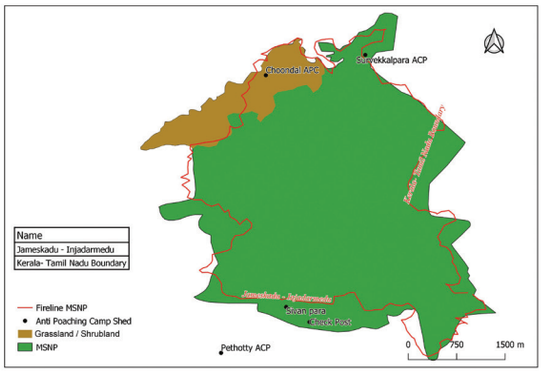
3.6.5 WILD FIRES

The forest fire was not reported from Mathikettan Shola National Park for the last ten years. The Choondal and Vattapara area of the Park is characterised by the presence of grasslands, highly vulnerable to fire during the dry season. Hence, special attention is given to this area during fire season. The Park is protected from the forest fire by firelines, control burning, engaging protection mazdoors, fire gangs etc. during the fire season. Two firelines with a length of 25 km along the boundary of the Park are maintained annually to protect the Park from fire **(Table 3.4 & Figure 3.1)** Active steps for the fire prevention in the fire prone areas are done with the help of EDC members.

TABLE 3. 4: LIST OF FIRELINE

Sl. No.	Name	Length (Km)
1	Jameskadu - Injadarmedu	18
2	Kerala- Tamil Nadu Boundary	7
	Total	**25**

FIGURE 3.1: MAP OF FIRELINE



3.6.6 INSECT ATTACKS AND PATHOLOGICAL PROBLEMS

No insect attacks and pathological problems were reported from the National Park in the past ten years.

3.6.7 WILDLIFE HEALTH

The presence of livestock in the fringe area poses the threat of an outbreak of foot and mouth diseases and other communicable diseases. The surrounding and neighbouring villages have a large number of cattle and other livestock. This increases the chances of transmission of zoonotic, vector-borne, other infections to wildlife. There is no standardized protocol for monitoring wildlife health inside the Park. Periodic vaccination programme to the livestock in the human settlements in fringe areas of the Park are being undertaken with the help of line departments, to prevent the spread of diseases to the wildlife. There is no incidence of outbreak of diseases were reported from the Park for the past ten years.

3.6.8 INTER-AGENCY PROGRAMME AND PROBLEMS.

There are no inter-agency programme operating inside the National Park.

3.7 TOURISM

Mathikettan Shola National Park is one of the ideal place for the tourism activities. The panoramic view of Anayirangal dam, Tamil Nadu, mixed forest vegetation, cool climate and the possibility of wildlife sightings are the key attraction of the Park. The Forest Department is offering eco-tourism packages in the Park with an aim to generate revenue for the management of the Park and also to create livelihood opportunities for indigenous communities. There are two entries to the Park, one at the Northern side of the Park, which is only 600 m away from the N.H 85 and the other on the Southern side, 8.5 km away from Santhanpara. According to the previous Management Plan, lack of infrastructure was the major limiting factor for the tourism operations which was created during the last decade.

The Information centre, dormitory, log house and nature education centre at Pethotty, stay faecility at Choondal are the tourism facilities available in the Park. A well organised guided trekking program is offered to the tourists and visitors. The 5 Km trekking track starts from the Choondal and ends at Check Post.

Based on the agreement signed between State Forest Development Agency and M/S Stesalit Systems. Ltd, a carrying capacity assessment on the present level of ecotourism activities, was carried out in the year 2019. 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 MoEFCC - Guidelines for Eco-tourism in and around Protected Areas. The estimated carrying capacity for trekking is 89 persons / day for Mathikettan which is greater than the current utilization rate.

The eco - tourism activities are managed by the members of Aduvilanthankudi EDC. Eco - tourism offers livelihood opportunities for the EDC members along with a sense of commitment to conservation and protection of the Park.

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. 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, income and revenue generated from Eco-tourism from 2014-15 to 2019-20 are given in **Table 3.5.**

TABLE 3. 5 : DETAILS OF VISITORS AND REVENUE FOR THE LAST FIVE YEAR

Year	Indian	Foreigners	Total	Govt. revenue	Income AFDA
2014-15	274	35	309	17327	108000
2015-16	513	37	550	23454	112300
2016-17	740	80	820	44100	183392
2017-18	661	110	771	51725	210594
2018-19	507	115	622	49475	192100
2019-20	528	129	657	59055	192160

3.8 RESEARCH MONITORING AND TRAINING

3.8.1 RESEARCH AND MONITORING

The Park management conducted a camera trap exercise in 2019 and identified 22 species of Mammals from the Park, including tiger, leopard, wild dog, nilgiri marten, brown palm civet, brown mongoose, stripe-necked mongoose, elephant, gaur, sambar deer, barking deer, mouse deer etc. Chiroptera biodiversity assessment done by the Park authorities in the year 2019 identified the presence of 14 species of bats. The Park management in collaboration with Travancore Nature History Society (TNHS) conducted the Birds, Butterfly and Odonate diversity assessment study from 2016 onwards and recorded the presence of 108 species of Birds, 121 species of Butterflies and 23 species of Odonates. Diversity assessment of Amphibians and Reptiles were carried out in 2019 and identified 27 species of Amphibians and 16 species of Reptiles from the PA. Ant diversity was assessed in 2019-2020 period and identified 20 species of Ants from the Park. A rapid flora exploration was conducted by the Park management identified the presence of 324 species of plants from the PA. The Park also participated in the Tiger Census and elephant census conducted at the National level.

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, Mahatma Gandhi University - Kottayam, University of Calicut - Thenhipalam and College of Forestry - Vellanikara are the major institutions conducting research in Mathikettan Shola National Park. Details of the researches conducted by the institutions are annexed **(Annexure 3.2)**.

3.8.2 TRAINING

Various trainings, awareness programme and capacity building programme are organised for the staff and EDC members from time to time. These include awareness on forest fire, firefighting techniques, bio diversity assessment, wildlife management, disaster mitigation, habitat improvement, sustainable management of the ecosystem, soil and moisture conservation, first aid, etc.

3.9 ECOSYSTEM, HABITATS AND WILDLIFE CONSERVATION STRATEGIES AND THEIR EVALUATION

The strategy of conservation is primarily focused on the protection of the Shola habitat and other native species. Conservation strategies give thrust to eco-restoration activities, 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. are undertaken periodically. As part of habitat management, eradication of exotic plants, restoration of the eradicated area, gully plugging and desilting of water holes etc. are being done on an ongoing basis. The strategy of conservation is primarily focused on the protection of the Shola forest and native species. The fire protection camps and firelines are established by department in fire prone zone of the Protected Area before the dry season. Regular perambulation, interior camping and frequent raids are conducted in view of strengthening the protection.

As part of conservation education the National Park organizes nature camp for school students, college students, non-governmental youth organisations, media persons and people's representatives. The Shola-grasslands, high altitude evergreen forest vegetation and the perennial streams present in the Park are better models for conservation education for the students of schools and colleges.

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

Periodical surveys and studies facilitating the conservation of flora and fauna are conducted and based on the reports appropriate interventions are being implemented from time to time. Annual maintenance of trek paths is being done.

3.10 ADMINISTRATIVE SET UP

Mathikettan Shola National Park is one of the administrative units under the Assistant Wildlife Warden, Shola National Parks Range in Munnar Wildlife Division. The Office of the Assistant Wildlife Warden Shola National Park is at Vattavada which is 75 Km away from the Park. In addition to MSNP 3 other PA's namely Pambadum Shola, Anamudi Shola National Parks and Kurinjimala Sanctuary, are also in the Shola National Parks Range. There is no separate staff strength for the Park. A Section Forest Officer, 4 Beat Forest Officers and 2 Forest Watchers are deputed for the management of Mathikettan Shola National Park from Kadavari Forest Station. The details are given in the **Table 3.6.** In addition to this, for the day to day activities protection mazdoors are also engaged.

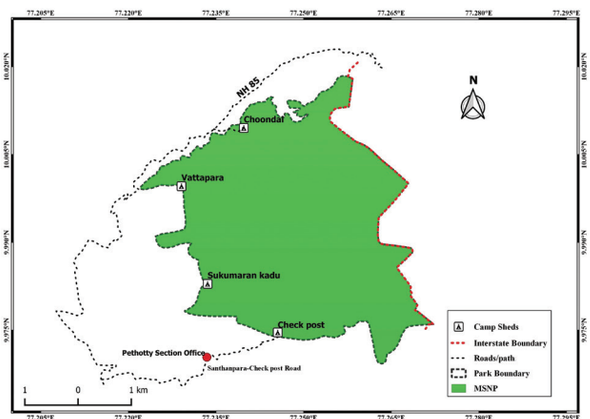
TABLE 3. 6 : DETAILS OF STAFF STRENGTH IN MSNP

Sl. No.	Name of Post	Present Strength
1	Assistant Wildlife Warden	1
3	Section Forest Officer	1
4	Beat Forest Officer	4
5	Forest Watchers	2

A) EXISTING ANTI-POACHING CAMP SHEDS

At present there are four camp sheds at Choondal, Vattapara, Sukumarankadu and Check Post. They are used by staff and watchers for camping during their field perambulation. Locations of anti-poaching campsheds are shown in **Figure 3.2**

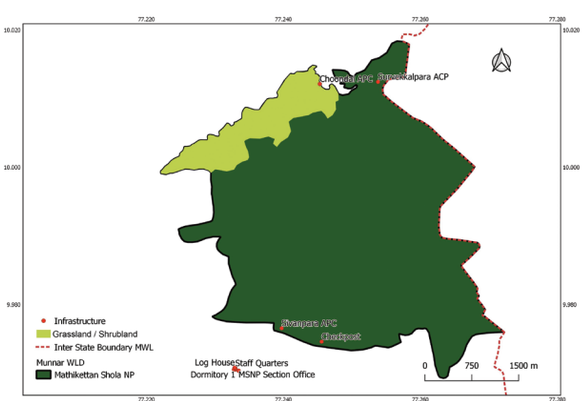
FIGURE 3. 2: MAP OF ANTI-POACHING CAMP SHEDS



B) EXISTING BUILDINGS

The existing buildings under the jurisdiction of the Park include Section Office, staff quarters, dormitory & amenity centre at Pethotty. **(Figure 3.3).**

FIGURE 3. 3: EXISTING BUILDINGS OF MSNP



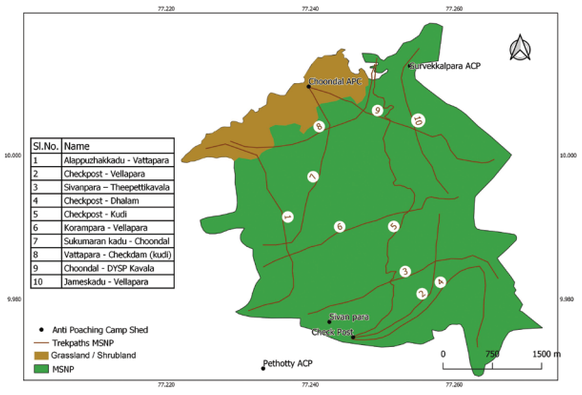
C) Trek paths

A total length of 36.5 km. trek paths as given in **Table 3.7** and **Figure 3.4** exists in the Park by the end of the previous plan period. These trek paths are used for patrolling, perambulation and protection purposes.

TABLE 3. 7: LIST OF TREK PATHS

Sl. No.	Name	Length Km.
1	Alappuzhakkadu - Vattapara	4
2	Checkpost - Vellapara	3
3	Sivanpara - Theepettikavala	3.5
4	Checkpost - Dhalam	4
5	Checkpost - Kudi	6
6	Korampara - Vellapara	3.5
7	Sukumaran kadu - Choondal	3.5
8	Vattapara - Checkdam (kudi)	3
9	Choondal - DYSP Kavala	3.5
10	Jameskadu - Vellapara	2.5
	Total	**36.5**

FIGURE 3. 4: MAP OF TREK PATHS



3.11 COMMUNICATION

Various mobile networks are available in Mathikettan Shola National Park. There is no wireless communication system in the PA.

3.12 SUMMARY OF THREAT TO WILDLIFE

a) Invasive species: The existence of invasive species, coffee and cardamom plants in the natural ecosystem may adversely affect the natural regeneration.

b) 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. 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. High level of vigilance is essential to keep the potentially illegal activities under check. there is no instance of ganja cultivation reported from the Park after the declaration of the National Park.

c) Poachers and smugglers: Poaching is a major problem in Protected Area management. North-Eastern and Southern border of the Parks shares boundary with human settlement and plantation which causes a high risk of poaching.

d) NWFP collection: The Park is rich in Non Wood Forest Produce. People of Aduvilanthankudi tribal settlement are involved in the collection of NWFP. The unscientific collection practices of NWFP, if not regulated appropriately and is likely to be a threat. Moreover, the illegal practice might lead to the extinction of many locally endemic plants within the Protected Area.

e) Wildlife diseases: Wildlife diseases are not reported so far from the National Park. Chances for a disease outbreak in the Park require close monitoring and surveillance due to the presence of a large number of livestock in human settlements in the fringe areas.

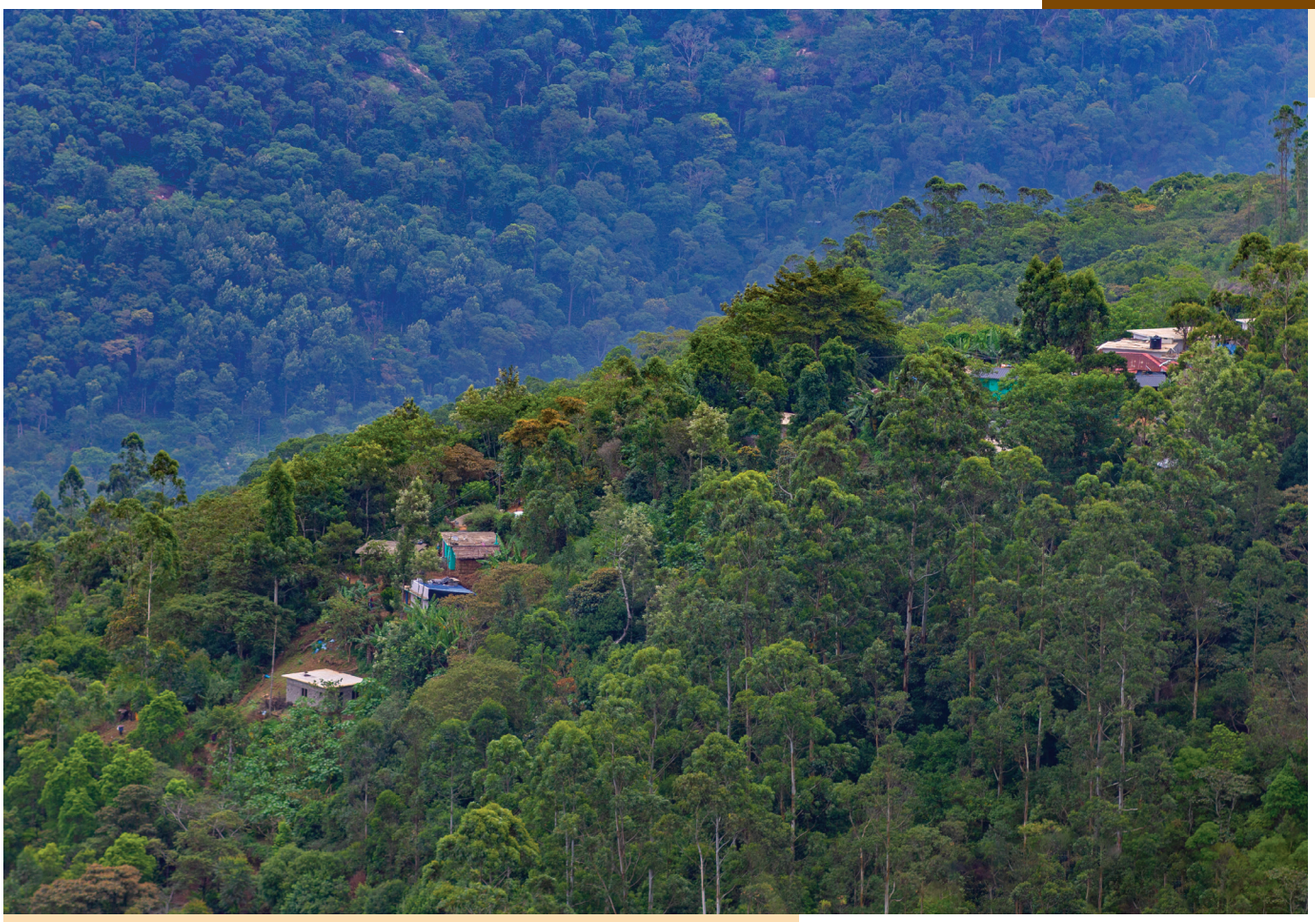
f) Human-wildlife conflict: The Majority of the population in human habitations adjoining to the Park are involved in agricultural practices. The land use practices in the fringes and in corridors attract wild animals especially elephants. Major crop raids are done by wild boars, elephant, sambar deer, bonnet macaque, etc. Man-Animal conflict is severe in Aduvilathankudy, Choondal, Thondimala, Thalakulam, Korampara, Pethotty, Dalam and Njandar areas which are outside the PA.

g) Soil erosion: Soil erosion is a threat to the Park, especially in the hill slopes and the banks of streams. The attention must be given to the areas where the exotic removal is carried out.

h) 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

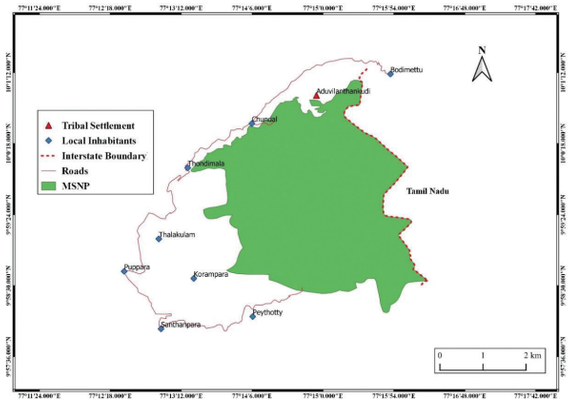
Aduvilanthankudi is the only tribal settlement lying adjacent to the North-Eastern boundary of the National Park. Apart from this, three other settlements are also lying adjacent to the Park, in which two in the Choondal area (SC Colonies) and a labour colony near the Pethotty section office in the Southern boundary.

Aduvilanthankudi tribal settlement has 52 families. The majority of them are engaged in agriculture and allied practices. In addition to this, Muthuvan Tribes are also working as casual labourers in the cardamom plantations and protection mazdoors in the Park. Major crops under cultivation are cardamom, coffee, potato etc. Thatching grass is collected from the PA for roofing of houses. The inhabitants of the Southern side of Park are Tamilians, they are engaged as employees in cardamom estate. The people in the colonies of Choondal area are also working in cardamom estate to earn a livelihood.

4.1.1 THE LOCATION, EXTENT, BOUNDARIES AND NATURAL ATTRIBUTES OF THE ZI.

The Eastern side of the National Park is sharing boundary with Tamil Nadu. Aduvilanthankudi is located in the North-Eastern boundary of the National Park. The SC colony is located at Choondal in the North-West side of the Park and the labour colony at Pethotty in the Southern boundary of the National Park. These are the major human settlements near to the Mathikettan Shola National Park. The details are given in **Figure 4.1**

FIGURE 4. 1 : LOCATION MAP OF ZONE OF INFLUENCE



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

There are no villages inside the Park. The 4 settlements outside the PA have their own distinct ways of life and customs. Muthuvans are the inhabitants of Aduvilanthankudi located in the fringe of the Park. Muthuvans are the forest-dwelling scheduled tribe community, and constitute one of the largest groups of tribes. Muthuvan tribes have a fair degree of self sufficiency in terms of livelihood and utilization of resources around them. Several tribes are employed as daily waged labourers in plantations and protection activities of the Park. They have a distinct social organization, strong community leadership, division of labour, adherence to traditional culture and ways of life. They are mostly agriculturists and prefer a secluded life, fostering their own culture, traditions, livelihood patterns, values, customs, medicine, gender relations, marriage, food habits, workship, etc. centered around the forest environment, seasons and resources. However, their dietary habits have changed substantially over the years. Muthuvan tribes are independent and prefer secluded life in settlements on hill areas with minimum contact with the outside world. Womenfolk of these communities are confined to household work, agriculture and allied activities. Even though the womenfolk were deeply inclined to follow the customs and practices rigidly and limit their contact with the outside world and other menflock in the previous years, increased visibility of women in the social process is observable in recent years. There is

a attitudinal change among the women in terms of their openness to seek health care, avail the benefits of government schemes, educate the children, presence in the market places etc. Betel / tobacco use, alcoholism, early marriage, dropout etc. are common among adolescents and young adults. The custom of social or gender distancing of adolescents boys, young adults and bachelors, in the form of staying in a common place called 'Sathram' is prominent in the Muthuvan Tribal settlements. Similarly, the tribal communities have a secluded common shelter for menstruating women and girls, known as 'Valayamapura'. Muthuvan tribes speak a local tribal dialect of Tamil. Due to the declaration of the forest tracts as Protected Areas and ban imposed on hunting and shifting for several generations, they were forced to abandon their traditional subsistence modes of shifting cultivation, hunting and gathering. The younger generation is given basic education and increasingly deriving the benefits of various schemes such as free education, stay in hostels, scholarships, etc. They are mainly depending on the Park for water.

