

KFRI Res. Rep. No.462

**Land use and its change in
forests of Kerala**

Research Project No. KFRI 556/2008

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May, 2013

Project Proposal

Title	Land use and its change in forests of Kerala
Investigators	Dr. P. Vijayakumaran Nair
Introduction	<p>During the last four decades much conversion of forest land to agriculture, plantations and submersion under water has taken place. Much of this is yet to appear in maps. In addition to this, bamboo and reed areas, teak, eucalyptus, acacia, oil palm plantations, etc. in maps can be updated. Satellite images available since 1973 to the present can be used for analyzing the land use and its change in Kerala. Maps available so far at 1:250,000 are too large a scale to depict changes. The study proposes to map the land use at 1:50,000 scale. Images from Landsat (1973), Thematic Mapper (1980), IRS1b (1985), IRS1c and D (1990-2000) and IRS P6 images (2002-2007) will be used to construct land use during this period. Topographic data in 1000 m and 90 m resolution will be compiled for use along with vector boundaries of forest, hydrology, and other base layers. The generated land use will be checked in the ground. As a derivative, the project will also classify and catalogue the satellite images available in KFRI into value added CDs that can be directly viewed and processed. The images would be processed and packaged to correspond to topo sheets, districts and forest administration units up to range level. The project will be implemented region wise and maps and data products would become available from the first year onwards.</p>
Objectives	<p>1) To map the forest land use in Kerala.</p> <p>2) To analyze the changes in forest cover.</p>
Method	<p>Most of the images are available in KFRI. Images for gaps if any will be procured. Red Green Blue (RGB) composites will be generated after proper enhancement of the bands. The images will be accurately geo-referenced to topo sheet and WGS84 projection. Vector GIS packages such as Mapinfo and Arc GIS available in the division will be used for digitization and Erdas software available in the division used for image processing and repackaging. Land use changes will be confirmed through GPS based ground checking.</p>
Output expected	<p>Land use maps to the levels of forest ranges and division at 10 year intervals from 1973.</p> <p>2) Geo-coded data sets of satellite images of different resolutions for use in</p> <p style="text-align: center;">ongoing and future projects in KFRI.</p>
Duration	Three years

Contents

Project proposal

Contents

Abstract

Introduction

Methods

Study area

Forests of Kerala

Northern Region

Kannur Division

Wayanad Wildlife Sanctuary

Wayanad North Division

Wayanad South Division

Kozhikode Division

Olavakode Region

Nilambur North Division

Nilambur South Division

Silent Valley National Park

Mannarkad Division

Palakkad Division

Nemmara Division

Parambikulam Wildlife Sanctuary

Central Region

Thrissur Division

Chalakudy Division

Vazhachal Division

Malayattur Division

High range Region

Kothamangalam Division

Idukki Wildlife Division

Munnar Division

Mankulam Division

Kottayam Division

Periyar Tiger Reserve

Southern Region

Ranni Division

Konni Division

Achankovil Division

Punalur Division

Thenmala Division

Thiruvananthapuram Wildlife Division

Thiruvananthapuram Division

Abstract

Forest boundaries were constructed from existing maps, topo sheets and forest department sources. Forest types and Land use were overlaid on this. Plantations and settlements were also overlaid on the maps. Details of flora and fauna were compiled from floras, research reports, census reports and sighting records. Mapinfo and Erdas packages were used for mapping and image analysis. One of the main objective of the project was to facilitate preparation of maps at state, circle, division and range levels.

Status of the forest at the level of range has been examined. The vested forests have practically been amalgamated into the reserve forest system and management of integrated area under two working plans is almost complete. The forest boundary in most parts of the state has been demarked with cairns or walls and excepting in few places, change in boundary or area under forest is not expected. There has been hardly any new conversion to plantations and no new submersion under hydro projects. Poster quality maps were generated at state, circle and division level. These are included in KFRI web site and can be searched and downloaded.

One glaring lack of accurate vegetation map for forests of Kerala is evident. With widespread agreement of not following Champion and Seth classification at subtype level, new mapping schemes at association level or RGB/NDVI parameters have to be developed. Effective fire protection is also changing the forest composition. Stoppage of selection felling and flowering of bamboo is also changing the vegetation. Allowing natural growth in plantations of protected areas is making updating of maps even more important.

Satellite images have been available from 1974 onwards. Recorded details of tree composition/IVI tables are the main source of information for periods prior to 1980. Initial images of 50m resolution are hardly comparable with high-resolution images of recent years. Multispectral images of 1980 onwards at 35, 23, 15 and 5.8 m permit supervised classification to identify vegetation. Latest sub meter images require another approach as identification can be carried out at object level.

Wide spread availability of composition data from geo-referenced locations in forests and sacred groves make spatial plotting and continuums can effectively supplement vegetation maps.

Land use and its change in forests of Kerala

Introduction

This project examines land use changes in the forests of Kerala. The state is divided into five regions, corresponding to forest circles and adjoining protected areas. The study had to be limited in some aspects due to the non-availability of satellite images and very large size of the tract to be covered. One of the main objectives of the project was to facilitate preparation of maps at state, circle, division and range levels.

Methods

Forest boundaries were constructed from existing maps, topographic sheets and forest department sources. Forest types and Land use were overlaid on this. Plantations and settlements were overlaid on the maps. Details of flora and fauna were compiled from floras, research reports, census reports and sighting records. Mapinfo and Erdas packages were used for mapping and image analysis.

Study area

The state is divided into five regions, northern, eastern, central, high ranges and southern. Detailed maps and description follow. Brief description of the regions are included.

Northern region: The Northern Circle consisting of the Kannur division, Kozhikode division, Wayanad North and Wayanad South along with the Wayanad Wildlife Sanctuary is one of the most important bamboo bearing areas in Kerala. Northern Circle is in the northern part of Kerala, bordered in the east and north by Karnataka and west by Arabian Sea. Nilambur Division of the Olavakode Circle borders the circle in the south. The Northern Circle consists of five divisions viz., Kannur Division, Kozhikode Division, Wayanad North Division, Wayanad South Division, Wayanad WLS and Aralam WLS.

Eastern region: The Eastern region is situated south of the northern circle and comprises of Nilambur North, Nilambur South, Mannarkad, Palakkad and Nemmara forest divisions. Because of geographic continuity, the Silent Valley National Park and Parambikulam Wildlife Sanctuary are also included under this. The Nilambur division is very important from the point of bamboo and is one of the best bamboo bearing areas in the state.

Central Region: The central part of Kerala comprises the Central Circle. The Palakkad Division and Nilambur South Divisions of the Olavakode Circle bound it in the north. In the east Tamil Nadu bounds it and in the

west Arabian Sea. In the north Mankulam, Munnar, Kothamangalam and Kottayam Divisions of the High Range region bound it. The Central Circle comprises of Thrissur Division, Chalakudy Division, Vazhachal Division, Malayattur Division and Peechi WLS.

High Range Region: High Range Region is more well-known for reeds, some parts do contain bamboos. Circle consists of Kothamangalam, Munnar, Mankulam and Kottayam divisions. Because of geographic continuity, Idukki Wildlife Sanctuary and Periyar Tiger Reserve, Eravikulam National Park and Chinnar Wildlife Sanctuary are also described in this section.

Southern Region: Southern region consists of Ranni, Konni, Achenkovil, Punalur, Thenmala, Agasthyavanam Trivandrum Wildlife and Trivandrum divisions.

Forests of Kerala



Forests of Kerala can be divided into five regions, Northern Region, Eastern Region, Central Region, High Ranges, Southern Region. These roughly correspond to forest circles. The protected areas falling within the area is also described to maintain continuity. Administrative details, topography and landuse are described, followed by conservation details.

Northern Region

The Northern Circle consisting of the Kannur Division, Kozhikode Division, Wayanad North and Wayanad South along with the Wayanad Wildlife Sanctuary is one of the most important bamboo bearing areas in Kerala.

Eastern Region

The Olavakode circle is situated south of the northern circle and comprise of Nilambur North, Nilambur South, Mannarkad, Palakkad and Nemmara forest divisions. Because of geographic continuity, the Silent Valley National Park and Parambikulam Wildlife Sanctuary are also included under this. The Nilambur region is very important from the viewpoint of bamboo and is one of the best bamboo bearing areas in the state. Availability of bamboo in the circle is summarised below.

Central Region

The central circle consists of Thrissur, Chalakudy, Vazhachal and Malayattur divisions. Because of geographical proximity, Peechi-Vazhani and Chimmony Wildlife Sanctuary are also described here.

High Ranges

High Range Circle is well-known for reeds, some parts do contain bamboos. Circle consists of Kothamangalam, Munnar, Mankulam and Kottayam divisions. Because of geographic continuity, Idukki Wildlife Sanctuary and Periyar Tiger Reserve, Eravikulam National Park and Chinnar Wildlife Sanctuary are also described in this section.

Southern Region

Southern circle consists of Ranni, Konni, Achenkovil, Punalur, Thenmala, Agasthyavanam, Trivandrum Wildlife and Trivandrum divisions.

Northern region

The Northern region consisting of the Kannur division, Kozhikode division, Wayanad North and Wayanad South along with the Wayanad Wildlife Sanctuary and Aralam Wildlife Sanctuary are one of the most important bamboo bearing areas in Kerala. The region is bordered in the east and north by Karnataka State and west by Arabian Sea. Nilambur Division of the Olavakode Region borders the region in the south. The

Kannur Division is the northernmost division in the region. It is bounded in the east and north by Karnataka and in the west by Arabian Sea. Calicut and Wayanad North Divisions of the same region bound it in the south. Calicut Division is situated to the south of the Kannur Division. It is bounded in the east by Wayanad North and South Divisions and in the west by Arabian Sea. Nilambur North Division bound it in the south. Wayanad North Division is situated to the east of Calicut Division and Wayanad South Division of the same region borders it in the south. Kannur borders it in the east and Karnataka in the north. Wayanad South Division is situated to the south of the Wayanad North Division and Calicut Division borders it in the west. Nilambur North Division of the Olavakode Region borders it in the south and Karnataka borders it in the east. Wayanad WLD is to the east of the Wayanad South Division of the same region. Karnataka borders the east and north and Tamil Nadu borders the south.

Kannur Forest Division

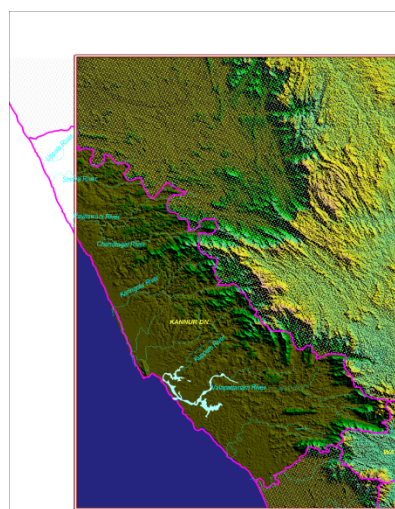
The Kannur division, the northern most forest division in Kerala consist of reserve forests and previous vested forests. There are five ranges in the division of which Kannavam range is the largest and Thaliparamba the smallest. Vegetation consists of moist deciduous and lateritic semi evergreen types. Bamboo is found in some parts. Evergreen forest is found in parts of Kottiyur, Kannavam and Kanhangad ranges. There are about 100 ha of bamboo plantations in different parts of the division.

Being the northernmost division of Kerala, Kannur Division is bordered in the East and North by Karnataka and Arabian Sea is on the western side. Uppala River, Payaswani River, Chandragiri River and Karingote River flows through this division. There are no reservoirs in this area. The areas of high altitude i.e., highland areas exist in the Eastern part of this division. The midland areas, the areas of medium altitudes exist in the Western part and there exist some low land areas in the South Western part of this division. The Eastern part has a maximum altitude of 300 m above mean sea level. The extent of forest areas in this region is

very less. The forest area exists in the Northern part of the division. Kannur Division is bordered in the South by the Wayanad and Kozhikode Divisions, and Karnataka in the North. Kuppam River, Valapattanam River and Anjarakandi Puzha flow through the division. High altitude areas occur in the North Eastern and South Eastern parts of this district. Midland areas occur in the central part of the district and low land areas are scarce existing only in the Western part. The maximum altitude present in this area is 600 m. Kannur District also have less forest area. The only forest area in the district is the Aralam WLS and forest areas situated nearby. The forest areas come under the Kannur Division of the Northern Region.



Kannur Division Map



Kannur Division Map

The region lies between $11^{\circ} 50'$ to $12^{\circ} 47'$ North latitude and $74^{\circ} 51'$ to $75^{\circ} 56'$ East longitude. It spreads over five northernmost taluks of Kerala, namely Kannur, Thaliparamba and Thalassery of Kannur district, Kasargode and Hosdurg taluks of Kasargode districts. Arabian Sea is in the western side. On its northern side the division shares the boundary with Karnataka state. Karnataka state and Aralam WLS occupy the areas next to its eastern boundary. On southern side it shares the boundary of Wayanad and Kozhikode District. Arabian Sea forms the western boundary. The division is comprised of five ranges namely Kasargode, Kanghai, Thaliparamba, Kottiyur and Kannavam.

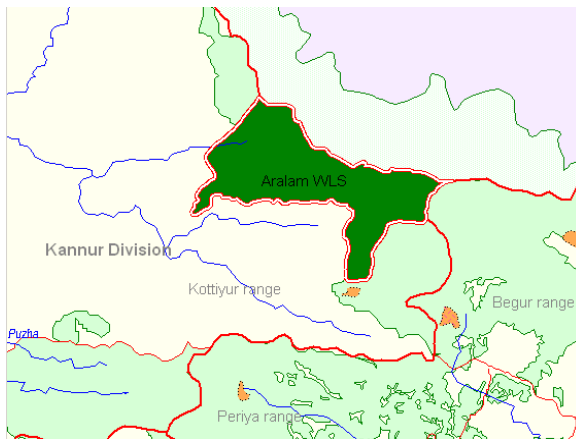
The major rivers passing through the area are Moghral, Chandragiri, Nileswaram, Karingotte, Valapattanam and Anjarakandi. All the rivers originate from Kerala part of Western Ghats and flows westward. Among these Valapattanam is the largest river with about 110 km length and 1321 sq. km catchment area. Chandragiri puzha originates from Coorg and drains Parappa, Adoor, Muliya and Karadka reserves. Nileswaram

River drains the Elery and Kenanur reserves Valapattanam River drains the Kottiyur reserves and Anjarakandi drains some portions of the Kannothe reserve.

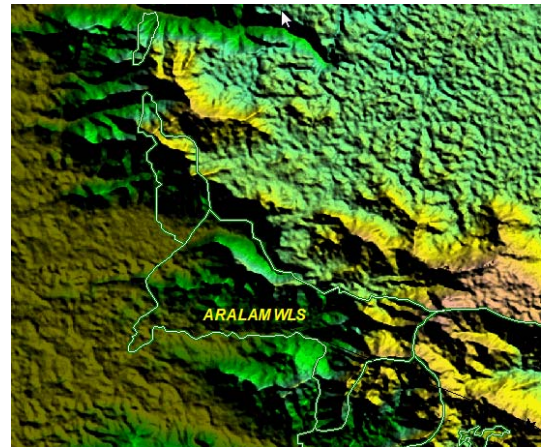
Forest Area statistics of Kannur Division

No	Range	Area (km²)
1	Kannavam	93.85
2	Kottiyur	60.68
3	Thaliparamba	24.85
4	Kanhangad	50.48
5	Kasargod	60.46
6	Aralam	55.00
Total		345.32

The northern part of this division is almost plain i.e., the Thaliparamba, Kanhangad and Kasargode Range are almost plains. The Southern part of the Kannur Division i.e. Kottiyur Range and Kannavam Range contain contours from a minimum value of 10m to a maximum value of 1500m. Kottiyur Range contains the maximum contour value of 1500m on the southeastern part. The southwestern part are almost plains.



Aralam Wildlife Sanctuary



Aralam Wildlife Sanctuary

Kasargode Range

Kasargode Range is, is the northernmost forest range in Kerala, is situated to the Northern part of the Kannur Division. Kasargode Range consists of Parappa, Karadka and Bandadka Sections. Parappa Range consists of Parappa and Netanige Beats, Karadka with Karadka and Muliyar Beats and Bandadka with Adoor and Madakole Beats. Karnataka

shares the boundary on the East and North and Arabian Sea on the western side. It is bordered in the south by Kanghangad Range. Kasargod Range has many peculiarities. The forest is limited to few isolated pockets, its total area is about 60 km² only. Range range is remarkable in that the range falls in three rivers basins, Uppala, Payaswini and Shriya. Three river basins, Manjeswaram, Uppala and Shriya fall entirely in the Manjeswaram Panchayat block of Kasargod Forest Range. There are no forests in these two basins. Manjeswaram basin: Area about 50 km². Two panchayats, Manjeswaram and Vorkady fall in this basin. Vorkady Panchayat is in the catchment area of this river. SOI sheets show much wetland cultivation on either side of river, but CESS-ISRO land use show much less wetland cultivation, with an increase in waste lands. Elevation is around 100m only. Vorkady Panchayat is in the catchment area of this river. Elevation is around 100m only.

There are mainly three streams. Bangramangeswara Hole, flowing south is the western border of the Panchayat. They are drawn in black colour in Survey of India (SOI) 1:50,000 topo sheet, indicating their seasonal nature. The Vorkady stream flows west wards. The other stream flows in a north to south direction and join Payaswini River. Topo sheet shows some amount of wet cultivation along these streams. CESS-ISRO land use show much less wetland cultivation, with an increase in waste lands. Previous land use is mainly scrub with cashew. Original vegetation is seen sacred groves. FIP 250 K does not show any natural vegetation.

Mansjeswaram is also the northern most Panchayat. Arabian sea is on the western side, Karnataka state on the north, Vokady Panchayat on the east and Mangalpady panchayat on the south. There are two streams, which form the Uppala River. Streams are seasonal. Estuary extends inland. No ponds could be seen in topo sheet. Topo sheet show wet cultivation along the streams. One could see large barren regions in this panchayat.

Kanghangad Range

Kanghangad Range consists of Panathadi, Maruthome and Bhemmanadi Sections. Of these the Panathode consists of Panathadi and Panathur Beats, Maruthome has two beats Maruthome and Balal, and Bhemmanadi consists of Chittarikkal and Konnakad Beats. Kanghangad Range is situated in the Northern part of the Kannur Division. It shares the Eastern boundary with Karnataka and Arabian Sea is on the western side. The southern boundary is shared with Thaliparamba Range and North with Kasargode Range.

Kannavam Range

Kannavam Range consists of Kannavam and Nedumpoyil Sections. Kannavam Section consists of Kannavam and Narikode Beats while Nedumpoyil Section consists of Nedumpoyil and Parakkad Beats. Kannavam Range is in the southern part of the Kannur Division. To the east there is Kottiyur Range and Arabian Sea is on the western side. Kuttidi Range of Calicut Division shares the southern boundary and to the North there is Kottiyur Range.

Thaliparamba Range

Thaliparamba Range consists of Karamaramthatu and Srukantapuram Sections. Karamaramthatu Section consists of Cherupuzha, Keramarathattu and Kudianmala Beats and Srukantapuram consists of Kunnathur and Kanhirakolly Beats. It is situated in the southern part of this division. To the east there is Karnataka and Arabian Sea is on the western side. The south is Kottiyur Range and north Kanghangad Range.

Kottiyur Range

Kottiyur Range consists of Tholambra, Iritty, Manalthana, Keezhpilly, Kottiyur East and West Sections. Tholambra consists of Tholambra and Nedumpoyil Beats, Iritty with Ayyankunnu and Chathiroor Beats, Kottiyur west with Kottiyur west and Kelakam Beats. Kottiyur East, Keezhpally and Manathana have no other separate beats. This range is situated in the southern part of this division. Aralam WLS bounds the range in the East and Arabian Sea in the West. Kannavam Range and Mananthavady Range of the Wyanad North Division borders it in the South while Thaliparamba Range in the North.

Aralam Wildlife Sanctuary

Location: The sanctuary is located between 11° 53' and 10° 26' N latitude and 75° 46' and 75° 56'E longitude, Revenue district: Kannur (Cannannore), drainage basin: Valapattanam River, mean annual rainfall 3400 mm, total area: 55 km² Major attractions: tropical wet evergreen forests (rain forests). Aralam Wildlife Sanctuary is located on the western slopes of the Brahmagiri ranges in the Western Ghats. This is the northern most wildlife sanctuary in Kerala. The vegetation is evergreen, semi-evergreen and moist deciduous forest. It was established in 1984. Headquarters of the sanctuary is near Iritty, a small town-55 km from Kannur. The sanctuary adjoins the Central State Farm at Aralam. The Sanctuary comes under the Wayanad wildlife division with Headquarters at Sulthanbathery (Sultan's Battery). The terrain is undulating with deep valleys and steep ridges. Aralam Puzha drains the

area. Elevation varies from 60m to 1589 m above MSL at Kalii Belia peak. Climate is largely tropical in the foothills, here the temperature varies from 21°C to 40° C and at the higher reaches temperature variation is much more pronounced (from 8° C to 25° C). Mean annual rainfall is about 3,000 mm. Wettest part of the year is June-August. Dry spell is usually three to four months long. Vegetation of the sanctuary can be broadly categorized as below: 1. Southern hilltop tropical evergreen forest 2. West coast tropical evergreen forest 3. West coast semi-evergreen forest 4. West coast semi evergreen Dipterocarpus forest

This is the only protected area of West Coast tropical evergreen forest of the *Dipterocarpus -Mesua-Palaquium* type. Edaphic conditions in this part of the southern Western Ghats are distinct from that of further southern reaches. Less than 25 km² of fairly undisturbed forests of this type is included in this sanctuary. Tropical evergreen and semi-evergreen forests are the predominant vegetation of the sanctuary. There are about 4.9 km² of teak and eucalyptus plantations within the sanctuary. Species such as *Vateria indica*, *Mesua ferrea*, *Machilus macrantha*, *Calophyllum elatum*, *Cullenia sp.*, *Mangifera indica*, *Toona ciliata*, *Myristica sp.*, *Euphorbia longana* and *Strobilanthes* are found in the evergreen forests. Common trees in the semi-evergreen vegetation are *Cinnamomum zeylanicum*, *Hopea parviflora*, *Largerstroemia lanceolata*, *Xylia xylocarpa*, *Mallotus, philippinensis* etc.

Animals found in the sanctuary include spotted deer, wild boar, elephant, gaur, etc. Leopard, Jungle cat and Malabar giant squirrel are can also be observed in deep forest. Aralam Wildlife Sanctuary is well connected by road with Thalasseri (45 km) and Kannur (55 km) towns. The nearest railway station is Thalasseri and the nearest airport is at Kozhikode, 113 km from Iritti.

Kozhikode Division

The Kozhikode Division at present consists of Kuttiady Range, Peruvannamuzhy Range and Thamarassery Range. The division by name Calicut division consisted of different areas in the past. There was also a division by name Kozhikode special division prior to formation of present Kozhikode division. The division consists mostly of vested forests. Few reserve forests also come with in the division. Working plan for the division is still under preparation. Total area of the division is 290.83 km², KFD (1997). Peruvannamuzhy is the largest range. The area is situated on a chain of hills runing parallel to the main Western Ghats. Kannothe and Periya RF are situated to the north of the division. The Kuttiady hydro electrical project area come with in this division. Both sides of the ridge

are steep, from 1500 m to 700 m on the Wayanad side and to 100 m on the Calicut side. Kurichiyar mala (1606 m) is the highest peak in the area. There are some high elevation evergreen forest and grassy areas near the Kakkayam dam. Eucalyptus plantation was raised in some areas. Large part of Kuttiady range is rocky areas. Peruvannauzhy range contains deciduous forest, semi evergreen forest and evergreen forest. Vegetation wise this range is very rich but rubber plantations, acacia plantations and released areas are also there. The Peruvannamuzhy and Kakkayam reservoirs have also submerged forest and teak plantations.

Wayanad Wildlife Sanctuary

The Wayanad plateau is well known for its deciduous and semi evergreen forest, bamboo and wildlife. Large number of plantations, and settlements have broken the forest continuity to some extent. Wayanad Wildlife Sanctuary was declared in 1973. As much as 33% of the sanctuary is under different types of plantations. The Wayanad Wildlife Sanctuary consists of about 344.56 km² of good bamboo area. The three ranges Muthanga, S.Bathery and Kurichiat are contiguous. Tholpetty is a separate chunk of forest, which has continuity with the Nagarhole National Park. The area break up is shown below. Bamboo flowered in 1992 in many parts of the sanctuary. The flowered bamboo were extracted for industrial use. Mature bamboo in many parts of Muthanga and Sulthan Bathery range may flower at any time. Being a Wildlife Sanctuary bamboo is extracted only after flowering.

Status of forest in Wayanad Wildlife Division

Sl.No	Range	Area (km²)
1	Tholpetty	77.67
2	Kurichiat	106.56
3	Muthanga	74.30
4	Sulthan Battery	86.03
	Total	344.56

The Sanctuary is located at 11° 53' and 10° 26' N latitude and 75° 46' and 75° 56'E longitude and comes under the Wayanad Revenue district. The drainage basin is Kabani River and the mean annual rainfall is 4500 mm and the total area is 344 km². The major attractions are tropical moist deciduous forests, valleys and peaks. A variety of wildlife including tiger, elephant, etc are present.

Established in the year 1973, the Wayanad wildlife sanctuary stands as a refuge of the wildlife of three states viz. Kerala, Tamilnadu and Karnataka. The sanctuary is contiguous with the protected areas - Nagarhole and Bandipur of Karnataka on the north-east and Mudumallai of Tamil Nadu on the south-east. Rich in biodiversity, the Sanctuary is an integral part of the Nilgiri Biosphere Reserve, which has been established with the specific objective of conserving the biological heritage of the region. Interestingly, it was from here that Pazhassi Raja fought valiantly against the British. Consisting entirely of notified Reserves, the Sanctuary is very rich in fauna and flora. The management of the Sanctuary lays emphasis on scientific conservation with due consideration to the general lifestyle of the tribals and others who live on the fringes of the forest.

The region is gently undulating with occasional hillocks. The mean elevation in the sanctuary is 650m above MSL and the highest point is Karottimala (1,150m). The temperature varies from 13^o-35^oC and the annual rainfall is 4500mm most of which is received during June to August. March, April and May are warm. The forest areas are evergreen, semi-evergreen, and deciduous. Reeds, bamboo and many medicinal plants are common in the area. Most of the forests are of the South Indian moist deciduous type. There are, however, a few patches of West Coast semi-evergreen forests. About 110 km² of the sanctuary is under plantations of Teak, Eucalyptus and Grewia. In the moist deciduous forest, Teak, Maruthu, Karimaruthu, Rose wood, Venteak, Vengai, Chadachi, Mazhukanjiram, Bamboo, etc. grow. In the semi-evergreen patches *Vateria indica*, *Lagerstroemia lanceolata*, *Terminalia paniculata*, etc are common.



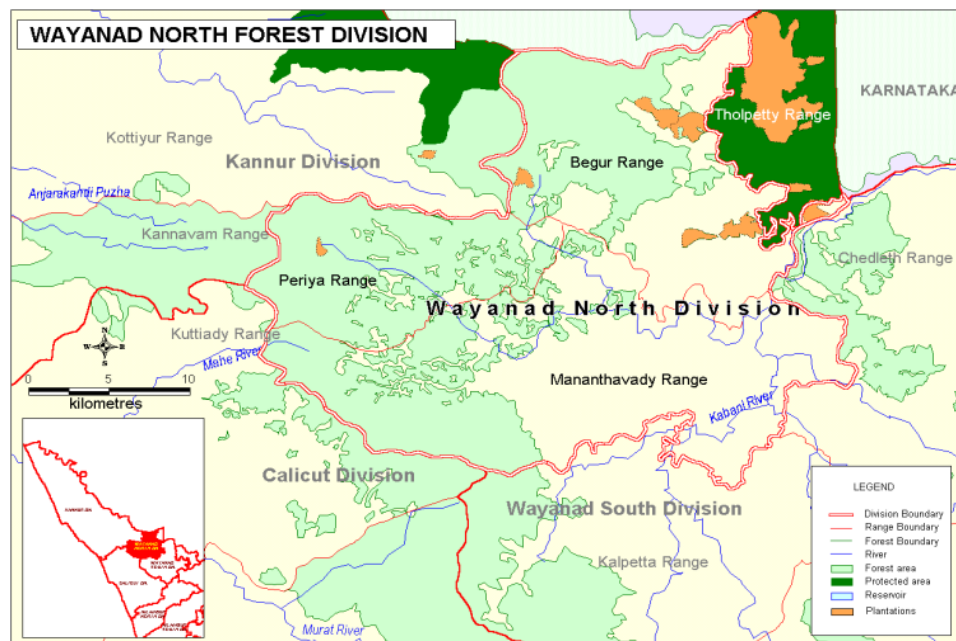
Elephant in Deciduous forest

The animal population of the sanctuary is varied. Elephant, Tiger, Panther, Jungle cat, Civet cat, Monkeys, Wild dog, Bison, Deer, Bear, etc. inhabit the sanctuary. Reptiles such as Monitor lizard and a variety of snakes are seen. Peacock, Babblers, Cuckoos, Owl, Wood pecker, Jungle fowl are only

a few among the different types of birds seen in the area. Among the animals, elephant occupies the prime position. Seasonal migrations of elephant to the forested tracts of the neighbouring states are common. Sanctuary has a fairly good tiger population. Sightings are frequent at Tholpetty, Rampur and Mavinhalla areas. Good roads connect the sanctuary with Kozhikode, Mysore and Ooty. The area is also connected by rail within 110 km from the Sanctuary. Nearest airport is at Kozhikode. Visitors may halt at Sultanbathery or Mananthavady and visit the Sanctuary. Government Rest Houses and private lodges offer accommodation. The headquarters of the sanctuary is at Sultan Bathery.