The inhabitants of the SC colony located at Choondal and labour colony located at Pethotty are engaged as casual labour in cardamom estate for their livelihood.

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

The people living on the fringes of the Park depend mainly on their agriculture land for livelihood. These are relatively bound by kinship relations, reciprocal exchange, and strong ties to the place. 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 roofing 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 work either outside or home-based. Some women experience a shift in the occupational pattern after marriage and childbirth by completely transitioning out of the work arena, while others remain double-burdened with active involvement in both work and family responsibilities. Farming and households depend solely on forests for water. The villagers are collecting the dried twigs and branches of coffee plants in the Park for their bonafide use. Wild Honey is the only NWFP collected from the Park which is collected seasonally from the selected areas of the Park by the tribes of Aduvilanthankudi.

4.1.4 IMPLICATIONS OF THE LAND USE AND RESOURCE 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, cardamom and eucalyptus and different species of acacia. The area under plantations is large and growing. Cardamom (around 42,000 ha) being the biggest employer of the Munnar Landscape also has pivotal position in conservation and management of biological diversity in the area. Being cultivated in the medium elevation tropical evergreen forests as a shade loving crop, it provides habitat for both terrestrial and arboreal fauna and a wide range of critical plant species found in the region. The main land use of the area surrounding the Park is cardamon cultivation. The management of cardamom estates has been highly evolved towards high yielding in the recent decades due to its economic gains that made considerable impact on naturally growing trees and the physical environment. As a result large scale input in the form of pesticides and chemicals and fast growing tree species as shade for the growing crop has been employed that impoverished the biological diversity 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 local inhabitants including tribes along the fringe area are engaged in farming and allied practices and they do not have many dependencies over the land and resources of the Park. There is no pressure of grazing inside the Park. So the inhabitants of the fringe area not make much impact on the habitat of the Park. The indigenous people from the Aduvilanthankudi are permitted to collect NWFP especially honey and training was given for the sustainable collection of NWFP. There is no standardized protocol for the collection of NWFP. The extent of the impact of NWFP collection, seasonality etc. has not been studied yet. The practices of clearing of hillocks for shifting cultivation, clearing the field by setting fire etc, causes large scale destruction of natural vegetation and soil erosion around the hillocks. Through successive interventions tribes along the fringe areas were forced to abandon their traditional modes of shifting cultivation, hunting and gathering. The existence of cardamom plantations surrounding the National Park mainly depends on the water from the Park. A large quantity of pesticides are being used in these plantations and it is adversely affecting the biodiversity outside and inside the Park. Mathikettan Shola functions as a water resource for the local inhabitants of Santhanpara Grama Panchayat. The water bodies of the Park offer an unintermittent supply of water even in the dry season.

4.1.5 PA MANAGEMENT PRACTICES AND THEIR IMPLICATIONS FOR PEOPLE

PA management programme and eco-tourism activities are giving alternate employment opportunities for the local communities thereby improving the standard of living of the families. An Eco-Development Committee known as the Aduvilanthankudi EDC is presently functioning in the Park. The 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 EDC annually, for the developmental activities of the indigenous population and the activities have been monitored and controlled by EDC. Firewood collection is permitted from the Buffer zone by the indigenous people for their bonafide use. Crop raiding by wild animals has also been reported from the surrounding villages. The crop cultivation along the fringe area has been attracting wild animals especially elephants, wild boar, Bonnet macaque, etc. The damage done by these animals is adversely affecting farmer's subsistence.

4.2 THE DEVELOPMENT PROGRAMME AND CONSERVATION ISSUES

Aduvilanthankudi Eco-Development Committee is functioning in the Park primarily focuses to ensure the sustainable livelihood of local people through the EDC programme. The Park provides employment opportunities to the local inhabitants especially to the settlers in Aduvilanthankudi. The EDC members have been engaged in the Park management activities including visitor management, fire management and other forest protection programme. Local inhabitants are selected and engaged as additional mazdoors in fire protection during the fire season. More opportunities need to be made available for them through eco-tourism and eco-development to make the people self-reliant. Every year, Anamudi Forest Development Agency (AFDA) is allocating Community Development Fund (CDF) through the EDC annually, for the developmental activities of tribes. This fund is utilised for the general development activities of the tribes.

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

The line departments such as the Tribal department and the Local Self-Government have been conducting various programs in the settlements. Immunization for livestock is conducted periodically. To reduce the dependency on the forest for fuel, communities are provided with solar power,

smokeless / biogas plants etc. The road to settlement is being maintained by the PWD. The Forest Department had set up two smart classrooms at Government High School, Santhanpara under Eco - Development Programme (EDP) budget head for the betterment of education facilities.

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

The local merchants adjacent to the Park (Pooppara and Bodimettu) control the economy of tribes by the debt trap system as they sell their products to those local merchants and buy their necessities from them. The long-existing exploitative relationship of the debt trap system still continues unabated. To reduce the dependency of the people on PA resources they have to be provided with financial and technical assistance for alternate means of livelihood. Implementing eco-development programme and starting eco-tourism activities with the participation of people will improve their living standards.

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

Increase in tourism, increase in 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 for cooking, and domestic purpose. Poles from the forest are used for making cattle sheds, fences, etc. People from the fringe areas are engaged as watchers for forest protection and allied works. Human-wildlife conflict is the main problem affecting the management of the PA and the ZI.

PART II

THE PROPOSED MANAGEMENT

CHAPTER 5

Vision, Objectives, Issues and Problems

5.1. THE VISION

Conservation of fragile Shola-grassland ecosystem for biological diversity, ecological services, livelihood security and ensuring habitat connectivity.

5.2. OBJECTIVES OF MANAGEMENT

- To conserve the rich biological diversity of the unique Montane Evergreen Forest ecosystem and also restore and maintain the ecosystem as the last relics of the Cardamom Hill Reserve.
- To establish habitat connectivity for the movement of elephants.
- 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 the People-PA interface for the promotion of the above said objectives.

5.3 PROBLEMS IN ACHIEVING OBJECTIVES AND STRATEGIES TO OVERCOME

Objective 1: To conserve the rich biological diversity of the unique Montane Evergreen Forest ecosystem and also restore and maintain the ecosystem as the last relics of the Cardamom Hill Reserve.

Sl. No.	Constraints	Strategies
1.	Presence of cardamom and coffee plantation within the Park.	1. Mapping the extent of coffee in the Park. 2. A quick and one-time eradication of coffee plants to prevent the regeneration of coffee seeds inside the Shola forest. 3. Collar pruning and cover the pruned area with soil is recommended for the eradication of coffee. 4. Prune the coffee plants before flowering. 5. Removal of the debris to stakeholders for the bonafide needs. 6. Divide the eco-restoration area into workable units and document the status of natural regeneration. 7. Develop an SOP for the eco-restoration in the Park.

2.	Fire	1. Create the map of fire prone areas based on the fire incidents of previous years. 2. Ensure the availability of modern firefighting equipment and engage fire gangs for protection during the fire season. 3. Control burning at Choondal, Vattapara, and other fire prone areas as a precautionary measure to prevent the spread of fire. 4. The width of the fireline / breaks must be site specific and double the width is recommended at the interstate boundary. 5. Strip and patchwise control burning is recommended as a fire protection tool. The width of the strip burning and the area of the patch burning must be site specific in grassland areas of Choondal, Vattapara etc. 6. A participatory fire Management Plan for the Park by involving local communities and plantation owners. 7. Ensure the availability of safety measures, equipment to all staff / watchers engaged in fire protection. 8. Make sure the availability of water in the critical fire prone areas. 9. Necessity of additional firelines and breaks to be examined by Wildlife warden and shall be carried out in need.
3.	Inadequate wildlife health monitoring 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 by Veterinary Department on an ongoing basis. 10. Implement regular wildlife health monitoring. 11. Surveillance / tracking system for monitoring the sick and ailing animals.
4.	Incomplete database of flora and fauna including threatened categories.	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. 3. Technological support for easy tracking of the movement of large mammals such as elephants and gaur in the Park. Drone, camera traps etc. can be used for this. 4. Conduct an annual survey of Birds, Reptiles, Amphibians, Butterflies, Odonates etc. 5. Establish a native CHR tree nursery for eco-restoration. 6. Maintenance of reports of studies, surveys, research papers etc. at the division level. 7. Mapping of Endemic species, Critical Wildlife Habitat etc.
5.	Insufficient infrastructure including communication, arms, vehicles, equipment & interior camping facilities.	1. Recommended a main wireless station at Vellapara and two base stations one each at Choondal and Pethotty. 2. Recommended the procurement of sufficient numbers of walkie-talkies.

		3. Ensure a sufficient number of vehicles for mobility. 4. Ensure basic amenities and infrastructure in all camp sheds. Regular maintenance of existing camp sheds. 5. Supply of safety kits to staff.
6.	NWFP collection.	1. Study on the threshold capacity of NWFP, seasonality etc. and take appropriate measures to ensure sustainability. 2. Define the zone of collection and frame access rules for sustainable collection. 3. NWFP collection to be documented and monitored by EDC. 4. Periodical training to stakeholders on sustainable collection of NWFP.
7.	Inadequate manpower for the Park.	1. Recommended additional post of 2 BFOs and 2 Forest watchers.
8.	Welfare amenities for staff.	1. Adequate facility for accommodation to staff / watchers, renovation of existing facilities and construction of additional facilities if necessary. 2. Ensure the availability of sufficient safety equipment. 3. Health insurance for staff on contract / daily wages / seasonally engaged.
9.	Potential ganja cultivation.	1. All the temporary camp shed need to be upgraded to permanent ones with sufficient manpower. 2. Strengthening intelligence gathering. 3. Frequent raids.
10.	Presence of invasive / exotic species.	1. Detailed study on the extent, type, and distribution of invasive / exotic species in the Park. 2. Identify the suitability of invasive / exotic species present in the Park for making useful products.

		3. Plan and implement an appropriate programme for the eradication of invasive / exotic species and promote the regeneration of endemic species.
11.	Poaching & Illicit felling.	1. Constant surveillance and Intelligence gathering. 2. Four barricades have to be established one each at the Check post and Choondal, two barricades on the state boundary at Njandarmedu and Surveykalpara. 3. Regular upkeep and maintenance of trek paths and ensure regular perambulation by staff. 4. Establishment of camp sheds at Jameskadu, Vattapara, Njadarmedu. Renovation of Surveykalpara campshed.
12.	Insufficient information on judicious distribution of water sources for wildlife.	1. Document the water level in each check dam in the PA. 2. EIA is to be conducted before the construction of major check dams inside the Park. 3. Maintenance and desilting of the check dams / water bodies in the PA. 4. Increase the storage capacity of the existing water holes.
13.	Absence of zonation.	1. Demarcate Choondal as a tourism zone. 2. Proposed a trekking programme from Choodal to Check Post.
14.	Protection of interstate boundary.	1. Fireline of the interstate boundary to be constructed at least double the width of the fireline. 2. Joint patrolling, sharing 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.

OBJECTIVE 2: TO ESTABLISH HABITAT CONNECTIVITY FOR THE MOVEMENT OF ELEPHANTS.

Sl. No.	Constraints	Strategies
1.	Detailed information on connectivity and corridor for movement of elephants.	1. Identify and map the corridors for the movement of elephants, in and around the National Park. 2. Habitat conservation. 3. Food and water.

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

Sl. No.	Constraints	Strategies
1.	Insufficient data on hydrology of the PA.	1. Periodic monitoring of silt accumulation in the check dams and water holes and carry out desilting if necessary. 2. Reconstruction of 16 check dams inside the National Park. Earthern dams are proposed over concrete dams. 3. Install automatic weather station. 4. The water level in each check dam must be recorded. 5. Measures for the conservation of water in the natural water bodies and improve the storing capacity.
2.	Excessive dependence on water sources of the Park.	1. Construct one check dam each at Udumbupara and Vellapara areas and the re-construction of existing check dams to ensure sufficient water for the wildlife as well as inhabitants of fringe communities. 2. Encourage tanks / water storing facilities in fringe area and settlements in association with line departments.

OBJECTIVE 4: TO PROMOTE ENVIRONMENTAL CONSERVATION AND AWARENESS.

Sl. No.	Constraints	Strategies
1.	Lack of infrastructure.	1. Establish an interpretation center for PA. 2. Implement two trekking programs for the visitors from Choondal-Karadipara and Choondal-Checkpost.

		3. Maintenance of the road from Pethotty to Check Post (3 Km). 4. A centralized information center for the division recommended at Marayoor and Munnar town. 5. Maintenance and upkeep of infrastructure for tourism and nature education. 6. Adequate infrastructure, accommodation and welfare amenities for staff. 7. Necessary infrastructure for optimization of revenue from eco-tourism.
2.	Lack of resource persons.	1. Invite experts from outside for classes. 2. Revise the honorarium for resource persons. 3. Mobilise local talent, expertise etc. from the locality to develop skills for imparting nature education.
3.	Educational materials for different target groups like students, tourists, media persons, politicians etc.	1. Documentaries, leaflets, pamphlets, interactive audio visual systems, books, charts and maps etc. for catering to the educational needs of various age groups with multilingual content.
4.	Signage	1. Eco-friendly signage will be installed. 2. To design signage unique to the Park in different languages.

OBJECTIVE 5: TO FACILITATE ECOTOURISM ACTIVITIES.

Sl. No.	Constraints	Strategies
1.	Lack of trained human resource.	1. Invite experts from outside for classes. 2. Revise the honorarium for resource persons. 3. Mobilise local talents, expertise etc. from the locality to develop skills for imparting nature education. 4. Engaging the necessary manpower for co-ordinating eco-tourism programme.
2.	Capacity building & training for guides and staff.	1. Trained resource personnel for managing eco-tourism.

		2. Capacity building traning for recording animal sightings and identifying indirect evidence for watchers. 3. To bridge the skill gap and professional expertise and improve species literacy biodiversity applications assisted by modern technology is recommended.
3.	Awareness to stakeholders.	1. Periodical training on identification of flora and fauna, wildlife monitoring, firefighting, first aid and tourism management, legal aspects, public relations, etc.
4.	Shortage of equipment.	1. Ensure the availability of binoculars, walkie-talkie, GPS etc. 2. Provision for periodical maintenance / upkeep, procurement of advanced equipment.
5.	Waste accumulation and plastic waste management.	1. A scientific waste Management Plan for the Park to be prepared and implemented.
6.	Tourism potential not tapped properly.	1. Distribution of leaflets, pamphlets, notices, information boards at strategic locations. 2. To ensure stakeholder participation in tourism. 3. Alternate income generation to the community through farm tourism and sale of value added products.
7	Lack of co-ordination with local tourism initiatives / tour operators.	1. Revenue sharing / subsidized charges for tour operators to promote eco-tourism / eco-shop products etc. 2. Formulation of appropriate mechanism in consultation with FDA.
8	Insufficient fund to meet the operating cost.	1. Optimising the tourism facilities for maximising the output and revenue.

OBJECTIVE : TO STRENGTHEN THE PEOPLE-PA INTERFACE.

Sl. No.	Constraints	Strategies
1.	Human-Wildlife Conflict.	1. Maintenance of existing solar fencing EPTs and construction of new in appropriate places.

		2. Timely payment of compensation. 3. Institution of crop insurance. 4. Appropriate habitat improvement programme within the Park.
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.
4.	Absence of information on natural and cultural resources and needs of local and ethnic communities.	1. Conduct a socio-economic survey in the settlements. 2. Ensure the livelihood security for the local people.
5.	Insufficient fund.	1. Convergence of funds (Local bodies / other line departments / Govt. of India / projects / NGOs) through the FDA. 2. Optimizing the scope of livelihood promotion activities in coordination with line departments such as MNREGS, Department of Agriculture etc.
6.	Inadequate Manpower for co-ordinating eco-development programme.	1. Engage necessary manpower through FDA on a contract basis.

CHAPTER 6

Strategies Boundaries, Zonation, Zone Plans and Theme Plans

6.1. BOUNDARIES

6.1.1. LEGAL BOUNDARY

The legal boundaries are already surveyed and 90% of the boundary is consolidated with permanent cairns / pillars by the end of the previous plan period. The consolidation of the boundary is not completed in Vattapara, Choondal and interstate areas. This needs to be completed during this plan period.

6.1.2. ECOLOGICAL BOUNDARIES

The Park shares its Eastern boundary with the boundary of the Theni Forest Division in Tamil Nadu. The North, West and South are surrounded by the cardamom plantations of CHR. The elephants use the Park as a corridor for moving from Chinnakanal and Anayirangal towards the South to Chakkulathimedu and then to Tevaram in Tamilnadu. Their movements towards Periyar Tiger Reserve has been totally cut off. There is no detailed study on the connectivity and movement of elephants in the area. The Wildlife Warden shall initiate actions to;

- Study the aspects of connectivity and corridor for movement of elephants.
- Attempt to secure the crucial corridors.
- Improve the habitat of animal corridors.
- Arrange periodic meetings with stakeholders in corridors.

6.1.2.1. INTERNAL BOUNDARIES

There are no well-defined internal boundaries regarding vegetation type, the extent of cardamom and coffee planted inside the forest. The Wildlife Warden may initiate action for mapping of vegetation and mapping the extent of cardamom and coffee.

6.2. ZONATION

The objectives of the zonation are to provide a geographical framework to manage the Park by prioritizing management activities in different zones of the Park. 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.

6.3. ZONE PLANS

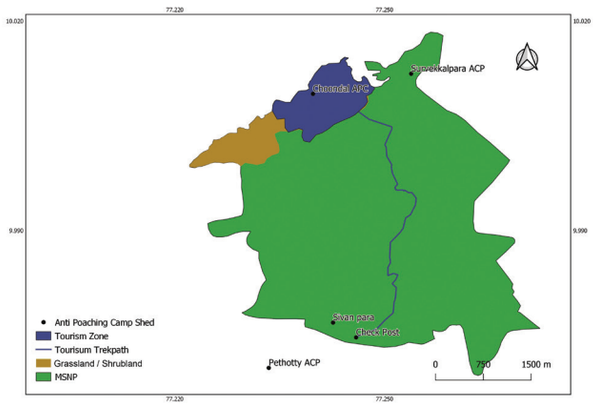
In order to achieve the objective, the Park is divided into the following zones.

1. Core zone
2. Buffer zone

6.3.1. PLAN FOR CORE ZONE

The Core zone is the protected zone where human interference is strictly minimized. The Core zone is that part of the Park which is comparatively undisturbed **(Figure 6.1)**. The focus of management shall be the protection of natural resources. The following activities subject to specific proposals in respective chapters of this Management Plan will be allowed to be implemented. On account of the conservation and eco-restoration measures adopted after the Notification of the Park, the areas under cultivation were brought back to the nature of a forest area. Traces of cultivation of coffee found in the Park are a threat to the natural vegetation. Large scale distribution of seeds by animals and birds cause the growth of coffee plants in various areas of the Park even in the Core zone.

FIGURE 6. 1 : ZONE MAP OF MSNP



a) Antipoaching activities: Maintenance and improvement of antipoaching camps / chowkies (Temporary sheds), patrolling camps, barriers, boundary walls, etc.

b) Communication and protection measures: Establishment of wireless towers, improvement and maintenance of fair weather forest roads not exceeding three meters in width, small bridges, culverts, fences, etc.

c) Fire protection measures

- Creation and maintenance of firelines as prescribed in the Management Plan by undertaking controlled cool or early burning and construction of watchtowers.
- No fireline / break should be taken on the edge of the Shola forest. The fireline / break around the Shola should be taken giving the a reasonable space for the expansion of Shola forest.
- Controlled burning shall be carried in grasslands of Vattappara and Choondal area.

d) Habitat improvement activities: Weed eradication, maintenance and development of meadows / grassland required for wild herbivores which are prey base for the carnivores, digging and maintenance of small water holes and small anicuts, earthen tanks for the impoundment of rain water.

e) Eco-restoration activities: Traces of cultivation of coffee and cardamom found in the Park are a threat to the natural vegetation. Large scale distribution of seeds by animals and birds causes the growth of coffee plants in various areas hence the eradication of coffee trees, plants, saplings, before the flowering season is essential for facilitating the regeneration of the Shola species and habitat maintenance in the Core zone. The following strategies and activities are proposed.

- Map the extent of cardamom and coffee.
- Explore the possibility of quick and one time eradication of coffee plants to prevent the regeneration of coffee inside the Shola forest.
- Collar pruning and cover the pruned area with soil for the eradication of coffee.
- Prune the coffee plants before flowering.
- Divide the eradication area in to workable units and document the natural regeneration.
- Monitor the regeneration status and soil erosion.
- Establishment of a permanent plot for monitoring succession and eco-restoration.
- Monitor the utilization of coffee berries by wild animals such as civets and birds.
- Studies on the effectiveness of eco-restoration and take appropriate measures.

f) **Management of grassland habitats:** Early or cool controlled winter burning of grassland habitats to facilitate the growth of fresh grass.

g) **Studies / data collection:** The studies like mapping of vegetation, wildlife health monitoring, documentation of flora and fauna including RET and Endemic, population monitoring of selected flora and fauna, habitat utilization and movement pattern of elephants, invasive species that have negative impact on ecosystem, spatial and temporal distribution of water sources, mapping of water sources, drainage map, etc. shall be conducted.

6.3.2. PLAN FOR BUFFER ZONE

Choondal area and Trek path from Choondal to Check post is designated as Buffer zone. The zone acts as a buffer for the Core zone and provides conditions for conservation of the natural eco-systems while allowing strictly regulated restoration, nature education, eco-tourism activities etc.

The zone will perform the functions of

- Promoting environmental conservation awareness
- People-PA interface
- Eco-tourism

The activities to be carried out are covered in the respective zone plan / theme plans.

6.4. THEME PLANS

The Park will be managed under the following theme plan

- Theme plan for Protection
- Theme plan for Fire Management
- Theme plan for Watershed and Water resources Management

6.4.1. THEME PLAN FOR PROTECTION

The Park is having a total extent of 12.8174 Km^2. It is having an interstate boundary of 9 km with the Theni Forest Division of Tamil Nadu. The Park is having threats like the cultivation of ganja, illicit brewing, poaching, smuggling of timber, etc. The Park is also having pressures on natural resources like grazing, firewood collection, NWFP collection, etc. Although the Park, was notified in 2003, there are many gaps in protecting the natural resources of the Park.

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 17.5 Km^2 area around the Park which partially includes Poopara Villages. After the final Notification of ESZ, a Zonal Master Plan will be prepared within two years for the management of ESZ. In order to protect the natural resources of the Park the following strategies and activities are proposed.

6.4.1.1. ADMINISTRATION OF THE PARK

The Wildlife Warden is based in Munnar which is 40 km away from the Park and the office of the Assistant wildlife Warden of the Park is at Top Station which is 75 km away from the Park. The Assistant Wildlife Warden is having administrative control over Pambadum Shola NP, Anamudi Shola NP and Kurinjimala Sanctuary also, along with MSNP. Presently one Forester, four Beat Forest Officers, one Tribal Forest watcher and one forest watcher are deployed from Kadavari station for the protection of the Park. Two beat forest officers and two forest watchers are proposed during this plan period for strengthening protection and other management activities of the Park **(Table 6.1).**

TABLE 6.1: PROPOSED STAFF STRENGTH

Sl. No.	Name of Post	Present Strength	Proposed Strength
1	Assistant Wildlife Warden	1	0
2	Section Forest Officer	1	
3	Beat Forest Officer	4	2
4	Forest Watchers	2	2

6.4.1.2 RE-ORGANIZATION OF ADMINISTRATIVE UNITS

The staff of Kadavari Forest Station is presently being utilized for the management of the Park. For the effective management of the Park, a separate staff cadre has to be deployed and protection mazdoors to be engaged.

6.4.1.3 CONSOLIDATION AND MAINTENANCE OF BOUNDARY

About 90 % of the boundary of the Park is completely demarcated with cairns / pillars. The Wildlife Warden will take steps to survey and consolidate the remaining areas at Choondal, Vattappara and some portion at the interstate border. Periodic maintenance of cairns / pillars shall be done during the present plan period.

6.4.1.4 ANTI-POACHING CAMP SHEDS (EXISTING & PROPOSED)

At present Survekkalpara, Choondal, Sukumarankadu, Sivan para and Checkpost campsheds are functional. The vulnerable areas do not have enough anti-poaching camp sheds. It is proposed to construct anti-poaching camp sheds at Jameskadu, Njadarmedu and Vattapara. Renovation of Surveykalpara and Check post camp sheds are proposed during this plan period. All the camp sheds proposed shall be manned and provided with basic amenities (toilets, camping equipment, solar power, etc.). These anti-poaching camps are used for camping for staff and watchers during their perambulation. 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 / chowkies (Temporary sheds) shall be ensured during this plan period. Regular interior patrolling 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.

6.4.1.5 OFFICE AND RESIDENTIAL BUILDINGS

Maintenance of the existing office and residential buildings shall be undertaken as and when required. All basic amenities such as electricity, drinking water etc. shall be improved in these buildings.

6.4.1.6 PATROLLING SCHEDULE

The Wildlife Warden will demarcate patrolling units in consultation with Assistant Wildlife Warden and communicate to the staff. The perambulation schedule will be communicated to the staff on monthly basis for implementation. The Assistant Wildlife Warden and Wildlife Warden shall conduct patrolling and make frequent surprise checks. The staff will maintain a movement register and wildlife monitoring register which shall be submitted to frequent verification by Assistant Wildlife Warden and Wildlife Warden. Frequent special ganja raids shall also be arranged by the Wildlife Warden / Asst. Wildlife Warden. During Monsoon period special patrolling and camping for 3-4 days shall

be carried out in the Park as part of protection plan. Moreover, inter-state patrolling and camping conducted during the previous plan will also be carried out during this plan period.

6.4.1.7 INTERSTATE CO-ORDINATION

The Park shares a total length of 9 km of the interstate boundary with Tamil Nadu. The Wildlife Warden shall take steps to prevent the spreading of fire, poaching and other illegal activities from the adjoining state through periodic interaction, joint patrolling, sharing information on smugglers, joint raids, etc. Activities like annual interstate boundary clearance, annual joint inspection of the boundary shall also be taken up. Interstate officers meetings conducted for strengthening the protection and sharing information of offenders during the previous plan will also be continued during this plan period. It is also proposed to conduct a meeting at the Range Officers level once in a month.

6.4.1.8 STRATEGIES FOR SPECIFIC ISSUES IN THE PARK

I) Presence of Exotics:

Traces of cultivation of coffee and cardamom found in the Park are a threat to the natural vegetation. Large scale distribution of seeds by animals and birds causes the growth of coffee plants in various areas hence the eradication of coffee trees, plants, saplings, before the flowering season is essential for facilitating the regeneration of Shola species and habitat maintenance in the Core zone.

II) Over Exploitation of NWFP and Collection of Firewood:

NWFP is collected mainly by the tribes living around the Park. The main NWFP collected is wild honey. The collection of NWFP by people will be controlled through Aduvilanthankudi EDC. Study on the threshold capacity of the NWFP collection, define zones of collection and frame rules for sustainable collection, proper documentation of NWFP collected, record the NWFP collection from location, seasonality, volume, training to stakeholders on scientific collection of NWFP are proposed to ensure the sustainability of NWFP.

III) Crucial corridor

The Park areas are surrounded by private lands on North-Western and Western sides and forest areas under Theni Forest Division on the Eastern side. The status of private land adjoining to Mathikettan Shola National Park is CHR. The fragmented habitat and land use practices restricted the free animal movement and resulted in human-wildlife conflict over a period of time, mostly in the areas of Pethotty, Thondimala, Dalam, Korampara, Thalakkulam, Bodimettu, Njandar. The conflict is more severe in the Anayirangal area. As per the WWF report, the elephants from MSNP move to Anayirangal through three routes namely:

(a) Thalakkulam, Thondimala, Choondal and Panthadikkulam

(b) Thalakkulam and Moolathara

(c) Kallapuzha, Shankarapandimettu, Puthappara, Moolathara, and Kozhippennakudi

The activities prescribed for the crucial corridor are;

- Secure crucial corridors of elephants to regulate and modify land use in tune with the management objectives.
- Improvement of the habitat of crucial corridors.
- Timely payment of compensation.
- Institution of crop insurance.

- Appropriate habitat improvement programme within the Park for promoting forage and water availability.
- Study the extent of the problem of wildlife damage and crops involved in the locations such as Thalakkulam, Thondimala, Choondal, Panthadikkulam, Moolathara, Kallapuzha, Shankarapandimettu, Puthappara, Moolathara, Dalam, Njandar and Kozhippennakudi.

6.4.1.9 FIRE

This issue is dealt separately under **'Theme Plan for Fire Protection'.**

6.4.1.10 PRESENCE OF ROAD THROUGH THE PARK

A fair wether road from Check post to Kudi is existing at present which needs annual maintenance. This road will be maintained based on the recommendations of the Sub-committee on guidelines for roads in Protected Areas. **(Annexure: 6.1).** No new road is proposed during this plan period. The existing road from Pethotty to Park entrance has to be maintained in this plan period which is outside the Park.

6.4.1.11 POTENTIAL THREAT OF POACHING AND GANJA CULTIVATION

After the Notification of the Park two cases were booked for poaching attempt. As the boundaries are characterized by the presence of leased cardamom plantations and the presence of small mammals in the outskirts, chances of poaching are high. The Park was known for ganja cultivation previously. Possibility of poaching and ganja cultivation shall strictly be controlled by regular perambulation and interior camping, strict handling of offenders and awareness creation among the public.

6.4.1.12 TOUGH TERRAIN

This issue will be tackled through assessing the need for trek paths for effective protection and improving the camping facilities like tents, field gears including GPS, compass, binoculars, digital cameras, torches, etc.

6.4.1.13 INFRASTRUCTURE DEVELOPMENT

The existing camping stations and anti-poaching camp sheds shall be improved with basic amenities such as solar power lantern, field cots, bed and mattress, kitchen utensils, drinking water, communication facilities, solar power, field equipments etc. Additional infrastructure may be constructed during the plan period if necessary.

a) Arms and ammunitions

At present the Park has one rifle, two more rifles (0.315) are proposed to be procured with necessary ammunition of minimum 50 Nos.

b) Communication facilities

At present there is no wireless communication system, it is proposed to procure the main wireless set and eight walkie talkies.

c) Antipoaching camp shed

It is proposed to construct permanent camp sheds at Jameskadu, Njadarmedu and Vattapara and renovation of Surveykalpara and Check post camp sheds.

d) Vehicle

At present the Assistant Wildlife Warden and Section Forest Officer have vehicles. A bike

is also provided for the Park. Replacement of old vehicles will be made after assessing the requirement.

e) Trek path

Trek paths with a total length of 36.50 km exist at present **(Table 3.5)**. These trek paths are maintained for perambulation purposes and the same shall be annually maintained to facilitate protection. New trek paths shall be constructed if necessary in consultation with the Field Director (Project Tiger) Kottayam.

f) Roads

The Check post- Choondal fair weather road is passing through the Park. This road will be maintained (not exceeding three meters in width) as and when required during the plan period. No new road is proposed during the plan period.

g) Check posts and chain gate

No public roads are passing through the Park, it is proposed to put a chain and lock system at the entry points on the Check post and Aduvilathankudi coupe road and other significant locations where ever necessary.

h) Uniforms and Field Equipment

It is proposed to ensure all essential field equipment such as tents, compass, GPS, binoculars, range finder, digital camera, rain gauge, thermometer, hygrometer, camera trap, field kits, etc.

6.4.1.14. STRENGTHENING OF INTELLIGENCE NETWORK

The Wildlife Warden, Assistant Wildlife Warden and staff will develop liaison with NGOs, people's representatives, EDC members, tribal heads, interstate officers, crime control bureau officials in sharing information. The informants may be rewarded. The Wildlife Warden may move a proposal for fixing the rewards to the informants depending on the type of crime and information. The legal support if any required may also be availed by the Wildlife Warden in special / serious cases. The Wildlife Warden should review and monitor the implementation of the protection plan periodically.

6.4.1.15 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, eating 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.

6.4.2. THEME PLAN FOR FIRE MANAGEMENT

The Park being located in the proximity of several human settlements, fire is frequent phenomena causing considerable damage to the flora and fauna in the region. A block wise fire management plan shall be prepared each year, in advance before the onset of fire season. While preparing a fire plan, natural features such as existing roads, trek paths, rivers, etc. shall be considered. Fire protection measures in the Park shall be undertaken in accordance with approved fire management plan. The fire prone areas in the Park are Choondal, Vattapara and the interstate border. 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 in the Park
- Prepare fire Management Plan on annual basis.
- Identify the fire prone areas and record every instance of fire with area burnt. 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 with GPS co-ordinates. The fire prone areas shall be given special attention.
- Prioritize and map fire prone areas based on local knowledge and previous fire incidents.
- Identify the factors causing fire and necessary steps to prevent them.
- Purchase of necessary firefighting equipment.
- Provide adequate training to field staff and firefighting squad in fighting fires and self-defences.
- Develop proper monitoring protocols and document the results and effectiveness of fire protection measures taken annually.
- The existing firelines / breaks shall be cleared annually before the fire season. They shall be periodically monitored to check the status of the accumulation of debris in the firelines. New firelines shall be taken according to necessity.
- Awareness programme to the forest fringe dwellers shall be done regularly along with the distribution of pamphlets and brochures for the same.
- Resources like manpower, vehicles, wireless, equipment etc available with adjoining divisions (Munnar Forest Division, & Tamil Nadu Forest Department) and other departments like Police, Fire Force etc. may be tapped in exigencies. Fire safety measures shall be described in the plans and a briefing on fire should essentially include briefing on fire safety also.

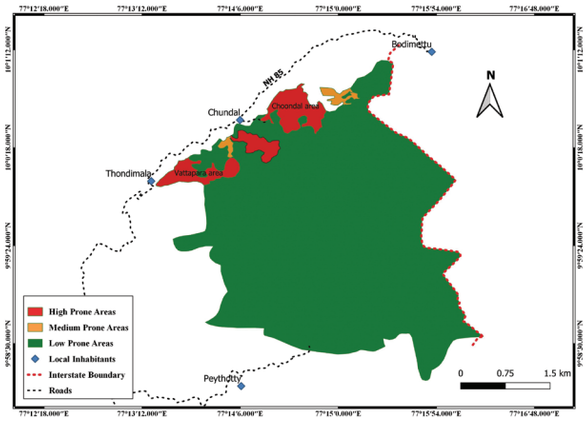


FIGURE 6.2 : FIRE PRONE AREAS OF MSNP

6.4.2.2 FIRE MANAGEMENT STRATEGIES

Following measures are proposed to prevent extensive fires: -

(I) FIRELINES:

The Assistant Wildlife Warden shall maintain the firelines / breaks in the fire prone areas given in **Table 3.4.** The necessity of additional firelines shall be examined by Wildlife Warden and shall be carried out as per the requirement of the situation with the concurrence of Field Director (Project Tiger) Kottayam. The schedule for maintenance of firelines / breaks as given in **(Table 6.2)** shall be borne in mind while executing the fire management plan.

- Firelines / breaks shall be taken as per the guideline issued by the KFD from time to time.

- No fireline / breaks should be taken on the edge of the Shola forest. The fireline / breaks around the Shola should be taken giving a reasonable space for the extension of the Shola forest.

TABLE 6. 2 : SCHEDULE FOR THE MAINTENANCES OF FIRELINE

Sl. No	Period	Activity
1	December 15- January 15	Taking of firelines. The materials cut shall be left on the middle of the firelines to dry
2	December 15- January 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 the early morning or evening hours when the temperature and wind are 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 in grasslands of Choondal and Vattapara by clearing a strip of 5m on all sides. It will have to be completed before December 30th. Controlled burning is done to prevent the rapid spread of fire. This is also beneficial for wildlife since summer showers will enable the growth of new green grasses. Among the different vegetation types, the grasslands are the most susceptible to fire. The areas proposed for controlled pre-burning is given in **Table 6.3**

Guidelines for controlled pre-burning

- All the areas to be burned shall be identified and recorded.
- Controlled burning will be carried out during the months of December to March.
- Controlled burning shall be carried out in grasslands by clearing a strip of 5 m on all sides.
- The burning activity shall be carried out in the 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 shall be set from one end and should not be simultaneously set on all sides of the block.
- 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 during the presence of sufficient staff.

Table 6. 3 : Control Burning Areas in MSNP

Sl No	Location	Area (ha)
1	Choondal	30
2	Vattapara	20

(III) **Fire Protection mazdoors / gangs:** The fire watchers will be engaged throughout the fire season for efficient fire protection activities. In addition to them, fire gangs will be engaged in the following vulnerable locations like Check post area, Surveykalpara, Sivan para and Kudi area. The Wildlife Warden shall ensure the engagement of fire watchers from the fringe area people, priority may be given to provide livelihood and employment to tribal people from Aduvilanthankudi tribal settlement.

(IV) **Participatory Fire Management**

The fringe area people from Aduvilanthan kudi, Choondal, Thondimala, Talakkulam, Korampara, Pethotty, Dalam and Njandar shall be involved in participatory fire management. Fire protection and fire management operations are being carried out by involving the cardamom plantations functioning in the boundaries and adjoining areas of the Park.

(V) **Awareness & Training:** Awareness campaigns are essential for preventing fire especially in the surrounding areas of the Park. The focus may be given to the Aduvilanthankudi settlement, members of Santhanpara Panchayath, cardamom plantation owners and workers etc. Innovative programme, awareness campaigns among different stakeholders are proposed highlighting fire prevention measures.

(VI) **Training programme:** Training programme will be given for staff watchers and other members of the community involved in fire protection.

(VII) **Fire watch towers and communication network:** All the infrastructure and communication facilities shall be made use in fire protection to prevent fire incidents and to mobilize additional forces in case of necessity. Necessary temporary / permanent sheds shall be erected in the fire prone areas during the fire season.

(VIII) **Firefighting equipment:** The equipment like gumboots, fire resistant suits, fire beaters, blower, water sprayers etc. shall be procured and made available to the fire camps.

(IX) **Impact monitoring:** Incidents of fire to be documented and reported promptly to the Field Director and 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 gap in fire protection shall be identified and suitable proposals may be made to make the Park fire free.

6.4.3. THEME PLAN FOR WATERSHED AND WATER RESOURCES MANAGEMENT

The utilization of habitat by the wild animals depends on the availability of water resources within their reach. Surface water repositories play a critical role in the Park and wildlife corridors, particularly

in the hot months. They maximise water retention in the soil and are crucial to eco-system health, apart 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 waterholes and prevent them from drying out. Camera traps need to be placed around the waterholes to record animal presence. Depending on the need additional waterholes may be constructed wherever necessary. Management interventions (other than protection) in natural waterholes 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 to 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.

The local people of Korampara, Muthupara, Choondal, Thondimala etc. also depend on the water discharged from the Park for drinking and irrigation purposes. To provide a judicious distribution of water sources for wildlife and to fulfill the water needs of the local people, the following strategies and activities are proposed.

- The existing check dams may be maintained. Monitor the water level and water quality in all the waterholes and check dams.
- Recommended check dams each at Udumbupara and Vellapara areas for providing drinking water for wild animals during summer months
- Mapping of water sources – water holes, check dams, streams and other natural sources with seasonality.
- Preparation of drainage map of the Park. The details available with Land Use Board on drainage and watershed may be collected.
- Installation of meteorological stations for the regular recording of weather data.
- Implementation of suitable measures for maintaining and improving watersheds, rejuvenating vegetation of habitats especially in restoration zone, soil and moisture conservation measures such as gully plugging, check dams, earthen bunds etc.
- Dialogue with local bodies and beneficiaries for water sharing and watershed conservation.
- Enhancement of water holding capacity through habitat improvement activities. A status paper on water resources and seasonality and propose future development of water holes and check dams / anicut accordingly.

(I) GENERAL GUIDELINES FOR MANAGEMENT OF PONDS AND CHECK DAMS

- The existing check dams and ponds shall be desilted 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 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 EDCs 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 a case, 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 driftwood 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 and moisture conservation works may be taken up on a priority basis in the vicinity and surrounding streams, water holes and check dam that dry 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 which dries otherwise in the lean period. Assistant Wildlife Warden shall maintain proper records 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

- New check dams or ponds shall be constructed based on the scientific assessment of 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.

6.4.4 THEME PLAN FOR HABITAT MANAGEMENT

The Park is home for wild animals necessitating to meet their vide variety of requirement 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 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 species that have negative impact on ecosystem, spatial and temporal distribution of water sources, mapping of water sources, drainage mapping, monitoring of burned areas, impact of controlled burning on the habitat utilization and distribution of small animals like amphibians, quantification of fire wood, 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 (CWH) 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 this 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. As of now no community rights have been issued in this national Park.

(I) MAINTENANCE OF SWAMPS

A marshy area or swamp is a place inside the Park dominated by grasses and sedges. Small streams originate from these areas and as such are always wet and moist which in turn help in keeping fresh and green vegetation all throughout. This area is unique in terms of microhabitats for Amphibians and micro fauna **Annexure 2.3.**

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 kind of biotic interference.
- The treatment areas shall be monitored to evaluate the management interventions.

(II) SUPPLEMENTATION OF ANIMAL NUTRIENTS

In an ecosystem supplement of animal nutrients 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 retain in the animal nutrients 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 tourisms facilities which increases negative human animal interactions and pose threat to wildlife. Thus animal nutrient areas 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 area shall be created near the vicinity of water holes and check dams, away from areas of human habitation.

- Regular monitoring of nutrient supplementing area 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

The Western Ghats region of Kerala which is also considered as a hotspot of biodiversity in the world can be projected as a potential Eco-tourism zone in the true sense. Eco-tourism can be generally seen to be a form of tourism involving visiting fragile, pristine and relatively undisturbed natural areas intended as a low impact often small scale alternative to standard commercial tourism. eco-tourism typically involves travel to destinations where flora, fauna and cultural heritage are primary attractions. Responsible eco-tourism programme include that minimize the negative aspects of conventional tourism on the environment and enhance the cultural integrity of local people.