Wayanad North Division

The Wayanad North division was recently formed. Forest continuity had been the main basis for the reorganisation. Reserved forests and vested forests have been brought under unified system of management. The forest coming under the Wayanad forest division had been under several administrative set ups earlier. The Wayanad North division consists of Begur range, Periya range and Mananthavadi range. The largest is Begur range followed by Periya range. Area break up is given below.



Map of Wayanad North Division

. Many parts of Begur range contain bamboo. Vast areas of well grown bamboo in the Thirunelly region is the most notable. Several plantations in vested forest areas have also been overgrown with bamboo. Periya and Mananthavady ranges contain only little bamboo. The bamboo in the Thirunelly region looks fully-grown and may flower in due course.

Bamboo in other areas, especially vested forests appear to be about 20-25 years old, judging from the size of the clumps. Periya and Mananthavady ranges contain only scattered clumps of young bamboo. There do not seem to be any scope for industrial exploitation. The tract lies between the latitudes $11^{\circ} 35'$ and $11^{\circ} 38'$ North and longitudes $75^{\circ} 27'$ and $76^{\circ} 35'$ East and comprises the forest which lie in the Kottayam, Kurumbranad and Wyanad Taluks of Malabar. The westernmost limit of the forests lies about 15 miles to the East of the Arabian Sea at Tellicherry, Coorg & Mysore adjoin the area on the North; Mysore and Nilgris form the Eastern and Southern boundaries.

Area breakup of forest area in Wayanad North Division

SI.No	Range	Area (km ²)
1	Begur	104.78
2	Periya	85.06
3	Mananthavady	26.05
	Total	215.89

The Wayanad North Division was recently formed. Forest continuity had been the main basis for reorganization. Reserved forests and vested forests have been brought under unified system of management. The forest coming under the Wyanad forest division had been under several administrative units earlier. The Wyanad North Division consists of Begur Range, Periya Range and Mananthavadi Range. The largest is Begur Range followed by Periya Range. Many parts of Begur Range contain Bamboo. Vast areas of well-grown bamboo in the Thirunelly area are the most notable. Periya and Mananthavady Ranges contain only little bamboo. There does not seem to be any scope for industrial exploitation.

Periya Range: It is situated in the Western part of the division.

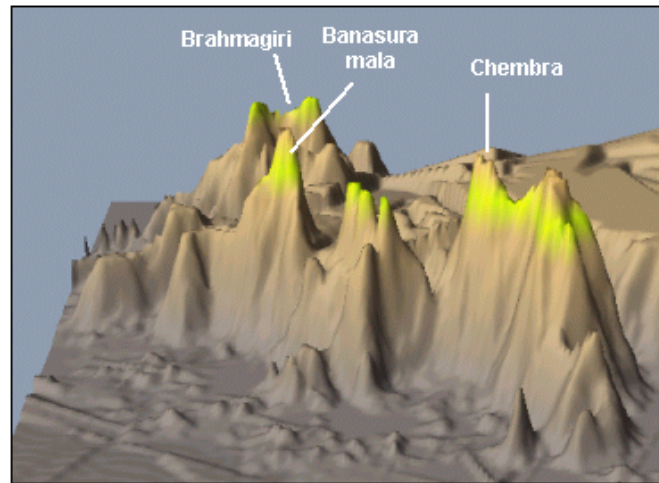
Mananthavady Range is situated to the south and to the east of this range. Kannavam Range of the Kannur Division borders it in the West and Kottiyur Range of the Kannur Division in the North.

Mananthavady Range: It is situated to the Eastern part of this division. To the East there is Chedleth Range of Wayanad South Division and to the west Kuttiady Range of Calicut Division. In the south Kalpetta Range of Wayanad South Division borders it and Begur Range in the North.

Begur Range: Begur Range is on the northern part of the division.

Tholpetty Range is on the east and Kottiyur Range of Kannur Division in

the west. Mananthavady Range is to the south and Karnataka borders in the north.



Three-D view of Brahmagiri region

The division is comprised of three readily distinguished types of terrain. The foothills on the plains rise from about 150 to 1000 feet above the sea. These are laterite in origin, rounded and moderately steep. The spurs, peaks and ravines that form the Western slopes of the Ghats, rise steeply from the foothills to the main ridge. This country is difficult of access and contains a number of peaks the most notable of which are Brahmagiri 5,277 feet, Karimalai 5,242 feet and Suryamudi 4,521 feet. Drainage is into the Arabian Sea through the Valarpattana, Anjarakandi and Vaniampuzha (Mahe river). The tableland of the Wyanad to the east of the main ridge that gradually slopes down east and north to the Mysore plateau. This is undulating country dotted with rounded hills, which are seldom steep. The heights on the plateau vary from 2,313 (at Kolvalli on Kabani river) to 3,802 (Karatimalai hill in the Chedlath Range). The entire drainage is into the Kabani River a tributary of the Cauvery. The slopes being gentle, the smaller streams tend to stagnate and form swamps. Many streams are perinnial; the important ones are Bavali hole draining the Begur Kundrakot and Alathur reserves, Kaduman thodu and Narasipuzha on the east and south of Padri reserve, Murumavu forming the western boundary of Kuruchiyat reserve with its tributaries, the Kurichiyat, Doddapallam streams. Ammanvayal thodu, Manja thodu, Katti halla, Nul puzha (Nugu hole), Naikatty stream, Ammankuli thodu, Mavinhalla, Mananthody puzha and Panamaram puzha are the major streams draining the area.

Rock: The underlying rock is principally coarse biotitic gneiss with quartz, feldspar, garnet, hornblende and mica. The quartz vein contains traces of

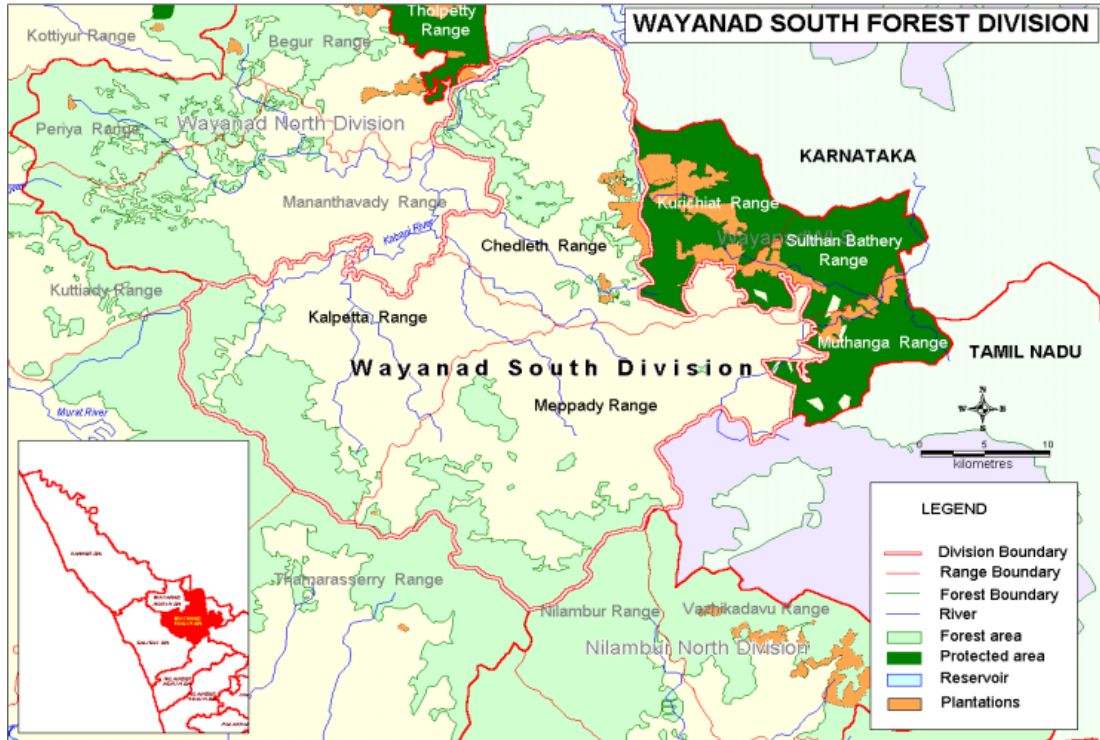
gold. Gneiss outcrops are confined to the higher elevations of the main ridge of the Ghats. The foothills at elevations below a thousand feet are often capped with outcrops of hard laterite while the slopes and lower areas are composed of lateritic soil over an underlying rock of laterite or disintegrated gneiss.

Soil: The soil of the slopes of the main ridge is a ferruginous red sandy loam generally ten to fifteen feet deep. On the plateau the soil is a rich clayey loam generally two to four feet deep with the sub soil either red gravel or yellowish clay of considerable depth. Trees particularly teak and *Lagerstroemia lanceolata* that require good drainage grow best on the gravelly sub-soil. The clay loam referred to above tends to become sandier as one goes eastwards and generally appears to support a poorer type forest. Lateritic soil is also found on the plateau, as for instance, the deficiency increasing with the rainfall. Humus content is high except in areas subject to frequent fires.

The northeastern part of this division is almost steep. The central part of this division is plain. The southern part of this division is almost plain. The highest peak is 1800m and exists in the Begur Range. Most of the highest valued contours exist in this range. There are contours of values 1200m, 1500m, etc in this region. The contours of value 900m exist in the southern part of this division i.e. in the Mananthavady Range. The lowest value is 300m.

Wayanad South Division

The Wayanad South division was recently formed. Forest continuity had been the main basis for the reorganisation. Reserved forests and vested forests have been brought under unified system of management. The forest coming under the Wayanad forest division had been under several administrative setups earlier. Geographically, the Chedleth range itself is in two parts. The eastern portion are contiguous with the Kurichiat range of Wayanad Wildlife Sanctuary. The Padri reserve is a well-known bamboo area since several decades. Kalpetta and Meppady ranges are part of a hill chain running parallel to the main Western Ghats. Estates and cultivation separate these two sets of areas. Kalpatta range is situated on the eastern side of Thamarassery hills. Meppady range is situated on the eastern side of Nilambur forest. The hills here are of high elevation with forests sloping to Nilambur valley, Thamarassery valley and Wayanad proper.



Wayanad South Division Map

The tract lies between the latitudes $11^{\circ} 35'$ and $11^{\circ} 38'$ North and longitudes $75^{\circ} 27'$ and $76^{\circ} 35'$ east and comprises the forest which lies in the Kottayam, Kurumbranad and Wyanad Taluks of Malabar. The westernmost limit of the forests lies about 15 miles to the East of the Arabian Sea at Tellicherry, Coorg & Mysore adjoin the area on the North; Mysore Nilgris from the Eastern and Southern boundaries

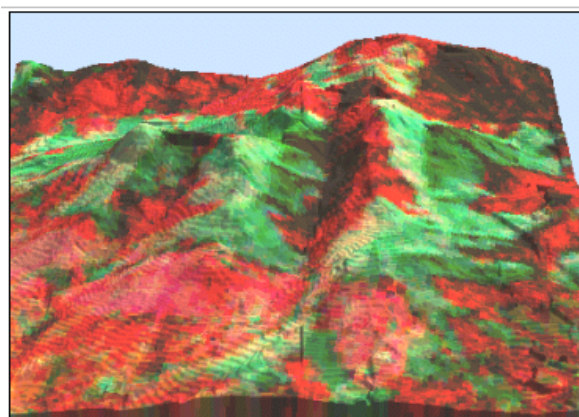
Status of forest in Wayanad South Division

<u>Sl.No</u>	<u>Range</u>	<u>Area (km²)</u>
1	Kalpetta	123.29
2	Meppady	116.86
3	Chedelath	86.00
	Total	326.15

Wayanad South Division was recently formed. Forest continuity had been the main basis for reorganization. Reserved forests and vested forests have been brought under unified system of management. The forest coming under the Wayanad Forest Division had been under several administrative units earlier. Geographically, the Chedleth Range itself is in two parts. The eastern portion is contiguous with the Kurichiat Range of

Wayanad wildlife sanctuary. The Padi reserve is a well-known bamboo area since several decades. Kalpetta and Meppady Ranges are part of a hill chain running parallel to the main Western Ghats. Estates and cultivation separate these two sets of areas. Kalpetta Range is situated on the eastern side of Nilambur forest. The hills are of high elevation with forests sloping to Nilambur valley, Thamarassery valley and Wyanad proper.

As mentioned earlier, the three ranges are situated in two geographically distinct areas. Chedleth Range is the smallest, but from the point of view of economic value and bamboo, it is richest.



Meppadi region with sholas and grasslands

Wayanad South Division consists of Chedleth Range, Kalpetta Range and Meppady Range. Chedleth Range: Chedleth Range is in the Northern part of the division. Kurichiat Range of Wayanad WLS borders it in the East and Mananthavady Range of the Wyanad North Division in the West. It is bound in the South with Kalpetta Range and Meppadu Range and Karnataka in the North

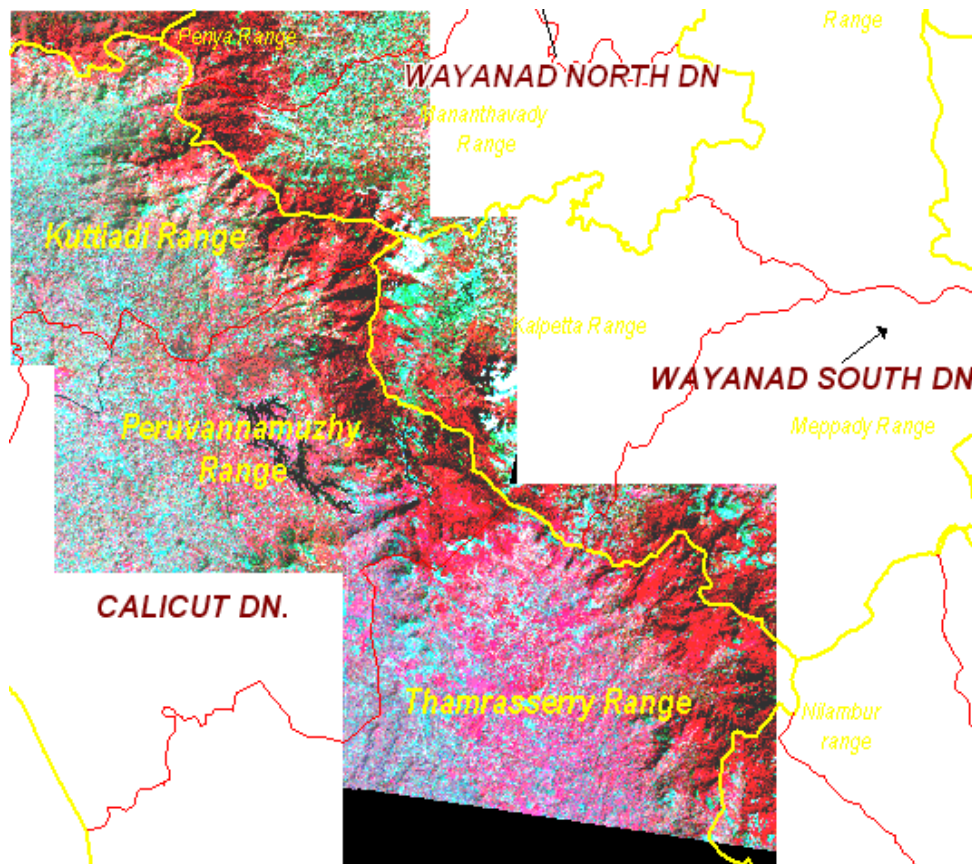
Kalpetta Range: It is situated in the northwestern part of this division. In the east Meppady Range borders it while Kuttiady Range and Peruvannamuzhy Range of Calicut Division borders it in the west.

Thamarassery Range and Peruvannamuzhy Range of Calicut Division borders it in the south and Mananthavady Range of Wayanad North Division in the North. Meppady Range: Meppady Range is situated in the South Eastern part. In the east Tamil Nadu shares the boundary with it and Kalpetta Range in the west. Nilambur Range of Nilambur north Division and Thamarassery Range of the Calicut Division borders it in the South and Chedleth Range in the north. The highest contour existing in this region is of value 1500m. The values of the contours existing in this region include 900m, 1200m, 1500m etc. The higher value contours exist

in the Meppady Range in the southern part and western part of the Kalpetta Range. The central region is almost plain. Lowest value of the contour is 450m.

Calicut Forest Division

Calicut Division at present consists of Kuttiady, Peruvannamuzhy and Thamarassery Ranges. Kuttiady Range consists mostly of rocky areas and scrub forest. The other two ranges contain mostly evergreen forest. These forests are located on the Western side of a chain of hills running from Nilambur to Periyar. Most of these forests were under private management till recently. Because of this reason the forest are highly disturbed. There are several large dams and reservoirs in this tract. Some of them are Kuttiadi, Peruvannamuzhy and Kakkayam. Two major roads go across this tract, one from Kuttiadi to Mananthavady and other from Calicut to Meppadi. Forest department had prepared a working plan soon after taking over the vested forests. Currently a management plan is under preparation.



RGB image of Calicut division

From the RGB image, evergreen forest is there in the eastern part of the Thamarassery Range and Peruvannamuzhy Range since these regions appear in red colour in the image. To the central part of the Peruvannamuzhy Range and Kuttiady Range there exist grasslands due to the light blue colour. Deciduous forests are almost absent in these areas.

Status of forest area in Calicut Division

Sl.No	Range	Forest Area (km ²)
1	Kuttiady	63.39
2	Peruvannamuzhy	127.72
3	Thamarasserry	99.72
	Total	290.83

Calicut Division is situated to the south of the Kannur Division and is divided into three ranges Kuttiadi, Peruvannamuzhy and Thamarassery Ranges. Arabian Sea is in the Western side. Calicut Division shares its boundary in the east with Wayanad north and south divisions. In the south it is bounded by Nilambur North Division. Peruvannamuzhy is the largest range. Kannothe and Periya reserved forest are situated to the north of this division. Kurichiar mala (1606 m) is the highest peak in this area. The Peruvannamuzhy and Kakkayam reservoirs have submerged forests as well as teak plantations. Bamboo has been extracted from parts of Peruvannamuzhy and Thamarassery Ranges.

Kuttiadi Range: Kuttiadi Range is situated to the northern part of the division. It is bounded in the east by the Periya and Mananthavady Ranges of the Wayanad North Division. Arabian Sea is on the Western side. To the south there is Peruvannamuzhy Range and Kannavam Range in the North. Large part of Kuttiady Range has rocky areas.

Peruvannamuzhy Range: This range is situated in the central part of the division. Arabian Sea is on the Western side and Kalpetta Range of the Wayanad South Division on the east. Thamarassery Range is to the south and Kuttiadi Range to the north. This range contains deciduous forest, semi evergreen forest and evergreen forest.

Thamarassery Range: It is situated in the southern part of the division. To the east there is Nilambur Range of Nilambur North Division. Arabian Sea is on the western side and Peruvannamuzhy Range is on the north. Edavanna Range of the Nilambur North Division borders it in the south.

The eastern side of the Peruvannamuzhy Range is steep. The value ranges from 10m to 1800m. Eastern side is almost steep. The contour value of 1800m is present in the Thamarassery Range.



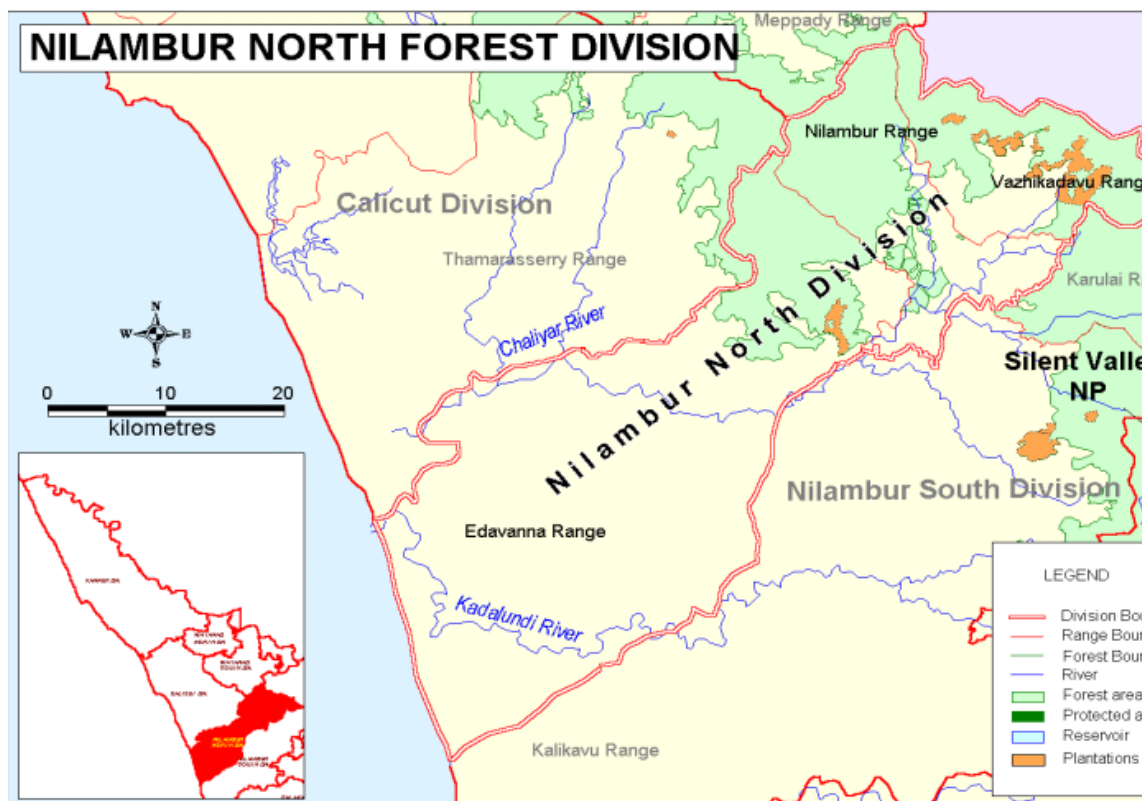
Ranges of the Calicut Division

Eastern Region

The Eastern region is situated south of the northern region and comprise of Nilambur North, Nilambur South, Mannarkad, Palakkad and Nemmara forest divisions. Because of geographic continuity, the Silent Valley National Park and Parambikulam Wildlife Sanctuary are also included under this. The Nilambur division is very important from the view point of bamboo and is one of the best bamboo bearing areas in the state.

Nilambur North Division

Nilambur North division consists of Nilambur, Edavanna and Vazhikadavu ranges. These forests were mostly vested forests earlier. Vegetation consists of deciduous and evergreen forests. The main area of bamboo under the Nilambur north division are Marutha, Vellakatta, Nellikutha, Pothukallu, Mundapotty, Thannikkadavu, Munderi, Cherambadi,, Pokkode, Edakkode, Elenchery, Ramaloor, Urngathiri malavaram, Nedumcheri malavaram and Ex-manjery kovilakam regions.



Map of Nilambur North Division

The forests are situated within 11° 10' and 11° 30' north latitude and 75° 55' and 76° 35' longitude East of Greenwich. In the East of the division the New Amarambalam, Karumpoya and Nellicutta reserves form one large compact area 67,632 acres in extent and covering the greater

part of the outer slopes of the Kundah Range of hills, the western escarpment of the Nilgiri plateau and a stretch of plains at their foot. The remaining forests are scattered along the banks of the Karimpuzha and its tributaries, the individual reserves, or blocks in the case of leased forests varying in extent from 1 to 2,800 acres.

Nilambur North Division consists of Nilambur, Vazhikkadavu and Edavanna Ranges. These forests were mostly vested forests earlier. Vegetation consists of deciduous and evergreen forests. This division shares its boundary with Karanataka in the East and Arabian Sea is in the western side. To the south there is Nilambur South Division and to the north there is Calicut and Wayanad South Division.

Edavanna Range: Edavanna Range is situated in the Western part of Nilambur north. In the east Kalikavu and Karulai Ranges of the Nilambur south Division borders it and Arabian Sea is on the western side. Kalikavu Range of the Nilambur South Division borders it in the south also while Thamarassery Range of Calicut Division in the north.

Status of forest in Nilambur North Division

Sl.No	Range	Forest area (Km²)
1	Nilambur	140.87
2	Edavanna	97.90
3	Vazhikkadavu	155.19
	Total	393.96

Nilambur Range: It is situated in the northeastern part of the division. To the east there is Vazhikkadavu Range and Thamarassery Range of Calicut Division in the West. Edavanna Range borders it in the south and Meppady Range of Wyanad south in the north.

Vazhikkadavu Range: This range is situated to the Eastern part of this division. In the east the Karulai Range of Nilambur south Division bound it. Nilambur Range borders it in the west and Edavanna Range in the south. Tamil Nadu borders it in the north.

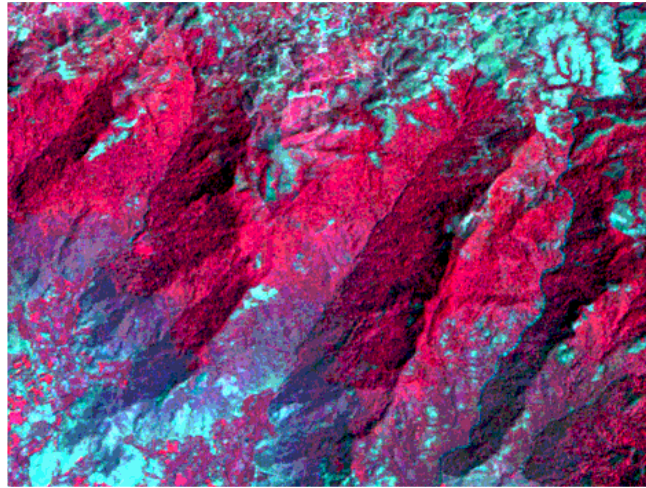
The outstanding topographical feature of the country is its sharp division into plains and hills. The plains of south Malabar except for a belt of practically level ground of varying width along the sea board are characteristically undulating. The higher ground rises generally to not more than about 300 feet above mean sea level. Although in exceptional cases it goes up to as much as 1,500 feet. The hills on the other hand are

strikingly precipitous. Even the low slopes are steep becoming more and more precipitous with increasing elevation. The hill forests vary in elevation from about 250 feet to 8,200 feet above the mean sea level the area above 6000 feet being almost their precipice.

The whole area is traversed by a network of rivers and streams. The main river Chaliar puzha runs more or less north east to south west. It has three main head water streams, the Chaliar puzha, the Karim puzha and the Punna puzha. The first rises in the south west of the Wyanad plateau while the sources of the latter are in the Kundah hills. The two latter meet on the edge of the teak plantations in the south of the Valluvasseri block and within two miles of their confluence they join the Chaliar Puzha at Chaliarmukku in the north west corner of the same block.



A Bamboo clump



Bamboo in RGB images

The fall of these rivers even near the foot of the hills is surprisingly small. The elevation of the riverbed at the confluence at Chaliarmukku is only 30 feet above mean sea level and this point is as much as 32 miles as the crow flies from the mouth of the river. Again the elevation of the riverbeds of the Karumpuzha and Punnapuzha at the foot of the hills Kanhirakadavu and Moochikal respectively is only about 235 feet. Above these points rivers and streams are torrents.

The underlying rock is Archaen. On the ghats and to some extent on the plains the rock is gneiss of a granite nature. On the foot hills and over the greater part of the plains the gneiss foliated to a much greater degree. It is probably part of a lower stratum than that found on the surface of the ghats. The foliated gneiss is formed into laterite. The distribution of the underlying gneiss is often lost over large areas. Throughout the area intrusive veins of quartz are to be seen. In the

laterite areas particularly the quartz veins having broken down quartz boulders and rocks of all sizes are found scattered over the surface.

Soils: By disintegration the granitic gneiss forms a very fine loam of varying depth. This varies mainly according to the position and slope, shallow and stony on the ridges, deep and fine in the valleys. The laterite is found in varying degrees of disintegration from a hard rock to fine gravel.