It has now become necessary to evolve appropriate location specific strategies for forests in Kerala in the sphere of eco-tourism development. During the last 10 years, a large number of eco-tourism projects have been developed by the Forest Department which provides employment to thousands of local people directly and indirectly. Proper, eco-tourism product development, its marketing, environmental impact assessment, monitoring etc. have to be done in a systematic way so that a large number of forest dependent communities will be further benefited. Eco-tourism aims at imparting entertainment and knowledge to visitors from nature without affecting its integrity. Through eco-tourism people get an opportunity to feel the forests, to see the flora, fauna and to feel and enjoy the cultural specialties of ancient and existing structures with a worshipful mind. Through the eco-tourism programme we provide employment to local people and earn revenue for the State without making any 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 MSNP CHOONDAL TRAIL

Eco-tourism Programs Mathikettan Shola NP	Physical Carrying Capacity (PCC)	Real Carrying Capacity (RCC)	Effective Permissible Carrying Capacity (EPCC)
(Choondal Trail)	180 persons / Day	89 persons / Day	89 persons /Day

Conservation education is an important component of environmental education. Its goal is to teach the theory and practice of preservation and restoration of biodiversity affected by human activities so that people can increase their awareness of conservation issues and change their attitudes and behaviour to promote environmental conservation. The Park is a small Protected Area and has only the capacity for nature based regulated tourism. Presently the Park provides accommodation facilities for the tourists in Log house and Amenity Centre. One Ethnic hut at Choondal has to be renovated and will be given to tourist in this plan period. The Park also provides well organised trekking programme to the tourist. The PA lacks the interpretation centre and hall for conservation education. In order to accomplish the plan objectives, the following strategies are proposed.

7.2 OBJECTIVES

- To promote environmental conservation awareness.
- To facilitate eco-tourism activities.

7.3 ISSUES AND PROBLEMS

- Lack of accommodation facilities for the tourist.
- Lack of interpretation centre for the PA.
- Lack of resource person for conducting nature camp.
- Lack of good documentaries regarding the Park for interpretation.
- Lack of staff exclusively for managing eco-tourism.
- Lack of benefit sharing mechanism.
- Lack of adequate equipment such as binoculars, hiking pole etc. for the tourist and trekkers.

7.4 STRATEGIES

- Initiate two trekking programme for visitors. (One each at Choondal - Karadippara and Choondal - Check post).
- The EDC members from Aduvilanthankudi trekkers EDC will be engaged in the trekking programme.
- Establish an Interpretation center at Pethotty for the tourist and nature education students.
- Upgrade the road from Pethotty to Check Post (3 Km).
- Choondal area will be demarcated as a Tourism zone.
- A centralized information center for the division at Munnar and Marayoor town for the tourist coming from Kerala and Tamil Nadu respectively. It shall be managed by EDC members.
- Engage a trained resource person for interpretation.
- Annual subscription and maintenance of website.
- New documentaries, wildlife books, charts and maps etc. for interpretation.
- Conduct nature awareness camps for various target groups including people in and around the National Park.
- Develop appropriate, eco-friendly hoarding and signages and erect at strategic locations.
- A post of eco-tourism officer for the overall monitoring of eco-tourism activities at the division level.
- Procure adequate equipment such as binoculars, solar lights, tents, sleeping bags, torches, hiking pole etc. may be provided on rent for the tourist.
- Benefit sharing mechanism from tour operators for the benefit of the local people / forest dependent communities.
- Create awareness among local communities / visitors to the Park.
- Provide training to the staff and EDC members in tourism.

- Legal enforcement with spot fine to control littering in National Park.
- Engage EDC watchers for the removal of litter from the Park.
- Develop a waste management plan for the PA.
- Recommends to setting up a committee including the Asst. Wildlife Warden, eco-tourism 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. The Wildlife Warden shall conduct annual review of environmental conservation awareness programme and nature based regulated tourism activities.

7.4.1 IDENTIFICATION OF THE ZONE

The tourism zone is already demarcated for tourism, interpretation and conservation education.

7.4.2 INFRASTRUCTURE DEVELOPMENT

- Centralized information centers, one each at Munnar and Marayoor.
- Provide toilets, fresh rooms, clock room etc. for the tourist at Pethotty and Choondal.
- Establish an interpretation centre for the Park at Pethotty.
- All new infrastructure to be created will be according to the eco-tourism guidelines.
- Maintenance of existing eco-tourism facilities.

7.4.3 REGULATIONS, MONITORING AND EVALUATION

For the successful and long-term management of eco-tourism, regular feedback from all the participants is necessary. In this way, shortcomings of conflict between and amongst different groups could be sorted out. The EDC should meet regularly and whenever required, invite experts to attend this meeting. For the regular monitoring certain data are required which could be designed in a pre-formatted datasheet to measure the following (I) The impact of tourist on the Park (II) Visitor numbers at different times of the year and in the different parts of the site, group size type and duration of visit, the interaction between visitors and crowding etc (III) Social impacts on local residents by eco-tourism (IV) Visitor satisfaction and the extent to which the expectations of visitors have been fulfilled (V) Value for money feedback.

7.4.4 INTERPRETATION AND PUBLICITY ACTIVITIES

- Green day celebrations and activities by involving local people and students of nearby schools.
- Establish an interpretation centre for the visitors with a nominal fee for entry.
- Create brochures, pamphlets, books regarding the significance of the Park, biodiversity etc.
- Erect eco-friendly signage conveying the importance of the Park, do's and don'ts etc. along the road.

7.4.5 CONSERVATION EDUCATION

- Engage resource persons for conservation education.
- Prepare a proper timetable 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.
- Create documentaries, power point presentations etc. for conservation education.
- Procurement of equipment for nature education like LCD projector, computer for awareness.

7.5 KEY AREAS OF TOURISM POTENTIAL FOR DEVELOPMENT AND PROMOTION OF ECO-TOURISM

The Tourism zone was already demarcated for tourism, interpretation and conservation education programme.

7.6 PRESCRIPTIONS FOR ECO-TOURISM LOCATIONS

- The existing facilities shall be maintained during this plan period.
- Special focus shall be on 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.
- A total ban on plastic (bags, bottles etc.) shall be enforced in the eco-tourism sites. Consuming plastic materials thrown into the forest area by the tourists has caused the death of animals in the recent past. Spot fine may be imposed for putting plastic waste in the eco-tourism sites. A proper mechanism for waste management shall be developed for all the eco-tourism sites. Forest Department will provide necessary support in providing tools, waste bins and other logistics. For the sites where municipal dry waste is being dumped illegally, CCTV cameras should be installed and regular patrolling for such areas should be carried out. Legal action shall be taken against the defaultes. Suitable signboards should be erected in eco-tourism sites and along the prominent routes.
- Visitors should be given an opportunity to appreciate forests and their importance.

CHAPTER 8

Eco-development

8.1 GENERAL

The economic wellbeing and improvement of quality of life of the indigenous communities are vital components for the successful implementation of the Plan. The responsible participation of local communities is essential in the protection of forest resources from fire, 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.

Aduvilanthankudi is the only one tribal settlement located in the fringe area of the National Park and settlement is having 52 families. Presently 15 members from Aduvilanthankudi are working in the Park as protection watchers. NWFP is also collected from the Park area by the tribes.

8.2 OBJECTIVES

To strengthen People-PA interface.

8.3 SPECIFIC ISSUES

- Human-Wildlife conflict
- Firewood collection
- NWFP collection

8.4 BROAD STRATEGIES

- 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. will be done. by pooling of resources from 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.
- Conducting the eco-development activities like micro plan.
- Training to staff on eco-development micro-planning and visits to other sites.
- Periodic renewal of micro plan of EDC.

8.4.1 FIREWOOD COLLECTION

- Study the impact of firewood from the Park and take appropriate measures
- Prevent the collection of indigenous species as fuelwood.
- Awareness building on alternate energy sources to reduce dependency on forests.
- Provide alternate energy sources for reducing the demand for the fuelwood in co-ordination with line departments / NGOs / LSGD / Clubs.

8.4.2 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.
- Regeneration of NWFP and medicinal plants in Red-data book.
- 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 programme for the development of livelihood options in the community.
- General activities / programme to improve public participation.

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 departments.

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 the negotiation and implementation phases. Responsible participation of the community depends more on the direct engagement of local leaders from the community. A gradual and ongoing effort is required in the current plan period to convince local communities of the possible benefits of good People - PA interface. Informal opportunities during 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. 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.

MSNP is the last remnant of the natural forests of the Cardamom Hill Reserve. During a rapid plant exploration, a total of 324 plant species belonging to Pteridophytes and Angiosperms were identified from the Park. Of these, 144 taxa (48%) are 'endemic'. Out of the total plant species recorded 9% are threatened category 4 are Critically Endangered, 7 are Endangered and 17 are Vulnerable. *Peperomia ekakesara* is a new plant species discovered by S. Syam Radh & Santhosh Nampy in the year 2018 from Park. 36 species of mammals were recorded from the Park (excluding rats, shrews and moles). The diversity of rats, shrews and moles inside the National Park is unknown to the world. Research, monitoring and training have a great role in the management of National Park. In order to accomplish the plan objectives, the following research, monitoring and training are proposed.

9.2 RESEARCH AND MONITORING

a) Habitat Improvement

- Map the extent and concentration of remnants of coffee plantation in the Park and take necessary steps for their eradication.
- Evolve scientific and standardised suitable site / species specific methods for the eradication of coffee and exotic species.
- Study on population dynamics of *Melanobatrachus indicus* (Galaxy Frog).
- Study the aspects of connectivity and corridor for the movement of wild elephants.
- Steps for facilitating the regeneration of Shola species and grasslands.

b) Biodiversity Assessment.

- A detailed study on Bryophytes, Pteridophytes, Gymnosperms and Angiosperms in the Park is recommended.
- Identification of the Strobilanthes species present in the Park, identify the Neelakurinji (*Strobilanthes kunthiana*) locations and establish a permanent plot for the long term monitoring of this species population.
- Study the Threatened taxa present in the Park.
- Assessment of small mammals like rats, shrews and moles.
- Daily monitoring of wildlife is recommended and need to document properly.
- Annual camera trap exercise to identify the movement pattern of large mammals like tiger, leopard and elephants.
- Conduct a detailed study regarding the small life forms in the Park.
- Population estimation and assessment of all taxa should be done at appropriate intervals and it should be properly documented for further use.

- Establish long term monitoring plots for studying regeneration status, vegetation change etc.
- Conduct annual survey of Birds, Butterflies, Odonates etc.
- Population estimation and habitat utilization study of Nilgiri Marten.
- Documentation of flora and fauna especially lower group animals.
- Training to watchers and staff on species identification and habitat conservation
- 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.

c) Wildlife Monitoring

- Monitor the movement of large mammals present inside the National Park.
- Move a proposal for establishing a temporary rescue centre for wildlife under the division.
- Regular monitoring of wildlife mortality.
- Vaccination of domestic animals.
- Develop a health monitoring protocol for wildlife and regular monitoring is recommended.
- Study and identify the spatial and temporal distribution of water sources and generate maps.
- Annual monitoring of water resources and its documentation.
- Annual monitoring of core area with respect to invasive and exotic species, fire and animal utilization.
- Qualitative and quantitative analysis of habitat for studying the impact of climate change.
- Radio-collaring and monitoring of elephants and problematic animals.
- Install an automatic weather station, and collect data regularly.
- Need assessment for a temporary rescue centre for wildlife in distress.
- Annual wildlife population estimation.

d) Socio-economic studies

- Conduct a socio-economic survey at the tribal hamlets adjacent to Park.
- Document ethnic knowledge.
- Income generation from the sale of NWFP.
- Identify and document the indigenous cultivating crops and establish germplasm for these crop varieties.
- Livelihood promotion programme for local communities.
- Study and recommendations on the effectiveness of EDCs.

- Record maintenance of researches, surveys, studies etc. at the Division level.
- Participation of local communities in conservation and protection activities.
- Effectiveness of strategies adopted for fire prevention.
- Optimising income from eco-tourism.
- Impact of excessive use of chemicals in the adjoining plantations.
- Study and document of traditional knowledge of indigenous community,

9.3 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 stakeholders 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 of eco-tourism programme.
- 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 system 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.

Details of the permission granted for research in the Shola National Park have been Annexed **(Annexure 3.2).**

CHAPTER 10

Organisation & Administration

10.1 STRUCTURE AND RESPONSIBILITIES

The organizational structure of the Park is as shown below:

- The Mathikettan Shola National Park will be headed by the Wildlife Warden who will have overall responsibility for the implementation of the Management Plan. The Wildlife Warden will develop a pocket field guide with a schedule of operations for the implementation of the Management Plan and furnish it to Assistant Wildlife Warden and Section Forester.
- The Wildlife Warden will make arrangements to give control forms to the Assistant Wildlife Warden and Section Forester and compile the information about the Park.
- The Wildlife Warden, Munnar will prepare Annual Plan of Operations and Schedule of Operations every year in the first week of April.
- The Wildlife Warden shall not deviate from the Management Plan prescriptions without the prior permission of the Chief Wildlife Warden.
- The Wildlife Warden shall also take action for reviewing the Management Plan after five years.

10.2 STAFF AMENITIES

- SFO and BFO Quarters at Pethotty
- Watcher Shed at Pethotty

BUDGET

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

Para. of Management plan	Activity	Financial requirements Total (Lakh)										Sub Total
		1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	
6.3.1 e	Removal of plantation of exotic species- Coffee plants for improvement of habitat and restoration of original vegetation	5	5	5	4	4	4	3	3	3	3	39
6.3.1 e	Assisting regeneration of indigenous species and eco-restoration	5	5	5	4	4	4	3	3	3	2	38
6.3.1.e	Establishment of permanent plots and monitoring successions and eco-restoration	2	2.5	3	3.5	2	2.5	3	3.5	3.5	3	28.5
6.4.1.4	Construction of patrolling camp shed and watch tower, maintenance of existing patrolling camp sheds and watch tower	6	15	12	12	15	20	20	15	23	25	163
6.4.1.5	New electricity connection for building and internet connectivity	2	2		1		4	4				13
6.4.1.12	Supply of kerosene, filed kit, mosquito net, touches to staff	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	15
6.4.1.13 a	Purchase of arms and ammunition	1		0.5		1.5		0.5			1.5	5
6.4.1.13 b	Purchase and maintenance of wireless system	2	8	1	1	5	1	1	1	1	5	26
6.4.1.13 d	Purchase of new vehicles and maintenance	3.5	15	4.2	4.5	4.8	5	5	3	3	3	51

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	5	1	1	1	1	5	1	1	1	1	18
6.4.1.13 g	Erection of chain gates and maintenance	2	3	1	1	1	1	1	1	1	1	13
6.4.1.13 f	Maintenance of roads	5	5	5	5	5	10	5	5	5	5	55
6.4.1.13 e	Maintenance of trek paths	7	7	7	8	8	8	10	10	10	11	86
6.4.1.14	Intelligence gathering and rewards to informers	0.5	0.5	0.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	6.75
6.4.1.14	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
6.4.1.11	Engaging protection Mazdoors	40	40	40	42	42	42	45	45	45	50	431
6.4.1.3	Survey of boundaries and construction and maintenance cairns / pillars	3	2.5	3	5	2	2	2	2	2	2	25.5
6.4.1.5	Construction and maintenance of Residential buildings	5	5	5	5	5	20	7.5	7.5	7.5	7.5	75
6.4.1.6	Engaging mazdoors for antipoaching activities	10	10	10	10	10	10	10	10	10	10	100
6.4.1.4	Conducting antipoaching camps at different areas in the National Park	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3	27.5
6.4.1.4	Construction of new antipoaching camp sheds		10	10	3	3	3	3	3	3	10	48
6.4.1	Ganja raids	1	1	1	1	1	1	1	1	1	1	10

6.4.1.7	Clearance or maintenance of inter state boundary	3	3	3	4	4	4	4	5	5	5	40
6.4.2.2(I)	Creation of firelines and maintenance	8	8	8	9	9	9	10	10	10	10	91
6.4.2.1	Mapping of fire prone areas	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1
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 (VIII)	Purchase of firefighting equipment (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	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3	27.5
6.4.2.2.(III)	Engaging firewatchers during fire season	7	7	7	7	7	7	7	8.5	8.5	8.5	74.5
6.4.2.2 (IV)	Participatory fire management	2.5	2.5	3	3	3	3.5	3.5	3.5	4	4	32.5
6.4.2.2 (VI)	Awareness of staff and EDC during fire season	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5
6.4.2.2 (VII)	Fire watch tower and communication network	2	2	2	2.5	2.5	2.5	2.5	3	3	3	25
6.4.3	Conduct feasibility studies to retain water in crucial location inside and outside Protected Area	0.5	0.5	0	0	0	0	0	0.5	0	1	2.5
6.4.3	Maintenance and creation of water holes / check dams	2.5	2.5	2.5	3.5	3.5	3.5	3.5	4	4	4	33.5
6.4.3	Mapping of water resources and preparation of drainage map	0	0.75	0	0	0	0	1	0	0	1	2.75
6.4.3.	Installation of meteorological station	0	5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	7
6.4.3.	Soil and moisture conservation measures (Gully plugging and bunds)	2	2	2	2.5	2.5	2.5	2.5	3	3	3	25

6.3.1. e	Monitoring regeneration status and soil erosion	0	1.5	0	0	1	0	0	0	0	0	2.5
6.4.4	Mapping vegetation type in the National Park	0.5	1	0	0	0	0	0	0	0	1	2.5
6.4.1.13 h	Uniform for protection mazdoors	1.5	2	3	1.5	4	5	5	2	4	3	31
6.4.1	Overhead and office expenses	1	1	1	1.5	1.5	1.5	2	2	2	2	15.5
6.4.1.5	Building maintenance	4	4	4	5	5	5	5	6	6	6	50
7.4	Establish an interpretation center at Pethotty.	0	25	0	0	0	0.1	0	0	0.2	0	25.3
7.4	Upgrade / maintenance the road from Pethotty to Check Post	0	15	3	3	3	3	20	0	2	3	52
7.4.4	Green day celebrations and activities by involving local people and students of nearby schools.	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1	7.5
7.4.2	Provide toilets, fresh rooms, clock room etc. for the tourist at Pethotty. and Choondal	15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	15.9
7.4.5	Establish a library for the nature education camp participants.	2	0.1	0.1	0.1	0.1	1	0.1	0.1	0.1	1	4.7
7.4.5	Create documentaries	2	0	0	0	0	3	0	0	0	4	9
7.4.5	Educational and awareness material	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	7.5
7.4.5	Awareness camps (including nature awareness camps)	4	8	4	4	4	5	5	5	5	5	49
7.4.5	Procurement of LCD, Computer for awareness camping	2	0	0	0	1.5	0	0	0	0	0	3.5

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, torches, s leeping 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
7.4	Waste management system	5	1	1	1	1	5	1	1	1	1	18
7.4.2	Maintenance of existing Eco-tourism facilities	3	3	3	2	2	2	2	5	2	2	26
7.4.4	Erection of signage at strategic location	1.5	1.5	1	1	1	2	1	1	1	2	13
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
8.4	Undertake appropriate habitat improvement programme within the Park for improving the availability of forage and water.	2	2	2	2	3	3	3	3	3.5	3	26.5
8.4	Eco-development activity (as per micro plan)	4	1.5	1.5	1.5	1.5	2	2	2	2	2	20
8.4	Training to staff on eco-development micro-planning and visits to other sites	2	2	2	2	2	2	2	2	2	2	20
8.4	Renewal of existing micro plan of EDC	0	1	0	0	0	0.5	1	0	0	0	2.5
8.4	Construction and maintenance of elephant proof trenches / solar fences	0	2.5	2.5	2.5	3	3	3	3	3.5	3.5	26.5
8.4	Compensation against wildlife damage	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	15