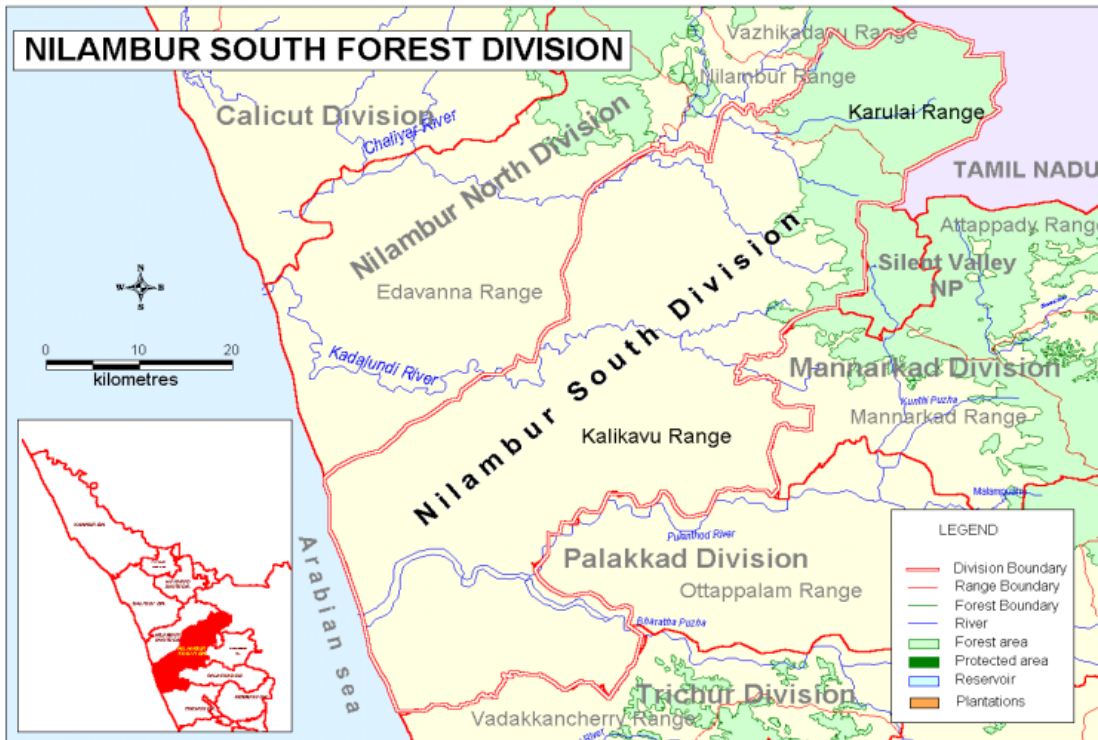
Alluvial deposits: The gneiss or the laterite is along the rivers and streams overlaid by river alluvium generally to a great depth as much as 70 feet in many places. This alluvium is a fine sandy loam, rich in organic matter and minute particles of mica. It generally contains a large number of water worn pebbles and boulders of quartz and gneiss. The river alluvium is overlaid near hillocks in the plains by laterite alluvium.

The northeastern part of this division is steep with a highest value of 1800m and a lowest value of 50m. The highest value is in the Nilambur Range and some in the Vazhikkadavu Range and Edavanna Range. The western part is almost plain and the maximum value is only 100m. The western side is plain.

Nilambur South Division

Nilambur South division consists of Kalikavu and Karulai ranges. These are well-known reserve forest areas managed under working plans for several decades. Vegetation consists of deciduous and evergreen types. Contain large quantity of bamboo in areas such as Manjery, Pulimada, Thalichola, Kuppamala and some parts of New Amarambalam RF. Kalikavu range has bamboo in areas such as Pullankode malavaram, Vadakkekotta malavaram, Cherumba malavaram and Kannothe malavaram. About 10,000 tonnes of flowered and non flowered bamboo is being extracted from the division in the current year.

The forests are situated within 11° 10' and 11° 30' north latitude and 75° 55' and 76° 35' longitude East of Greenwich. In the East of the division the New Amarambalam, Karumpoya and Nellicutta reserves form one large compact area 67,632 acres in extent and covering the greater part of the outer slopes of the Kundah Range of hills, the western escarpment of the Nilgiri plateau and a stretch of plains at their foot. The remaining forests are scattered along the banks of the Karampuzha and its tributaries, the individual reserves, or blocks in the case of leased forests varying in extent from 1 to 2,800 acres.



Map of Nilambur South Division

Nilambur south Division consists of Kalikavu and Karulai Ranges. These forests were mostly vested forests earlier. Vegetation consists of deciduous and evergreen forests. This division shares its boundary with Karnataka in the East and Arabian Sea in the western side. To the north there is Nilambur north Division and to the south there are Thrissur, Palakkad and Mannarkkad Divisions.

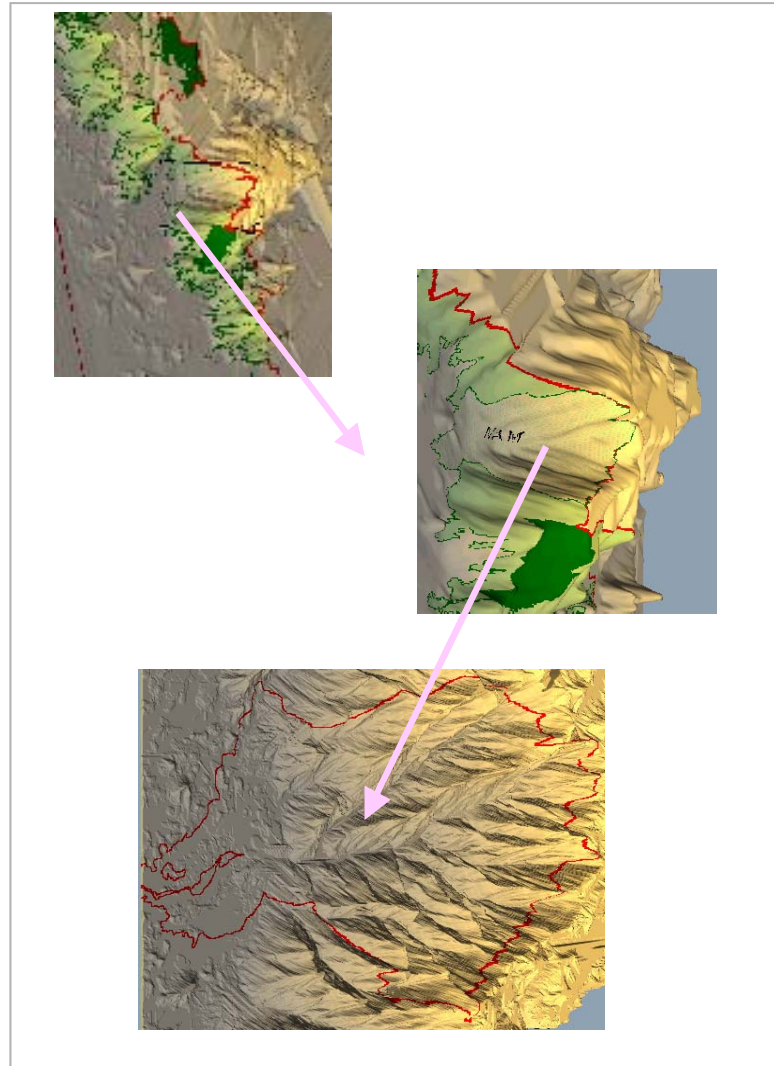
Kalikavu Range: It is situated in the western part of the division. To the east there is Silent Valley NP and Mannarkkad Range of Mannarkkad Division along with Karulai Range and Arabian Sea is in the western side. To the north there is Nilambur and Edavanna Ranges of Nilambur north Division.

Status of forest in Nilambur South Division

Sl.No	Range	Forest area (km ²)
1	Kalikavu	99.83
2	Karulai	265.61
	Total	365.44

Karulai Range: It is situated in the eastern part of the division. It shares the boundary with Tamil Nadu in the east and Kallikavu Range in the west. To the north there is Vazhikkadavu Range of Nilambur north Division. Tamil Nadu borders it in the south also. The whole area is

traversed by a network of rivers and streams. The main river Chaliar puzha runs more or less north east to south west. It has three main head water streams, the Chaliar puzha, the Karum puzha and the Punna puzha. The first rises in the south west of the Wyanad plateau while the sources of the latter are in the Kundah hills. The two latter meet on the edge of the teak plantations in the south of the Valluvasseri block and within two miles of their confluence they join the Chaliar Puzha at Chaliarmukku in the north west corner of the same block.



3d View if Karulai area

The fall of these rivers even near the foot of the hills is surprisingly small. The elevation of the river bed at the confluence at Chaliarmukku is only 30 feet above mean sea level and this point is as much as 32 miles as the crow flies from the mouth of the river. Again the elevation of the river beds of the Karimpuzha and Punnapuzha at the foot of the hills

Kanhirakadavu and Moochikal respectively is only about 235 feet. Above these points rivers and streams are torrents.

The southern part of the division is steep with a maximum value of 2100m and a minimum value of 50m. The central part of the division is almost plain. The western part of the division is steep to a certain extent. The maximum value here is only 600m and the minimum value 50m. The western side is plain. The highest valued contour exists in Karulai Range in the southern region and the minimum valued exists in the Kallukkavu.

Silent Valley National Park

Silent Valley contain mostly evergreen forests, grass lands and reed brakes. No bamboo in commercially extractable quantity is found in Silent Valley.

The park is located at 11°4'N-11°13'N latitude and 76°24'E-76°29'E longitude and comes under the Palakkad (Palghat) Revenue district. Drainage basin is River Kunthi (Bharathapuzha Basin) and the mean annual rainfall is 3400 mm. The total area is 90 km² and the major attractions are tropical wet evergreen forests, grasslands and shola forests, valleys and peaks, lion tailed Macaque and variety of wildlife.

Status of forest in Silent Valley National Park



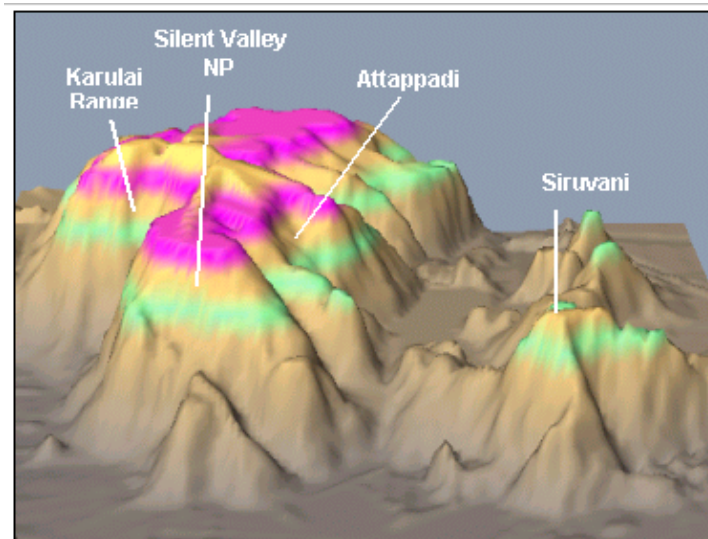
Evergreen Forest



Evergreen Forest

The reserved forests in the catchment area of Kunthipuzha located in the south western slopes of Nilgiris were the subject of a major ecological controversy during the early eighties. This was regarding the proposal to construct a hydroelectric dam across Kunthipuzha within the reserved forest. In the end the Silent Valley forest was notified as a national park in March 1984. The core of the Nilgiri Biosphere Reserve, the Silent Valley National Park is probably one of the most magnificent gifts of nature to mankind, a unique preserve of tropical rain forests in all its pristine glory

with an almost unbroken ecological history. Thanks to its difficult terrain and remoteness, the extent of degradation is minimal in comparison with other sanctuaries. Sairandhri Vanam, as referred in the Mahabharatha and the River Kunthi give a mythological dimension to the National Park. The Silent Valley is seldom silent but it has an inexplicably unique character about it, with the dense forest, the music of the birds and its quiet majesty with an area of about 90 km², the park is situated in the North-eastern corner of the Palakkad district. It rises abruptly to the Nilgiri plateau in the north and overlooks the plains of Mannarkkad in the south. The river Kunthi descends from the Nilgiri Hills above an altitude of 2000 m and traverses the entire length of the valley finally rushing down to the plains through a deep gorge. River Kunthi never turns brown, it is crystal clear and perennial...



Three-D view of Silent valley and adjacent areas

The Silent Valley forest ranges in elevation from 900 m to 2500 m above mean sea level and gets an average rainfall of 3000 to 6000 mm per year.

The forests belong to the Malabar Rain Forests by Biogeographical classification and harbour more than 1000 species of plants. The flowering plants here include 966 species belonging to 134 families and 599 genera. The dicotyledons are 701 in number, distributed among 113 families and 430 genera; monocotyledons are 265 distributed among 21 families and 139 genera. The 5 dominant families recorded from Silent Valley are 1. Orchidaceae with 108 species belonging to 49 genera, Fabaceae with 55 species representing 26 genera. 2. Rubiaceae with 49 species representing 27 genera and Asteraceae with 45 species representing 25 genera. Many of these are rare and endangered and some are now extinct elsewhere. The following are some of the new species and genera

recorded recently from Silent Valley. *Hedyotis silentvalleyensis*, *Kanjaram palghatensis*, *Porpax chandrasekharanii*, *Silentvalleya nairii*, *Nydnocarpus pendulus* etc. New species of orchids recorded are: - *Oberonia bisaccata*, *Liparis indiraii*, *Eriatiagii*, *Ipsea malabarica*, a ground orchid rediscovered after a lapse of more than a century. *Scutellaria oblonga* and *Anodendron rhinosporum*, two Sri Lankan plants have also been recorded.

The major vegetation types present in the national park are: 1. Southern hilltop tropical evergreen forest, 2. West coast tropical evergreen forest, 3. West coast semi-evergreen forest, 4. Southern subtropical hill forest, 5. South Indian subtropical hill savannah (Woodland), 6. Southern montane wet temperate forest 7. Southern montane wet scrub, 8. Southern montane wet grassland



Kunthi Puzha



Lion-tailed Macaque

Silent valley is well known for tropical wet evergreen forests that harbor rare plants and animals. Tropical evergreen forests occurring within a narrow strip along the equator is perhaps the most endangered natural habitat. Extremely fragile, it has suffered most from human interaction. In species diversity it is the richest habitat and has developed in areas of the heaviest rainfall. There is very little soil erosion and the streams and rivers originating from the rain forests are perennial and this may be attributed to thick canopy and closely packed tree stumps. In fact, scarcity of water is rarely felt. The evapo-transpiration from these forests is much higher than that from any other surface. This cools the atmosphere helping easy condensation of water vapour. This is the origin of the local summer rains. Wild fires lead to abrupt changes in the ecosystem degrading the forest. When the British entered the Silent Valley more than a century ago, these forests were untouched and

extended to all sides. They named it the Silent Valley because there were no Cicadas then. Today however, true evergreen forests untouched by man are only a dream. Unlike in most other Sanctuaries viewing wild animals in this park is quite difficult because of the thick vegetation.

Silent Valley has a good representation of all peninsular mammals. They are Lion-tailed Macaque, Nilgiri Langur, Bonnet Macaque, Tiger, Leopard (Panther), Leopard Cat, Jungle Cat, Fishing Cat, Common Palm Civet, Small Indian Civet, Brown Palm Civet, Ruddy Mongoose, Stripe-necked Mongoose, Wild Dog, Sloth Bear, Otter, Flying Squirrel, Malabar Giant Squirrel, Indian Pangolin (Scaly anteater), Porcupine, Wild Boar, Sambar, Spotted Deer, Barking Deer, Mouse Deer, Gaur and Elephant. Birds include rare species such as Indian black-crested Baza, Bonellis' hawk eagle, Rufous bellied hawk eagle, Shaheen falcon, short-eared owl, Peninsular scopes owl, Ceylon frog mouth, Great Indian hornbill, Nilgiri laughing thrush, House martin, Rufous bellied-short wing, Malay bittern etc. About 170 species have been recorded of which 31 are migrants. The fauna include a number of possibly new species, a few very primitive animal groups, notably limbless amphibians and rare small mammals such as the Peshwa's bat, Heary-winged bat and Nilgiri Marten. Butterflies and moths are varied and plenty. There are more than 100 species of butterflies and 400 species of moths. Quite a few of them are extremely rare and endemic. The Silent Valley is a veritable gene pool of tropical flora and fauna.

Silent Valley National Park and Periyar Tiger Reserve, protects some of the best remaining evergreen forests in the southern Western Ghats. But on its own the long term viability of the Silent Valley forests, as well as its potential to preserve the tropical evergreen forest ecosystems, are limited. Lacking adequate buffer belts along its perimeter, with the degradative influence of past damage (in particular fire damage) still affecting the forest adversely, the area can be valuable in ecosystem preservation only as a part of the Nilgiri Biosphere Reserve.

Mannarkkad Division

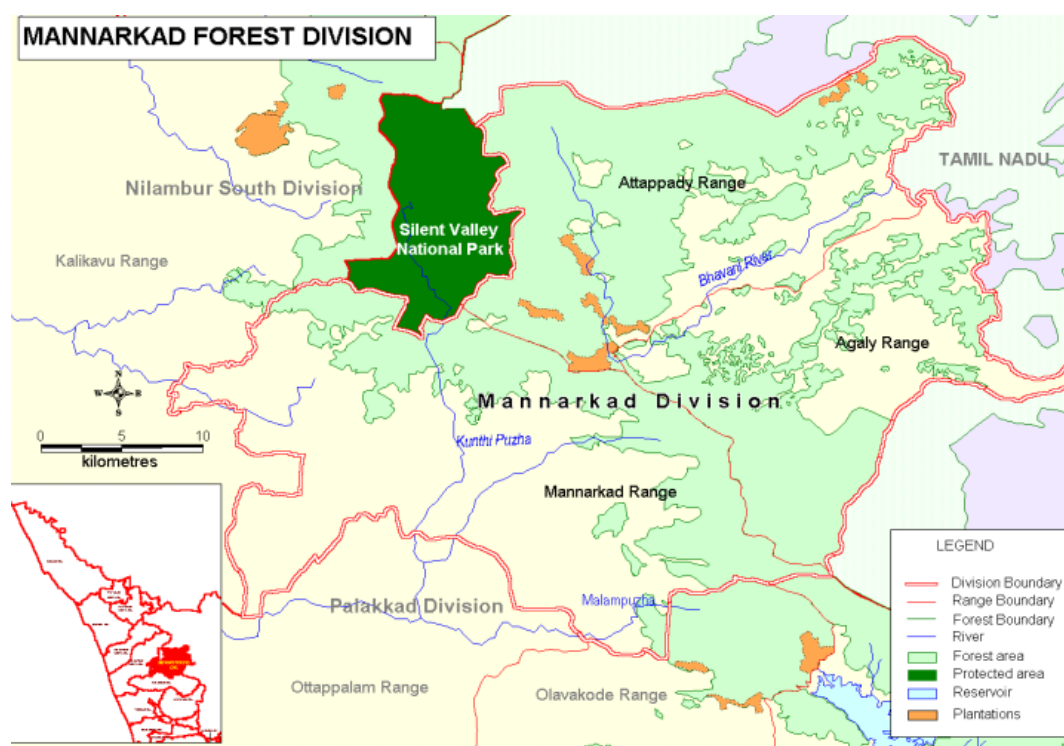
Attappady, Agaly and Mannarkkad ranges come under the Mannarkkad forest division. Total forest area comes to about 530.11 km². Vegetation consists of deciduous and evergreen forests. Of the three ranges, Attappady range has the largest amount of bamboo. The main bamboo areas in Attappady range are Gottiarakandy, Thadikkundu, Kadukumanna, Aanavayi, Panthamathode etc. Bamboo areas under Agaly range are Thachanmala, Nellipathy, Kuruvambady, Kattakkad, Puliyara, Mochikkundu, Thumbappara etc. Bamboo areas under Mannarkkad range

are Erumbakachola, Injikunnu, Edathanthukara, Cherakkampady vettilachola, Achinatty, Pandan malavaram, etc.

Status of forest in Mannarkad Division

Sl.No	Range	Forest area (km ²)
1	Attappadi	249.43
2	Agaly	129.10
3	Mannarkad	151.58
Total		530.11

Mannarkad Division shares its boundary with Tamil Nadu in the east and in the north. In the west, Nilambur south Division borders it while in the south Palakkad Division borders it.



Map of Mannarkkad Division

Attappady Range: Attappady Range is situated in the northeastern part of the Mannarkkad Division. It shares its boundary with Tamil Nadu in the east and north, and Silent Valley NP in the west. Mannarkkad Range is to the south of Attappady Range.

Agaly Range: It is situated in the southeastern part of this division. In the east Tamil Nadu shares its boundary and in the west Mannarkkad Division.

Walayar Range of Palakkad Division borders it in the south and Attappady Range in the north.

Mannarkkad Range: This range is situated in the southwestern part of this division. To the east there is Agaly Range and to the west Kalikavu Range of Nilambur south Division. Ottappalam Range of Palakkad Division is in the south and Silent Valley NP and Attappady Range in the north.

The northern part of this region is steep. The maximum value is 2100m and exists in the Attappady Range. The contours valued 600m, 900m etc are scattered all over the division. There is only one contour valued 2100m. The southwestern part is almost plain.



Cactus Forest

Palakkad forest division

The Palaghat forest division is situated between $10^{\circ} 45'$ and $11^{\circ} 15'$ of North latitudes and $76^{\circ} 26'$ and 77° longitudes east of the Greenwich.

All the reserves except the Silent Valley reserve are situated within the Palaghat and Mannarghat Taluks of Palaghat revenue district and the Silent valley reserve in the Perinthalmanna taluk of Malappuram revenue district.

The reserves of this division are distributed in five discontinuous bits. The division is bounded on the north by the Nilgiri district, Coimbatore district on the east, Nilambur forest division on the west and northwest, and Nemmara forest division on the south.

Status of forest in Palakkad Division

Sl.No	Range	Forest area (km ²)
1	Olavakkode	81.27
2	Walayar	122.35
3	Ottappalam	34.78
	Total	238.40

The total forest area of this division is 37211.9409 hectares. There are three ranges under this division Ottappalam Range, Olavakkode Range and Walayar Range. The division shares its eastern boundary with Tamil Nadu and in the west with Nilambur South Division. In the North there is Mannarkkad Division and to the South there are Thrissur and Palakkad Divisions.

State of boundaries: The boundaries are partly neutral and partly artificial. Most of the reserves lie as discontinuous blocks hence they have separate well-defined boundaries.



Map of Palakkad Division

Ottappalam Range: Ottappalam Range is situated to the western part of the division. To the east there is Olavakkode Range and to the west Kalikavu of the Nilambur south Division. Mannarkkad Range of

Mannarkkad Division and Kalikavu Range of Nilambur south Division are to the North, and Vadakkanchery Range of Thrissur Division is in the south.

Olavakkode Range: It is situated in the central part of the division. To the East there is Kollengode Range and Ottappalam Range to the west.

Kollengode Range and Alathur Range of Nemmara Division borders it in the South and Mannarkkad Range of Mannarkkad Division in the North.

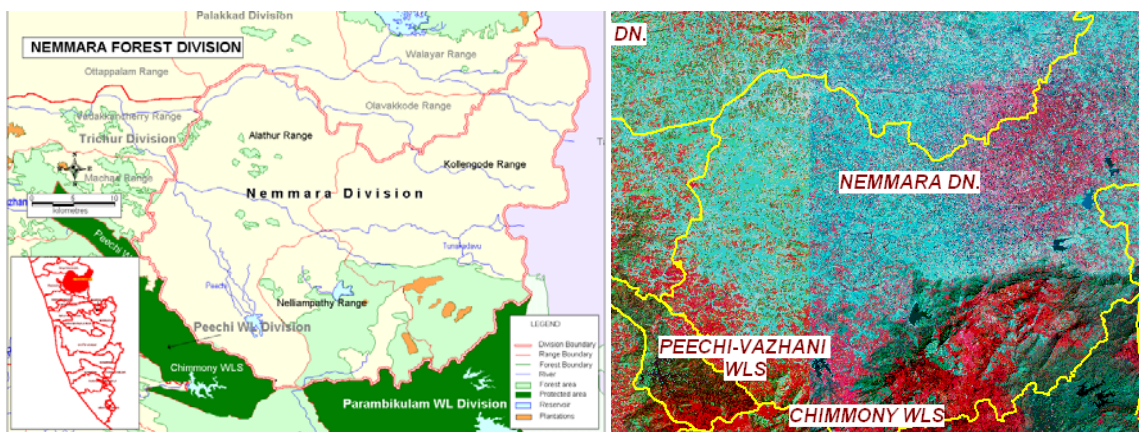
Walayar Range: It is situated in the Eastern part. In the east Tamil Nadu and Kollengode Range of Nemmara Division bound it. It is bordered in the West and South by Olavakkode Range. In the North it shares its boundary with Tamil Nadu and with the Agaly Range of Mannarkkad Division.

Vegetation in this division consists of deciduous and evergreen forest. Of the three ranges Walayar Range has comparatively more bamboo and Ottappalam Range is devoid of bamboo. The division has few bamboo plantations also.

Many of the streams and rivers are perennial due to the heavy rainfall in this area. The rivers and streams flowing through this area include Karumpuzha, Sappal Thodu, Plakattampalli thodu, Puliampally thodu and Minpallam puzha. The important rivers are the Kundi puzha, Bhavani River and Siruvani River. In the recent years, Kundi Puzha has gained importance and the Silent Valley hydroelectric scheme is proposed in this river. The main drinking water supply for the Coimbatore Township is from the Siruvani River. The southeastern part of this division is almost plain. The highest valued contours are present on the northeastern part of this division. Contours, mostly low valued are scattered throughout the division. Walayar Range has the highest value contours. Olavakkode Range is almost plain. Ottappalam Range has lower valued contours and are mostly scattered over the range. The lower valued contour is in this region. The lowest value is 50m and the highest value is 1800m in the northern part of Walayar and Olavakkode region.

Nemmara Forest Division

Nemmara Division is situated in the central part of Kerala. It shares its boundary in the east with Tamil Nadu and in the west with Thrissur Division. To the southwest there is Peechi WLS and Chimmony WLS. Chalakudy Division shares the boundary in the south along with the Parambikulam WLS. Palakkad Division bound it in the north.



Nemmara Division map

RGB image

Nemmara Division consists of Alathur, Nelliampathy and Kollengode Ranges.

Alathur Range: It is situated in the western part of the division. To the east there are Nelliampathy and Kollengode Ranges. Machad and Vadakkanchery Ranges of Thrissur Division border it in the west. Peechi WLS and Chimmony WLS border it in the south along with the Palappilly Range of Chalakudy Division. Olavakkode Range of Palakkad Division borders it in the north.

Nelliampathy Range: It is situated in the southeastern part of the division. It shares the border with Tamil Nadu in the east and Alathur Range in the west. Parambikulam WLS is situated to the south of this range. In the north Kollengode Range borders it.

Status of forest in Nemmara Division

	Range	Forest area (km²)
1	Nelliyampathy	205.94
2	Kollengode	51.79
3	Alathur	81.68
	Total	339.41

Kollengode Range: It is situated in the northeastern part of the division. Tamil Nadu shares the boundary in the east and Alathur Range in the west. To the south there is Nelliampathy Range and to the north there is Olavakkode Range of Palakkad Division.

Topography: The highest valued contour exists in the Kollengode Range of this division. The value is 1500m. The northern part of this division is plain. Lesser valued contours exist in the southern part of this division. The Alathur Range of this division is almost plain. The lowest value of the contour is 100m. The Nelliampathy Range is steep. The south western part consists of ever-green forests as they appear in red in the RGB image. The northern and the eastern part along with some of the western parts are grasslands, since they appear in light blue colour in the image. Deciduous forests are almost absent in this division.

The south western part consists of evergreen forests as they appear in red in the RGB image. The northern and the eastern part along with some of the western parts are grasslands, since they appear in light blue colour in the image. Deciduous forests are almost absent in this division.

History: The Nemmara Forest Division was first formed on 1st July 1958 as per G.O.(MS) 683 dated 27th June 1958 by integrating the forest areas from Chalakudy, Thrissur and South Coimbatore Divisions, with three Ranges namely Parambikulam, Nelliampathy and Sungam. Parambikulam Range had 20437 hectares of Forest areas with Head quarter at Parambikulam while Nelliampathy Range and Sungam Ranges had 21398 hectares and 6977 hectares with Head quarters at Nemmara and Thunakadavu respectively. Reserve war area distribution of the Ranges was as given below:

Till the first working plan for this Division was prepared in 1969-70, these 3 Ranges were managed as per the Working Plan of their parent Forest Divisions respectively. The First Working Plan for Nemmara Forest Division was prepared by Shri. K.P. Chandrasekharan and Mohammed Moosa for the period from 1969-70 to 1983-84. Even before the commencement of the preparation of the First Working Plan, about 6319.30 ha of natural forests coming within the tract dealt with, was converted into teak plantations from 1961 onwards by the Special Division namely 'Parambikulam Teak Plantation Division'.

All the Private Forests in the State of Kerala were Nationalised as per the Act 26 of 1971. (The Private Forests Vesting and Assignment Act), with effect from 10.5.1971. A separate Forest Division was formed for the management of Vested Forests within the Palakkad Revenue District and the Division was named as Palakkad Special Division. A separate Working Plan was prepared for Vested Forests of the Special

Division by Shri. P.K.Zacharia, for the period from 1980-81 to 1989-90.