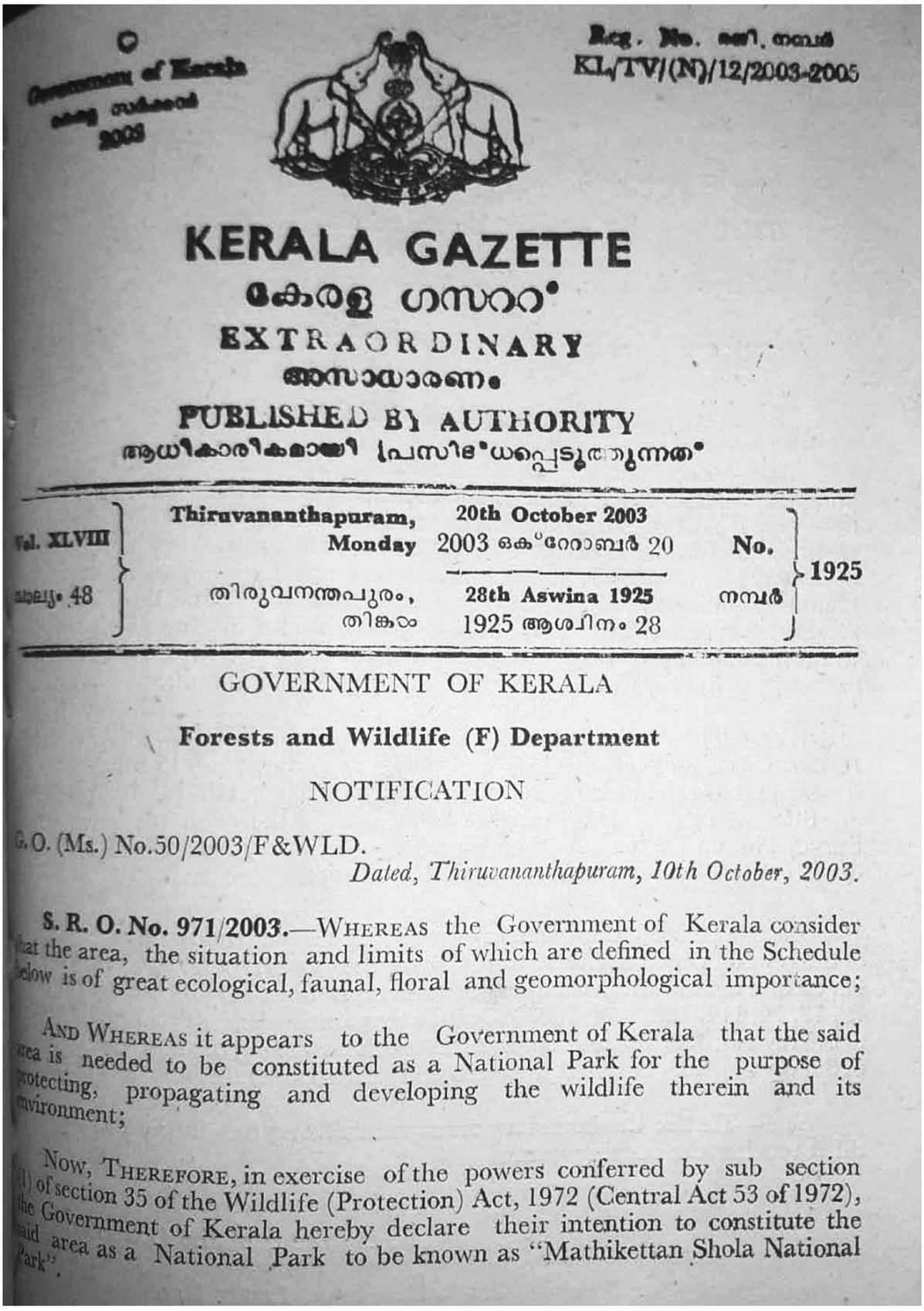
8.4	Study the extent of wildlife damage problem	0	0.5	0	0	0	0	0.5	0	0	0	1
8.4.1	Purchase and maintenance of renewable energy system	1	2	2	1	1	0	0	0	0	2.5	9.5
8.4.2	Study, extent and impact of NWFP collection	0	0.3	0	0	0	0.3	0	0	0	0.3	0.9
8.4.2	Training of scientific collection of NWFP and value addition	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5
8.4.2	Regeneration of NWFP and medicinal plants in Red-data book	0	2	1.5	1.5	1.5	1.5	1.5	1.5	2	2	15
9.2 (b)	Document flora and fauna including RET and endemic and its periodic survey	0.5	0.5	0.75	0.5	0.5	0.5	1	0.5	0.5	0.5	5.75
9.3 (d)	Study and document of traditional knowledge of indigenous communities	0	0	1.5	0.5	0	0	0	0	0	1.5	3.5
9.3	Study and identify invasive species that have negative impact on ecosystem	0	0	1.5	0	0	0	0	0	0	0	1.5
9.2 (c)	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 (c)	Study on elephant movements and connectivity	0	2	1	1	1	0	0	0	0	0	5
9.3	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
9.3	Training to staff and EDC members on wildlife health monitoring, firefighting etc.	1	1	1	1	1	1	1	1	1	1	10

9.3	Capacity building of local communities for eco-tourism programme	1.5	2	2	2	1.5	2	2	1.5	2	2	18.5
9.3	Capacity building staff and guides in managing eco-tourism	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	15
9.3	Vaccination of domestic animals	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1
9.3	Wildlife health monitoring	2	2	2	2	2	2	2	2	2	2	20
9.3	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
	Grand Total	**208.75**	**275.5**	**203.75**	**200.55**	**209.45**	**247.95**	**242.5**	**213.5**	**224.8**	**256.4**	**2283.15**

ANNEXURE

ANNEXURE 1.1

NOTIFICATION OF NATIONAL PARK



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

KERALA GAZETTE

കേരള ഗസറ്റ്

EXTRAORDINARY

അസാധാരണം

PUBLISHED BY AUTHORITY

ആധികാരികമായി പ്രസിദ്ധപ്പെടുത്തുന്നത്

Vol. XLVIII — Thiruvananthapuram, Monday — 20th October 2003 / 2003 ഒക്ടോബർ 20 — No. 1925

വാല്യം 48 — തിരുവനന്തപുരം, തിങ്കൾ — 28th Aswina 1925 / 1925 ആശ്വിനം 28 — നമ്പർ

GOVERNMENT OF KERALA

Forests and Wildlife (F) Department

NOTIFICATION

G.O. (Ms.) No.50/2003/F&WLD.

Dated, Thiruvananthapuram, 10th October, 2003.

S. R. O. No. 971/2003.—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 and geomorphological importance;

AND WHEREAS it appears to the Government of Kerala that the said area is needed to be constituted as a National Park for the purpose of protecting, propagating and developing the wildlife therein and its environment;

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 "Mathikettan Shola National Park".

SCHEDULE

District	:	Idukki
Taluk	:	Udumbanchola
Village	:	Pooppara
Extent	:	1281.7419 hectares

Situation and limits of the said area

North.—The boundary commences from the point where the interstate boundary between Kerala and Tamil Nadu meets the southern boundary of Survey No. 32 of Pooppara Village on the Resurvey Minor Circuit and runs west parallel to the Bodimettu-Pooppara road, along the southern boundary of Survey Nos.17, 16, 13, 14, 8, 2 and thence turning south, along the eastern boundary of Block 13, and Survey Nos. 34, 35, 36, 37 and thence along the southern boundary of Survey Nos. 37 and 38 and turning north along the western boundary of Survey No. 38 to reach a point where northern most extremity of Survey No. 38 meets the Resurvey Minor Circuit.

West.—Thence the boundary turns south and follows the Resurvey Minor Circuit along the eastern boundary of Block No. 13 till it meets the stream and turning south-west along the stream to meet the northern boundary of Survey No. 65 and turns south along the eastern boundary of Survey No. 65 till it meets the boundary of Survey No. 64 on the line demarcating the area handed over after eviction.

South.—Thence the boundary turns east along the northern boundary of Survey No. 64, 63 and turns south along the eastern boundary of Survey No. 62, 80 and again turns east along the northern boundary of Survey No 78,71, 72, 73, 74, 174, 192, 193, 195, 197 and turns south along the eastern boundary of Survey No. 198, 199 and again turns northeast along the northern boundary of Survey No. 205, 207, 208, 209, 210, 211, 212 to meet the interstate boundary.

East.—Thence the boundary runs north along the interstate boundary till it reaches the starting point.

By order of the Governor,

LIZZIE JACOB,
Principal Secretary to Government (Power), in-charge of Forest and Wildlife Department.

Explanatory Note

(This is not a part of the notification, but is intended to indicate its general purpose.)

Mathikettan area is part of the Cardamom Hill Reserve (CHR), notified in the Travancore Government Gazette dated the 24th August 1897, wherein the area was constituted as a Reserve Forest under section 18 of Regulation II of 1068. Subsequently various Government orders/rules, were issued for assigning the Cardamom Hill Reserve area for Cardamom cultivation, as well as regarding the control over the land and trees.

The provisions contained in G. O. (Ms.) 804/58/Rev dated the 9th August 1958 were being followed for the management of the Cardamom Hill Reserve area, thereby control over the land rests with the Revenue Department, and control over the tree growth with the Forest Department. Hence there was a dual control over the Cardamom Hill Reserve areas. Subsequently, vide G. O.(Ms.) No. 328/2002/RD dated the 17th October, 2002, Government have transferred 1281.7419 hectares of the said land to the administrative control of Forest Department. Considering the unique nature of the Shola forests in Mathikettan and its importance as an elephant corridor, the State Wildlife Advisory Board has recommended to declare the area as a National Park.

Government finds it necessary to declare the area as a National Park for protecting its ecological, faunal, floral and geomorphological wealth. Therefore, the Government have decided to declare its intention to constitute the said area as a National Park. This notification is intended to achieve the above subject.

PRINTED AND PUBLISHED BY THE SUPERINTENDENT OF GOVERNMENT PRESSES AT THE GOVERNMENT CENTRAL PRESS, THIRUVANANTHAPURAM, 2003.

ANNEXURE 2.1

MONTH WISE RAINFALL DATA DURING THE LAST TEN YEARS NEAR MSNP

Month	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
January	18.9	94.2	4.7	0.4	5.6	0.0	0.0	2	45.8	8.2
February	0.0	107.4	0.2	92.1	5.1	35	13.4	65.2	5.6	27.2
March	12.8	22.2	21.3	21.8	11.2	110.6	23.8	45.1	102.6	11.2
April	98.6	268.8	178.6	45.7	47.2	216.8	29.2	183.2	83.4	55.2
May	82	28.6	24.9	71.2	247.8	124.4	166.7	261	79.6	11.8
June	286	398.6	203.4	714.6	256.6	391.4	391.4	503.8	324.4	144.7
July	419	351	184	623	614.4	276.3	276.3	826	129	297.6
August	260.4	410.2	283	425.4	559.2	145.86	145.86	1052.4	508.2	577.8
September	159.4	188.2	148.4	292.3	272	526	236.8	236	402	402.4
October	296.2	298.5	327.9	139.3	376.6	122.4	122.4	345.6	214.4	267
November	243.8	237.2	150.8	253.9	156.6	266.6	266.6	216.8	106.8	130.6
December	33.4	14	12.7	47	54.2	105.8	44.1	Data nil	240.2	64
Total	1910.5	2418.9	1539.9	2726.7	2606.5	2321.16	1716.56	3737.1	2242	1997.7

ANNEXURE 2.2

ANNUAL TEMPERATE DATA DURING THE LAST TEN YEARS NEAR MSNP

Year	Average Minimum Temperature (0C)	Average Maximum Temperature (0C)
2009	17.2	25.8
2010	17.5	26.5
2011	16.9	25.8
2012	17.2	26.1
2013	16.9	25.4
2014	17.2	25.6
2015	16.6	26.2
2016	16.1	27.0
2017	13.8	25.6
2018	15.1	25.7
2019	13.3	26.2

Source- Indian Cardamom Research Institute(ICRI)

ANNEXURE 2.3

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

Sl No.	Name of water bodies	GPS		Dry Months
		Latitude	Longitude	
Ponds				
1	Onnam thodu (Right)	9.983511111	77.23694444	April - May
2	Onnam thodu (Left)	9.983388889	77.23778889	April - May
3	Kadayiruppu	9.995194444	77.25372222	April - May
4	Thakkalikavala-1	9.985586111	77.25936111	May
Check dams				
1	Mannakudi	9.975886111	77.24859444	April - May
2	Sivan para 1	9.975236111	77.24533056	April - May
3	Sivan para 2	9.9753	77.24481389	April - May
4	Sivan para 3	9.9748	77.24472222	April - May
5	Kuttapan kadu 1	9.985877778	77.23243333	May
6	Kuttapan kadu 2	9.9863	77.23393611	May
7	Onnam thodu 1	9.986222222	77.23515278	April - May
8	Onnam thodu 2	9.983444444	77.23584444	April - May
9	Onnam thodu 3	9.986611111	77.23599444	April - May
10	Kurishukavala	9.986555556	77.2502	May
11	Sukumaran kadu	9.994388889	77.2535	April - May
12	Kadayiruppu	9.994555556	77.25461111	April - May
13	German kadu 1	9.991611111	77.23605	May
14	German kadu 2	9.988305556	77.23558889	May
15	Thakkali kavala	9.985655556	77.25936111	April - May
16	Sarvakkal para	10.00079167	77.25129722	April - May
17	Karipara	10.00525	77.25366667	May
18	Manalootu	10.00579444	77.26066667	April - May

ANNEXURE 2.4

ANGIOSPERMS OF MATHIKETTAN SHOLA NATIONAL PARK

Sl. No.	Scientific Name	Family	Local Name	Status
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 foliosus* (Wight) Anders.	Acanthaceae	Vettilakurinji	Endemic to PI
7.	*Strobilanthes gracilis* Bedd.	Acanthaceae	Thokakurinji	Endemic to SWG
8.	*Strobilanthes micranthus* Wight	Acanthaceae	Kallankurinji	Endemic to SWG
9.	*Strobilanthes neilgherrensis* Bedd.	Acanthaceae		Endemic to SWG
10.	*Strobilanthes neoasper* Venu & Daniel	Acanthaceae		Endemic to WG
11.	*Strobilanthes papillosus* Anders.	Acanthaceae		Endemic to SWG
12.	*Strobilanthes pulneyensis.* Hook. f	Acanthaceae	Chonayamkallu-kurinji	Endemic to SWG
13.	*Strobilanthes rubicundus* (Nees) Anders	Acanthaceae		Endemic to SWG
14.	*Strobilanthes tristis* (Wight) Anders.	Acanthaceae		Endemic to SWG
15.	*Strobilanthes zenkerianus* Anders.	Acanthaceae		Endemic to SWG

16.	*Thunbergia tomentosa* Wall. ex Nees	Acanthaceae		
17.	*Achyranthes bidentata* Blume	Amaranthaceae	Nayaruvichedi	
18.	*Indobanalia thyrsiflora* (Moq.) Henry & Roy	Amaranthaceae		Endemic to SWG
19.	*Ancistrocladus heyneanus* Wall. ex Graham	Ancistrocladaceae	Modiravalli	
20.	*Meiogyne ramarowii* (Dunn) Gandhi	Annonaceae	Panthalmaram	Endemic to SWG
21.	*Heracleum candolleanum* (Wight & Arn.) Gamble	Apiaceae	Kattugeerakam	Endemic to SWG
22.	*Heracleum sprengelianum* Wight & Arn.	Apiaceae	Kattumalli	Endemic to WG
23.	*Hydrocotyle conferta* Wight	Apiaceae		VU, Endemic to SWG
24.	*Pimpinella pulneyensis* Gamble	Apiaceae		Endemic to SWG
25.	*Vanasushava pedata (Wight)* P.K. Mukh. & Constance	Apiaceae		VU, Endemic to SWG
26.	*Ilex gardneriana* Wight	Aquifoliaceae		CR
27.	*Ilex wightiana* Wall. ex Wight	Aquifoliaceae	Vellodi	
28.	*Arisaema leschenaultii* Blume	Araceae	Pambucholam	Endemic to SWG
29.	*Arisaema peltatum* C.E.C. Fisch.	Araceae		Endemic to SWG
30.	*Arisaema psittacus* Barnes	Araceae	Pambucholam	Endemic to SWG
31.	*Arisaema sarracenioides* Barnes & C.E.C. Fisch.	Araceae		Endemic to SWG
32.	*Arisaema tylophorum* C.E.C. Fisch.	Araceae		Endemic to WG
33.	*Aralia leschenaultii* (DC.) J. Wen	Araliaceae		Endemic to SWG

34.	*Polyscias acuminata* (Wight) Seem.	Araliaceae		Endemic to WG
35.	*Schefflera racemosa* (Wight) Harms	Araliaceae	Ettilamaram	
36.	*Ceropegia decaisneana* Wight	Asclepiadaceae		VU, Endemic to WG
37.	*Ceropegia maculata* Bedd.	Asclepiadaceae		
38.	*Hoya pauciflora* Wight	Asclepiadaceae		
39.	*Hoya wightii* Hook. f.	Asclepiadaceae	Ellodiyan	Endemic to SWG
40.	*Tylophora mollissima* Wight & Arn.	Asclepiadaceae		Endemic to SI
41.	*Tylophora tetrapetala* (Dennst.) Suresh	Asclepiadaceae	Nanjaippan	
42.	*Ageratum conyzoides* L.	Asteraceae	Kumminnipacha	
43.	*Anaphalis lawii* (Hook. f.) Gamble	Asteraceae		Endemic to PI
44.	*Anaphalis subdecurrens* (DC.) Gamble	Asteraceae		
45.	*Blumea oxyodonta* DC.	Asteraceae		
46.	*Chaetoseris cyanea* (D. Don) C. Shih	Asteraceae		
47.	*Cirsium wallichii* DC. var. wightii (Hook. f.) Vivek.	Asteraceae	Chakkumullu	
48.	Cissampelopsis corymbosa (Wall. ex DC.) Jeffrey & Chen.	Asteraceae		
49.	Conyza canadensis (L.) Cronq.	Asteraceae		
50.	Dichrocephala integrifolia (L. f.) O. Ktze.	Asteraceae		
51.	Emilia scabra DC.	Asteraceae	Poosha-thala	Endemic to India

52.	*Gnaphalium polycaulon* Pers.	Asteraceae		
53.	*Gynura travancorica* W. W. Smith	Asteraceae	Koppuchedi	Endemic to SWG
54.	*Hypochoeris glabra* L.	Asteraceae		
55.	*Launaea acaulis* (Roxb.) Babc. ex Kerr.	Asteraceae		
56.	*Myriactis wightii* DC.	Asteraceae		CR
57.	*Phyllocephalum scabridum* (DC.) Kirkman	Asteraceae		Endemic to WG
58.	*Picris hieracioides* L.	Asteraceae		
59.	*Senecio lavandulaefolius* DC.	Asteraceae		Endemic to India
60.	*Vernonia anamallica* Bedd. ex Gamble	Asteraceae		VU, Endemic to SWG
61.	*Vernonia arborea.* Buch.-Ham	Asteraceae	Kadavari	
62.	*Vernonia bourneana* W. W. Smith	Asteraceae		Endemic to SWG
63.	*Vernonia fysonii* Calder	Asteraceae	Kaliyamman pathiri	Endemic to SWG
64.	*Vernonia heynei Bedd.* ex Gamble	Asteraceae		CR, Endemic to SWG
65.	*Vernonia salvifolia* Wight	Asteraceae		EN, Endemic to SWG
66.	*Vernonia travancorica* Hook. f.	Asteraceae	Karana, Thempu	Endemic to WG
67.	*Youngia japonica* (L.) DC.	Asteraceae		
68.	*Balanophora fungosa* J. R. & G. Forst. ssp. indica (Arn.) Hansen	Balanophoraceae	Nilamchakka	
69.	*Impatiens campanulata* Wight	Balsaminaceae	Thottachinungi	Endemic to SWG

70.	*Impatiens clavicornu* Turcz.	Balsaminaceae		Endemic to WG
71.	*Impatiens cordata* Wight	Balsaminaceae	Thottachinungi	Endemic to WG
72.	*Impatiens cuspidata* Wight & Arn.	Balsaminaceae	Thottachinungi	Endemic to WG
73.	*Impatiens elegans* Bedd.	Balsaminaceae		CR, Endemic to SWG
74.	*Impatiens jerdoniae* Wight	Balsaminaceae		Endemic to WG
75.	*Impatiens latifolia* L.	Balsaminaceae		Endemic to SWG
76.	*Impatiens maculata* Wight	Balsaminaceae		Endemic to SWG
77.	*Impatiens parasitica* Bedd.	Balsaminaceae		Endemic to SWG
78.	*Impatiens tangachee* Bedd.	Balsaminaceae	Kannipoovu	Endemic to WG
79.	*Impatiens uncinata* Wight	Balsaminaceae		Endemic to SWG
80.	*Impatiens wightiana* Bedd.	Balsaminaceae		EN, Endemic to SWG
81.	*Begonia floccifera* Bedd.	Begoniaceae	Kalthamara	Endemic to SWG
82.	*Cullenia exarillata* Robyns	Bombacaceae	Mullenchankka	Endemic to SWG
83.	*Cardamine africana* L.	Brassicaceae		
84.	*Cardamine hirsuta* L.	Brassicaceae		
85.	*Sarcococca coriacea* (Hook.) Sweet	Buxaceae	Mattuvadi	Endemic to PI
86.	*Viburnum coriaceum* Blume	Caprifoliaceae	Mottumookkan	
87.	*Spergula arvensis* L.	Caryophyllaceae		

88.	*Bhesa indica* (Bedd.) Ding Hou	Celastraceae	Penali	
89.	*Euonymus crenulatus* Wall. ex Wight & Arn.	Celastraceae	Dhanthapatri	Endemic to SWG
90.	*Microtropis ramiflora* Wight	Celastraceae		
91.	*Microtropis stocksii* Gamble	Celastraceae		Endemic to WG
92.	*Microtropis wallichiana* Wight ex Thw.	Celastraceae		
93.	*Mesua thwaitesii* Planch. & Triana	Clusiaceae	Kilinanku	
94.	*Cyanotis papilionacea* (Burm. f.) Schult. f.	Commelinaceae		
95.	*Cyanotis thwaitesii* Hassk.	Commelinaceae		
96.	*Argyreia daltonii* Clarke	Convolvulaceae		Endemic to SI
97.	*Argyreia elliptica* (Roth) Choisy	Convolvulaceae	Adumbuvalli	
98.	*Argyreia imbricata* (Roth) Sant. & Patel	Convolvulaceae		Endemic to SI
99.	*Mastixia arborea* (Wight) Bedd.	Cornaceae	Kattukarpooram	Endemic to SWG
100.	*Bulbostylis barbata* (Rottb.) Kunth ex Clarke	Cyperaceae		
101.	*Carex filicina* Nees	Cyperaceae		
102.	*Schoenoplectus mucronatus* (L.) Palla	Cyperaceae		
103.	*Scleria pergracilis* (Nees) Kunth	Cyperaceae		
104.	*Daphniphyllum neilgherrense* (Wight) K. Rosenth	Daphnyphyllaceae	Kozhikkulamavu	
105.	*Dichapetalum gelonioides* (Roxb.) Engl.	Dichaprtalaceae	Kattukappikkuru	