The Forest Divisions within the Palakkad Revenue District viz. Palakkad, Palakkad Special and Nemmara Forest Divisions were amalgamated and re-organised to form Divisions and Ranges with compact administrative units of areas by bringing them within the District/Taluk boundaries as per G.O.(MS)121/89/ F& WLD: dated 28.12.1989, for administrative convenience and better protection of the forests. But the Parambikulam Wildlife Division was allowed to keep its entity and hence no alteration was made to its boundaries. Thus the present Nemmara Forest Division was formed with Headquarters at Nemmara, with three Ranges consisting of 205.517 sq km. of Reserve Forests and 145.6858 sq km.of Vested Forests coming within the Revenue Taluks of Chittur and Alathur, excluding the area of Wildlife Division . The three Ranges of the present Nemmara Division are Alathur with Headquarters at Vadakkencherry , Kollengode with Headquarters at Kollengode and Nelliampathy with Headquarters at Nemmara . Thus the present Nemmara Division started functioning from 1.4.1990.

Nelliampathy Reserve Forest is the largest and extensive block having an extent of about 200 sq km. This extensive tract is an un-surveyed area. The notification as per which the tract became Reserve Forest does not give the exact extent of this block. At the time of the notification itself the tract had a number of estates strewn around and they were treated as enclosures within the Reserve Forests. Again in another notification published in Cochin Government Gazette dated 11.2.1933, 11nos. estates, which were relinquished, were declared as Reserve Forests.

Extensive area within the Nelliampathy Reserve Forests were leased out to private individuals and limited companies even before the settlement for raising cash crops like coffee, cardomom, rubber etc. and those areas still exist as such within the Reserve Forests. It is quite likely that these estates would have encroached into the Reserve.

In addition to these diversion of forestland, an extent of 298.345ha of forest area was handed over to the Kerala Forest Development Corporation for raising cash crops. Another extent of 0.30ha to accommodate the police station and another extent of 2 acres to construct Panchayath Office were handed over to the Revenue Department on 10.8.1968 and 30.11.1976 respectively

Vested Forests: All the three Ranges in the Division consists of Vested Forest Areas. Alathur and Kollengode Ranges comprise only Vested Forests, where as Nelliampathy Range consists both Vested Forests and Reserve Forests. Most of the Vested Forest areas are bits lying scattered in the plains and lower hills and they are in a denuded state due to over exploitation and biotic interference in the past. Many areas are rocky in nature and not capable of supporting tree growth. Certain forest tracts got vested with Government from the Venganadu Kovilakam of Kollengode, Puzhakkalidam, Nellikkalidam etc are extensive areas lying contiguous with the Reserve Forests of the Division. As per the Administration report for 93-94 of Olavakkode Circle, the extent of Vested Forests in the Division is 146.9326 Sq. Kms. All these areas were demarcated and surveyed.

Natural Forests: As per records the forest area in this Division is about 351.2032 sq km. But actual wooded area will be considerably less. In the past major portion of the forests was wet evergreen type, with luxuriant vegetation and a bewildering array of species. Under the influences of various biotic factors, considerable extent of rain forests were deteriorated and retrogressed into the sub-climax types or even to the lower seral stages. Bulk of the Reserve Forests of the Division is even now of wet evergreen type, barring few patches here and there. The upper slopes of the various criss- crossing ridges in the ghat ranges are bare of tree growth, covered either with grassy patches or open with rocky out crops. The forests in the Palakkad gap are almost open, with comparatively short boled trees. Certain patches of forests even now retain the peculiar characteristics and features of the wet evergreen types, inspite of the fact that they are incessantly subject to all types of adverse influences. Considerable extent of wet evergreen forest areas, that were leased out, were converted into various plantations of cash crops, though they still retain the title reserved forests. Almost all the vested forest areas were over-exploited in the past, as well as even after their nationalization. Hence major portion of such areas were depleted and now supports only secondary growths, while certain other areas have become open barren lands.

Bamboos, Reeds and Rattans: There is heavy demand for bamboos, both from the locals and outside areas. They are used for the construction of huts, sheds, pandals, fencing, and for scaffolding in the concrete works. They are also used in cottage industries for making baskets, mats and other household articles. The Kerala State Bamboo Corporation at Angamaly, Grasim Industries at Mavoor and

The Hindustan News Print Ltd at Velloor, and many paper mills in the adjoining state require bamboos as raw materials. Bamboos are available in the forests of this Division.

Reeds are used locally for making baskets, toys and mats. Reed areas are not extensive and in remote area, as such economical exploitation was not yet attempted. Canes are hardly available in these forests for extraction. As per the recent Government order G.O. (MS) No. 26/86 Forest dated, 11-2-86, canes are to be supplied to the Kerala State Harijan-Girijan Co-operative Federation. Bamboos and reeds are generally allotted to the industrial concerns as per Government Orders. They are also permitted to be collected as head loads by the traditional labourers and tribes on the strength of seigniorage pass, for their bonafide uses.

Non Wood Forest Produce: The forests of the Division are rich in a variety of minor forest produces, which include honey, wax, tamarind, spices, oil seeds and plants having medicinal properties. Due to the significance gained by the indigenous system of therapy during the recent past, the medicinal plants are having much demand. Though the Girijan co-operative societies are empowered to collect the items, illegal collection by the locals is on the increase, because of the attractive prices that these items fetch. The important non-timber forest produces available in this tract are honey, wax, tamarind, and plants that yield spices, oil seeds and such other parts having medicinal properties. Erankoles, canes, dammer, etc are also available in this tract

Kollengode Range

Forests of Kollengode Range lie adjacent to the forest of Sungam range and forests of Nelliampathy Range. Northern edge is a steep ridge. The region on the top form a kind of plateau. The steep ridge form a barrier to ready access. Map shows paths leading from Nelliampathy and Sungam areas. There are estates inside the forest area. Chulliar reservoir is situated just below the ridge. Meenkara reservoir is in the plains. There are small plantations. RGB image appears as evergreen areas with several rocky areas. FIP Map shows the area as containing evergreen, deciduous and degraded forests.

Alathur Range

Alathur Range has continuous forests with Chimmony WLS. The region adjoining Mangalam reservoir is hilly. Roads from NH 47 reach many parts of the range. Forest consist of few small patches.

Mangalam dam comes inside the range. Main forest adjoining Chimmony is deciduous in nature. The patches in the plains appear mostly deciduous with some reddish areas. RGB image shows large patches of evergreen and deciduous forest. Deciduous forest are mostly on the fringes. There are several blank, rocky hill tops.

Nemmara Range

Forests of Nemmara and Kollengode are situated on a hill chain. The region is hilly. Pothundy side is steep. Estates are on a flat crest line. There is road to Nelliampathy from NH 47. A large patch of estates occupy valleys in the upper reaches. Pothundi dam is inside this area. The forest in the upper reaches, including the trees in the estate region look mostly evergreen. Evergreen, deciduous and degraded forests occur in this region.

Choolannur Pea Fowl Sanctuary.

The Government has accorded administrative sanction for implementation of a scheme for development of a Pea Fowl Sanctuary at Choolannur, in two vested forest bits, one bit having an extent over 202ha in Alathur Range and the second bit having an extent over of 280ha lying contiguous with the first bit in Thrissur Forest Division. It is proposed to implement the scheme during the VIII th plan period itself ie from 1993-94 to 1996-97 with an expenditure of 37.14 lakhs. Peacocks are found in a better concentration in the vested forest of Choolannur area. There are about 100 to 150 Pea Fowls in the area. The area is to be declared as a Pea Fowl Sanctuary, in order to protect the National Bird and its habitat. The tract was degraded considerably due to over exploitation by cattle grazing, annual fires and other biotic interferences in the past. About 10ha of the area supports sparse tree growth, about 100ha supports secondary growth of moist deciduous species and the balance area is barren with rocky patches. The area is almost plain with small hillocks here and there.

Central Region

The central part of Kerala comprises the Central Region. The Palakkad Division and Nilambur South Divisions of the Olavakode Region bounds it in the north. In the east, Tamil Nadu bounds it and in the west the Arabian Sea. In the north Mankulam, Munnar, Kothamangalam and Kottayam Divisions of the High Range region border it. The Central Region comprises of Thrissur Division, Chalakudy Division, Vazhachal Division, Malayattur Division and Peechi WLS.

Thrissur Division is the northernmost division in this region and is bounded in the west by Arabian Sea. Peechi WLS and Nemmara Division of the Olavakode Region bound it in the east. In the south it is bounded by Chalakudy Division and, in the north by Palakkad and Nilambur South Divisions of the Olavakode Region. Chalakudy Division is situated to the south of the Thrissur Division and Arabian Sea bound it in the west. Vazhachal Division border it in the south and Parambikulam WLS of the Olavakode Region along with the Vazhachal Division border it in the east. Chimmony WLS is situated to the north of Chalakudy Division and to the west of Nemmara Division. To the north of Chimmony WLS, Peechi WLS is situated. Thrissur Division is to the west of Peechi and Nemmara to the east. Vazhachal Division is bordered on the east by Tamil Nadu and on the west by Arabian Sea. Chalakudy Division and Parambikulam WLS of the Olavakode Region border it in the north and in the south, Malayattur Division. Vazhachal Division borders Malayattur Division in the north and, Kottayam, Kothamangalam, Munnar and Mankulam Divisions of High Range region border it in the south. In the east it is bounded by Tamil Nadu and in the west by Arabian Sea.

Administrative units

No.	Name	Area (km ²)
1	Nemmara	336.94
2	Parambikulam	274.14
3	Thrissur	210.01
4	Chalakudy	279.71
5	Vazhachal	413.94
6	Malayattur	617.77
7	Peechi Vazhani, ChimmonyWLS	201.73
	Total	2334.24

Study area covers the forests of Central region of Kerala, consisting of Nemmara, Thrissur, Chalakudy, Vazhachal and Malayattur forest divisions and Parambikulam, Peechi-Vazhani, Chimmony and Thattekad wildlife sanctuaries (Fig. 3.1.1). General features of the region are presented and the area described division wise. Geologically, the region consists of several structural lineaments through which most of the rivers flow (Fig. 3.1.2). Geographically there is no clear demarcation to the southern and eastern sides. Unlike in many parts of Kerala even the state boundaries do not run along a crest line in these areas. There is a large chain of hills on the eastern side of the central region. They include Anamalai hills (TN), the Eravikulam plateau and the Palni hills (TN).



Map of central region

Nemmara Division: Forests immediately south of the Palghat gap are in this region. The hills are particularly high reaching a height of more than 1000m. On the western side, there is another chain of hills.

Thrissur Division: A series of hills form the boundary of Thrissur Division, Peechi – Vazhani Wildlife Sanctuary and Chimmony Wildlife Sanctuary come in this division.

Chalakudi Division: The chain of hills from Chimmony Wildlife Sanctuary extends into Chalakudy and Vazhachal Divisions.

Vazhachal Division: Parambikulam Wildlife Sanctuary: Excepting the western region, Parambikulam Wildlife Sanctuary is more or less plain. There is a chain of hills adjoining hills of Nelliayampathy on the western side.

Malayattoor Division: Malayattoor Division has a series of low hills on the north, middle and southern sides. Several reservoirs are situated inside this.

Four major rivers drain the area. Bharathapuzha to the north, Manali, Kurumali and Chalakudy rivers in the middle region and Periyar in the south. Bharathapuzha river is on the northern side of the area. Much of Nemmara Division is drained by tributaries of this river. A short river originates from Vazhani area and flows west. There is a small man made reservoir at Vazhani. The next major river system is Kurumali. It has two major components Manali originating in Peechi area and Kurumali River originating in Chimmony area. Kurumali River has two branches Chimmony River and Mupli River. Manali and Kurumali rivers join and empty into Cannoli canal, which is a water body running in north-west direction.

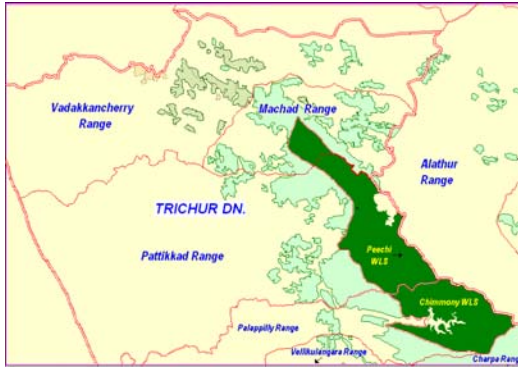
The next major river system is that of Chalakudy River. Thekkadi River and Parambikulam River join and flow west wards. Karappara River from northern side and Sholayar from southern side joins this river to form the Chalakudy river. Malayattur Division is drained by tributaries of Periyar. Forests form a more or less continuous stretch from Palghat gap to Periyar River. The forest adjoining inhabited areas plains are highly fragmented. Satellite image shows the overall vegetation clearly.

Thrissur Forest Division

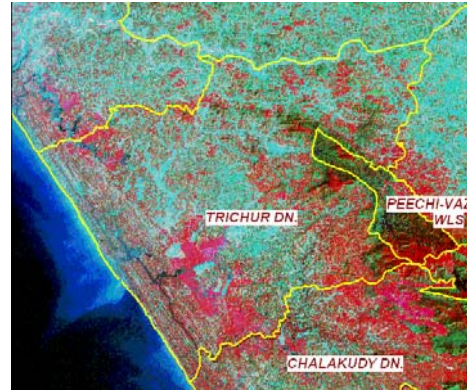
Thrissur Division consists of Vadakkanchery, Pattikkad and Machad Ranges. Because of the geographic continuity Peechi Wildlife Division is also included in this section. Vegetation is almost deciduous. Bamboo is generally sparse in drier regions. Bamboo is distributed in small patches all over the division. Thrissur Division is situated in the central part of Kerala. To the east there is Nemmara Division of the Olavakkode region and Arabian Sea is in the western side. Palakkad Division and Nilambur south Division shares the boundary in the north and Chalakudy Division in the south.

Vadakkanchery Range: It is situated in the northern part of the division. Arabian Sea is in the western side and, Machad and Alathur Range of Nemmara Division in the east. Pattikkad Range is situated to the south and Kallikavu Range of Nilambur south Division to the north.

Pattikkad Range: Pattikkaad Range is situated to the southern part of this division. Peechi-Vazhani WLS is situated in the east and Arabian Sea is in the western side.



Map of Thrissur Forest Division



RGB image of Thrissur Division

To the south there is Palappilly Range of Chalakudy Division and to the north there is Vadakkancherry Range.

Machad Range: Machad Range is situated to the eastern side of this division. Alathur Range of Nemmara Division shares the boundary in the east and Vadakkancherry Range in the west. Pattikkad Range and Peechi-Vazhani WLS are to the south and Vadakkancherry Range to the north.

Area break up of forest in Thrissur Division

	Range	Total forest area (Km²)
1	Vadakkancherry	58.86
2	Pattikkad	59.44
3	Machad	92.34
4	Peechi WLS	126.73
	Total	337.37

The western part and south eastern part of the division has evergreen forests. It is also found in the north eastern part. Grasslands are present throughout the division. Deciduous forest is present along the south eastern border. The eastern part of the division is steep. The highest one is 1200m and exists in the Pattikkad Range. The western part of the Vadakkancherry and Pattikkad Range is plain. The minimum value of the contour is 10m. The eastern part of this division is having contours of low value and the only high value contour is 1200m.

No details before the year 1750 are available. Between 1760 and 1780 Portuguese and Dutch traders extracted large quantities of

teak from forests owned by local chieftains and exported them to their countries. After 1800 AD, forests of this division were managed under lease system. During the next 100 years teak was extracted under departmental supervision which led to degradation of forests. After this attempts were initiated to improve forests and to make the harvesting plan based.

In 1921 a Working Plan was prepared for this division. It was not brought into operation due to the proposal to assign large areas of forest lands for cultivation as a result the forests were continued to be managed on the basis of Annual plan of operations. Between 1921 to 1931 the most important operation of department was extraction of timber. In the 1930s attempts were made to promote regeneration of forests in area such as Killannur and Kuthiran. Between 1938 and 1949 large extent of forest lands were clear felled for "grow more food programme". These also led to encroachment of forests. The great demand for all types of timber, even inferior species, after 1940, encouraged the department to exploit all over-mature tree growth in all accessible and inaccessible forests of this division. In 1955 when the first working plan was prepared the forests of Thrissur Forest Division were subjected to utilization for food production, and encroachment.

The first Working Plan for Thrissur Forest Division was written by Shri. M.P. George for the period from 1955-'56 to 1969-'70. The main objects of the plan were: To improve the growing stock in the forests, improve grazing facilities, protect catchment areas and to improve production of fire wood and small timber to meet local needs. It had five Working Regions, Conversion Working Region, Selection Working Region, Protection Working Region, Bamboo Working Region and MFP Working Region. It gave an impetus for the scientific management of forests of this division but all the prescriptions were not followed strictly. The plan was continued up to 1973

The second Working Plan was written by Shri. K.J. Joseph for the period from 1973-'74 to 1982-'83. The Nelliampathy Range which was part of the first plan was excluded in the second plan. The main objectives of this plan were to bring maximum area under intensive management by raising large scale plantations, to suggest some modifications required in the past systems of management for some areas where they were already subjected under some system or other and to increase the production of industrial raw material. It had nine Working Regions, they were Teak plantation Working Region, Teak

cum softwood Working Region, Industrial wood Working Region, Cashew Working Region, Bamboo Working Region, MFP Working Region, Protection Working Region and Miscellaneous Working Region. Large areas under teak plantations in a way reduced illegal wood cutting. A number of industrial plantations were also raised in this plan period.

Though two working plans were prepared and executed for the period 1955 to 1974, no considerable measures were taken to conserve bio-diversity, conserve soil moisture, control forest fires, grazing and to prevent encroachment. The overall objectives of the working plan has been protecting and improving conditions of Natural forests in order to conserve Bio-diversity, conserve soil and moisture conservation, to improve productivity of plantations, to improve living conditions of hill men and to inspire people and their outlook towards forests. To achieve all these objectives, six Working Regions 1) Watershed management Working Region (3911 Ha), 2) Industrial plantation Working Region (5790 Ha eucalyptus, acacia and mixed softwood), 3) Teak plantation Working Region (2679Ha), 4) Cashew plantation Working Region (640 Ha), 5) Bamboo Working Region (1210 Ha) 6) NWFP & Tribal welfare Working Region were constituted. In addition to this, there are area chapters on Salvage felling, Wildlife management, Participatory Forest Management and Miscellaneous prescriptions.

The eastern part of the division is steep. The highest one is 1200m and exists in the Pattikkad Range. The western part of the Vadakkanchery and Pattikkad Range is plain. The minimum value of the contour is 10m. The eastern part of this division is having contours of low value and the only high value is 1200m.

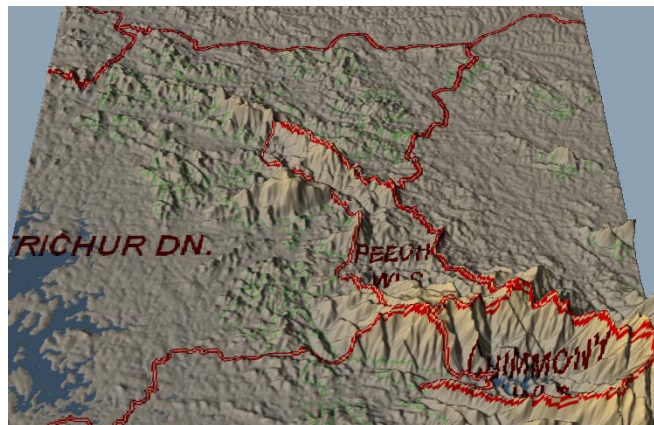


Fig. 3.2.2 Three-d view of the central region

Vegetation

The western part and south eastern part of the division has evergreen forests. It is also found in north eastern part. Grasslands are present throughout the division. Deciduous forest is present along the south eastern border.

Constituent Ranges

The area under the division is divided into three ranges, Pattikkad, Machad and Vadakkanchery. Of these Machad is the largest with about 100km² forest areas. The other two ranges are about half this size.

Pattikkad Range

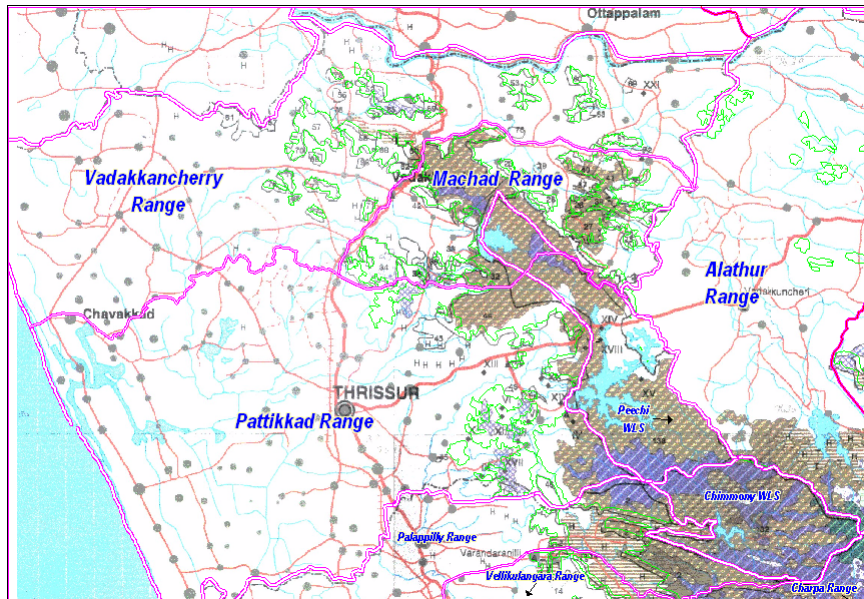
Forests situated on either side of NH 47 constitute the Pattikkad Range. Administrative jurisdiction extends over a large area up to sea coast. Areas outside the wildlife sanctuary falling under the previous Peechi Range is being intended to be brought under this range. Major feature is Vellani Pacha, a ridge of forest with evergreen forest. The Kerala Forest Research Institute is situated in a leased area in the range. Range office is situated at Pattikkad, beside NH 47. There is difference of opinion regarding the viability of region on the western side of NH as a separate entity.

Topography: The region is highly hilly due to the presence of Vellani Pacha ridge and other hills. Streams leading to the Kurumli River drain the area. Some of the irrigation canals pass through forest areas and contribute to increased water availability. The NH 47 cut through the hills in the Kuthiran region.

Accessibility: The forest is accessible through roads starting from the National High way. Vazhani region is separately accessible from Vadakkanchery side.

Forest continuity: There are two large isolated patches of forest. There are two large continuous parts, one adjoining Peechi-Chimmony wildlife sanctuaries and the other on either side of Machad Mala.

Anthropology: The region is remarkable in two respects. Presence of tribals of Malayan community and presence of large number of settlers. The former in Kuthiran area have been asking for facilities.



FIP map showing major vegetation types

Vegetation: FIP map shows most of the region as degraded deciduous. A small region near Chimmony-Peechi wildlife sanctuary is shown as degraded ever green forest. Vellani Pacha contains evergreen and semi evergreen forest, but there is much degradation due to human interference from nearby villages. The dry forests are generally of a stunted nature. Isolated bits are mostly deciduous, while large patches have evergreen forest.

Plantations: There are teak plantations inside the range. [Details.](#)

MFP: Pattikkad Range forms an important source of medicinal plants for the Thrissur region. Many people are involved in their collection and marketing.

Machad Range

Forests of Machad Range form the catchment area of Vazhani reservoir. Part of the range has been demarcated as wildlife sanctuary along water shed. There is difference of opinion regarding the viability of region on the western side of NH as a separate entity. Topography: The forest is on either side of hill that runs in NW direction. The region is drained by streams leading to Vazhani reservoir. Vazhani river flows west and joins a series of coastal canals.

Accessibility: Machad range is accessible from the Pattkkad side and from Vazhani side.

Forest continuity: The forest consists of a main stretch along the Vellani Pacha ridge and isolated forests in two clusters on either side of the ridge.

Vegetation: FIP. Vegetation is mostly degraded moist deciduous, some parts are shown as degraded evergreen. Machad hill has the appearance of evergreen forest in RGB, although FIP describes most of it as moist deciduous. **Plantations:** Various plantations have been attempted in the range.

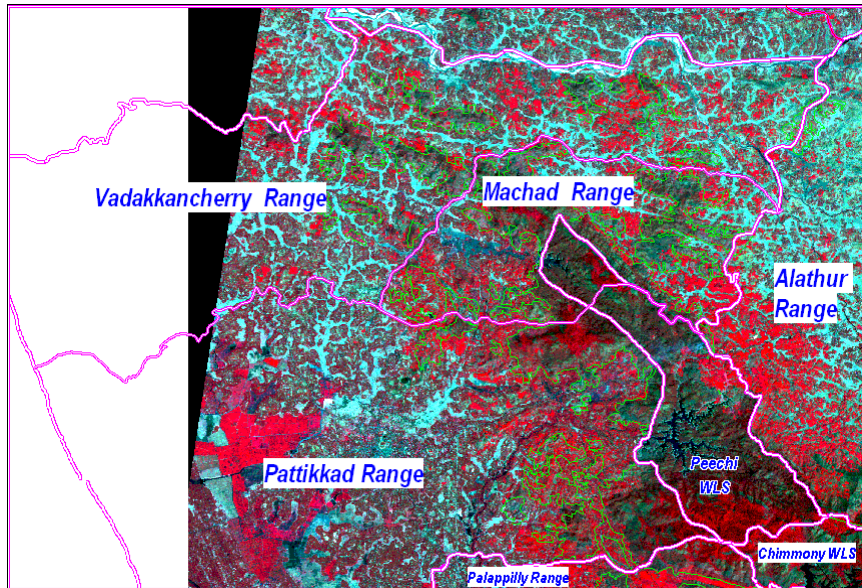


Fig. 2.3.3 RGB image of Thrissur forest Division

Vadakkanchery Range

Several scattered bits of forests constitute the Vadakkanchery Range. The administrative jurisdiction of the range extends up to the sea coast.

Topography: Forests consist of few isolated hillocks.

Accessibility: The forests are in general well connected by the Thrissur-Shoranur road and various other interconnecting small roads. A railway line also passes through the area.

Vegetation: There is hardly any trace of original vegetation left in the forest patches which have been converted to plantations of teak or eucalyptus. **Plantations.** There is reddish tinge in some of the patches.

Peechi Wildlife Division

Peechi – Vazhani wildlife sanctuary was formed by combining parts of Peechi, Pattikkad and Machad ranges on 6-8-1958. Area of

the sanctuary is 125 km². The Vazhani region is still under the administrative control of Machad Range. Contains two reservoirs Peechi and Vazhani.

History: Between years 1760 and 1780 forests changed control from local chieftains to Cochin State. In 1949 the forests were organized under two divisions, Thrissur and Chalakudy. Peechi-Vazhani was declared wildlife sanctuary in 1958. There was reorganization of ranges in 1968. Until 1996 the sanctuary was under administrative control of Thrissur Division after which administration was transferred to Peechi wildlife Division. First management plan covered 1990-2000 period. Interim management plan covered 2000-2002. Under the first management plan, the sanctuary was divided into core zone, buffer zone and Tourism zone. Small scale operations in teak plantations and inter planting of bamboo were some of the activities. Thalappally Girijan society collected a variety of MFP consisting mainly medicinal plants and honey from the forests. Latest working plan was prepared after wide discussion at various levels with stakeholders' participation. Current management plan stresses conservation of biodiversity. The office is located at Peechi. It is also the Division head quarters for Peechi Wildlife Division which comprises of the Peechi – Vazhani wildlife sanctuary and Chimmony wildlife sanctuary.

Topography: Altitude of the sanctuary varies from 100 to 1000 m. Vazhani area is drained by streams leading to Wadakkanchery Puzha. Other areas are drained by streams leading to Kurumali and Manali rivers. Water spread area of two reservoirs is 14.79 km². There are three vayals of 1, 5 and 10 ha area inside the sanctuary.

Accessibility: The sanctuary is accessible through road originating from NH 47. **Enclosures:** There are encroachment problems in tribal and non tribal areas.

Vegetation: About 80% of the area is moist deciduous, 15 evergreen and 5 % under plantations of teak and soft wood. There are areas where teak occurs naturally? There are teak and soft wood plantations. Plantations are mainly near inhabited areas. There are failed plantations. Soft wood plantations consist of *Bombax malabaricum*, *Ailanthus malabaricum* and *Acacia auriculiformes*. Teak 363.507 ha, Soft wood 582.437 ha, Belt plantation 44.400 ha and miscellaneous plantation: 692.57 ha. Elephant, gaur, sambar deer, sloth bear, bonnet macaque, Malabar giant squirrel, wild dog, spotted

deer are seen in the area. Movement of tiger and leopard from adjoining Parambikulam areas are also reported,

Chimmony Wildlife Sanctuary

Till the formation of Peechi Wildlife Division in 1996 Chimmony WLS was under the administrative control of Thrissur Division. The first management plan for the wildlife sanctuary covered 1990-2000 period. The current working plan was made with stake holder participation. The Wildlife Sanctuary was formed from parts of Palappilly Range. Total area 85.067 km². The entire area is one section.

History: History before 1900 cover various lease systems for extraction of timber and fire wood. Cyclone of 1940 and clearance of forests under 'Grow More Food' schemes affected forests adversely. Till formation of Peechi Wildlife Division, administration was by Chalakudy Division and Parambikulam Wildlife Sanctuary.

Previous management: As per the first working plan (1990-2000), the sanctuary was divided into core zone, buffer zone and tourism zone. The zonation is maintained in the current (2002-2010) management plan. Parts of chimmony Wildlife Sanctuary was subjected to selection felling as per MP Goerge's working plan (1955-70). Clearing trees of submergence area occurred between 1975 and 1980.

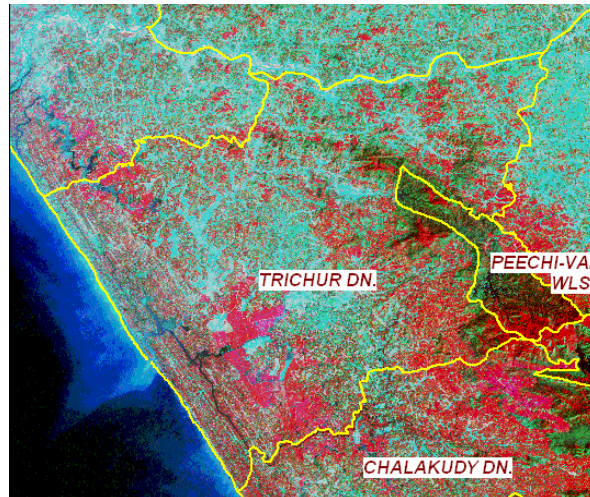
The sanctuary is contiguous with Parambikulam Wildlife Sanctuary, Vazhachal and Chalakudy Divisions. Office is located at Chimmony. **Topography:** Altitude range from 40 to 1110 m. A large number of streams drain into the Chimmony Reservoir which has an area of 10.1 km². The Chimony reservoir is inside the sanctuary.

Accessibility: The area is accessible from NH by tarred road. There are about 10km of forest roads inside the sanctuary.

Vegetation: Vegetation consist of moist deciduous, semi evergreen and evergreen forests. There is teak and teak mixed with *Bombax malabaricum*. Total area is 328.47 ha.

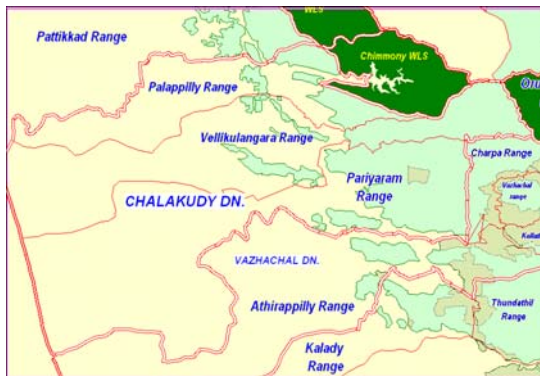
Animals: Elephant, gaur, sambar, spotted deer, wild boar, bonnet macaque, Nilgiri langur, sloth bear, etc. Wild dogs, leopard, tiger and lion-tailed macaque are also reported. Malabar giant squirrel occur in the area.

NTFP: Palappally Girijan Society collects MFP from the sanctuary. Mostly medicinal plants. Tribals residing in submersion area were shifted few times, and finally to a location outside forest in 1993.

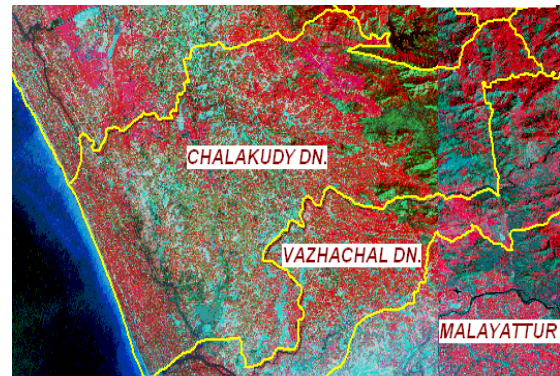


**RGB image showing major vegetation features
Chalakudy Forest Division**

Chalakudy Division consists of Pariyaram, Palappilly and Vellikulangara Ranges. Because of the geographic continuity Peechi Wildlife Division is also included in this section. Vegetation is almost deciduous. Bamboo is distributed in small patches all over the division. Chalakudy Division is situated in the central part of Kerala. In the east Vazhachal Division and Parambikulam WLS borders it. Arabian Sea is on the western side. To the south there is Thrissur Division and to the north there is Vazhachal Division.



Chalakudy Division Map



RGB image of Chalakudy Division

Palappilly Range: Palappilly Range is situated in the northern part of the division. In the east Chimmony WLS border it and Arabian Sea is in the western side. Vellikulangara Range is in the south and Pattikkad Range of Thrissur Division is in the north.

Vellikulangara Range: It is the central part of the Chalakudy Division. In the eastern side the boundary is shared by Palappilly Range and

Arabian Sea is in the western side. To the south there is Pariyaram Range and to the north there is Palappilly Range.

Status of forest in Chalakudy Division

	Range	Total forest area (km²)
1	Pariyaram	115.31
2	Palappilly	56.00
3	Vellikulangara	108.40
4	Chimmony WLS	75.00
	Total	354.71

Pariyaram Range: Pariyaram Range is in the southern part of the division. Charpa Range of Vazhachal Division borders it in the east and Arabian Sea is in the western side. Athirappilly Range of Vazhachal Division shares the boundary in the south while Vellikulangara Range in the north.

From the RGB composite of the Chalakudy Division it is seen that the eastern and north eastern part contains evergreen forest due to the red colour. The green colour shows that deciduous forests are there in the eastern as well as the south eastern part. The westernmost region has evergreen forest along the border and the light blue colour shows grasslands. Deciduous forest areas are less when compared with the other. The highest value is 1500m and is in the Vellikulangara Range. The western part of the division is almost plain. The altitude ranges from 10m to 1500m. The western part of Palappilly Range, Vellikulangara Range and Pariyaram Range are almost plains.

History: Before 1900 timber, mainly teak was extracted under various lease systems. Between 1900 and 1950 the forests of the region were divided into ranges, sub ranges and divisions at various times. The Chalakudy Division came into existence in 1950 when the forests of the erstwhile Cochin state were reconstituted into Chalakudy and Thrissur Divisions. The first working plan for the newly constituted division was made by T. P. Viswanathan(1958). Chalakudy Division was formed with three ranges, Kodasseri, Athirappally and Parambikulam. Historically there were some disputes about the forests of Parambikulam region with the Coimbatore Division.

Tramway: A notable feature of the time was the tram way and the Orukomban Working Region. Before the tram way the timber extraction, mainly timber was on a limited scale. The tramway continued to work till 1950 transporting a large quantity of timber, though not always under profit.

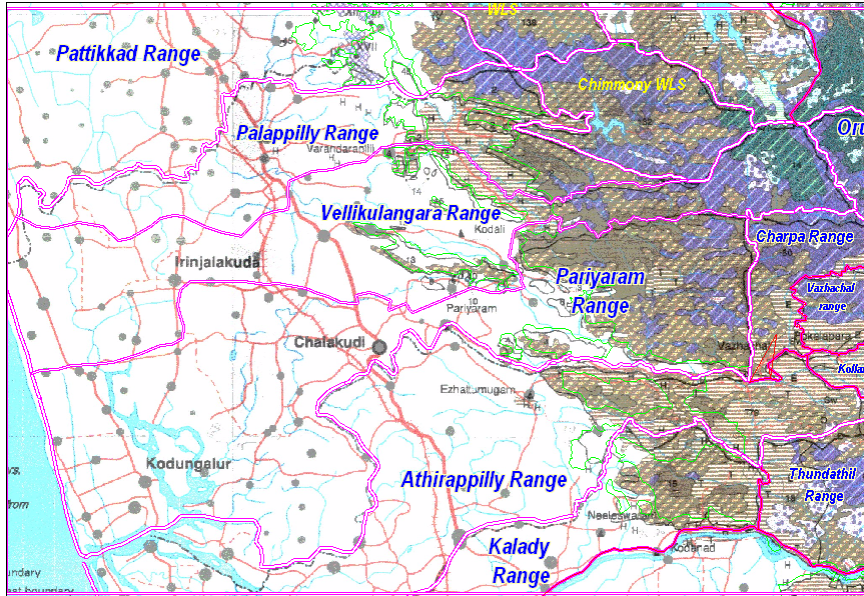
The Chalakudy – Anamalai road was constructed in 1942. The first working plan proposes conversion working region, selection working region, bamboo working region, MFP working region and protection working region. A large number of plantations were made under this working plan.

Working plan by John Koil Parambil cover the period from 1969-70 to 1978-79. Further reorganization of the ranges took place after 1958. Parambikulam Range was removed from the Division. Chalakudy Division was reconstituted in 1962 as having five ranges, Pariyaram, Vazhachal, Sholayar, Kalady and Thundathil. In 1981 the Division was again reorganized with three ranges, Palappilly, Vellikulangara and Pariyaram. Working plan gives details of sections and beats.

Palappilly Range: Palappilly Range is situated in the northern part of the division. In the east Chimmomy WLS border it and Arabian Sea is in the western side. Vellikulangara Range is in the south and Pattikkad Range of Thrissur Division is in the north.

Vellikulangara Range: It is the central part of the Chalakudy Division. In the eastern side the boundary is shared by Palappilly Range and Arabian Sea is in the western side. To the south there is Pariyaram Range and to the north there is Palappilly Range.

Pariyaram Range: Pariyaram Range is in the southern part of the division. Charpa Range of Vazhachal Division borders it in the east and Arabian Sea is in the western side. Athirappilly Range of Vazhachal Division shares the boundary in the south.

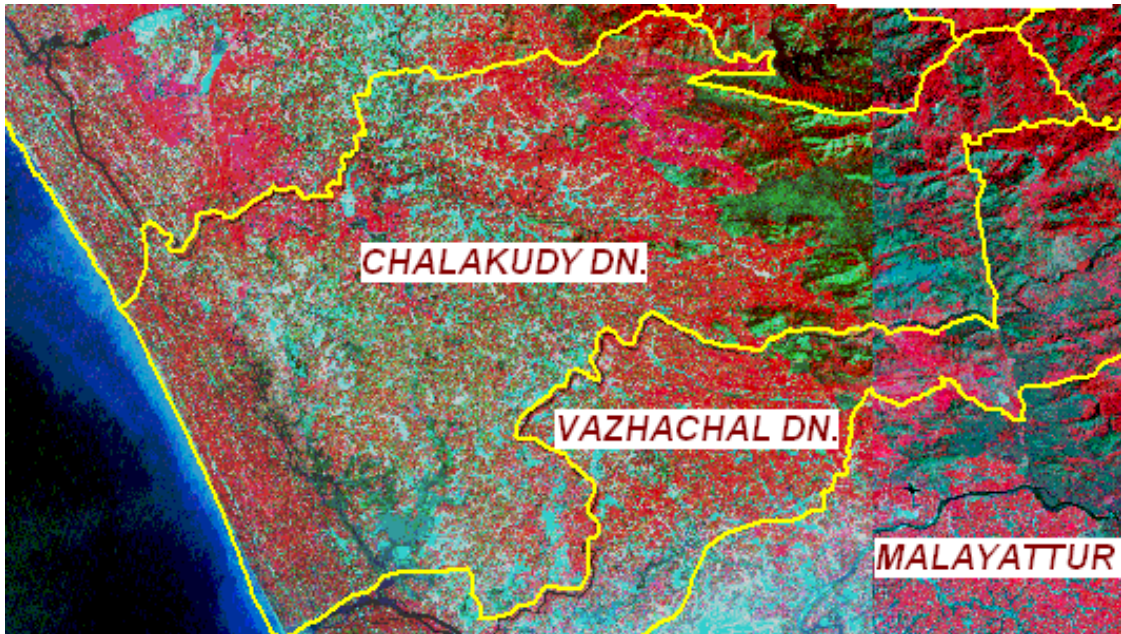


Chalakudy Division Map

Vegetation: Vegetation consists of evergreen forest and moist deciduous forest. Many of the rocky ridges are without trees. From the RGB composite of the Chalakudy Division it is seen that the eastern and north eastern part contains evergreen forest due to the red colour. The green colour shows that deciduous forests are there in the eastern as well as the south eastern part. The westernmost region has evergreen along the border and the light blue colour shows grasslands. Deciduous forest areas are less when compared with the other.

Bamboos and reeds: As per first working plan (Viswanathan, 1958), about 10,000 number of bamboos and about same number of reeds were extracted annually before the first working plan. As per the second working plan, annual yield of bamboos and reeds are placed at 15,000 and 200,000 numbers. Bamboos and reeds are used for local consumption and rafting. MFP list includes medicinal plants, canes, lemon grass oil, etc.

Tribals: The first working plan refers to Kadars, Malayars and Muthuvans residing in this area.



RGB image of Chalakudy Division

Pariyaram Range

Pariyaram range adjoins inhabited areas. In addition to forests adjoining Charpa range there are few isolated hills with forest.

Topography: Hills run in east west direction with several streams flowing west. Northern regions are drained by tributaries of Mupli pusha which is part of Chimmony basin. The area is drained by tributaries of Chalakudy river. A major rivulet forms the eastern boundary. Chalakudy river is on the southern side.

Accessibility: The range is accessible from the southern and western sides. Interstate road from Chalakudy pass through the southern region. Roads originating from the national high way extend up to the fringes of forest on the western side.

Enclosures: Topo sheet does not show enclosures, but there are isolated hills with in the forest.

Vegetation: FIP map shows degraded low elevation evergreen forest as the main vegetation. Map shows teak plantations in the middle of the range. Most of the ranges appear to be deciduous in RGB. Central region has evergreen elements.

Vellikulangara Range

This range lies north of Pariyaram range. It adjoins inhabited areas. Jurisdiction of the range extends up to the coast.

Topography: The middle region of the range is hilly. Muplipuzha drains most of the area.

Accessibility: Forests in the periphery are accessible through roads leading to the National High way. There is a road coming inside.

Enclosures: The area has scattered hillocks with forests. Map does not show enclosures.

Vegetation: FIP map shows degraded moist deciduous forests. RGB image shows the forest to be of deciduous nature. There are rubber estates in the periphery. There are plantations on either side of the road.

Palappilly Range

This range also adjoins inhabited areas. There are a large number of rubber estates in the surrounding areas.

Topography: Forest is continuous with Chimmony and Peechi wild life sanctuaries. The area is drained by Mupli river.

Accessibility: Road from Pudukkad to Chimmony pass through the area.

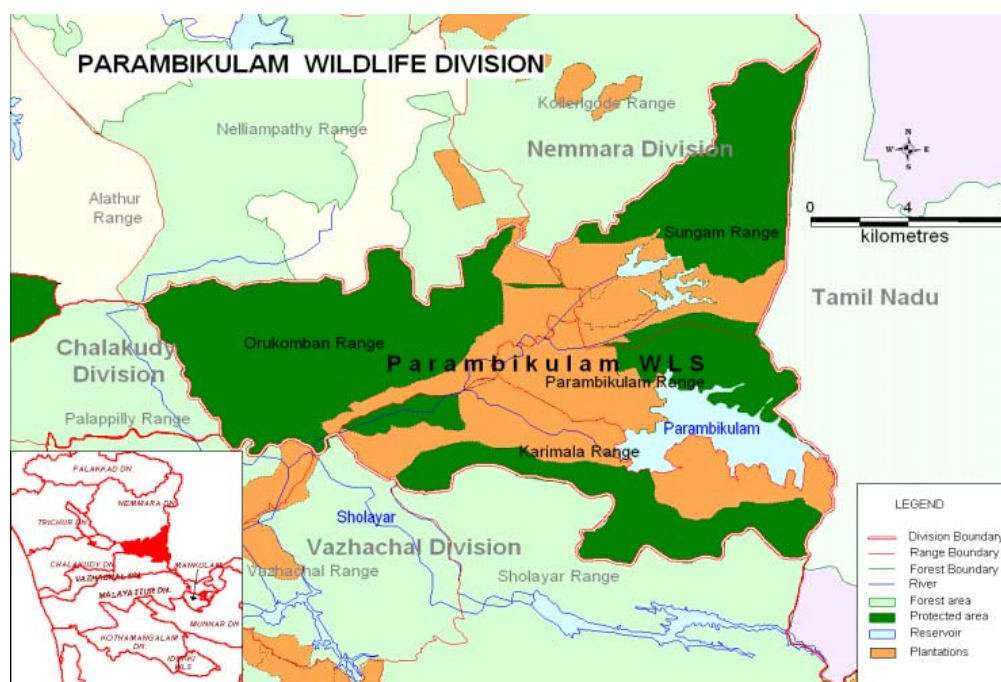
Enclosures: Map does not show enclosures but there are scattered hills with forest.

Vegetation: Isolated hills are mostly deciduous. Region adjoining wild life sanctuaries are evergreen.

FIP map shows degraded deciduous and evergreen forests. Map does not show enclosures or plantations. Forest plantations include rubber.

Parambikkulam wildlife sanctuary

The Sanctuary is located between 10° 20' and 10° 32'N latitude and 76° 35' and 76° 50'E longitude. It comes under the revenue district of Palakkad (Palghat) and the drainage basin is of Chalakkudi River. The mean annual rainfall is 2,590 mm and the total area is 285 km². The major attractions are moist deciduous forests, largest living teak of Kerala forests- the Kannimara Teak and a large variety of wildlife at close quarters.



Map of Parambikulam Wildlife Division

Status of forest in Parambikulam Wildlife Sanctuary

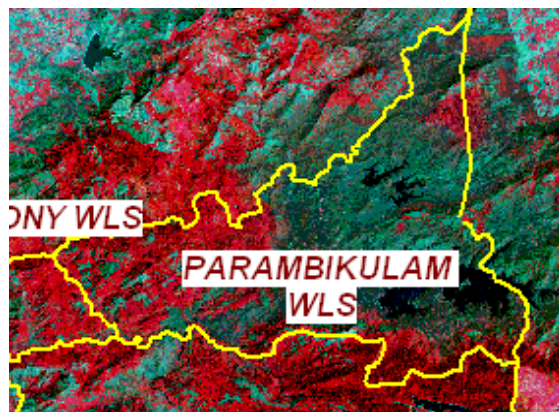
	Range	Total forest area (km ²)
1	Parambikulam	52.18
2	Orukomban	71.84
3	Karimala	68.37
4	Sungam	81.75
	Total	274.14

Parambikulam had been well known for rich forests and wildlife. Parambikulam wildlife sanctuary lies immediately south of Palghat gap in the Western Ghats. The sanctuary has an area of 285 km². Forest of the Parambikulam valley is one of the most intensively worked forest stretches in the state. The Parambikulam-Aliyar project and associated dams that came up in sixties and extensive teak plantations extending over almost 100 km² had tremendous impact over the biodiversity of the forest tract. Wildlife sanctuary was notified in 1962 which is contiguous with the Anamalai Wildlife Sanctuary of Tamil Nadu. Parambikkulam Wildlife Sanctuary is the upper catchment area of the Chalakkudy River. It is the third largest protected area in the state. A giant teak tree 40 m high and 6.4 m in

girth is a standing monument of the past, aptly named 'Kannimaram' the significance of this sanctuary in protecting the ecosystem diversity of the southern Western Ghats is important only when it is taken into consideration along with the adjacent Peechi-Vazhani Wildlife Sanctuary and the Chimmony Wildlife Sanctuary in Kerala. The tribal communities viz. Kadars, Malasars and Muduvas live inside the sanctuary in five settlements.

Evergreen forest is present in the western part; these areas are red in the RGB image. The eastern part is green and so contains deciduous forests. There are grasslands also.

Topography : Several streams originate from the hill ranges and flow down westward to join the river Chalakudi. The terrain is most undulating with a valley in the basin. The Karimala Gopuram is the highest peak (1444m). The average elevation is about 600 m. The sanctuary is situated at an elevation of 600m above MSL. The area is bound by the westerly flowing Karappara River in the west and the same river flowing easterly in part of the south. The sanctuary is contiguous across the river with the natural forests of Sholayar and Vazhachal. On the eastern side, the boundary is purely an administrative one with the forest clearance running throughout the area bordering Indira Gandhi Wildlife sanctuary of Tamilnadu.



RGB image of Parambikulam WLS

The northern boundary is defined by the south westerly flowing Thekkady River up to the central part of the area beyond which it merges with the natural forests of Nelliampathis towards north. The area in general has a slope towards west. The Tamil Nadu Government under the Parambikulam-Aliyar Project has built three Dams viz. Parambikulam, Thunakadavu and Peruvairipallam. The reservoir harbours several kinds of aquatic fauna.



Malabar Giant squirrel



Gaur

Climate: Mean annual rainfall is 2,590 mm. The Sanctuary receives heavier rains between June and August. The eastern part of the sanctuary receives more rains in October- November. Temperature drops substantially at night; mist envelops the Sanctuary in the morning hours.

Forest types: The sanctuary exhibits a spectrum of vegetation types ranging from tropical wet evergreen forests, semi evergreen forests, and moist deciduous forests to dry deciduous forests and grasslands. There are teak plantations of about 90km² area within the sanctuary. Interspersed with teak plantations, there are numerous low-lying marshy lands and grasslands locally known as vayals. Bamboo is distributed all over the sanctuary. Reeds are found along the banks of major rivers.

Tropical evergreen forests (area 50 km² approximately) and a wide variety of trees grow here. The top canopy consists of Pali, Punna, Nangu, VEDIPLAVU, Kalpine, Aini, Vellapine, Kambakam, Vellagil, Pathiri, Nedunar, etc. Lower canopy predominantly consists of Vetti, Kara, Naragam, Marotti, Kurukutti, Cheru, Mullilavu, etc. Undergrowth comprises Antidesma, Calamus, Glycosmis, Ixora species, etc.

Semievergreen forests (Extent 30 km²) both evergreen and moist deciduous species are found in these areas.

Moist deciduous forests occupy an area of 70 km². Top canopy - Manjakadambu, Vaka, Pala, Elavu, Vembu, Rosewood, Aval, Ventek, Venga, Teak, Maruthi, Pathiri, etc. Lower canopy- Arampuli, Pezhu, Konna, Kodapunna, Murukku, Kanjiram, Bamboos, etc.

Southern dry deciduous forests (extent 15 km²) Top Canopy- Teak, Vengai, Muzhukanjiram, Maruthu, Vaka, Mulluvenga, Rosewood, etc. Middle and lower canopy- Veppu (Neem), Manjanathi, Sandal, etc.

with moist patches of *Dendrocalamus* and *Bamboosa arundinacea*, Under growth is chiefly of *Lantana* and *Helicteres* besides grass. Mammals: Bonnet macaque, Lion tailed macaque, Nilgiri langur, Loris, Tiger, Leopard, Jungle cat, Civet, Mongoose, Fox, Bear, Elephant, Gaur, Nilgiri Tahr, Spotted Deer, Sambar, Barking deer, Wild boar; Pangolin etc. Reptiles - crocodile, varanus, pond terapin, cane turtle, gecko, skink, chameleon, snakes such as King Cobra, Spectacled Cobra, Krait, Viper, Python, Green keel back, Rat snake, Vine snake etc. Fishes: Aral, Bral, Vattudi, Thilopia, Noori, Mooshu, Poochutti, Kollotty, Exyprius, Taral etc.

The sanctuary harbours 26 species of large and medium sized mammals. These include Elephant, Lion-tailed Macaque, Slender Loris, Tiger, Leopard, Gaur, Nilgiri Tahr and Flying Squirrel. The reservoir and the major rivers contain crocodile. A total of 168 species of birds are reported from the area. Birds: - Darter, Little Cormorant, Black eagle, Lesser adjutant stork, Black capped kingfisher, Great Indian hornbill, Broad billed roller, Black wood-pecker, etc.



Teak Plantations



Lion Tailed Macaque

The Sanctuary is headed by a Divisional Forest Officer with head quarters at Thunacadavu and is under the direct control of the Field Director, Project Tiger. The Sanctuary is accessible by road. Buses ply between Pollachi and Parmbikulam. Pollachi is 60 kms away and has a railway station. Nearest airport is Coimbatore which is 100 km away. Visitors may have boat ride in the Parmbikulam Lake and tour the Sanctuary accompanied by guides. There is a forest rest house at Thunacadavu. The Parmbikulam Project also provides accommodation. There are several hotels in Pollachi and Coimbatore.

Parambikulam Wildlife Sanctuary is really an all-in-one sanctuary. It is endowed with luxuriant vegetation and all kinds of magnificent wildlife of the State. It is one of the best sanctuaries in the country for viewing the savage beauty of gaur, the awesome majesty of elephant and the 'fearful symmetry' of tiger. Chirping birds and gurgling streams make this sanctuary lively and lovely. Of all the sanctuaries in Kerala Parambikulam has the largest gaur population. Sambar, spotted deer, jungle cat, and lion tailed macaque, common otter, sloth bear etc. are also common. There are also a few tigers and leopards.

Parambikulam Wildlife Sanctuary stretches around the Parambikulam, Thunacadavu and Peruvuripallam dams. The reservoirs of these dams are rich in fish life and shelter a good number of crocodiles. In 1962 a small sanctuary was established in Sungam Range of Nemmara Forest Division. The area of this sanctuary was enhanced to 285 sq. km in 1973 and the present Parambikulam Sanctuary was formed. The sanctuary has dense evergreen and deciduous forests. There is a considerable extent of teak plantations also within the sanctuary. The '*Kannimari*' teak at Thellikkal measuring 46m height and 625 cm girth attracts visitors. Facilities for boarding and lodging are available at the sanctuary. There are forest rest houses at Thunacadavu, Thellikkal and Elathode. At Parambikulam there is another establishment run by Parambikulam Aliyar Projects of Tamil Nadu. Motor transport and boat cruise can be arranged on request. Thunacadavu which is the headquarters is 48 km from Pollachi. Pollachi is accessible from Coimbatore and Palghat.

Vazhachal Forest Division

Vazhachal Division consists of Charpa, Vazhachal, Sholayar, Kollathirumedu and Athirappilly Ranges. Bamboo is distributed in small patches more on the western side, along the water courses. Vazhachal Division shares its eastern boundary with Tamil Nadu and Arabian Sea in the western side. Chalakudy Division and Parambikulam WLS are to the north of the division and Malayattur Division to the south.

Athirappilly Range: Athirappilly Range is situated to the western part of the division. The eastern side is bounded by Kolathirumedu Range, Vazhachal Range and Charpa Range. The south is Kalady Range and

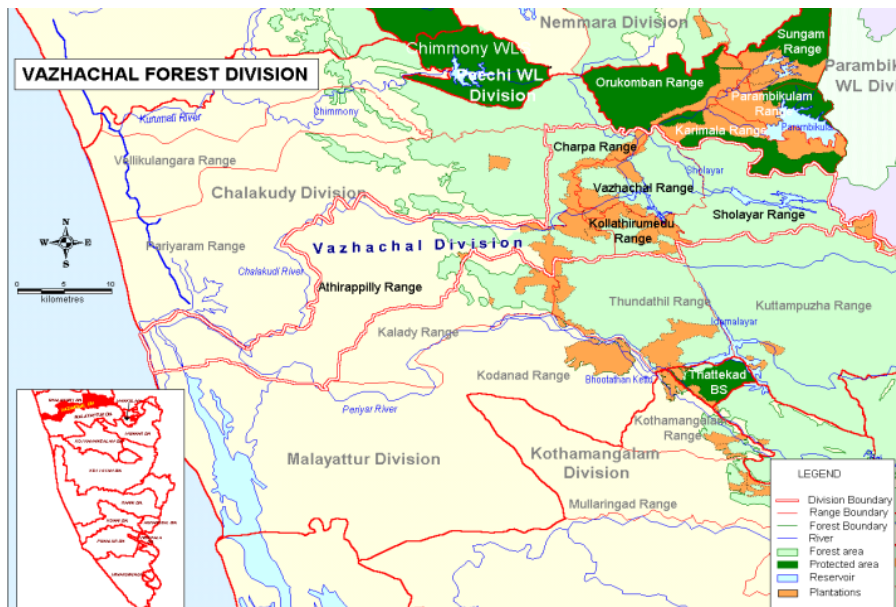
Kodanad Range of Malayattur Division. The north is Pariyaram Range of Chalakudy Division.

Status of forest in Vazhachal Division

	Range	Total forest area (km ²)
1	Charpa	59.98
2	Vazhachal	90.64
3	Sholayar	138.88
4	Kollathirumedu	29.35
5	Athirappilly	95.10
Total		413.95

Charpa Range: It is in the northeastern side of the division. To the east there is Vazhachal Range and to the west there is Pariyaram Range of Chalakudy division. Athirappilly Range and Vazhachal Range share the boundary in the south. Orukomban and Karimala Ranges of Parambikulam Wildlife Division border it in the north.