106.	*Drosera peltata* Smith	Droseraceae	Azhukanni	
107.	*Diospyros trichophylla* Alston	Ebenaceae		VU
108.	*Elaeagnus kologa* Schult.	Elaeagnaceae	Kattumunthiringa	
109.	*Elaeocarpus munronii* (Wight) Mast.	Elaeocarpaceae	Kalrudraksham	Endemic to SWG
110.	*Elaeocarpus tuberculatus* Roxb.	Elaeocarpaceae	Karamaram	
111.	*Elaeocarpus variabilis* Zmarzty	Elaeocarpaceae	Kotlampazhamaram	Endemic to WG
112.	*Rhododendron arboreum* J. E. Smith ssp. nilagiricum (Zenk.) Tagg.	Ericaceae	Kattupoovarasu	VU, Endemic to SWG
113.	*Eriocaulon brownianum* Mart. ex Wall.	Eriocaulaceae	Buttonpoovu	
114.	*Acalypha brachystachya* Hornem.	Euphorbiaceae		
115.	*Antidesma montanum* Blume	Euphorbiaceae	Thathalamaram	
116.	*Aporusa fusiformis* Thw.	Euphorbiaceae		
117.	*Drypetes venusta* (Wight) Pax & Hoffm.	Euphorbiaceae	Choota	Endemic to SWG
118.	*Drypetes wightii* (Hook. f.) Pax & Hoffm.	Euphorbiaceae	Vellakasavu	VU, Endemic to SWG
119.	*Excoecaria oppositifolia* Griff. var. crenulata (Wight) Chakrab. & Gangop.	Euphorbiaceae	Era	
120.	*Glochidion candolleanum* (Wight & Arn.) Chakrab. & Gangop.	Euphorbiaceae	Chathakkadambu	
121.	*Glochidion ellipticum* Wight	Euphorbiaceae	Kulachan	
122.	*Micrococca beddomei* (Hook.f.) Prain			Endemic to SWG
123.	*Casearia ovata* (Lam.) Willd.	Flacourtiaceae	Malampavatta	

124.	*Casearia rubescens* Dalz.	Flacourtiaceae		Endemic to SWG
125.	*Hydnocarpus alpina* Wight	Flacourtiaceae	Malamarotti	
126.	*Scolopia crenata* (Wight & Arn.) Clos	Flacourtiaceae	Mullukara	
127.	*Exacum wightianum* Arn.	Gentianaceae	Thavalakkalchedi	Endemic to SWG
128.	*Swertia corymbosa* (Griseb.) Wight ex Clarke in Hook.f.	Gentianaceae	Avalpoovu	Endemic to PI
129.	*Swertia minor* (Griseb.) Knobl.	Gentianaceae		Endemic to SWG
130.	*Aeschynanthus perrottetii* A.DC.	Gesneriaceae		Endemic to WG
131.	*Didymocarpus tomentosa* Wight	Gesneriaceae	Elichuzhien	Endemic to PI
132.	*Rhynchoglossum notonianum* (Wall.) Burtt	*Gesneriaceae*		
133.	*Laurembergia coccinea* (Blume) Kanitz	Haloragaceae		
134.	*Hypericum japonicum* Thunb. ex Murr.	Hypericaceae		
135.	*Hypericum mysurense* Heyne ex Wight & Arn.	Hypericaceae	Avaramkola	
136.	*Apodytes dimidiata* Meyer ex Arn.	Icacinaceae	Karineeli	
137.	*Gomphandra coriacea Wight*	Icacinaceae	Chottamaram	
138.	*Nothapodytes nimmoniana* (Graham) Mabb.	Icacinaceae	Peenari	
139.	*Juncus bufonius* L.	Juncaceae		
140.	*Juncus inflexus* L.	Juncaceae		
141.	*Anisochilus argenteus* Gamble	Lamiaceae	Sheethakkoraali	VU, Endemic to SI

142.	*Isodon coesta* (Buch.-Ham. ex D. Don) Kudo	Lamiaceae		
143.	*Isodon lophanthoides* (Buch. -Ham. ex D.Don) H.Hara	Lamiaceae		Endemic to WG
144.	*Isodon nilgherricus H.Hara* (Benth.)	Lamiaceae		Endemic to SWG
145.	*Leucas hirta* (Heyne ex Roth) Spreng.	Lamiaceae		Endemic to PI
146.	*Leucas lanceifolia* Desf.	Lamiaceae		Endemic to PI
147.	*Leucas vestita* Benth.	Lamiaceae	Hanumanpal	Endemic to SWG
148.	*Micromeria imbricata* (Forssk.) C.Chr.	Lamiaceae		
149.	*Plectranthus barbatus* Andr.	Lamiaceae	Panikoorka	
150.	*Pogostemon benghalensis* (Burm. f.) O. Ktze.	Lamiaceae	Bhoothachedayan	
151.	*Pogostemon mollis* Benth.	Lamiaceae		Endemic to WG
152.	*Pogostemon wightii* Benth.	Lamiaceae		Endemic to SWG
153.	*Scutellaria violacea* Heyne ex Benth.	Lamiaceae	Kattuthulasi	
154.	*Scutellaria wightiana* Benth.	Lamiaceae		Endemic to PI
155.	*Actinodaphne bourdillonii* Gamble	Lauraceae	Malavirinji	Endemic to SWG
156.	*Apollonias arnottii* Nees	Lauraceae	Karamavu	Endemic to SWG
157.	*Beilschmiedia wightii* (Nees) Benth. ex Hook. f.	Lauraceae	Nagaramaram	EN, Endemic to SWG
158.	*Cinnamomum perrottetii* Meisner	Lauraceae		VU, Endemic to SWG
159.	*Cinnamomum wightii* Meisner	Lauraceae	Shanthamaram	Endemic to SWG

160.	*Cryptocarya beddomei* Gamble	Lauraceae	Chembalava	VU, Endemic to SWG
161.	*Litsea bourdillonii* Gamble	Lauraceae		
162.	*Litsea coriacea* (Heyne ex Meisner) Hook. f.	Lauraceae	Maravettithali	
163.	*Litsea oleoides* (Meisner) Hook. f.	Lauraceae	Matthi	Endemic to SWG
164.	*Litsea udayanii* Robi	Lauraceae		Endemic to SWG
165.	*Litsea wightiana* (Nees) Hook. f.	Lauraceae	Pattuthali	Endemic to SWG
166.	*Litsea wightiana* (Nees) Hook. f. var. *tomentosa* (Meisner) Gamble	Lauraceae		Endemic to SWG
167.	*Neolitsea cassia* (L.) Kosterm.	Lauraceae	Keezhambazham	
168.	*Neolitsea fischeri* Gamble	Lauraceae	Varimaram	VU, Endemic to SWG
169.	*Neolitsea scrobiculata* (Meisner) Gamble	Lauraceae	Mulakunari	Endemic to WG
170.	*Machilus macrantha* Nees	Lauraceae	Kulamavu	
171.	*Phoebe wightii* Meisner	Lauraceae	Chudala	Endemic to PI
172.	*Asparagus gonoclados* Baker	Liliaceae	Sathavari	Endemic to WG
173.	*Chlorophytum heynei* Rottl. ex Baker,	Liliaceae		
174.	*Chlorophytum sharmae* Adsul, Lekhak & S. R. Yadav	Liliaceae		Endemic to SWG
175.	*Dianella ensifolia* (L.) DC.	Liliaceae		
176.	*Lobelia heyneana* Schult.	Lobeliaceae		
177.	*Lobelia nicotianifolia* Roth ex Roem. & Schult.	Lobeliaceae	Kattupukayila	

178.	*Fagraea ceilanica* Thunb.	Loganiaceae	Vellarimodakam	
179.	Gardneria ovata Wall.	Loganiaceae		
180.	*Dendrophthoe memecylifolia* (Wight & Arn.) Danser	Loranthaceae		Endemic to SWG
181.	*Helixanthera obtusata* (Schult.) Danser	Loranthaceae		Endemic to WG
182.	*Taxillus tomentosus* (Heyne ex Roth) Tieghem	Loranthaceae		
183.	*Rotala indica* (Willd.) Koehne	Lythraaceae		
184.	*Magnolia nilagirica* (Zenk.) Figlar	Magnoliaceae	Kattuchempakam	
185.	*Abelmoschus angulosus* Wall. ex Wight & Arn.	Malvaceae	Kattukasthuri	
186.	*Medinilla beddomei* Clarke	Melastomataceae		Endemic to SWG
187.	*Medinilla malabarica* Bedd.	Melastomataceae		VU, Endemic to SWG
188.	*Medinilla sahyadrica* Sujanapal & Sasidh.	Melastomataceae		Endemic to SWG
189.	*Memecylon idukkianum* Nampy & Syam Radh	Melastomataceae		Endemic to SWG
190.	*Memecylon wightii* Thw.	Melastomataceae		
191.	*Osbeckia aspera* (L.) Blume	Melastomataceae		
192.	*Osbeckia leschenaultiana* DC.	Melastomataceae	Nailangi	Endemic to SWG
193.	*Sonerila brunonis* Wight & Arn.	Melastomataceae		
194.	*Aglaia apiocarpa* (Thw.) Hiern	Meliaceae		VU
195.	*Aglaia perviridis* Hiern	Meliaceae	Karakil	VU

196.	*Aphanamixis polystachya* (Wall.) Parker	Meliaceae	Chemmaram	
197.	*Dysoxylum binectariferum* (Roxb.) Hook. f. ex Bedd	Meliaceae	Akil	
198.	*Dysoxylum ficiforme* (Wight) Gamble	Meliaceae	Puvilakil	VU
199.	*Trichilia connaroides* (Wight & Arn.) Bentv.	Meliaceae	Thirivembu	
200.	*Cocculus laurifolius* DC.	Menispermaceae	Aadukolli	
201.	*Cyclea fissicalyx* Dunn	Menispermaceae		EN, Endemic to SWG
202.	*Stephania japonica* (Thunb.) Miers	Menispermaceae	Paasichedi	
203.	*Ficus laevis Blume var.* macrocarpa (Miq.) Corner,	Moraceae	Peyathi	Endemic to SWG
204.	*Ficus talbotii* King	Moraceae	Vellayal	
205.	*Ardisia rhomboidea* Wight	Myrsinaceae		Endemic to SWG
206.	*Embelia adnata* Bedd. ex Clarke	Myrsinaceae		Endemic to SWG
207.	*Embelia ribes* Burm. f.	Myrsinaceae	Vizhalari	
208.	*Maesa indica* (Roxb.) DC.	Myrsinaceae	Kattuvizhal	
209.	*Rapanea capitellata* (Wall.) Mez	Myrsinaceae		
210.	*Rapanea thwaitesii* Mez	Myrsinaceae	Cheeramaram	EN, Endemic to WG
211.	*Syzygium densiflorum* Wall. ex Wight & Arn.	Myrtaceae	Kurunjaval	VU, Endemic to SWG
212.	*Syzygium hemisphericum* (Wight) Alston	Myrtaceae	Tholnjaval	
213.	*Chionanthus mala-elengi* (Dennst.) P. S. Green ssp. *linocieroides* (Wight) P. S. Green	Oleaaceae		EN, Endemic to SWG

214.	*Chionanthus ramiflorus* Roxb.	Oleaaceae	Kaattuchakkalathi	
215.	*Jasminum brevilobum* A. DC.	Oleaaceae	Kattumulla	Endemic to PI
216.	*Ligustrum perrottetii* A. DC.	Oleaaceae	Kathikodimaram	Endemic to WG
217.	*Olea paniculata* R. Br.	Oleaaceae		
218.	*Circaea alpinia* L. ssp. *imaicola* (Asch. & Magn.) Kitamura	Onagraceae		
219.	*Aerides ringens* (Lindl.) C.E.C. Fisch.	Orchidaceae		
220.	*Brachycorythis splendida* Summerh.	Orchidaceae		Endemic to SWG
221.	*Bulbophyllum acutiflorum* A. Rich.	Orchidaceae		Endemic to SI
222.	*Bulbophyllum fimbriatum* (Lindl.) Rchb.f.	Orchidaceae		Endemic to SWG
223.	*Calanthe triplicata* (Willem.) Ames	Orchidaceae		
224.	*Cymbidium aloifolium* (L.) Sw.	Orchidaceae		
225.	*Dendrobium nanum* Hook.f.	Orchidaceae		Endemic to SWG
226.	*Oberonia sebastiana* Shetty & Vivek	Orchidaceae		Endemic to SWG
227.	*Aeginetia pedunculata* Wall.	Orobanchaceae	Yellow Ghost Flower	
228.	*Christisonia tubulosa* (Wight) Benth. ex Hook. f.	Orobanchaceae		Endemic to SWG
229.	*Biophytum intermedium* Wight	Oxalidaceae		
230.	*Biophytum sensitivum* (L.) DC. var. *candolleanum* (Wight) Edgew. & Hook.f.	Oxalidaceae	Mukkutti	
231.	*Decaloba leschenaultii* (DC.) M.Roem.	Passifloraceae	Seemavellari	Endemic to PI

232.	*Peperomia ekakesara* Nampy & Syam Radh	Piperaceae		Endemic to SWG
233.	*Peperomia heyneana* Miq.	Piperaceae		
234.	*Peperomia tetraphylla* (G.Forst.) Hook. & Arn.	Piperaceae		
235.	*Piper mullesua* Buch.-Ham. ex D. Don	Piperaceae		
236.	*Piper schmidtii* Hook.f.	Piperaceae		Endemic to SWG
237.	*Piper wightii* Miq.	Piperaceae		Endemic to SWG
238.	*Pittosporum napaulense* (DC.) Rehder & Wilson	Pittosporaceae	Kasumaram	
239.	*Plantago erosa* Wall.	Plantaginaceae	Njaramboori	
240.	*Polygala arillata* Buch.-Ham. ex D. Don	Polygalaceae		
241.	*Clematis gouriana* Roxb. ex DC.	Ranunculaceae	Nikidakodi	
242.	*Clematis wightiana* Wall. ex Wight & Arn.	Ranunculaceae		Endemic to WG
243.	*Rhamnus wightii* Wight & Arn.	Rhamnaceae	Kokkuvalli	
244.	*Photinia integrifolia* Lindl. var. sublanceolata Miq.	Rosaceae	Choluvan	
245.	*Prunus ceylanica* (Wight) Miq.	Rosaceae	Attanaripongu	
246.	*Rubus ellipticus* Smith	Rosaceae	Mullippazham	
247.	*Rubus glomeratus* Blume	Rosaceae	Mulluvettila	Endemic to PI
248.	*Rubus niveus* Thunb.	Rosaceae	Karimcheechi	
249.	*Canthium rheedei* DC.	Rubiaceae	Edalimaram	Endemic to PI

250.	*Ixora notoniana* Wall. ex G. Don	Rubiaceae	Iramburippi	Endemic to SWG
251.	*Lasianthus parvifolius* Wight	Rubiaceae		Endemic to SWG
252.	*Mussaenda tomentosa* Wight ex Wall.	Rubiaceae	Pattam	Endemic to SWG
253.	*Neanotis longiflora* (Hutch.) Lewis	Rubiaceae		Endemic to SWG
254.	*Nostolachma crassifolia* (Gamble) Deb & Lahiri	Rubiaceae		EN, Endemic to WG
255.	*Ophiorrhiza grandiflora* Wight	Rubiaceae		Endemic to SWG
256.	*Psychotria anamalayana* Bedd.	Rubiaceae		Endemic to SWG
257.	*Psychotria macrocarpa* Hook. f.	Rubiaceae		VU, Endemic to SWG
258.	*Psychotria nilgiriensis* Deb & Gangop. var. *astephana* (Hook. f.) Deb & Gangop.	Rubiaceae	Pavadakkambu	Endemic to SWG
259.	*Saprosma foetens* (Wight) K. Schum.	Rubiaceae	Theenari	Endemic to SWG
260.	*Tarenna alpestris* (Wight) Balakr.	Rubiaceae		Endemic to SWG
261.	*Acronychia pedunculata* (L.) Miq.	Rutaceae	Orilatheeppetti-maram	
262.	*Murraya paniculata* (L.) Jack.	Rutaceae	Naaragamulla	
263.	*Meliosma pinnata* (Roxb.) Maxim. ssp. *barbulata* (Cufod.) Beus.	Thakiri Sabiaceae		
264.	*Meliosma simplicifolia* (Roxb.) Walp.	Sabiaceae	Kallavi	
265.	*Isonandra perrottetiana* A. DC.	Sapotacaeae	Karimpala	Endemic to SWG
266.	*Xantolis tomentosa* (Roxb.) Rafin.	Sapotacaeae	Mullupala	
267.	*Solanum capsicoides* All.	Solanaceae	Rakthachunda	

268.	*Solanum mauritianum* Scop.	Solanaceae		
269.	*Solanum pseudo-capsicum* L.	Solanaceae	Jerusalem cherry	
270.	*Solanum violaceum* Ortega ssp. *multiflorum* (Clarke) Matthew	Solanaceae	Cheruvazhuthana	
271.	Turpinia cochinchinensis (Lour.) Merr.	Staphyleaceae	Pambaravetti	
272.	*Symplocos monantha* Wight	Symplocaceae		Endemic to SWG
273.	*Eurya japonica* Thunb.	Theaceae	Kooramar	
274.	*Gordonia obtusa.* Wall.ex Wight & Arn	Theaceae	Kattukarana	
275.	*Celtis philippensis Blanco* var. wightii (Planch.) Soep.	Ulmaceae	Paalpatani	
276.	*Celtis tetrandra* Roxb.	Ulmaceae	Poochakkurumaram	
277.	*Trema orientalis* (L.) Blume	Ulmaceae	Pottama	
278.	*Debregeasia longifolia* (Burm. f.) Wedd.	Urticaceae	Poonoolmaram	
279.	*Debregeasia wallichiana* (Wedd.) Wedd.	Urticaceae		
280.	*Elatostema sessile* J.R. Forst. & J.G.A. Forst.	Urticaceae		
281.	*Elatostema wightii* Hook. f.	Urticaceae		Endemic to SWG
282.	*Lecanthus peduncularis* (Wall. ex Royle) Wedd.	Urticaceae		
283.	*Pellionia heyneana* Wedd.	Urticaceae	Nilampatti	
284.	*Pilea melastomoides* (Poir.) Blume	Urticaceae	Narali	
285.	*Pouzolzia auriculata* Wight	Urticaceae	Parapodukki	

286.	*Pouzolzia wightii Bennett* var. *scabra* (Wight) C.E.C. Fisch.	Urticaceae	Naralikola	Endemic to SI
287.	*Procris crenata* Robins.	Urticaceae	Tambu	
288.	*Valeriana leschenaultii* DC.	Valerianaceae		Endemic to SWG
289.	*Callicarpa tomentosa* (L.) L.	Verbenaceae	Naikumbil	
290.	*Clerodendrum infortunatum* L.	Verbenaceae	Vattapparuvalam	
291.	*Viola betonicifolia* J.E. Smith	Violaceae		
292.	*Korthalsella japonica* (Thunb.) Engl.	Viscaceae		
293.	*Viscum angulatum* Heyne ex DC.	Viscaceae		
294.	*Parthenocissus semicordata* (Wall.) Planch. var. *roylei* (King) Raiz. & Saxena	Vitaceae		
295.	*Tetrastigma leucostaphylum* (Dennst.) Alston ex Mabb.	Vitaceae	Seenkaikkodi	
296.	*Xyris capensis* Thunb.	Xyridaceae		
297.	*Alpinia abundiflora* Burtt & R.M. Smith	Zingiberaceae	Kattuelam	
298.	*Amomum hypoleucum* Thw.	Zingiberaceae		
299.	*Globba schomburgkii* Hook.f.	Zingiberaceae		
300.	*Zingiber wightianum* Thw.	Zingiberaceae	Malayinchi	

VU- Vulnerable; **CR-** Critically Endangered; **EN-** Endangered; **END-** Endemism; **IUCN**-International Union for Conservation of Nature and Natural resources; **WG-** Western Ghats; **SWG-** Southern Western Ghats; **SI-** South India; **PI-** Peninsular India

ANNEXURE 2.5

FERNS OF MATHIKETTAN SHOLA NATIONAL PARK

Sl.No.	Name	Family	Status
1.	*Adiantum raddianum*	Adiantaceae	Common
2.	*Angiopteris evecta*	Marattiaceae	Common
3.	*Arachniodes aristata*	Dryopteridaceae	Common
4.	*Asplenium aethiopicum*	Aspleniaceae	Common
5.	*Asplenium zenkeranum*	Aspleniaceae	Rare
6.	*Bolbitis subcrenata*	Dryopteridaceae	Common
7.	*Cyathea nilgirensis*	Cyatheaceae	Rare, Endemic
8.	*Cyclosorus dentatus*	Thelypteridaceae	Common
9.	*Cyclosorus parasiticus*	Thelypteridaceae	Common
10.	*Deparia patersoni*	Woodsiaceae	Rare
11.	*Diplazium esculentum*	Woodsiaceae	Common
12.	*Huperzia phlegmaria*	Lycopodiaceae	Rare
13.	*Leptochilus deccurens*	Polypodiaceae	Common
14.	*Nephrolepis auriculata*	Lomariopsidaceae	Common
15.	*Parahenionitis arifolia*	Pteridaceae	Common
16.	*Phymatosorus beddomei*	Polypodiaceae	Rare
17.	*Pteridium aquilinum*	Dennstaedtiaceae	Common
18.	*Pteris argyraea*	Pteridaceae	Rare
19.	*Pteris confusa*	Pteridaceae	Common
20.	*Pteris cretica*	Pteridaceae	Critically Endangered
21.	*Pteris perrotteti*	Pteridaceae	Endangered, Endemic
22.	*Pyrrosia beddomei*	Polypodiaeae	Rare
23.	*Selaginella involvens*	Selaginellaceae	Rare
24.	*Vittaria elongata*	Pteridaceae	Common