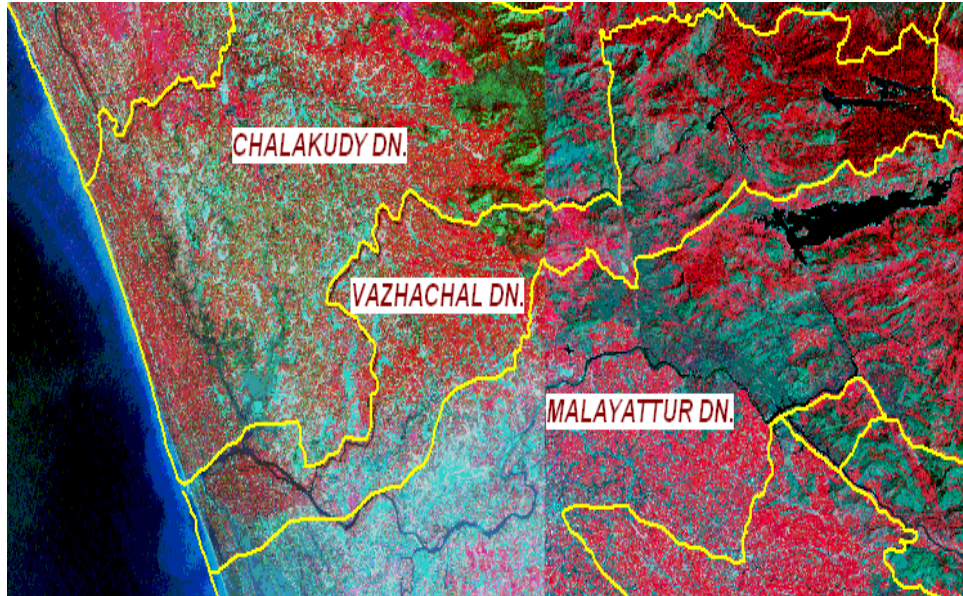
Vazhachal Range: Vazhachal Range is in the eastern part of the division. In the east Sholayar Range border it and Charpa Range in the west. Kollathirumedu Range is in the south and Karimala Range of the Parambikulam Wildlife Division in the north.



Map of Vazhachal Division

Kollathirumedu Range: Kollathirumedu Range is situated to the southern side of the division. Sholayar Range borders it in the east and Athirappilly Range is in the west. Thundathil Range of Malayattur Division borders it in the south while Karimala Range of Parambikulam Wildlife in the north.

Sholayar Range: Sholayar Range is situated in the eastern part of the division. It shares the boundary with Tamil Nadu in the east and Kolathirumedu Range in the west. Kuttampuzha Range of Malayattur Division is in the south and Karimala Range of Parambikulam WLS is



in the north.

RGB image of Vazhachal Division

The red colour in the RGB image in the eastern, central and southern part shows the presence of evergreen forest there. Deciduous forest is present in the northern part indicated by green colour in the RGB image. The light blue colour in the western part implies the presence of grasslands. The eastern part of the division is steep, highest value being 1500m in the Vazhachal Range. The Sholayar Range, Kollathirumedu Range and Charpa Range are also steep. The eastern part of the division is almost plain. The western part contains only one contour and is of value 10m.



Athirappilly Water falls

Vazhachal Forest Division was formed consequent to the reorganization of the erstwhile Central Region, Thrissur and Industrial Plantation Region, Perumbavoor to form High Range Region Kottayam and the present Central Region. The areas of this Division fall in Kodassery Reserve, Malayattur and Idayara Reserve and Athirappilly Reserve. The areas of this division were formerly parts of Chalakudy Division and of Industrial Plantation Divisions of Perumuzhi and Vazhachal. The present Vazhachal Division came into existence with effect from 1.8.1981 with its Head Quarters at Chalakudy.

Athirappally Range

This range covers the western portions of the division adjoining inhabited areas. The forest is continuous with Thundathil range and Kollathirumedu range. There are few isolated hillocks inside the range. Administrative jurisdiction extends up to the coast. Chalakudy river forms the northern boundary. There is a road along the left bank of Chalakudy River as well. A path from Kalady Range below comes into the range. This path passes through Kurisumudi. The path extends to Chalakudy river also. No enclosures are seen in topo sheet. The isolated hills are described to contain dense mixed forest with bamboo. The isolated hills have deciduous colour on the fringes and reddish colour on the hills. The main forest is a mixture of deciduous and evergreen types. In the main forest, excepting the hill range on top, forest is covered with teak and eucalyptus plantations.

Kollathirumedu Range

Kollathirumedu range is wedged between Athirappally and Vazhachal ranges. Entire area is forest. There are few low hills. Even though adjoining Chalakudi River, the middle and western portions are drained by streams leading to Periyar. The range is totally accessible as the interstate road from Chalakudy pass through the range. A foot path passing through Kurisumudi and Chalakudi river also enter the range. Topo sheet do not show any enclosures. FIP maps also show the entire area under teak and eucalyptus plantations. There are about equal quantity of red and bluish elements. The red groups are clumped together indicating particular vegetation. Most of the range is under teak and Eucalyptus plantations. As per 1:50 K topo sheet, the western portions under teak and eastern portions are under eucalyptus

Vazhachal Range

Vazhachal range also has its entire area of jurisdiction under forest. The range is remarkable in having rivers on most of the boundaries. The range is drained by tributaries of Chalakudi river. Chalakudy River flows through the middle of the range. There are hills on either side. There is Poringal reservoir inside the range. Interstate road from Chalakudy pass through part of the range. Older maps show foot paths from Parambikulam leading to the range. Older maps do not show any enclosures. Originally the range may have contained evergreen and semi evergreen forests. The FIP map shows teak plantations, low and medium elevation forests, etc. The range has considerable amount of teak plantations on the northern part and eucalyptus plantations on the southern part.

Charpa Range

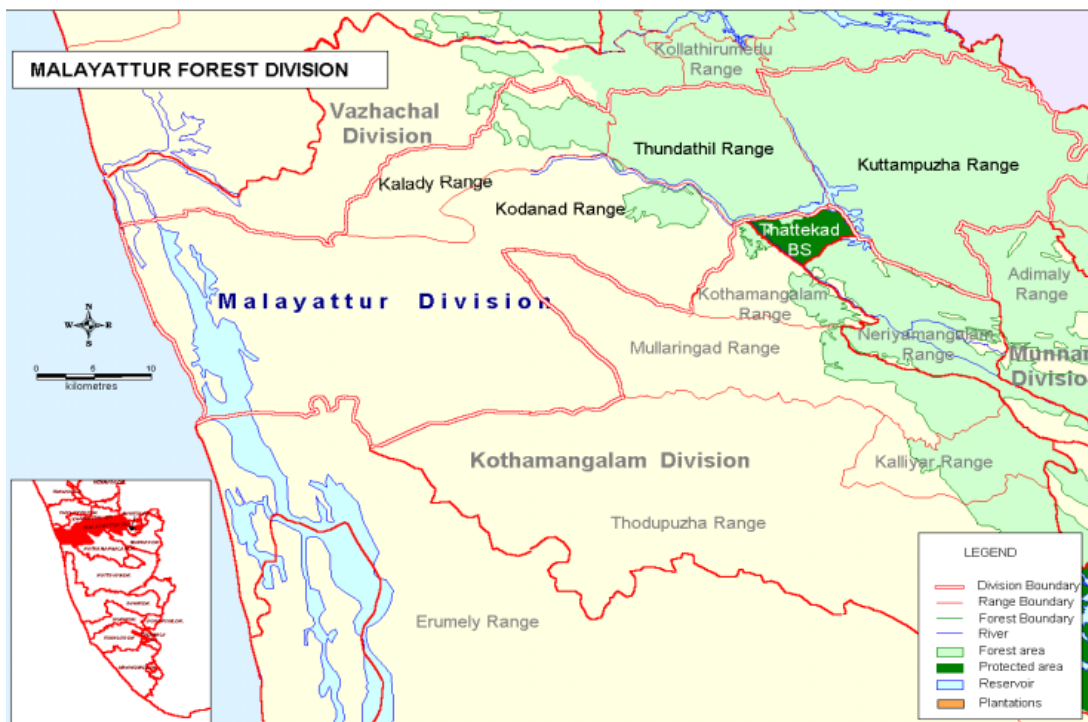
Charpa range is also remarkable in having entire area under jurisdiction being forest and surrounded by river on almost all boundaries. The range is hilly in nature being situated between two tributaries of Chalakudy river. East and west are covered by two streams, and the southern side by Chalakudy river. Accessibility is from the interstate road from Chalakudy, which pass through the southern part of the range. Older maps show foot paths from the plains extending up to the range. Recent map show a road along charpa thodu, along the eastern boundary. FIP map show degraded deciduous forests and low elevation evergreen forest. RGB show reddish areas on the northern side. The terrain is very hilly. There are plantations along road beside Charpa thodu .

Sholayar Range

There is a reservoir inside, all the area under jurisdiction is forest. The western parts are drained to the Poringal reservoir. Other parts are also drained by the Chalakudy river in circuitous manner through Orukomban and Karappara Rivers. The interstate road from Chalakudy pass through the middle of the range. No enclosures as per old map. Vegetation consists of large stretches of low and medium elevation evergreen forests. RGB image also show evergreen forests, few scattered deciduous patches are seen on the western side. In spite of accessibility from tarred road, hardly any plantation exist in the range, may be due to the evergreen nature of the forests.

Malayattur Forest Division

Malayattur Division consists of Kalady, Kodanad, Kuttampuzha and Thundathil Ranges. Bamboo is distributed in small patches all over the division. Malayattur Division shares its boundary with Arabian Sea in the western side and Tamil Nadu in the east. In the south Vazhachal Division borders it. Kothamangalam Division along with the Kottayam and Munnar Divisions of the High Range region borders it in the south.



Map of Malayattur Division

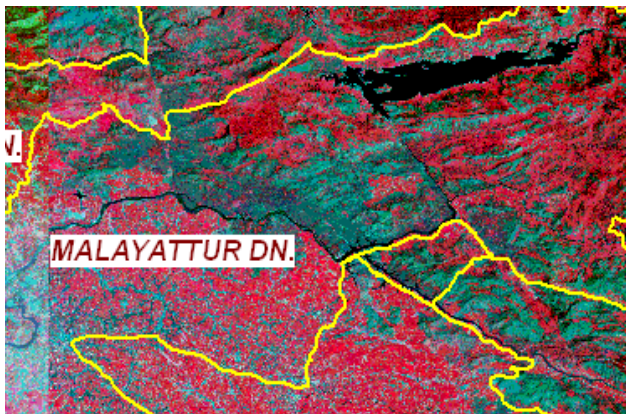
Kalady Range: Kalady Range is in the south western part of the division. Thundathil Range of the Malayattur Division along with the Kothamangalam Division borders it in the east. Arabian Sea is on the western side and Kalady Range in the north. Erumely Range of Kottayam Division along with Thodupuzha and Mullaringad Ranges of Kothamangalam Division borders it in the south.

Thundathil Range: This range is situated in the eastern part of the division. To the east there is Kuttampuzha Range and Thattekkad WLS to the south. Kalady and Kodanad Ranges border it in the west while Kolathirumedu Range along with the Athirappilly Range of Vazhachal Division borders it in the north.

Status of forest in Malayattur Division

	Range	Total forest area (km ²)
1	Kalady	72.51
2	Kodanad	56.74
3	Thundathil	131.40
4	Kuttampuzha	357.11
	Total	617.76

Kuttampuzha Range: It is situated in the eastern part of the division. Anakulam Range of Mankulam Division along with the Munnar Range of Munnar Division borders it in the east and Thundathil Range in the west. Adimaly Range and Neriya mangalam Range of Munnar Division borders it in the south while Sholayar Range of Vazhachal Division borders it in the north.



The eastern side and the south western part of the division contain evergreen forest as they are in red colour in the RGB image. The central part contains deciduous forest. There are grasslands also in the central and in the western part. The eastern part of the division is steep with the highest value of 1200m in the Kuttampuzha Range. The Kalady Range and Kodanad Range are plains. Kodanad Range and Kalady Range are mostly plain. The region near western boundary is almost plain.

Kuttampuzha Range

This range is remarkable in the sense that almost all the area under its jurisdiction is forest. Idamalayar reservoir, Pooyamkuttu reservoir and reed extraction are the main features of this range. There are many large west flowing rivers in the area.

There is a road leading to the Pooyamkuttu dam site. The dam is almost on the western boundary of the range, further transport from there is only through water. One time this range was more well connected with outside world through the Alwaye-Munnar road. The road was made motorable by the 20 th century, before which it was an important trade route. This road at present starts from Thattekkad and goes along the left bank of Pooyamkuttu river and proceeds to Munnar. Damage to the key bridges in flood led to abandoning of the road. Part of the road was made motorable in dry weather for reed extraction and in connection with the Pooyamkuttu project. There is a foot path from the Valpara region of Tamil Nadu to this region. Muduvass occupying the hill tops use it. There are no enclosures within the range as per topo sheet. On the southern side there is an enclosure and a path leading to this. Idamalayar reservoir is a very prominent land mark situated on the north western corner of the range. Kuttampuzha river forms the boundary also on one side. Bhuthathankettu reservoir comes on the southern side. The region contains mostly evergreen forest. There are few scattered deciduous patches on the western side. FIP 250K map shows four types of vegetation 1) Deciduous/savannah areas on hill tops and northern side of Idamalayar dam. 2) Low elevation evergreen and semi-evergreen areas (degraded). 3) Medium elevation evergreen forest and its degradation areas. 4) High elevation evergreen forests of upper reaches. Muduvass occupying the hill tops and settlers in the Manikantanchal area are worth mentioning.

Thundathil Range

This range is remarkable in the sense that almost all the area under its jurisdiction is forest. Periyar form the boundary along the southern side. Several rivers draining to Periyar dissect the area into hills and valleys in north-south direction. Because of large river and reservoir on the western and southern sides, accessibility is limited. As per older toposheets, paths leading from Malayattur and Idamalayar side are present. A path from Edamalayar leads all the way to Bhagavathykulam on the western boundary. Another path leads from Idamalayar to Malayattur along the northern parts of the range. Topo sheet does not show many enclosures. Buthathankettu reservoir come on the southern side. Large areas are shown as Teak plantations in FIP map 250 K Topo sheet show teak plantations on the NW corner, eucalyptus along Periyar. Large tracts on the southern side is also teak plantation.

Vegetation on the northern part appear reddish (evergreen). Curious red path amidst green is surprising. FIP show as teak. As per FIP map, there are three main types of vegetation deciduous forest. medium elevation evergreen forest and teak plantations.

Thattekakd WLS

Forms continuous area along with Malayattur Division. It is wedged between Kuttampuzha and Thundathil ranges. Almost all sides are surrounded by rivers.

Kalady Range

It is the western most range in the division. Jurisdiction is deep into cultivated areas, but forests occur on the eastern side only. Kurisumudi and Malayattur Nature study center comes in this area. There area rubber estates along the southern boundary of the range. There are roads from Malayattur. A path starting from Idamalayar pass through Thundathil range on the eastern side and pass through the middle of the range to Malayattur. There are two hills of isolated forest on the western side. Even though Periyar is on the south, away from forest, a tributary of it flowing in west-east direction drain the range. Middle and eastern portions have teak plantations. Middle of the forest region is deciduous, other regions scattered with specs of red colour. As per FIP, the area is mostly deciduous savannah.

Kodanad Range

This is a small patch of forest on the left side of Periyar. Remarkable in that the main contour is 100 m. Accessible from Perumbavur and Kothamangalam. No enclosures. Small streams drain to Periyar. As per toposheet the entire area is teak plantations. The hill comprise the Kottappara RF. Southern parts appear to have deciduous forest. Other parts are reddish. As per topo sheet the entire area is teak plantations. Most of the northern parts appear red in RGB image.

Thattekkad Bird Sanctuary

Thattekkad bird sanctuary is situated in Idukki district. The sanctuary is a peninsular land between the branches of Periyar river in Malayattur Forest Division. The one and only sanctuary of its kind in Kerala, the Thattekkad Bird Sanctuary was constituted in 1983. Situated in the Devikulam Taluk of Idukki district, this bird sanctuary is a feast to the eyes and music to the ears. Several kinds of birds usually found in south India are seen here. The famous ornithologist, Dr. Salim Ali, has appreciated the bird diversity of this sanctuary. He is reported to have identified 167 birds and his student, Dr. Sugathan 207 and the Bombay Natural History Society has identified 253 kinds of birds. Spread over an extent of 25.16 km², Thattekkad attracts nature lovers from far and wide.

As is common on the Western Ghats, the terrain is undulating and elevation ranges between 35m and 523m. The highest point is the Njayapilli peak (523m). The mean annual rainfall is 2500 mm and the temperature varies between 17 and 35 °C. Tropical evergreen forests, tropical semi-evergreen forests and tropical deciduous forests occur in the area. There are patches of grasslands also. Aquatic plants are plenty. Tropical evergreen forests harbour Vellapine, Karanjili, Palley, Kunthirikam, Bhadraksham, Kanala, Kurangatti, etc. Tropical semi ever-green forests harbour Anjili, Kambakam, etc and trees of commercial value like teak, Rose wood, Ventek, Venga, Maruthi also grow.

Elephant is sighted occasionally. Leopard, bear, porcupine, python, cobra are also sighted. Mammals such as flying squirrel, sloth bear, elephant, lion-tailed macaque etc. are seen. The avifauna of the sanctuary include residents and migratory birds. Crimson-throated Barbet, Bee-eater, Sunbird, Shrike, Fairy Blue- bird; Grey headed Fishing Eagle, Blackwinged Kite, Night Heron, Ceylon frog mouth, Grey Heron, Malabar Shama, Common Grey Hornbill, Malabar Hornbill, Indian Roller, Cuckoo, Common Snipe, Crow Pheasant,

Jungle Nighthawk, Kite, Grey Drongo, Malabar Trogon, Woodpecker, Large Pied Wagtail, Baya Weaver Bird, Grey Jungle Fowl, Indian Hill Myna, Robin Bird, Jungle Babbler and Darter are reported from this area.

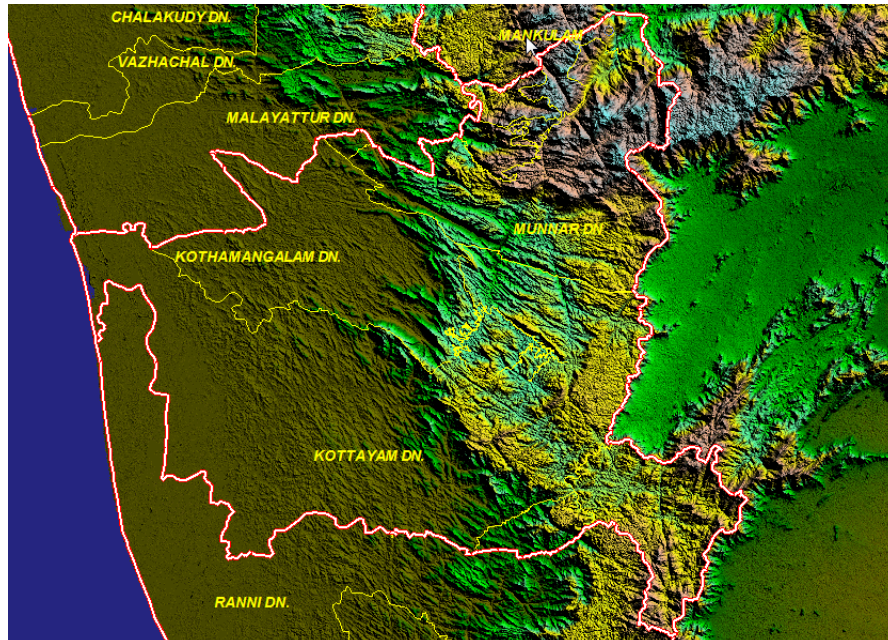
The Sanctuary is 13 kms North-East of Kothamangalam along the Pooyamkutti road. The nearest railway station is Aluva, at a distance of 48 km. Kochi, the nearest airport, is 71kms from Thattekkad. Lodging facilities are available at the PWD rest house near the Dam. Private lodges are available at Kothamangalam.

High Range Region

High Range Region is well known for reeds, some parts do contain bamboos. Region consists of Kothamangalam, Munnar, Mankulam and Kottayam divisions. Because of geographic continuity, Idukki Wildlife Sanctuary and Periyar Tiger Reserve, Eravikulam National Park and Chinnar Wildlife Sanctuary are also described in this section.

Kothamangalam Forest Division

Kothamangalam division consists of Thodupuzha, Kothamangalam, Mullaringad and Kaliyar ranges. Bamboo seems to be found only in the central region. Kothamangalam is situated to the south of Malayattur Division. It shares the eastern boundary with Idukki WLS along with Kottayam Division. Kottayam Division borders it in the west and south also. Thattekkad WLS is situated to the north of this division.



Map of Kothamangalam Division

Thodupuzha Range: This range is situated in the southern part of the division. Idukki WLS along with Ayyappankovil Range of Kottayam Division borders it in the east and Erumely Range of Kottayam Division in the south. Erumely Range of Kottayam Division along with the Kodanad Range of Malayattur Division borders it in the west. Mullaringad and Kaliar Ranges are to the north of this division bordering it.

Forest status in Kothamangalam Division

	Range	Forest area (km²)
1	Thodupuzha	218.38
2	Kothamangalam	12.17
3	Kaliyar	49.08
4	Mullaringad	37.38
	Total	317.01

Kothamangalam Range: Kothamangalam Range is in the northern part of the division. Neriya mangalam Range of the Munnar Division borders it in the east and Kodanad Range of Malayattur in the west. To the south there is Mullaringad Range and Thundathil Range of Malayattur Division in the north.

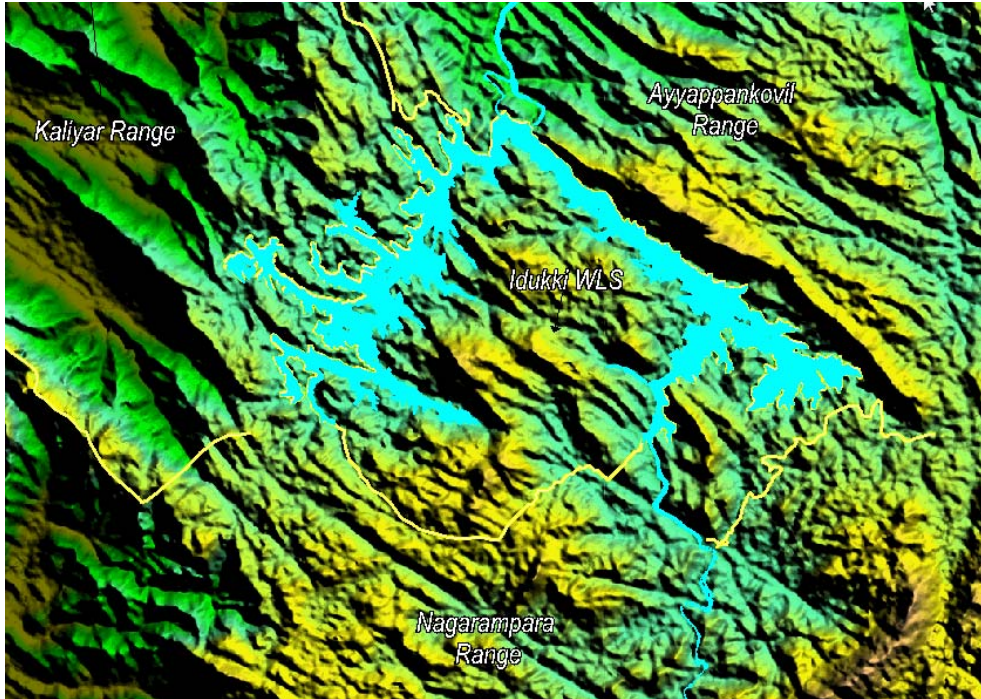
Mullaringad Range: It is in the northern part of the division. In the east Neriya mangalam Range of Munnar Division border it while Kodanad Range of Malayattur Division in the west. Thodupuzha Range is to the south and Kothamangalam Range to the north.

Kaliar Range: Kaliar Range is situated to the eastern part of the division. Ayyappankovil Range of Kottayam Division along with Neriya mangalam Range of Munnar Division borders it in the east and Thodupuzha Range in the west and south. Mullaringad Range bounds it in the north. The western part of this division i.e. Thodupuzha Range, Mullaringad Range and Kothamangalam Range are almost plains. The contour value varies from a minimum value of 10m and a maximum value of 100m. The Kaliar Range, eastern part of Mullaringad Range is steep. The highest valued contours are 900m existing in the eastern part of the Thodupuzha Range.

Idukki Wildlife Sanctuary

Idukki Wildlife division consists of Idukki Wildlife Sanctuary, Thattekkad Bird Sanctuary, Eravikulam National Park and Chinnar Wildlife Sanctuary. Eravikulam National Park has mostly evergreen forests and grasslands. No bamboo in commercially extractable quantities detected.

The Sanctuary comes under the Idukki Revenue district. The drainage basin is Periyar River. The mean annual rainfall is 3000mm. The total area is 70 Km². The major attractions are tropical moist deciduous forests, grasslands and shola forests, valleys and peaks, elephants and variety of other wildlife. The sanctuary falls in the High Ranges of the Western Ghats. The area was declared as wildlife sanctuary in 1976. Sanctuary forms the immediate catchment of a 30 km² reservoir constituted by Idukki, Cheruthoni and Kulamavu dams.



Map of Idukki WLS

The altitude varies from 900-1400m above MSL. Temperature varies from 16°-35°C and the mean annual rainfall is 2,500mm. The land area consists of evergreen, moist deciduous and savannah types of forests. Important wildlife includes elephant, tiger, leopard, gaur, sloth bear, sambar, malabar squirrel, wild dogs etc. The head quarters of the sanctuary is at Vellappara, between Painavu and Cheruthoni.

This sanctuary is situated in Idukki district above the Idukki arch dam. It was set up in 1976 with an area of 70 sq. km. The flora and fauna of Idukki is very similar to those of Thekkady. Although tiger, leopard, gaur, and sloth bear live in this sanctuary they are seldom seen. Sambar and herds of elephants could however be seen usually. Idukki dam, the only arch dam in the country, is another attraction.

Status of forest in Idukki Wildlife Division

	Range	Forest area (km ²)
1	Idukki WLS	105.36
2	Thattekkad BS	25.16
3	Eravikulam NP	97.00
4	Chinnar WLS	90.44
	Total	317.96

Facilities for accommodation and food are available at Kulamavu and Vazhathope in the Inspection Bungalows of the Kerala State Electricity Board. This sanctuary is 164 km by road from Cochin, which is the nearest airport. Idukki is also accessible from Kottayam and Thekkady. Compared to the other major wildlife sanctuaries in Kerala such as Periyar and Parambikulam, the Idukki Wildlife Sanctuary has a fairly degraded habitat with low density of animals. An examination of the past history of the area, impact of the Idukki hydroelectric project and many anthropic factors peculiar to the area are essential for a proper understanding of the present status of the sanctuary. About 70 km of forest between the two arms of the Idukki reservoir was declared as a wildlife sanctuary in 1976.



Map of Idukki WLS

Earlier accounts dating back to the 18th century describe the Periyar River flowing through narrow gorges and unspoilt wilderness in the Idukki region. Tribals inhabiting the area were described as practising shifting cultivation during the latter part of the 19th century. Many indications suggest that these tribals migrated to this part from elsewhere. Large tracts of nearby areas have been brought under tea cultivation since 1870. The human settlement in the present submersion area seems to have occurred during the turn of the century. The settlers report that at that time of colonisation, animals like elephants, gaur, sambar, barking deer, wild pig, bonnet macaque, tiger, panther and bear were present in the Idukki area. There have been a series of encroachments in the fifties.

A proposal for constructing a dam at Idukki to produce about 50 MW of electricity was made in 1937. This was subsequently enlarged and modified in 1947 to produce 780 MW of electricity. The project involved construction of dams at Idukki, Cheruthoni and Kulamavu (Fig. 2) creating

a lake of about 75 km². The construction work started in 1963 and extended up to 1976. Implementation of the Idukki hydro - electric project brought about rapid improvements in accessibility and communication to remote areas along with colonisation of forests by new settlers. Recent estimates show that Idukki district has about 50% of the total area under forest.

A study on the post construction environmental status of the Idukki project area was conducted from 1980 to 1984 by the Kerala Forest Research Institute. For the study, a larger area of about 150 km², including portions lying between the reservoir and the Kulamavu - Idukki road and Idukki - Ayyappankoil road was chosen. As part of the study, the status of wild animals, vegetation and anthropic factors were examined in detail. The impacts of construction workers staying in the project area, drawing of power lines, laying of roads, development of township and effect of resettlement of displaced people on wild animals were examined. Sighting records and indirect evidences were employed for documenting animal abundance and distribution. Habitat quality was recorded on a gridded map by ground check. Ward and Connor (Memoirs of the Survey of Travancore and Cochin States, Surveyor General's office, Madras 1825) and Bourdillon (A report on the forests of Travancore, Govt. Press, Trivandrum, 1893) had described animals like elephants, pigs, etc. as being present in this tract during the last century. Animals like sambar, wild pigs, wild dogs, hare, porcupine, barking deer and mouse deer, though not readily sighted was present in many plots as indicated by pellets and foot prints. There was no sign of animals like gaur, bear, tiger and panther from the study area.

Elephants are probably the most affected animal when habitat is disturbed. Fragmentation of habitat, herd composition, sex ratio and frequency were examined and compared to that in other populations. The similarity of the herds sighted indicates that the elephants move all over the area. The habitations on the western and northern sides as well as the Kalyanathandu hill chain restrict the movement of elephants. On the south - eastern side cultivations and habitations block the movement of elephants. There are only about a few kilometres of continuous forest available south of Kulamavu region. Numerous habitations and villages dispersed through out the region also affect the movement of the elephants. The route taken by one of the herds show that human disturbance makes the elephants to change their route very often. The elephant herd size sighted varied from two to fifteen. Majority of the herds had less than 10 individuals in the group. In less disturbed populations as in Periyar herds of 30 or more individuals are common. The Idukki pattern of smaller herds is characteristic of highly disturbed population. The

elephant population of the reserve is estimated to be around 75. Out of a total sighting of 321 individuals, 10.2% were solitary.

Groups exceeding 15 individuals were rare. Out of these, the males constituted only three individuals (0.93%). During the course of the study two different adult tuskers could be identified, one had asymmetric tusks. These elephants were sighted at Maruthumkanam and Kodayurutty. Male elephants in the sub adult or juvenile categories were not observed. Among the female elephants there were 95% adults and 2.5% sub - adults. A distribution of the elephant dung size also showed few individuals in the smallest size category. The sex ratio is very much different from 1:1 found in healthy populations. These facts indicate that the elephant population at Idukki is in a state of decline. The elephants seem to be confined to a limited area. All the surrounding areas are under cultivation. The only connection with any large chunk of forest is at Meenmutty.

There were only two sightings of sambar. Evidence of sambar, barking deer, hare and wild pigs were obtained from the sample plots. On a few occasions wild pigs were sighted. In many areas there were abundant signs of hare. The main carnivores noted were jackal and wild dog. Jackals were observed on a few occasions. There were only indirect evidence of wild dogs. Several cases of wild dogs attacking domestic goats and cattle were noticed. Thus unusual behaviour is probably due to the lack of wild prey. The Zoological Survey of India team has recorded three wild dogs poisoned by villagers. Tiger and leopard were not sighted.

Bonnet macaque, the only primate in the area was sighted at Meenmutty, Kalamkamathi and near the Butterfly Valve Chamber (BVC). The troop size varied from few to about 40 individuals. The range of the monkeys was limited to a few square kilometres around each region. The monkeys also indulged in a great deal of crop raiding. Troops of bonnet macaques seen inside the forest were comparatively shy; their troop size was also smaller. The troop size of the bonnet macques seen in the BVC area were smaller than those found in other habitats. These monkeys have been displaced from the area when the work in connection with Idukki stage II and III commenced in early 1984. The wild pigs raid crops in cultivated areas and hence frequent reports appear about them. The region has undergone many changes before and after the completion of the project. Some of these are human settlements, fire, cattle grazing, and establishment of plantations and emergence of a township in the area. Shifting cultivators and cattle grazers set fire to the forest and the grasslands almost every year. Regeneration of trees were found to be severely affected due to fire. Burning of grasslands with Eucalyptus plantations are also of common occurrence. As in the case of other places

near forest, people in the study area gather fuel wood from the forest. The presence of large number of staff quarters, tea shops, etc. has put a high demand on fuel. As a result of this, tree density is gradually on the decrease around the habitations.

The study area had a few tribal settlements. Traditionally they practised shifting cultivation. Many of the displaced tribals settle down in nearby forest areas rather than going to other regions. Persons evicted from the submerged areas were paid compensation, but most of these people moved and settled within 20 to 30 km radius. Many persons were reported to have migrated to forest areas above the maximum water level and settled there. Many of the workers who came in for the construction work also encroached forest and stayed over. During the latter phases, because of the settlers organizational strength and political backing, they were able to extract substantial compensation and resettled at the place of their choice adjacent to the developing township and civil station in the middle of the forest. About 200 ha of forest were cleared for this purpose between Pynavu and Cheruthoni.

A decision to put up the headquarters of the Idukki district at Pynavu was taken, possibility to make use of the buildings constructed in connection with the Idukki project. This decision along with that of resettling people in the neighbourhood of the civil station had a more far reaching effect on the environment of this region compared to all other activities done in recent times. As a result of all these activities, a break in forest continuity between Pynavu and Cheruthoni which is the only remaining connection with any large chunk of forest is developing. Encroachment of forest in the vicinity of the project area continues unabated. The cultivators gradually annex parts of adjoining forest to their cultivation by shifting the temporary boundaries and trenches.

Encroachments, roads and plantations are found to be synergistic. A few important points need to be considered in future management of the sanctuary. Protection of the evergreen vegetation near the civil station, restrictions on leasing of forest for cardamom cultivation, extending limits of Wildlife Sanctuary and restriction of encroachment and development of township are the most important of them. Before going to the details we should bear in mind that the region has to a great extent been irrevocably damaged. The area does not have much scope for bringing back into conflict with what is already established. It may be more advantageous to have the residential quarters of staff near Idukki or Kulamavu rather than around Painavu. It can be seen that the civil station and resettlement area have made a break in the forest continuity already.

The only good patch of evergreen forest is located near Pynavu civil station. Cardamom cultivation has degraded most of the other parts. The

sanctuary at present includes only degraded areas, mostly grassland and rocky areas. The portions between the Kulamavu - Idukki road and Idukki - Kattappana road should be included in the sanctuary. Idukki area is often cited as the only protected area in the Cardamom hills. The object of a Wildlife Sanctuary is to provide a habitat for endangered and endemic species of plants and animals. The Idukki Wildlife Sanctuary can serve this purpose only by adding more areas and resorting to protection measures. Steps like introducing animals will have to be undertaken, the region, already a favourite tourist spot because of the dam and power house can offer facilities for viewing animals from boat. Thus the problems facing Idukki Wildlife Sanctuary, the isolated remnant of the Cardamom hills are diverse and challenging.

Mankulam Division

Mankulam division consists of Anakulam and Mankulam ranges. Bamboos are found in some patches.

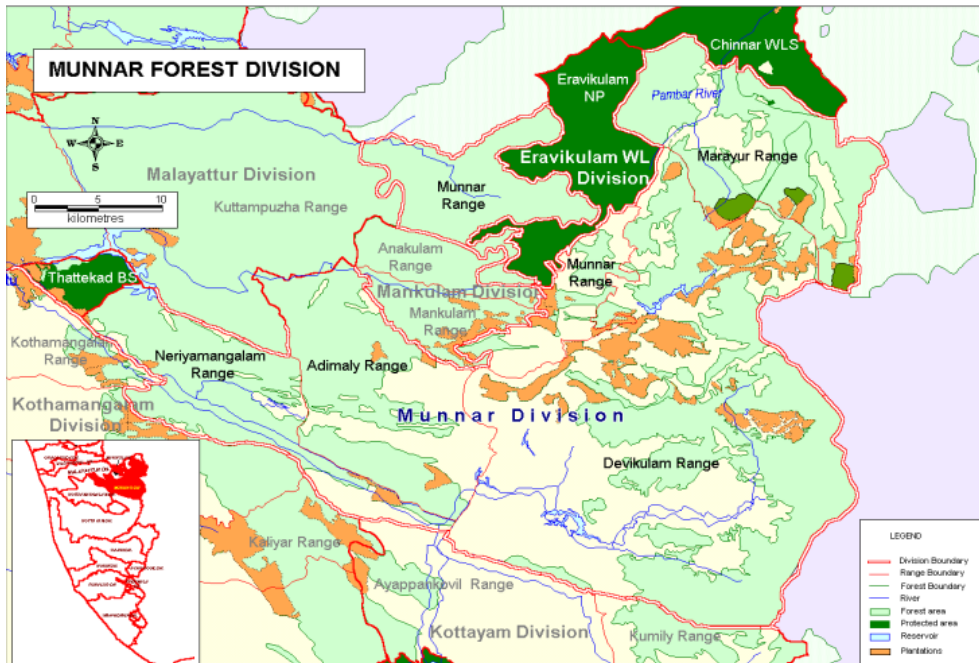
Munnar Forest Division

Munnar division consists of Munnar, Marayur, Devikulam, Adimali and Neriya-mangalam. Any way bamboo is found only in some areas. Based on survey of an effective area of 418 km² of the then Munnar division, Chandrasekharan (1973) estimates a growing stock of 9,80,000 metric tonnes (air dry) reeds and 36,000 metric tonnes (air dry) of bamboo. Because of reorganisation of territory it is not possible to make meaningful comparisons with present study.

Munnar Division consists of Munnar, Marayur, Devikulam, Adimali and Neriya-mangalam Ranges. Bamboo is found in only some areas. Munnar Division shares the eastern boundary with Tamil Nadu and western boundary with Mankulam and Malayattur Divisions along with Kothamangalam Division. In the north Eravikulam and Chinnar WLS along with the Tamil Nadu borders it while in the south Kottayam Division.

Status of forest in Munnar Division

	Range	Forest area (km²)
1	Munnar	106.00
2	Marayur	71.32
3	Devikulam	324.91
4	Adimali	110.87
5	Neriyamangalam	102.74
	Tota	715.84



Munnar Division map

Neriyamangalam Range: It is situated in the western part of the division. Adimaly Range borders it in the east while Kothamangalam and Mullaringad Ranges of Kothamangalam Division border it in the west. In the south Mullaringad Range shares the boundary and Kallar Range of Kothamangalam Division and Kuttampuzha Range in the north.

Adimaly Range: Adimaly Range is in the western part of the division. Devikulam Range is in the east and in the west Neriyamangalam Range borders it. Neriyamangalam Range borders it in the south also. Kuttampuzha Range of Malayattur Division along with Mankulam Range of Mankulam Division borders it in the north.



Cardomom cultivation



Strobilanthus- Nilakurinji

Munnar Range: Munnar Range is in the northern part. To the east there is Devikulam Range and Adimaly Range to the west. Adimaly Range also borders it in the south along with the Devikulam Range. To the north there is Eravikulam NP.

Marayur Range: Marayur Range is in the northeastern part of the division. In the east it shares the boundary with Tamil Nadu and in the west with Eravikulam NP. Devikulam Range is to the south and Chinnar WLS to the north.

Devikulam Range: Devikulam Range is in the south eastern part of the division. It shares the boundary with Tamil Nadu in the east and Adimaly Range in the west. Ayyappankovil and Kumily Ranges share the boundary in the south while Marayur Range in the north.



Nilgiri Tahr

The region is steep throughout and the southeastern part is plain. The highest value contour is 2400m and in the Marayur Range. The Devikulam Range is almost plain. The southern and western regions are steep i.e. the Neriya Mangalam and Adimaly Range.

Kottayam Forest Division

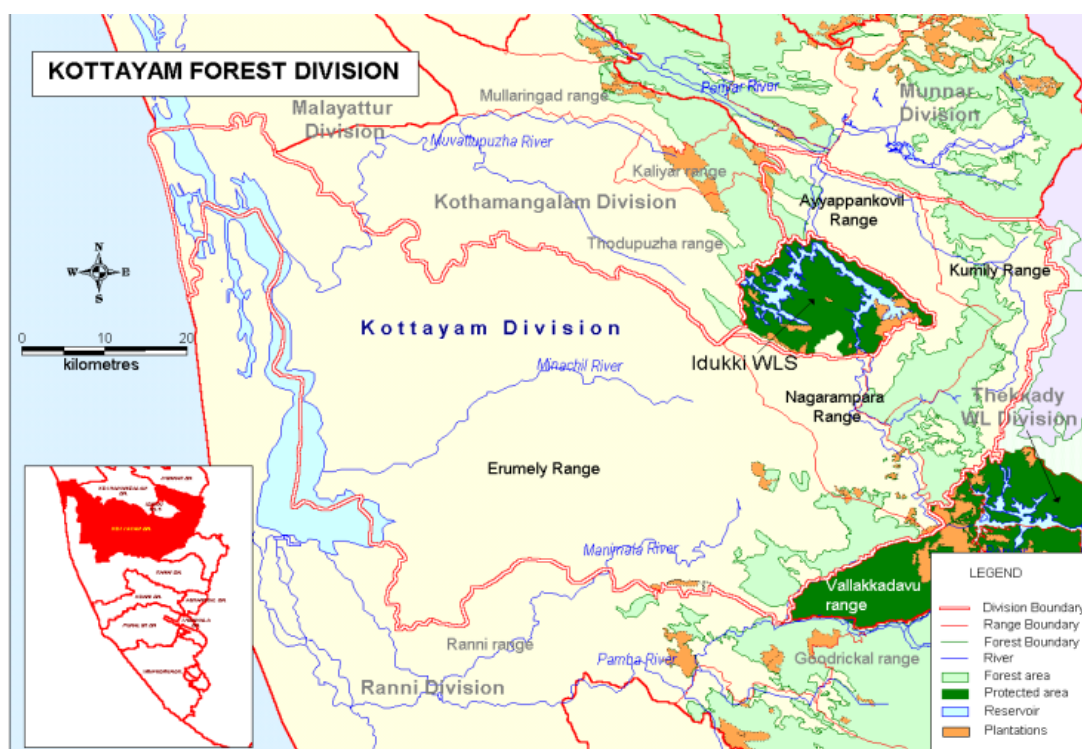
Kottayam division consists of Erumeli, Ayyappankovil, Nagarampara and Kumily ranges. Bamboo is found along the western portion of the division. Mainly in Ayyappankovil, and Nagarampara ranges. Based on survey of 423 km² of the then Kottayam division, Chandrasekharan (1973) estimates a growing stock of 28,000 metric tonnes (air dry) of reeds and 38,000 metric tonnes (air dry) of bamboo.

Kottayam Division consists of Erumeli, Ayyappankovil, Nagarampara and Kumily Ranges. Bamboo is found along the western portion of the division, mainly in the Ayyappankovil and Nagarampara

Ranges. Kottayam Division shares its boundary with Tamil Nadu in the east and Ranni Division and Arabian Sea in the western side. Kothamangalam Division is situated to the north of this division and Ranni Division to the south. Idukki WLS is situated to the northeastern part of the division.

Status of forest in Kottayam Division

	Range	Forest area (km ²)
1	Erumeli	143.56
2	Ayyappankovil	107.00
3	Nagarampara	176.00
4	Kumily	265.59
	Total	692.15



Map of Kottayam Division

Erumeli Range: Erumeli Range is situated to the western part of the division. In the east Nagarampara Range borders it and Ranni Range of Ranni Division along with Arabian Sea in the western side. Ranni Range of Ranni Division bound it in the south also. Thodupuzha Range of Kothamangalam Division borders it in the north.

Nagarampara Range: This range is situated in the eastern part of the division. To the east there is Kumily and Ayyappankovil Ranges and in the west Erumely Range borders it. Thekkady WLS border it in the south and Idukki WLS in the north.

Kumily Range: Kumily Range is in the eastern part of the division. In the east it shares the boundary with Tamil Nadu and in the west with Ayyappankovil Range. Thekkady WLS and Nagarampara Ranges are situated to the south and Devikulam Range of Munnar Division in the north.

Ayyappankovil Range: Ayyappankovil Range is in the northern part of the division. Kumily Range shares the boundary in the east while Kaliar Range and Thodupuzha Range of Kothamangalam Division shares the boundary in the west. In the south Idukki WLS and Kumily Range shares its boundary and, Adimaly and Devikulam Ranges of Munnar Division in the north.

The western part of the division is almost plain. The Erumeli Range is in the western part. The eastern part of this range and the central part have contour values ranging between a maximum of 900m to a minimum of 10m. The Kumily, Ayyappankovil and Nagarampara Range are almost plains. The highest value of contour is 1200m and in the southern part of the Ayyappankovil Range. The minimum valued contour exists in the northeast and the southern part of Kumily Range and eastern part of Erumeli Range.



Tea cultivation

Periyar Tiger Reserve

Periyar Tiger Reserve consists of Thekkady and Vallakkadavu ranges. The sanctuary is located at 9°16'N - 9°36'N latitude and 76°57'E-77°25'E longitude and comes under the Revenue district, Idukki. The drainage basin is Periyar River and mean annual rainfall is 3400 mm. The total area is 777 km² and the major attractions are tropical wet evergreen forests (rain Forests), Valleys and peaks, boat ride in the Periyar Lake and

watching of animals especially elephants at close quarters during the boat ride.

Periyar Tiger Reserve is the largest sanctuary in Kerala and is situated on the Western Ghats in Peerumedu taluk in Idukki district bordering Tamil Nadu. The eastern half of the sanctuary is two river basins, the major water resources viz. the Mullayar and the Periyar bordered by lofty hills and around with Mullayar watershed having the highest peak viz. Kallimalai (2014m). The Mullayar and Periyar which meet at Mullakkudy were barraged by the construction of Mulla Periyar Dam in 1895 forming the now famous picturesque Periyar lake 26 km² in extent when full. Maximum depth of water at maximum level is 46m and the minimum is 32m. The sanctuary slopes towards west and loses elevation up to 200m when it reaches the Pamba valley, the point of confluence of Pamba and Azhutha rivers. The western portion has in its middle the Mount Plateau an undulating chain of hillocks with a mean elevation of 1,200 m above MSL. Regarding climate, the temperature ranges from 15-31°C. Mean annual rainfall is about 2,000mm with a peak in July. The area was first made a sanctuary in 1934 by the Maharaja of erstwhile Travancore state under the name Nellikampetty Game Sanctuary. It was renamed as Periyar Wildlife Sanctuary in 1950 after adding some more areas. Periyar became a Tiger Reserve in 1978 when it was included in the Project Tiger Scheme. There is no settlement inside the reserve. The Reserve is 777 km²; but the actual forest area excluding Periyar Lake, residential colonies, Sabarimala temple premises etc is estimated at 741 km² comprising 305km² of evergreen, 275 km² of semi evergreen, 98 km² of moist deciduous and the rest grasslands and plantations.



Tiger

Periyar Tiger Reserve has been traditionally considered as a model habitat for elephants. The other animals found are bison, sambar, wild boar etc. One of the most interesting aspects in the behaviour of the elephants in Periyar is their amazing capacity to swim large stretches of water. There are certain points which they choose to cross the lake. At least 10 such points between the boat landing and the dam are identified. Why the elephant cross the lake at such points and not elsewhere is an

interesting question. One possible explanation is that these points lie in the original paths of the elephants through the forests before the lake was formed.

The Periyar Tiger Reserve ranges in altitude from 900 m to 2019 m above sea level and the average annual rainfall is between 2000 mm and 5000 mm per year. There are two to three rainless months. The major vegetation types represented within this protected area are: 1. Southern hilltop tropical evergreen forest 2. West coast tropical evergreen forest 3. Canebrakes 4. Wet bamboo brakes 5. West coast semi-evergreen forest 6. West coast secondary evergreen Dipterocarp forest 7. Southern moist mixed deciduous forest 8. Riparian fringing forest 9. Reed brakes 10. South Indian sub-tropical hill savannah woodland II. Southern montane wet temperate forest 12. Southern montane wet grasslands

There are other seral stages and subgroups in particular of the tropical moist deciduous forest occurring within this forest. This protected area is not only the most extensive in Kerala but also includes the largest extent of west coast tropical evergreen, southern hilltop tropical evergreen, west coast semi-evergreen, west coast secondary evergreen dipterocarp forest and southern Indian tropical hill savannah woodland forest ecosystems. From the point of view of conservation of representative ecosystems in southern Western Ghats, this wildlife sanctuary is at present the best. Out of its 777 km² area, at least 300 km² in a compact segment and another 50 km² scattered in smaller pockets are climax tropical moist forest areas. The degradative pressures, excepting fire along its fringes, gradually reducing the area of intact ecosystem are minimal. Contiguous with this sanctuary, towards the south and south-west, there is a further 500 km² of practically undisturbed forest vegetation in the adjacent Ranni and Tenmala Divisions forming part of the Gudrikal, Konni and Ranni reserved forests.

Periyar Sanctuary is the best sanctuary in India for watching and photographing elephant at close quarters. This sanctuary takes its name from the river Periyar, the second largest river in Kerala. When a dam was constructed across the Periyar River by the erstwhile Madras Government in 1895 for irrigation, the waterspread filled the valleys forming a many-armed lake with creeks and small islands. The unextrated trees still stand dead in the lake like fossils holding their branched tops above water and providing perch for darters, the most common aquatic bird in the sanctuary.

The Periyar Sanctuary owes its birth to the innovative interest of Shri Chithira Thirunal Maharaja of the former Travancore State. Realising the importance of wild life conservation, the Maharaja appointed Mr. S. C. H. Robinson as the first Game Warden in 1933. Based on his

recommendation the forest around the lake was constituted as a sanctuary, called Nelliampatty Sanctuary in 1934. In 1950 the Periyar Wild life Sanctuary was formed by adding the remaining portion of Periyar lake reserve, Rattendon Valley and Mount Plateau to Nelliampatty Sanctuary. Now it extends over an area of 777sq. km. In 1978 the Periyar Sanctuary was declared a Tiger Reserve under the Project Tiger. The Periyar Sanctuary is in Idukki district and forms part of the high ranges of the Western Ghats. The topography of the sanctuary is undulating. In the east along the State boundary and also in the south-west portion the land drops precipitously. Vellimala is the highest peak in the sanctuary (2019 m). The Periyar lake, the nucleus of the sanctuary is about 26sq. km in extent. The maximum depth near the dam is 46 m when the lake is full.

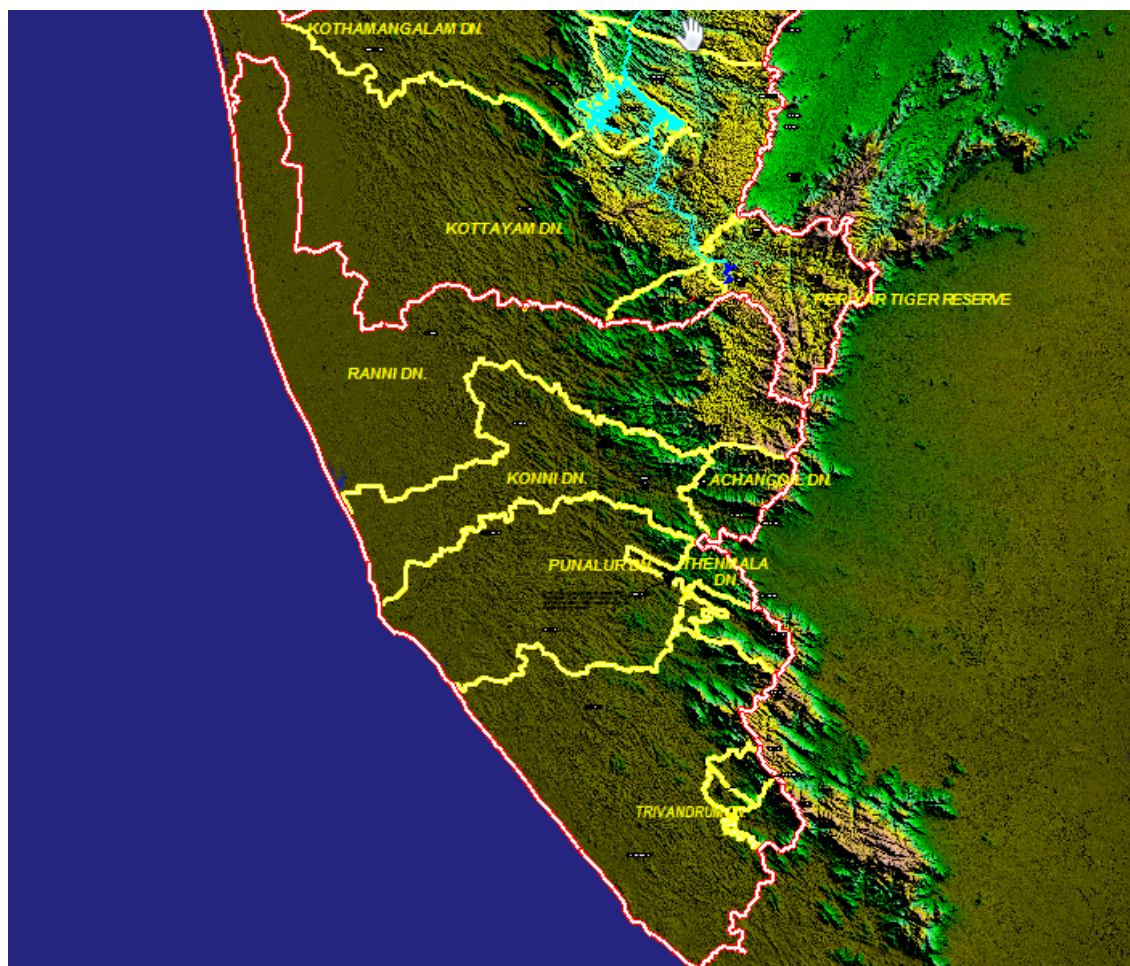
The vistas of Periyar Sanctuary with its lake, creeks, islets and peninsulas form a natural kaleidoscope in different shades of green and blue. The vegetation varies from grasslands to tropical wet evergreen forests. The principal species are elephant grass in the grasslands and *Terminalia paniculata* in the moist deciduous and semi evergreen forests. *Bambusa bambos* occurs in patches especially along water courses and in moist localities. Plantations of *Eucalyptus grandis* have been established in about 55sq. km of the sanctuary since 1962. The varied habitat in the sanctuary supports a number of species of terrestrial and arboreal animals. The Indian (Asiatic) elephant is the chief attraction. As per 1983 census there are 932 elephants in the sanctuary. From the boat a visitor can closely watch the wild elephants coming down to the lake in herds or in small groups. Lone bulls are not uncommon. Periyar is acclaimed to be the best place in the world for studying all aspects of elephantine life. Other common animals with their latest population survey figures are Wild boar 500, Tiger 41, Sambar 452, Black naped hare 20, Porcupine 450, Leopard 15, Giant squirrel 150, Nilgiri langur 170 troops, Gaur 100, Wild dog 50 packs, Barking deer 50, Lion tailed macaque 11 troops, Mouse deer 50, Bonnet macaque 10 troops.

Aquatic bird life is rather poor apparently because the water in the lake is deep. The common aquatic birds are the Indian darter and the black necked stork. Other important birds are the great Indian horn bill, brahminy kite, little cormorant, pied king fisher and wood pecker. Of reptiles, both poisonous and non-poisonous snakes including king cobra are found in fairly good numbers. Tortoises may often be seen basking on the rocks close to the bank. Otters are usually found around Edapalyam. The facilities and ease with which wildlife can be viewed at extremely close quarters while having a cruise in the lake make Periyar one of the best sanctuaries in the country. The headquarters and place of entry is

Thekkady which is accessible by good roads from the airports of Madurai (145 km.), Trivandrum(272 km.) and Cochin(190 km). The nearest rail heads are Kottayam (115 km) on the Ernakulam-Trivandrum line and Theni on the Madurai-Bodinaickanur line. Hotel accommodation is available in and around Thekkady. Aranya Nivas Hotel (continental style), Edapalyam Lake Palace (continental style) and Periyar House (Indian style) are three hotel establishments run by the Kerala Tourism Development Corporation, a Government of Kerala undertaking. All these hotels are within the sanctuary limits and set amidst picturesque settings. Visitors, who prefer to stay deep inside the forest for thrill or research can stay in the Forest Rest Houses at Manakavala, Mullaukudi or Thannikudy. All these rest houses are two roomed with watch towers nearby. The sanctuary is open throughout the year. But the best season is from September to May as is the case with all other sanctuaries of Kerala State.

Southern Region

Southern region consists of Ranni, Konni, Achenkovil, Punalur, Thenmala, Agasthyavanam, Trivandrum Wildlife and Trivandrum divisions.



Map Soutehrn region

Ranni Division

Ranni division consists of Ranni, Goodrickal and Vadasserrikkara ranges. Bamboo is found only in the south-west corner in Ranni range. Division is reputed for reeds. Based on survey of 781 km² of the then Ranni division, Chandrasekharan (1973) estimates a growing stock of 9,86,000 metric tonnes (air dry) of reeds and 90,000 metric tonnes (air dry) of bamboo. Results of present study more or less agree with figure above.

Konni Division

Konni division consists of Konni, Naduvathumuzhy and Mannarappara ranges. Central part of the division in north-south direction show bamboo. Based on survey of 303 km² of the then Konni

division, Chandrasekharan (1973) estimates a growing stock of 42,000 metric tonnes (air dry) of reeds and 1,80,000 metric tonnes (air dry) of bamboo. Present study shows slightly less bamboo in the division compared to the figure above.