ANNEXURE 2.6

MAMMALS OF MATHIKETTAN 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	*Trachypithecus johnii*	Cercopithecidae	Nilgiri langur	VU	WG	Sch. I (Part I)
4	*Herpestes fuscus*	Herpestidae	Brown Mongoose	LC		Sch. II (Part II)
5	*Herpestes vitticollis*	Herpestidae	Stripe-necked Mongoose	LC		Sch. II
6	*Paradoxurus jerdoni*	Viverridae	Brown Palm Civet	LC	WG	Sch. II (Part II)
7	*Viverricula indica*	Viverridae	Small Indian Civet	LC		Sch. II (Part II)
8	*Panthera pardus*	Felidae	Common Leopard	VU		Sch. I (Part I)
9	*Prionailurus bengalensis*	Felidae	Leopard Cat	LC		Sch. I (Part I)
10	*Panthera tigris*	Felidae	Tiger	EN		Sch. I (Part I)
11	*Funambulus sublineatus*	Sciuridae	Dusky-Stripped Palm Squirrel	VU	WG & SL	Sch. IV
12	*Ratufa indica*	Sciuridae	Malabar Giant Squirrel	LC		Sch. II (Part II)
13	*Bos gaurus*	Bovidae	Gaur	VU		Sch. I (Part I)
14	*Moschiola indica*	Tragulidae	Indian Chevrotain (Mouse Deer)	LC		Sch. I (Part I)
15	*Hystrix indica*	Hystricidae	Indian Crested Porcupine	LC		Sch. IV
16	*Lepus nigricollis*	Leporidae	Black-Naped Hare	LC		Sch. IV
17	*Martes gwatkinsii*	Mustelidae	Nilgiri Marten	VU	WG	Sch. II (Part II)

18	*Rusa unicolor*	Cervidae	Sambar deer	VU		Sch. III
19	*Muntiacus muntjak*	*Cervidae*	Southern Red Muntjac (Barking Deer)	*LC*		*Sch. III*
20	*Melursus ursinus*	Ursidae	Sloth Bear	VU		Sch. I (Part I)
21	*Sus scrofa*	Suidae	Wild Boar	LC		Sch. III
22	*Cuon alpinus*	Canidae	Wild dog	EN		Sch. II (Part I)
23	*Cynopterus sphinax*	Pteropodidae	Short-nosed Fruit Bat	LC		Sch. V
24	*Cynopterus brachyotis*	Pteropodidae	Lesser Dog-faced Fruit Bat	LC		Sch. V
25	*Rousettus leschenaulti*	Pteropodidae	Fulvous Fruit Bat	LC		Sch. V
26	*Megaderma spasma*	Megadermatidae	Lesser False Vampire Bat	LC		
27	*Rhinolophus indorouxii*	Rhinolophidae	Rufous Horse-shoe Bat	DD		
28	*Rhinolophus beddomei*	Rhinolophidae	Lesser Woolly Horse-shoe Bat	LC		
29	*Rhinolophus lepidus*	Rhinolophidae	Blyth's Horse-shoe Bat	LC		
30	*Hipposideros pomona*	Hipposideridae	Anderson Leaf-nosed Bat	LC		
31	*Myotis peytoni*	Vespertilionidae	Peyton's Whiskered Myotis	LC		
32	Murina spp.	Vespertilionidae				
33	Kerivoula spp.	Vespertilionidae				
34	Pipistrellus spp.	Vespertilionidae				
35	Pipistrellus spp.	Vespertilionidae				
36	*Miniopterus pusillus*	*Miniopteridae*	Small Bent-winged Bat	LC		

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

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

ANNEXURE 2.7

BIRDS OF MATHIKETTAN SHOLA NATIONAL PARK

No	English Name	Species name	IUCN	END	WPA
1	Jungle Bush Quail	*Perdicula asiatica* (Latham, 1790)	LC		Sch. IV
2	Painted Bush Quail	*Perdicula erythrorhyncha* (Sykes, 1832)	LC		Sch. IV
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	Emerald Dove	*Chalcophaps indica* (Linnaeus, 1758)	LC		Sch. IV
7	Green Imperial Pigeon	*Ducula aenea* (Linnaeus, 1766)	LC		Sch. IV
8	Mountain / (Nilgiri Imperial Pigeon)	*Ducula badia* (Raffles, 1822)	LC		Sch. IV
9	White- Rumped Needletail	*Zoonavena sylvatica* (Tickell, 1846)	LC		
10	Brown-Backed Needletail	*Hirundapus giganteus* (Temminck, 1825)	LC		
11	Indian Swiftlet/ Edible Nest Swiftlet	*Aerodramus unicolor* (Jerdon, 1840)	LC		Sch. I
12	Asian Palm Swift	*Cypsiurus balasiensis* (Gray, JE, 1829)	LC		
13	Greater Coucal	*Centropus sinensis* (Stephens, 1815)	LC		Sch. IV
14	Lesser Coucal	*Centropus bengalensis* (Gmelin, JF, 1788)	LC		Sch. IV
15	Indian Pond Heron	*Ardeola grayii* (Sykes, 1832)	LC		Sch. IV
16	Oriental Honey Buzzard	*Pernis ptilorhynchus* (Temminck, 1821)	LC		Sch. I

17	Crested Serpent Eagle	*Spilornis cheela* (Latham, 1790)	LC		Sch. I
18	Changeable Hawk Eagle (Crested Hawk Eagle)	*Nisaetus cirrhatus* (Gmelin, JF, 1788)	LC		Sch. I
19	Black Eagle	*Ictinaetus malaiensis* (Temminck, 1822)	LC		Sch. I
20	Shikra	*Accipiter badius* (Gmelin, JF, 1788)	LC		Sch. I
21	Black Kite	*Milvus migrans* (Boddaert, 1783)	LC		Sch. I
22	Jungle Owlet	*Glaucidium radiatum* (Tickell, 1833)	LC		Sch. IV
23	Malabar Trogon	*Harpactes fasciatus* (Pennant, 1769)	LC		Sch. IV
24	Malabar Grey Hornbill	*Ocyceros griseus* (Latham, 1790)	LC	WG	Sch. I
25	Speckled Piculet	*Picumnus innominatus* (Burton, 1836)	LC		Sch. IV
26	Heart-Spotted Woodpecker	*Hemicircus canente* (Lesson, 1832)	LC		Sch. IV
27	Common Golden-Backed Woodpecker (Common Flameback)	*Dinopium javanense* (Ljungh, 1797)	LC		Sch. IV
28	Lesser Golden-Backed Woodpecker (Black-Rumped Flameback)	*Dinopium benghalense* (Linnaeus, 1758)	LC		Sch. IV
29	Rufous Woodpecker	*Micropternus brachyurus* (Vieillot, 1818)	LC		Sch. IV
30	Greater Golden-Backed Woodpecker (Greater Flameback)	*Chrysocolaptes lucidus* (Tickell, 1833)	LC		Sch. IV
31	White-Cheeked Barbet	*Psilopogon viridis* (Boddaert, 1783)	LC		Sch. IV
32	Coppersmith Barbet/ Crimson Breasted Barbet	*Psilopogon haemacephalus* (Statius Müller, 1776)	LC		Sch. IV
33	Chestnut-Headed Bee-Eater	*Merops leschenaulti* (Vieillot, 1817)	LC		
34	Common Kingfisher/ Small Blue Kingfisher	*Alcedo atthis* (Linnaeus, 1758)	LC		Sch. IV
35	White-Throated Kingfisher (White- Breasted Kingfisher)	*Halcyon smyrnensis* (Linnaeus, 1758)	LC		Sch. IV

36	Plum-Headed Parakeet	*Psittacula cyanocephala* (Linnaeus, 1766)	LC		Sch. IV
37	Malabar Parakeet (Blue-Winged Parakeet)	*Psittacula columboides* (Vigors, 1830)	LC	WG	Sch. IV
38	Vernal Hanging Parrot	*Loriculus vernalis* (Sparrman, 1787)	LC		Sch. IV
39	Small Minivet	*Pericrocotus cinnamomeus* (Linnaeus, 1766)	LC		Sch. IV
40	Scarlet Minivet (Orange Minivet)	*Pericrocotus flammeus* (Forster, JR, 1781)	LC		Sch. IV
41	Large Cuckooshrike	*Coracina javensis* (Lesson, 1831)	LC		Sch. IV
42	Black-Headed Cuckooshrike	*Lalage melanoptera* (Rüppell, 1839)	LC		Sch. IV
43	Golden Oriole	*Oriolus kundoo* (Sykes, 1832)	LC		Sch. IV
44	Black-Naped Oriole	*Oriolus chinensis* (Linnaeus, 1766)	LC		Sch. IV
45	Pied/Bar-Winged Flycatcher-Shrike	*Hemipus picatus* (Sykes, 1832)	LC		Sch. IV
46	Common Iora	*Aegithina tiphia* (Linnaeus, 1758)	LC		Sch. IV
47	Ashy Drongo	*Dicrurus leucophaeus* (Vieillot, 1817)	LC		Sch. IV
48	Bronzed Drongo	*Dicrurus aeneus* (Vieillot, 1817)	LC		Sch. IV
49	Greater Racket-Tailed Drongo	*Dicrurus paradiseus* (Linnaeus, 1766)	LC		Sch. IV
50	Bay-Backed Shrike	*Lanius vittatus* (Valenciennes, 1826)	LC		
51	Long-Tailed Shrike/ Rufous Backed shrike	*Lanius schach* (Linnaeus, 1758)	LC		
52	Indian/ Rufous Treepie	*Dendrocitta vagabunda* (Latham, 1790)	LC		Sch. IV
53	White-Bellied Treepie	*Dendrocitta leucogastra* (Gould, 1833)	LC	WG	Sch. IV

54	House Crow	*Corvus splendens* (Vieillot, 1817)	LC		Sch. V
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	Indian Paradise - Flycatcher (Asian Paradise - Flycatcher)	*Terpsiphone paradisi* (Linnaeus, 1758)	LC		Sch. IV
58	Thick-Billed Flowerpecker	*Dicaeum agile* (Tickell, 1833)	LC		Sch. IV
59	Tickell's/ Pale-Billed Flowerpecker	*Dicaeum erythrorhynchos* (Latham, 1790)	LC		Sch. IV
60	Plain Flowerpecker/ Nilgiri Flowerpecker	*Dicaeum concolor* (Jerdon, 1840)	LC		Sch. IV
61	Purple-Rumped Sunbird	*Leptocoma zeylonica* (Linnaeus, 1766)	LC		Sch. IV
62	Small /Crimson-Backed Sunbird	*Leptocoma minima* (Sykes, 1832)	LC	WG	Sch. IV
63	Purple Sunbird	*Cinnyris asiaticus* (Latham, 1790)	LC		Sch. IV
64	Loten's Sunbird	*Cinnyris lotenius* (Linnaeus, 1766)	LC		Sch. IV
65	Golden-Fronted Leafbird	*Chloropsis aurifrons* (Temminck, 1829)	LC		Sch. IV
66	Jerdon's Leafbird	*Chloropsis jerdoni* (Blyth, 1844)	LC		Sch. IV
67	House Sparrow	*Passer domesticus* (Linnaeus, 1758)	LC		Sch. IV
68	Western Yellow Wagtail	*Motacilla flava* (Linnaeus, 1758)	LC		Sch. IV
69	Grey Wagtail	*Motacilla cinerea* (Tunstall, 1771)	LC		Sch. IV
70	Grey-Headed Canary-Flycatcher	*Culicicapa ceylonensis* ceylonensis (Swainson, 1820)	LC		Sch. IV
71	Grey tit/Cinereous Tit / Indian Great Tit	*Parus cinereus* (Vieillot, 1818)	LC		Sch. IV

72	Black-Lored Tit / Indian Black-Lored Tit	*Machlolophus xanthogenys* (Vigors, 1831)	LC		Sch. IV
73	Jungle Prinia	*Prinia sylvatica sylvatica* (Jerdon, 1840)	LC		Sch. IV
74	Ashy Prinia	*Prinia socialis socialis* (Sykes, 1832)	LC		Sch. IV
75	Common Tailorbird	*Orthotomus sutorius* (Pennant, 1769)	LC		Sch. IV
76	Blyth's Reed Warbler	*Acrocephalus dumetorum* (Blyth, 1849)	LC		Sch. IV
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	Grey-Headed Bulbul	*Brachypodius priocephalus* (Jerdon, 1839)	NT	WG	Sch. IV
81	Yellow-Browed Bulbul	*Acritillas indica* (Jerdon, 1839)	LC		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	Oriental White-Eye	*Zosterops palpebrosus* (Temminck, 1824)	LC		Sch. IV
87	Indian Scimitar Babbler	*Pomatorhinus horsfieldii* (Sykes, 1832)	LC		Sch. IV
88	Black Headed/ Dark-Fronted Babbler	*Rhopocichla atriceps* (Jerdon, 1839)	LC		Sch. IV
89	Common Babbler	*Turdoides caudatus*			

90	Rufous Babbler (South of Palghat Gap)	*Argya subrufa hyperythrus* (Sharpe. 1883)	EN		
91	Jungle Babbler	*Turdoides striata* (Dumont, 1823)	LC		Sch. IV
92	Velvet-Fronted Nuthatch	*Sitta frontalis* (Swainson, 1820)	LC		
93	Brahminy Starling	*Sturnia pagodarum* (Gmelin, JF, 1789)	LC		Sch. IV
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	Oriental Magpie Robin	*Copsychus saularis* (Linnaeus, 1758)	LC		Sch. IV
98	Asian Brown Flycatcher	*Muscicapa dauurica* (Raffles, 1822)	LC		Sch. IV
99	Rusty-Tailed Flycatcher	*Muscicapa ruficauda* (Swainson, 1838)	LC		Sch. IV
100	White-Bellied Blue Flycatcher	*Cyornis pallidipes* (Jerdon, 1840)	LC	WG	Sch. IV
101	Verditer Flycatcher	*Eumyias thalassinus* (Swainson, 1838)	LC		Sch. IV
102	Nilgiri Flycatcher	*Eumyias albicaudatus* (Jerdon, 1840)	NT	WG	Sch. IV
103	White-Bellied Sholakili	*Sholicola albiventris* (Blandfords, 1868)	VU		Sch. IV
104	Malabar Whistling Thrush	*Myophonus horsfieldii* (Vigors, 1831)	LC		Sch. IV
105	Black-And-Orange Flycatcher	*Ficedula nigrorufa* (Jerdon, 1839)	NT	WG	Sch. IV
106	Blue-Capped Rock Thrush	*Monticola cinclorhyncha* (Vigors, 1831)	LC		Sch. IV

107	Pied Bushchat	*Saxicola caprata* (Linnaeus, 1766)	LC		Sch. IV
108	Nilgiri Blackbird	*Turdus merula simillimus* (Jerdon, 1839)	NE		Sch. IV

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

ANNEXURE 2.8

REPTILES OF MATHIKETTAN SHOLA NATIONAL PARK

Sl. No.	Scientific Name	Family	Common Name	IUCN	END	WPA
1	*Monilesaurus ellioti* (Günther, 1864)	Agamidae	Elliot's Forest Lizard	LC	WG	
2	*Slea anamallayana* (Beddome, 1878)	Agamidae	Anamalai Spiny Lizard	LC	WG	
3	*Dravidogecko anamallensis* (Gunther, 1875)	Gekkonidae	Anamalai Gecko	NT	WG	
4	*Eutropis carinata* (Schneider, 1801)	Scincidae	Common Keeled Skink	LC		
5	*Ristella travancorica* (Beddome, 1870)	Scincidae	Beddome's Cat Skink	LC	WG	
6	*Kaestlea travancorica* (Beddome, 1870)	Scincidae	Travancore Ground Skink	LC	WG	
7	Ristella sp.	Scincidae	Cat Skink			
8	*Melanophidium punctatum* (Beddome, 1871)	Uropeltidae	Pied-belly Shield tail	LC	WG	Sch. IV
9	*Uropeltis rubromaculatus* (Beddome, 1867)	Uropeltidae	Red-spotted Shield tail		WG	Sch. IV
10	*Uropeltis maculata* (Beddome, 1878)	Uropeltidae	Red-sided Shield tail		WG	Sch. IV
11	*Ptyas mucosa* (Linnaeus, 1758)	Colubridae	Indian Rat Snake	NE		Sch. II
12	*Lycodon travancoricus* (Beddome ,1870)	Colubridae	Travancore Wolf Snake	LC		Sch. IV
13	*Ahaetulla dispar* (Gunther, 1864)	Colubridae	Gunthr's Vine Snake	NT	WG	Sch. IV
14	*Hebius beddomei* (Günther, 1864)	Natricidae	Beddome's Keelback	LC	WG	Sch. IV
15	*Calliophis nigrescens* (Gunther,1862)	Elapidae	Striped Coral Snake	LC	WG	Sch. IV
16	*Trimeresurus macrolepis* (Beddome, 1862)	Viperidae	Large Scaled Green Pit Viper	NT	WG	Sch. IV

LC –Least Concern, **NE** –Not Evaluated, **NT** – Near Threatened; **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

AMPHIBIANS OF MATHIKETTAN SHOLA NATIONAL PARK

Sl. No.	Scientific Name	Family	Common Name	IUCN	END	WPA
1	*Duttaphrynus melanostictus (Schneider, 1799)*	Bufonidae	Common Indian Toad	LC		
2	*Duttaphrynus microtympanum (Boulenger 1882)*	Bufonidae	Small-eared Toad	VU	WG	
3	*Pedostibes tuberculosus* (Gunther 1875)	Bufonidae	Malabar Tree Toad	EN	WG	Sch. IV
4	*Minervarya brevipalmata* (Peters, 1871)	Dicroglossidae	Short-webbed Frog	DD	WG	Sch. IV
5	*Micrixalus Adonis* (Biju, Garg, Gururaja, Shouche, & Walujkar, 2014)	Micrixalidae	Munnar Torrent Frog	NE	KL	
6	*Melanobatrachus indicus* (Beddome, 1878)	Microhylidae	Galaxy frog or Black Microhylid Frog	EN	WG	
7	*Uperodon montanus* (Jerdon, 1854)	Microhylidae	Jerdon's Ramanella	NT	WG	
8	*Nyctibatrachus acanthodermis* (Biju, Bocxlaer, Mahony, Dinesh, Radhakrishnan, Zachariah, Giri & Bossuyt, 2011)	Nyctibatrachidae	Spinular Night Frog	NE	KL	
9	*Nyctibatrachus anamallaiensis* (Myers, 1942)	Nyctibatrachidae	Anamallai Night Frog	NE	WG	
10	*Nyctibatrachus poocha* (Biju, Bocxlaer, Mahony, Dinesh, Radhakrishnan, Zachariah, Giri & Bossuyt 2011)	Nyctibatrachidae	Meowing Night Frog	NE	WG	
11	*Indosylvirana sreeni* (Biju, Garg, Mahony, Wijayathilaka, Senevirathne & Meegaskumbura, 2014)	Ranidae	Sreeni's Golden-backed frog	NE	WG	
12	*Indirana semipalmata* (Boulenger, 1882)	Ranixalidae	South Indian Frog	LC	WG	Sch. IV

13	*Ghatixalus asterops* (Biju, Roelants & Bossuyt, 2008)	Rhacophoridae	Ghat Tree Frog	DD	WG	
14	*Polypedates occidentalis* (Das & Dutta, 2006)	Rhacophoridae	Charpa Tree frog	DD	WG	
15	*Raorchestes anili* (Biju & Bossuyt, 2006)	Rhacophoridae	Anil's Bush Frog	LC	WG	
16	*Raorchestes beddomii* (Gunther, 1876)	Rhacophoridae	Beddome's Bush Frog	NT	WG	
17	*Raorchestes chlorosomma* (Biju & Bossuyt, 2009)	Rhacophoridae	Green-eyed CR Bush Frog	WG		
18	*Raorchestes dubois* (Biju & Bossuyt, 2006)	Rhacophoridae	Kodaikanal Bush Frog	VU	WG	
19	*Raorchestes jayarami* (Biju & Bossuyt, 2009)	Rhacophoridae	Jayaram's Bush Frog	NE	WG	
20	*Raorchestes kadalarensis* (Zachariah, Dinesh, Kunhikrishnan, Das, Raju, Radhakrishnan, Palot & Kalesh, 2011)	Rhacophoridae	Kadalar Bush Frog	NE	KL	
21	*Raorchestes munnarensis* (Biju & Bossuyt, 2009)	Rhacophoridae	Munnar Bush Frog	CR	WG	
22	*Raorchestes ochlandrae* (Gururaja, Dinesh, Palot, Radhakrishnan & Ramachandra, 2007)	Rhacophoridae	Ochlandrae Reed Bush Frog	DD	WG	
23	*Raorchestes ponmudi* (Biju & Bossuyt, 2005)	Rhacophoridae	Large Ponmudi Bush Frog	CR	WG	
24	*Raorchestes sushili* (Biju & Bossuyt, 2009)	Rhacophoridae	Sushil's Bush Frog	CR	WG	
25	*Rhacophorus calcadensis* (Ahl, 1927)	Rhacophoridae	Kalakad Tree Frog	EN	WG	
26	*Rhacophorus pseudomalabaricus* (Vasudevan & Dutta, 2000)	Rhacophoridae	Malabar False Tree frog	CR	WG	
27	Uraeotyphlus sps & Bossuyt, 2008)	Ichthyophiidae	Caecilian			

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 2.10

BUTTERFLIES OF MATHIKETTAN SHOLA NATIONAL PARK

Sl. No.	Subspecies scientific Name	Family	Common Name	IUCN Status/ Endemism	WPA
1	*Troides minos (Cramer, [1779])*	Papiionidae	Sahyadri Birdwing	SI	
2	*Pachliopta hector (Linnaeus, 1758)*	Papiionidae	Crimson Rose	PI & SL	Sch. I
3	*Graphium agamemnon menides (Fruhstorfer, 1904)*	Papiionidae	Dakhan Tailed Jay		
4	*Graphium doson eleius (Felder & Felder, 1864)*	Papiionidae	Dakhan Common Jay		
5	*Graphium teredon (Felder & Felder, 1865)*	Papiionidae	Narrow-banded Bluebottle	SI	
6	*Papilio demoleus demoleus Linnaeus, 1758*	Papiionidae	Northern Lime Swallowtail		
7	*Papilio helenus daksha Hampson, 1888*	Papiionidae	Sahyadri Red Helen		
8	*Papilio polymnestor polymnestor Cramer, [1775]*	Papiionidae	Indian Blue Mormon		
9	*Papilio polytes romulus Cramer, [1775]*	Papiionidae	Indian Common Mormon		
10	*Papilio paris tamilana Moore, 1881*	Papiionidae	Sahyadri Paris Peacock		
11	*Catopsilia pomona pomona (Fabricius, 1775)*	Pieridae	Oriental Lemon Emigrant		
12	*Eurema blanda silhetana (Wallace, 1867)*	Pieridae	Sylhet Three-spot Grass Yellow		
13	*Eurema brigitta rubella (Wallace, 1867)*	Pieridae	Small Grass Yellow	LC	
14	*Eurema hecabe hecabe (Linnaeus, 1758)*	Pieridae	Oriental Common Grass Yellow		
15	*Eurema laeta laeta (Boisduval, 1836)*	Pieridae	Indian Spotless Grass Yellow		

16	*Colias nilagiriensis Felder & Felder, 1859*	Pieridae	Nilgiri Clouded Yellow	WG	
17	*Delias eucharis (Drury, 1773)*	Pieridae	Indian Jezebel		
18	*Prioneris sita (Felder & Felder, 1865)*	Pieridae	Painted Sawtooth	SI & SL	Sch. IV
19	*Pieris canidia canis Evans, 1912*	Pieridae	Sahyadri Cabbage White		
20	*Cepora nerissa phryne (Fabricius, 1775)*	Pieridae	Dakhan Common Gull		
21	*Appias albina swinhoei (Moore, 1905)*	Pieridae	Sahyadri Common Albatross		
22	*Appias libythea (Fabricius, 1775)*	Pieridae	Western Striped Albatross		Sch. IV
23	*Leptosia nina nina (Fabricius, 1793)*	Pieridae	Oriental Psyche		
24	*Pareronia ceylanica ceylanica (Felder & Felder, 1865)*	Pieridae	Sri Lankan Dark	WG & SL Wanderer	
25	*Hebomoia glaucippe australis Butler, 1898*	Pieridae	Sahyadri Great Orange-tip		
26	*Melanitis leda leda (Linnaeus, 1758)*	Nymphalidae	Oriental Common Evening Brown		
7	*Melanitis phedima varaha Moore, 1857*	Nymphalidae	Sahyadri Dark Evening Brown		
28	*Melanitis zitenius gokala Moore, 1857*	Nymphalidae	Sahyadri Great Evening Brown		Sch. II
29	*Lethe drypetis todara Moore, 1881*	Nymphalidae	Dakhan Treebrown	SI & SL	
30	*Lethe europa europa (Fabricius, 1775)*	Nymphalidae	Dakhan Bamboo Treebrown		
31	*Lethe rohria neelgheriensis (Guérin-Méneville, 1843)*	Nymphalidae	Common Treebrown		
32	*Mycalesis anaxias anaxias Hewitson, 1862*	Nymphalidae	Sahyadri White-bar Bushbrown		Sch. II
33	*Mycalesis junonia Butler, 1868*	Nymphalidae	Malabar Glad-eye Bushbrown	SI	

34	*Orsotriaena medus mandata (Moore, 1857)*	Nymphalidae	Sahyadri Medus Brown		
35	*Telinga oculus Marshall, 1881*	Nymphalidae	Red-disc Bushbrown	WG	
36	*Ypthima baldus baldus (Fabricius, 1775)*	Nymphalidae	Common Five-ring		
37	*Ypthima chenu (Guérin-Méneville, 1843)*	Nymphalidae	Nilgiri Four-ring	WG	
38	*Ypthima huebneri* Kirby, 1871	Nymphalidae	Common Four-ring		
39	*Ypthima tabella Marshall & de Niceville, 1883*	Nymphalidae	Sahyadri Baby Five-ring	WG	
40	*Ypthima ypthimoides (Moore, 1881)*	Nymphalidae	Palni Four-ring	WG	
41	*Zipaetis saitis Hewitson, 1863*	Nymphalidae	Banded Catseye	WG	Sch. II
42	*Euripus consimilis meridionalis Wood-Mason, 1881*	Nymphalidae	Sahyadri Painted Courtesan		Sch. II
43	*Rohana parisatis atacinus Fruhstorfer, 1913*	Nymphalidae	Sahyadri Black Prince	LC	
44	*Ariadne ariadne indica (Moore, 1884)*	Nymphalidae	Indian Angled Castor		
45	*Ariadne merione merione*	Nymphalidae	Dakhan Common Castor		
46	*Charaxes psaphon imna Butler, 1870*	Nymphalidae	Indian Plain Tawny Rajah		
47	*Charaxes solon solon (Fabricius, 1793)*	Nymphalidae	Pale Black Rajah		
48	*Cyrestis thyodamas indica Evans, 1924*	Nymphalidae	Common Map		
49	*Argynnis castetsi castetsi* (Oberthür, 1891)	Nymphalidae	Palni Fritillary	WG	
50	*Cirrochroa thais thais (Fabricius, 1787)*	Nymphalidae	Sahyadri Yeoman	SI & SL	
51	*Cupha erymanthis maja* Fruhstorfer, 1898	Nymphalidae	Sahyadri Rustic		

52	*Phalanta phalantha phalantha (Drury, [1773])*	Nymphalidae	Oriental Common Leopard		
53	*Vindula erota saloma de Nicéville, 1886*	Nymphalidae	Sahyadri Cruiser		
54	*Libythea myrrha rama Moore, 1872*	Nymphalidae	Sri Lankan Club Beak		
55	*Athyma inara Westwood, 1850*	Nymphalidae	Color Sergeant		
56	*Athyma perius perius (Linnaeus, 1758)*	Nymphalidae	Oriental Common Sergeant		
57	*Athyma ranga karwara (Fruhstorfer, 1906)*	Nymphalidae	Karwar Blackvein Sergeant		Sch. II
58	*Neptis hylas varmona Moore, 1872*	Nymphalidae	Indian Common Sailer		
59	*Pantoporia hordonia hordonia (Stoll, [1790])*	Nymphalidae	Oriental Common Lascar		
60	*Hypolimnas bolina jacintha (Drury, 1773)*	Nymphalidae	Oriental Great Eggfly		
61	*Hypolimnas misippus (Linnaeus, 1764)*	Nymphalidae	Danaid Eggfly		Sch. I,II
62	*Junonia hierta hierta (Fabricius, 1798)*	Nymphalidae	Oriental Yellow Pansy	LC	
63	*Junonia iphita iphita (Cramer, [1779])*	Nymphalidae	Chocolate Pansy		
64	*Junonia lemonias lemonias (Linnaeus, 1758)*	Nymphalidae	Chinese Lemon Pansy		
65	*Kaniska canace viridis Evans, 1924*	Nymphalidae	Sahyadri Blue Admiral		
66	*Vanessa indica pholoe (Fruhstorfer, 1912)*	Nymphalidae	Sahyadri Red Admiral		
67	*Danaus chrysippus chrysippus (Linnaeus, 1758)*	Nymphalidae	Oriental Plain Tiger		
68	*Euploea core core (Cramer, [1780])*	Nymphalidae	Indian Common Crow	LC	
69	*Parantica aglea aglea (Stoll, [1782])*	Nymphalidae	Coromandel Glassy Tiger		

70	*Parantica nilgiriensis (Moore, 1877)*	Nymphalidae	Nilgiri Tiger	NT	WG
71	*Tirumala limniace exoticus (Gmelin, 1790)*	Nymphalidae	Oriental Blue Tiger		
72	*Tirumala septentrionis dravidarum Fruhstorfer, 1899*	Nymphalidae	Dakhan Dark Blue Tiger		
73	*Spalgis epius epius (Westwood, 1852)*	Lycaenidae	Oriental Apefly		
74	*Castalius rosimon rosimon (Fabricius, 1775)*	Lycaenidae	Continental Common Pierrot		
75	*Celatoxia albidisca (Moore, [1884])*	Lycaenidae	White-disc Hedge Blue		WG
76	*Celastrina lavendularis lavenduris (Moore, 1877)*	Lycaenidae	Sri Lankan Plain Hedge Blue		
77	*Discolampa ethion ethion Westwood, 1851*	Lycaenidae	Oriental Banded Blue Pierrot		
78	*Euchrysops cnejus cnejus (Fabricius, 1798)*	Lycaenidae	Oriental Gram Blue		Sch. II
79	*Jamides bochus bochus (Stoll, [1782])*	Lycaenidae	Indian Dark Cerulean		
80	*Jamides celeno celeno (Cramer, [1775])*	Lycaenidae	Oriental Common Cerulean		
81	*Lampides boeticus (Linnaeus, 1767)*	Lycaenidae	Pea Blue		Sch. II
82	*Leptotes plinius plinius (Fabricius, 1793)*	Lycaenidae	Asian Zebra Blue		
83	*Megisba malaya thwaitesi (Moore, [1881])*	Lycaenidae	Tailless Malayan		
84	*Nacaduba beroe gythion Fruhstorfer, 1916*	Lycaenidae	Assam Opaque Six-Lineblue		
85	*Nacaduba kurava canaraica Toxopeus, 1927*	Lycaenidae	Karwar Transparent Six-Lineblue		
86	*Prosotas nora ardates (Moore, [1875])*	Lycaenidae	Indian Common Lineblue		
87	*Pseudozizeeria maha ossa* (Swinhoe, 1885)	Lycaenidae	Dakhan Pale Grass Blue		

88	*Talicada nyseus nyseus (Guérin-Méneville, 1843)*	Lycaenidae	Indian Red Pierrot		
89	*Udara akasa mavisa (Fruhstorfer, 1917)*	Lycaenidae	Sahyadri White Hedge Blue		
90	*Udara singalensis (Felder, 1868)*	Lycaenidae	Sinhalese Hedgeblue		
91	*Zizeeria karsandra (Moore, 1865)*	Lycaenidae	Dark Grass Blue		
92	*Zizina otis indica (Murray, 1874)*	Lycaenidae	Indian Lesser Grass Blue		
93	*Zizula hylax hylax (Fabricius, 1775)*	Lycaenidae	Indian Tiny Grass Blue		
94	*Spindasis vulcanus (Fabricius, 1775)*	Lycaenidae	Common Silverline		
95	*Deudorix epijarbas epijarbas (Moore, 1857)*	Lycaenidae	Oriental Cornelian		
96	*Badamia exclamationis (Fabricius, 1775)*	Hesperiidae	Brown Awl		
97	*Burara jaina fergusonii (de Nicéville, [1893])*	Hesperiidae	Sahyadri Orange Awlet		
98	*Choaspes benjaminii benjaminii (Guérin-Méneville, 1843)*	Hesperiidae	Sahyadri Indian Awlking		
99	*Hasora chromus chromus (Cramer, [1780])*	Hesperiidae	Oriental Common Banded Awl		
100	*Hasora taminatus taminatus (Hübner, 1818)*	Hesperiidae	Lankan White-banded Awl		
101	*Celaenorrhinus putra (Moore, [1866])*	Hesperiidae	Bengal Restricted Spotted Flat		
102	*Pseudocoladenia dan dan (Fabricius, 1787)*	Hesperiidae	Sahyadri Fulvous Pied Flat		
103	*Sarangesa dasahara davidsoni Moore, [1866]*	Hesperiidae	Indian Common Small Flat		
104	*Coladenia indrani indra Evans, 1926*	Hesperiidae	Dakhan Tricolor Pied Flat		
105	*Tagiades litigiosa litigiosa* Möschler, 1878	Hesperiidae	Sylhet Water Snow Flat		

106	*Aeromachus dubius dubius Elwes & Edwards, 1897*	Hesperiidae	Sahyadri Dingy Scrub Hopper		
107	*Aeromachus pygmaeus (Fabricius, 1775)*	Hesperiidae	Pygmy Scrub Hopper		
108	*Ampittia dioscorides dioscorides (Fabricius, 1793)*	Hesperiidae	Indian Bush Hopper		
109	*Notocrypta curvifascia curvifascia (Felder & Felder, 1862)*	Hesperiidae	Chinese Restricted Demon		
110	*Thoressa astigmata (Swinhoe, 1890)*	Hesperiidae	Unbranded Ace	WG	
111	*Oriens concinna (Elwes & Edwards, 1897)*	Hesperiidae	Sahyadri Dartlet	WG	Sch. IV
112	*Oriens goloides (Moore, [1881])*	Hesperiidae	Smaller Dartlet		
113	*Potanthus pseudomaesa (Moore, [1881])*	Hesperiidae	Indian Dart		
114	*Taractrocera ceramas (Hewitson, 1868)*	Hesperiidae	Incomplete Tawny-spotted Grass Dart		
115	*Telicota bambusae bambusae (Moore, 1878)*	Hesperiidae	Oriental Dark Palm-Dart		
116	*Baoris farri (Moore, 1878)*	Hesperiidae	Complete Paint-brush Swift		Sch. IV
117	*Borbo cinnara (Wallace, 1866)*	Hesperiidae	Rice Swift		
118	*Caltoris kumara kumara (Moore, 1878)*	Hesperiidae	Sahyadri Blank Swift		
119	*Caltoris philippina philippina (Herrich-Schäffer, 1869)*	Hesperiidae	Philippine Swift		Sch. II
120	*Pelopidas mathias mathias (Fabricius, 1798)*	Hesperiidae	Dakhan Small Branded Swift		
121	*Pelopidas subochracea subochracea (Moore, 1878)*	Hesperiidae	Bengal Large Branded Swift		Sch. IV

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

ANNEXURE 2.11

ODONATES OF MATHIKETTAN SHOLA NATIONAL PARK

Sl. No	Scientific names	Family	English Names	Endemicity	IUCN
1	*Aciagrion approximans krishna* Fraser, 1921	*Coenagrionidae*	*Violet-Striped* Slender Dartlet	*LC*	
2	*Anax immaculifrons* Rambur, 1842	Aeshnidae	Blue Darner		LC
3	*Bradinopyga geminata* (Rambur, 1842)	Libellulidae	Granite Ghost		LC
4	*Caconeura ramburi* (Fraser,1922)	Platycnemididae	Coorg Bambootail	WG	DD
5	*Diplacodes trivialis* (Rambur,1842)	Libellulidae	Ground Skimmer		LC
6	*Orthetrum chrysis* (Selys, 1891)	Libellulidae	Brown-Backed Red Marsh Hawk		LC
7	*Orthetrum glaucum* (Brauer, 1865)	Libellulidae	Blue Marsh Hawk		LC
8	*Orthetrum pruinosum* (Burmeister,1839)	Libellulidae	Crimson-Tailed Marsh Hawk		LC
9	*Orthetrum sabina* (Drury, 1770)	Libellulidae	Green Marsh Hawk		LC
10	*Orthetrum triangulare* (Selys, 1878)	Libellulidae	Blue-Tailed Forest Hawk		LC
11	*Pantala flavescens* (Fabricius, 1798)	Libellulidae	Wandering Glider		LC
12	*Trithemis aurora* (Burmeister, 1839)	Libellulidae	Crimson Marsh Glider		LC
13	*Indolestes gracilis* (Hagen, 1862)	Lestidae	Davenport's False Spreadwing	WG	LC
14	*Copera marginipes* (Rambur, 1842)	Platycnemididae	Yellow Bush Dart		LC
15	*Crocothemis servilia* (Drury, 1770)	Libellulidae	Ruddy Marsh Skimmer		LC

16	*Diplacodes nebulosa* (Fabricius, 1793)	Libellulidae	Black Tipped Ground Skimmer	LC	
17	*Heliocypha bisignata* Hagen in Selys,1853	Chlorocyphidae	Stream Ruby		LC
18	*Libellago indica* (Fraser, 1928)	Chlorocyphidae	River Heliodor	PI	LC
19	*Neurobasis chinensis* (Linnaeus, 1758)	Calopterygidae	Stream Glory		LC
20	*Orthetrum luzonicum* (Brauer, 1868)	Libellulidae	Tricolored Marsh Hawk		LC
21	*Tramea limbata* (Desjardins,1832)	Libellulidae	Black Marsh Trotter		LC
22	*Trithemis festiva* (Rambur, 1842)	Libellulidae	Black Stream Glider		LC
23	*Lestes elatus Hagen in* Selys,1862	Lestidae	Emerald Spreadwing		LC

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

ANNEXURE 2.12

ANTS OF MATHIKETTAN SHOLA NATIONAL PARK

SL. No.	Species Name	Sub Family
1	*Myrmoteras indicum* (Moffett, 1985)	Formicinae
2	*Camponotus sp.*	Formicinae
3	*Crematogaster hodgsoni (*Forel, 1902)	Myrmicinae
4	*Tapinoma melanocephalum* (Fabricius, 1793)	Dolichoderinae
5	*Brachyponera luteipes* (Mayr, 1862)	Ponerinae
6	*Leptogenys chinensis* (Mayr, 1870)	Ponerinae
7	Nylanderia sp.	Formicinae
8	Cardiocondyla sp.	Myrmicinae
9	*Polyrhachis exercita* (Walker, 1859)	Formicinae
10	*Polyrhachis hippomanes ceylonensis (*Emery, 1893)	Formicinae
11	*Technomyrmex indicus (*Bolton, 2007)	Dolichoderinae
12	*Lepisiota sp.*	Formicinae
13	*Polyrhachis illaudata* (Walker, 1859)	Formicinae
14	Tetramorium sp.	Myrmicinae
15	*Tetraponera nigra* (Jerdon, 1851)	Pseudomyrmecinae
16	Pheidole sp.	Myrmicinae
17	Leptogenys sp.	Ponerinae
18	Camponotus sp.	Formicinae
19	Plagiolepis sp.	Formicinae
20	Hypoponera sp.	Ponerinae

ANNEXURE 3.1

ANTI-POACHING CAMP SHEDS IN MATHIKETTAN SHOLA NATIONAL PARK

Name of APC	GPS	
	Latitude	Longitude
Choondal	10.00954	77.23976
Vattapara	9.999592	77.22909
Sukumaran Kadu	9.9829	77.23358
Check post	9.974606	77.24557

ANNEXURE 3.2

LIST OF RESEARCH PROGRAMS CONDUCTED AT MATHIKETTAN SHOLA NATIONAL PARK

Sl. No.	Title of project	Principal Investigator	Duration	Institution
1	Systematic studies on the Bryophyte flora of the Mathikettan Shola National Park	Dr. Prakash Kumar	2015-2017	Malabar Botanical Garden, Calicut
2	Ecology and Conservation of fresh water Swamp ecosystem of the Western Ghats, Kerala Region.	DR. Rajendra Prasad	2016-2018	TBGRI, Palode
3	Antivirals from medicinal plants of Western Ghats selected based on the traditional Knwoledge (TK) or ethnobotanical information	DR. S.R. Suja	2015-2018	TBGRI, Palode
4	Bio-processing of two coded ani-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
5	Understanding the evolution of endemism in the Amphibians of the Western Ghats.	DR. P.S. Easa	2016-2018	Asia Biodiversity conservation Trust, Thrissur
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 Agriculture, Kasargode
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	2017-2018	Dr. Ajith Kumar	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	School of 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	Dr. Sathyanarayanan	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 a Sciences, Punjabi, University, Patial
47	Development and maintenance of conservatories: Wild Fruit Plants	Sri S.M Shareef	2012-2014	JNTBGRI, Palode
48	Phytogeography of King Cobras (Ophiophagus hannah) 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 plant species of the Western Ghats	Sri. P.S. Jothish	2015-2019	JNTBGRI, Palode

55	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	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.

***

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

***

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 PROGRAMS: 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

PROGRAMS 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 Programs 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	Remarks (buffer or enclave)
			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 MATHIKETTAN SHOLA NATIONAL PARK 2020-21 TO 2029-30