Achenkovil Division

Achenkovil division consists of Achenkovil, Kallar and Kanayar ranges. Bamboo is found in the western region of the division. An examination of satellite imagery show bamboo in many parts of the division.

Punalur Division

Punalur division consists of Anchal and Pathanapuram ranges. In these two ranges also reeds and bamboo are found in some patches. Based on survey of 224 km² of the then Punalur division, Chandrasekharan (1973) estimates a growing stock of 12,000 metric tonnes (air dry) of reeds and 1,17,000 metric tonnes (air dry) bamboo.

Thenmala Division

Thenmala division consists of Arienkavu and Thenmala ranges. Bamboo seems to be sparse in the division, there are some bamboo plantations. Reeds are more common. In the case of Arienkavu range bamboo is rare and reeds are common in many areas. Based on survey of 476 km² of the then Thenmala division, Chandrasekharan (1973) estimates a growing stock of 3,70,000 metric tonnes (air dry) of reeds and 1,84,000 metric tonnes of (air dry) bamboo. Ashary, (1960) reports a total yield of about 4,50,000 bamboos for the Thenmala division.

Trivandrum Wildlife Division

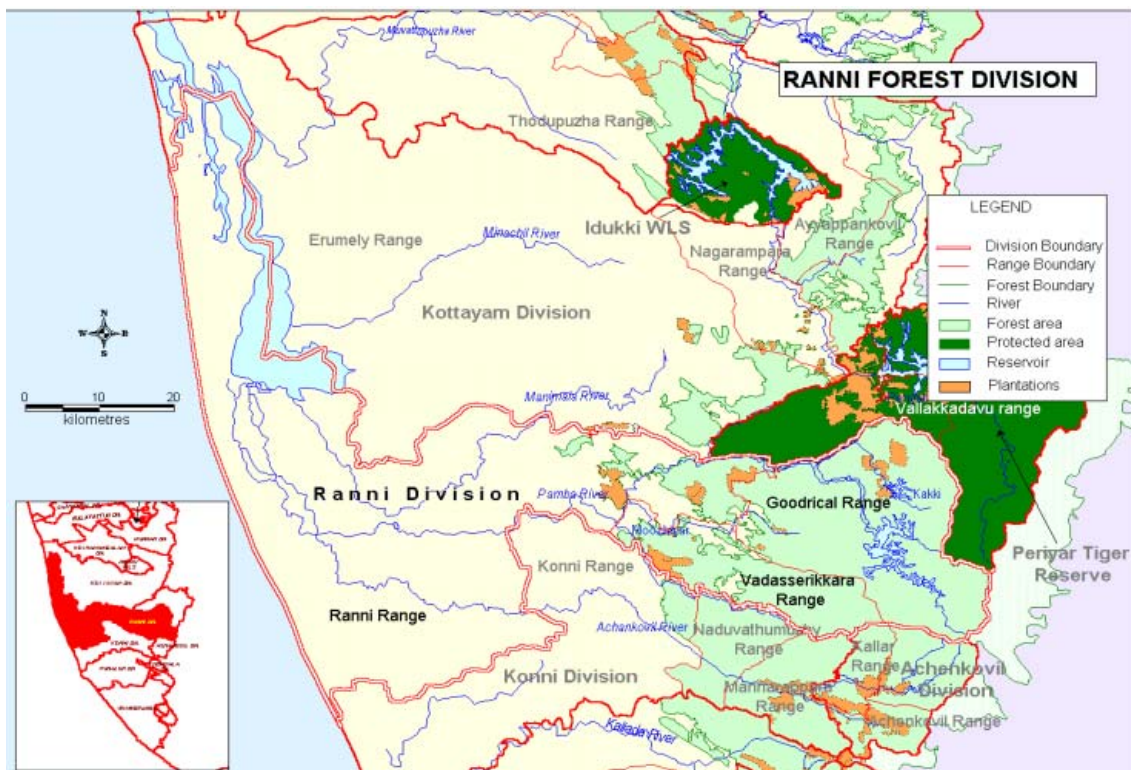
Trivandrum Wildlife Division consists of Neyyar, Peppara and Shenduruny Wildlife Sanctuaries. Because of geographical continuity Agasthyavanam Biological Park is also included in this section. In Neyyar Wildlife Sanctuary Bamboo is common in patches near reservoir and along water courses. The hilly regions have mostly reeds. Reeds and bamboo occur in between. Reeds are also seen in river courses, in these cases bamboos are seen in higher areas. Being wildlife sanctuary, no extraction is carried out. In Peppara bamboo is common in few patches only. Dense patches are mostly near Agasthyavanam. Reeds are present mostly near to the reservoir. Being a wildlife sanctuary, no extraction is done at present.

Trivandrum Division

Trivandrum division consists of Kulathupuzha, Palode and Paruthipally ranges. In Paruthipally range, bamboo is distributed along the western side in patches. Reeds are also found in some patches. In the case of Palode range, bamboo is found only in small patches. Reeds are found more commonly. In the case of Kulathupuzha range bamboo is distributed on the western side and along river. Reeds are also common in most part of the range. Chandrasekharan (1973) estimates a growing stock of 3,98,000 metric tonnes (air dry) reeds and 1,63,000 metric tonnes (air dry) of bamboo. Present study shows much more bamboo in this tract.

Ranni Forest Division

Ranni Division consists of Ranni, Goodrickal and Vadasserikkara Ranges. Bamboo is found only in the south west corner of the Ranni Range. Ranni Division shares the boundary in the east with Tamil Nadu and Periyar Tiger Reserve and Arabian Sea is in the western side. Kottayam Division borders it in the north and Konni Division in the south. Periyar Tiger Reserve is situated to the northeast of the division. Achenkovil Division borders it in the south along with the Konni Division.



Map of Ranni Division

Ranni Range: Ranni Range forms the western part of the division. In the east Vadasserikkara and Goodrickal Range borders it. Arabian Sea is in the western side. Erumely Range of Kottayam Division borders it in the north and Konni Division in the south.

Goodrickal Range: This range is in the northeastern part of the division. Periyar Tiger Reserve and Tamil Nadu border it in the east while Vadasserikkara and Ranni Range in the west. Vallakkadavu Range shares the boundary in the north and Vadasserikkara Range borders it in the south.

Status of forest in Ranni Division

Sl.No	Range	Total forest area (km ²)
1	Ranni	136.24
2	Goodrickal	653.97
3	Vadasserikkara	268.86
	Total	1,059.07

Vadasserikkara Range: It forms the southeastern part of the division. The eastern boundary is shared by Goodrickal Range and the west with the Ranni Range. Naduvathumuzhy Range and Mannarappara Range of Konni Division borders it in the south and Goodrickal Range in the north.



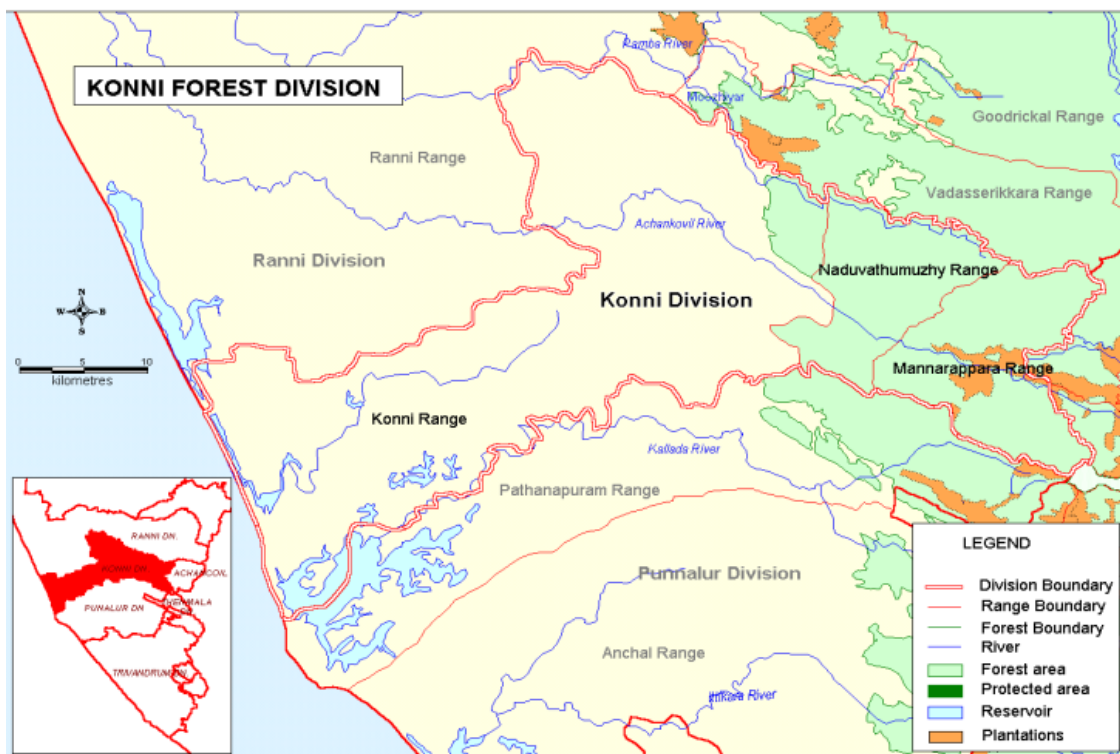
Reed Brakes

The western part of the Ranni Range is plain. The eastern part of the Ranni Range, the Goodrickal Range and Vadasserikkara Range are steep. The highest value is 1500m in the eastern part of the Goodrickal

Range. The lowest value is 10m in the central part of the Ranni Range. Goodrickal Range is having highest value contours.

Konni Forest Division

The total area of the tract is about 330 km². The forest lies in the taluks of Kunnathur, Pathanamthitta, Pathanapuram and Shencottah of the Quilon revenue Division. At present the area comprises of Konni Range, Konni teak plantation range, Chengara teak plantation range and a small portion of the Ranni Range. The teak plantations at Konni and Chengara though they primarily fall within the territorial jurisdiction of Konni and Ranni Ranges respectively are treated as two independent institutions. The tract falls within north latitude 9° 1'32" and 9° 21'57" and east longitudes 76° 47'30" and 77° 12'18". On the north are the extensive forests of the proposed Ranni forest Division; on the east and south the forest of the Shencotta and Quilon Divisions respectively and on the west the cultivated plains. Kodumon north and south blocks are bounded on all sides by cultivations of the Kunnathur and Pathanamthitta taluks. Altitudes: The forest lies mainly on the western slopes of the main range of the Western Ghats. The altitude varies from 250 meters to 5100 meters. The highest point is 5100 meters on the northeastern corner of the division boundary.



Map of Konni Division

Topography: The whole area is hilly in nature, the eastern portion being much more rugged than the west. The tract has two distinct valleys viz. those of Achenkovil and Kumaranperur-Kallar rivers. They are separated by ranges of hills, which extend from the main ghats and lie more or less in an east to west direction. The Achenkovil valley takes off on the east from the main range. From this range the Nagamala spur (3417 ft) runs nearly west. This ridge separates Achenkovil valley from that of the Punalur River. It rapidly descends and runs at an elevation of about 1000 feet to terminate near Shaliakara. From Thuval mala (4710ft) on the main ghats, a well-defined spur called the Alappadimala runs in almost a straight line and divides the valley of Kallar from that of the Achenkovil River. Another spur runs southwest from the main ridge and reaches Chempalakar (3261 ft) situated almost due north of Thora. The southern slope of this ridge is precipitous, while the northern slope is gradual. The main valley of the Achenkovil River is met at intervals by many other valleys' bringing in feeder streams from the ranges on both sides. The Kumaranperur-Kallar river is confined between the hill range of the Chempalakar (3261 ft) and Chennattukara ridges (3800 ft). Both these ridges are covered with grass at the top and form conspicuous sights from the distance. As these ranges extend to the west they break up into numerous spurs, which slope down to about 500 ft and are thickly covered with vegetation. The Kumaranperur-Kallar and Achenkovil rivers join the Pamba River at Vadasserikkara and Veeyarpuram respectively and they form the main drainage channels of these extensive forests.

Status of forest in Konni Division

SI.No	Range	Forest area (km ²)
1	Konni	62.73
2	Naduvathumuzhy	138.94
3	Mannarappara	130.00
Total		331.67

Water supply: A network of rivers and streams traverses the whole area. The rivers are mostly perennial. The Kakkad aar, the Kumarenperur-Kallar and the Achenkovil aar with its tributary Kallar, drain the whole area. All the three rivers flow finally into the Pamba River, which is the main river of these extensive tracts of forests. All these rivers run more or less east

to west and finally empty their waters into the Vembanad Lake. The Kakkad aar runs between the Chennattukara and another grassy ridge of considerable height, which descends to about 1000 ft at Nilakkal. It joins the Pamba River at Perinad. The Kumarenperur-Kallar is confined between the Chempalakar and Chennattukara ridges and empties its waters into Pamba River near the village of Vadasserikkara. Numerous perennial streams join both Kakkad aar and Kallar. The Chittar, Ambalathode and Manjar drain waters into Kakkad aar. Other streams also join this river above the tract dealt within this plan. The Chellickal aar and the Waeal aar join and form the main Kumaranperur-Kallar. Thekkuthode, Thannithode and Mundomuzhithode are some of its feeder streams. The Achenkovil aar rises on the western slopes of Thuvalmala and Ramakkal peaks. Its streams descend rapidly to the bottom of the valley and flow west. This river, in its course towards west receives the waters of many streams on the north and the south. A mile down the Achenkovil village, this river is joined by Sangupilam thodu on the south bank. About three miles down this point Chittar a large stream that drains the valley below Nagamala, joins the main river. About three miles below Chittar and a mile above Thora the river is joined on the right side by the Kallar, a stream much larger and with stronger current than the main river at this point. This Kallar takes its origin on the western slopes of the main range. About three miles above its junction with Achenkovil aar, Arambathodu joins it on its north bank. The rocky character of its bed and the strong current in floods, make the floating of timber very difficult in Kallar. At Thora, the Achenkovil aar receives the waters of the Thora thodu, which drains the northwestern slopes of Nagamala hills. Further down, the main river receives one after the other, the Chempala thodu, Kachira thodu, the Karuppan thodu, Kokka thodu, Naduvathumizhi thodu and Kummannur thodu on its right bank and Palankuzhi thodu, Mannarppara thodu and Kadiar on its left bank, before the main river leaves the forest tract. The main river in the monsoon is used for floating bamboos and reeds from almost its very source and timber in rafts for about twenty miles up stream from Konni.



Teak Plantation

Distribution: The reserves dealt with form one compact block except for a few isolated blocks viz., Aruyapalam reserve, Kalanjoor reserve and the Kodumon north and south blocks, which are amidst of adjoining cultivations. **Division into ranges:** The area is divided into three ranges Konni, Naduvathumuzhi and Mannarappara Ranges.

Konni Range: Konni Range is situated in the Western part of the Konni Division. The Ranni Range borders south and the northern side is Pathanapuram Range. The eastern boundary is Naduvathumuzhy Range and Arabian Sea is in the Western side.

Naduvathumuzhy Range: This range is in the central part of the Konni Division. It is situated to the west of Mannarappara Range and to the east of Konni Range. Vadasserikkara Range of Ranni Division is the northern boundary and Pathanapuram Range of Punalur Division is the southern boundary.

Mannarappara Range: The eastern part of the Konni Division forms the Mannarappara Range. In the east the Kallar and Achenkovil Ranges of the Achenkovil Division shares the boundary while in the west with Naduvathumuzhy Range. Vadasserikkara Range of Ranni Division is situated to the north and Pathanapuram Range of Punalur Division to the South.

Achenkovil Forest Division

Achenkovil Division consists of Achenkovil, Kallar and Kanayar Ranges. Achenkovil Division shares the boundary with Tamil Nadu in the east and Konni Division in the west. Punalur Division borders it in the south and Ranni Division in the north.

Status of forest in Achenkovil Division

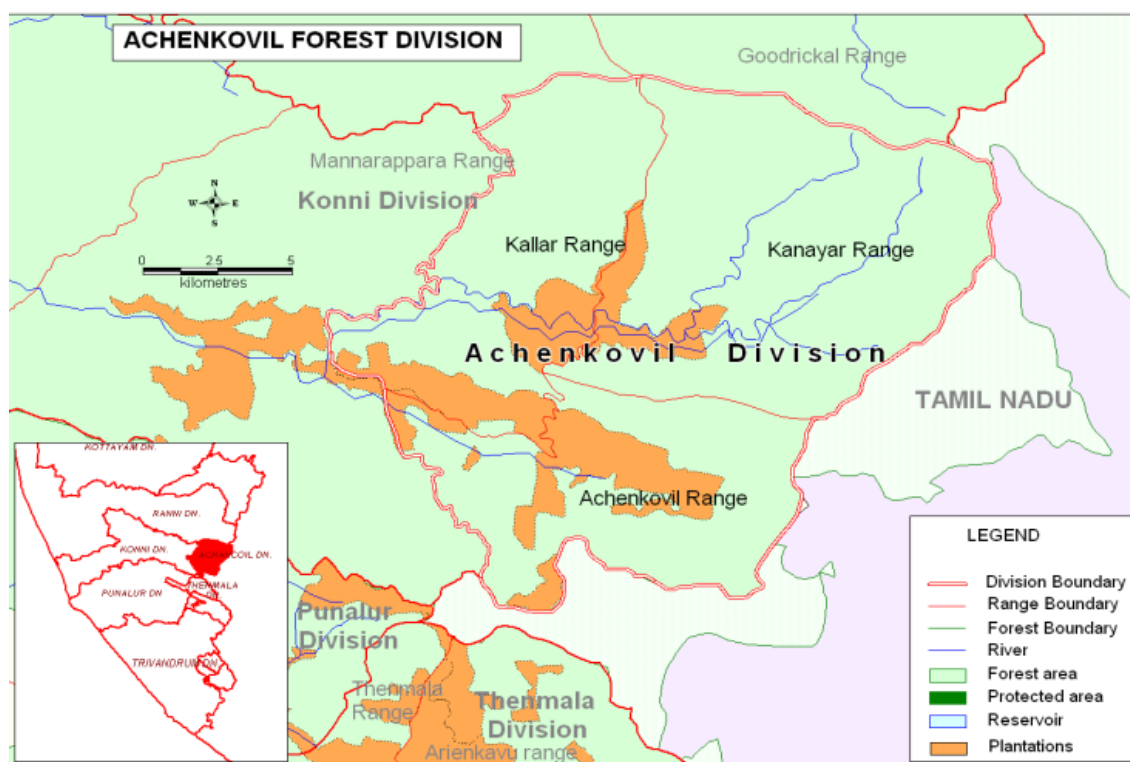
Sl.No	Range	Forest area (Km²)
1	Achenkovil	84.00
2	Kallar	78.00
3	Kanayar	107.00
	Total	269.00

Kallar Range: The northwestern part of Achenkovil Division is Kallar. The eastern side is shared by Kanayar Range and west by Mannarappara Range of Konni Division. Achenkovil Range borders in the south and Vadasserikkara Range of Ranni Division in the north.

Kanayar Range: Kanayar Range forms the northeastern part of the division. Achenkovil Range borders it in the east and in the south.

Kallar Range borders it in the west and Goodrickal Range of Ranni Division in the north. The area is steep. The value starts from 150m to 1800m above m.s.l.

The Kanyar Range is at a highest elevation. The northern part of the Kanyar range is almost steep while the Achenkovil range is plain.



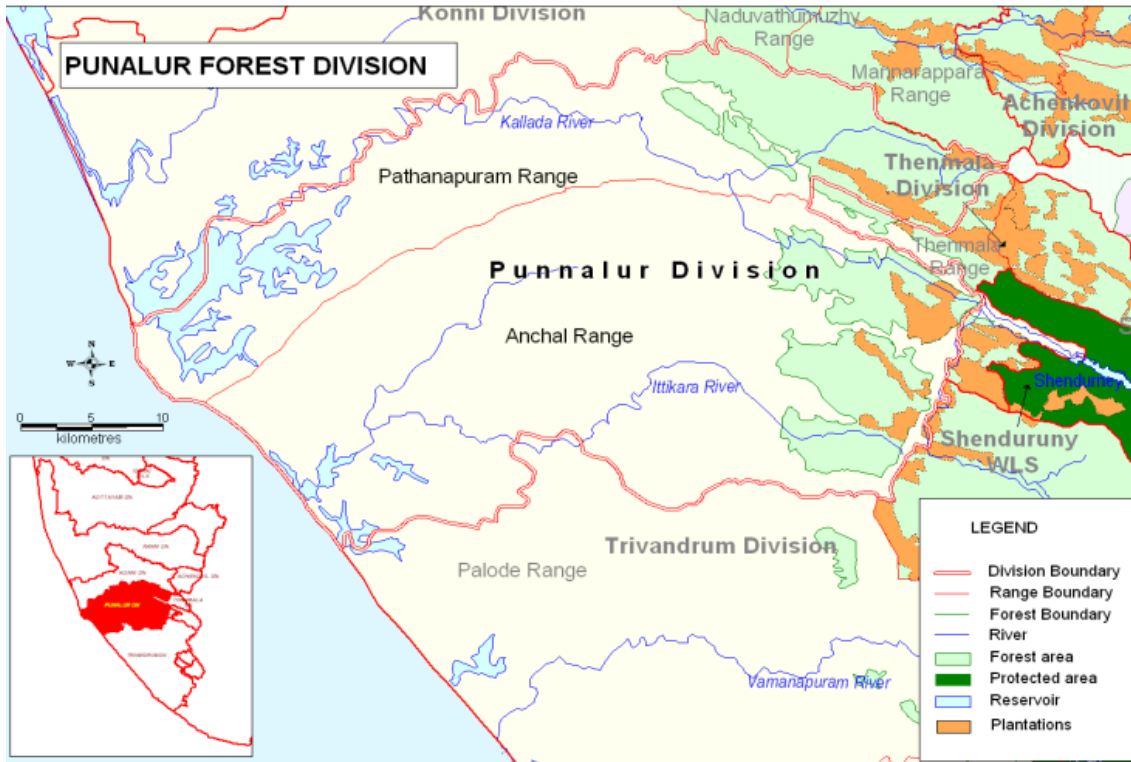
Map of Achenkovil Division

Punalur Forest Division

The tract lies between $8^{\circ} 52'$ and $9^{\circ} 7'$ North latitudes and $76^{\circ} 35'$ and $77^{\circ} 6'$ East longitudes and comprises of Pathanapuram and Anchal Ranges. The reserve forest covers an area of 275 sq. km. The forests of Pathanapuram Range are engulfed by the southern boundary of Konni Division passing through Vellapacode, Kaikunnam, Ayeravelly and Nagamala ridges. Western boundary of Arienkavu reserves passing through Nagamala and Nedumpara upto Vellimala estate and the Punalur, Pathanapuram, Kalanjoor road.

The forests of Anchal Range are surrounded by Kallada River on the north and almost a major portion of the eastern side, the rest by

Trivandrum-Shenkottah road upto Madathara, Madathara-Nilamel road on the south and Nilamel-Anchal-Punalur road on the west.



Map of Punalur Division

These forests are outer foothills of Western Ghats with a gentle terrain rolling down to the blooming villages of the Pathanapuram and Anchal with very few peaks. Here all aspects are represented. With exception to the interior areas of Achenkovil reserve, all reserves are well accessible in both ranges owing to the various plantation projects like Rehabilitation Plantation Ltd, State Farming Corporation, Oil Palm India LTD, and Kerala Forest Development Corporation besides the various developmental activities of the panchayats in the numerous enclosures.

Yeroor and Ayiranellor reserve forests present a rolling type of country of low rounded hill alternately with swampy valleys. The altitude varies from 21m to 75m at the foothill to 350m on the hill at Thekkumla. Achenkovil and Shallakara reserves exhibit a more rugged topography with hills above 600m. In the Pathanapuram Range three main ridges are traceable one running along the northern boundary of the range from Nagamala peak up to padam and goes through the Shalliakara and Punnala reserve with interruptions. Another lies parallel to the above passing through hill points 500m, 630m, 670m in Achenkovil reserve forest and with interruptions through Shallakkara at 85 in Punmala and Chithelvetty upto Urukavis and the third ridge forms the common

boundary of Achenkovil and Ariyankavu reserve forest. These three main ridges form two valleys, one drained by Ambanar River and the other by Kuruvanthavalam. There is a good system of river belts and streams, which drain the forests of this division. The Ambanad and Shaliakkara streams drain the forests of Pathanapuram while the tributaries of Kallada and Ithikara rivers and Chittar and Kadamankode streams drain those of the Anchal Range. Owing to the large-scale clearance of forests and resultant habitation most of the stream dealt with in the previous working plan reports have either been narrowed down or some have changed courses on account of silting. These rivers are not navigable as there are numerous rapids near Meemutti and Ottakkal are the most important. Above Ottakkal the Kallada River is dammed for the purpose of irrigation and construction of the right and left canals are under various stages.

Status of forest in Punalur Division

Sl.No	Range	Forest area (km²)
1	Anchal	148.41
2	Pathanapuram	131.81
	Total	280.22

As common in Western Ghats the underlying rocks are metamorphic consisting of charnockites and other gneisses. The Pathanapuram Range is rich in minerals. The mica mine area is situated in the valley of Ambanad streams about 8km to the east of the Karippanthode contain a fairly good percentage of mica. Formerly some excavation of mica was done here but now the mica mine remains unworked.

Soil is originated from disintegrating gneisses and is deep and alluvial in the valley bottom and banks of streams. The heavy opening up of the forest cover has given rise to out crops of hard laterite. The degree of laterisation varies from place to place. Heavy down pours causes loss of calcium and other bases resulting in the audic nature of the soil. Alluvial soil: Occurs in the riverbanks and valleys. Red loamy laterite soil rich in minerals is the major type found in other areas. In Yeroor reserve sand soil is met with in some parts. This is poor in nutrients and humus is practically nil. Sandy loam and clay loams are found in areas round Kumarankundy and Kaikunnam of Achenkovil and Shaliakara reserves. Clay loam is more common at Mambazhathara in Achenkovil reserve forest. The important rivers and their tributaries, which are the main source of water supply, are Ambanad River, Nanja thodu, Kachar thodu,

Ithikara Ar, Chittar streams, Kuravanthavalam River, Karippan thodu, Kadakkamon thodu, Kallada River and Vattamanar.

There are nine reserved forests, which have been distributed in the two ranges of Anchal and Pathanapuram.

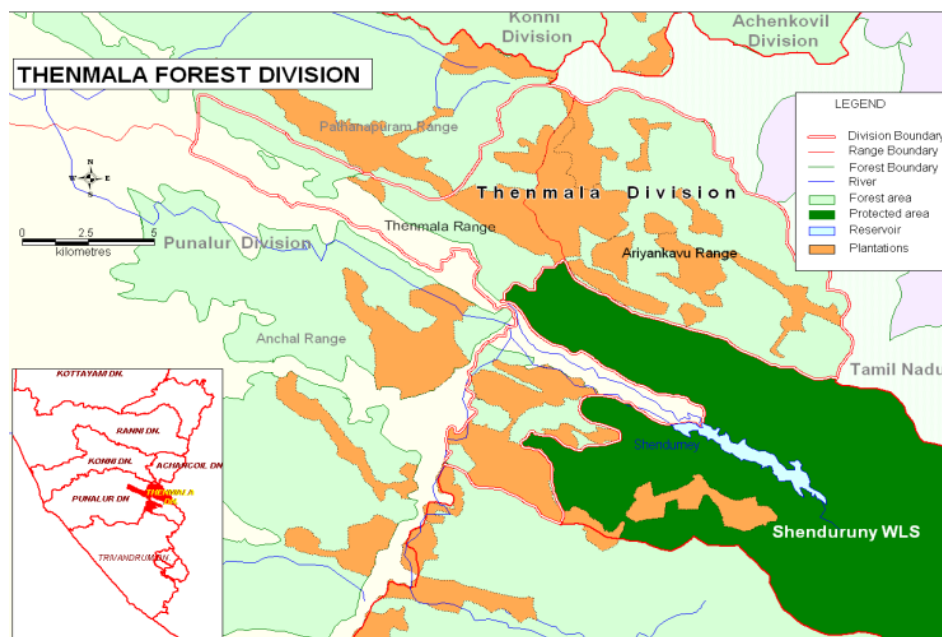
Pathanapuram Range: It is situated in the northern part of the Punalur Division. Thenmala Range of Thenmala Division borders it in the East and Arabian Sea in the Western side. In the south Anchal Range borders it while in the north Konni Range, Naduvathumuzhy Range and Mannarappara Ranges of the Konni Division.

Anchal Range: It is in the southern part of the Punalur Division. To the east there is Kulathupuzha Range and Arabian Sea is in the western side. Palode Range of Trivandrum Division borders it in the south and Pathanapuram Range in the north.

The eastern part of the Punalur Division is almost plain the highest value being 600m in the northeastern side of Pathanapuram Range. The western part of the Anchal and Pathanapuram Range is plain. The lowest contours are of value 10m and through the central part of these ranges. The central part of this division is plain.

Thenmala Division

Thenmala Division consists of Arienkavu and Thenmala Ranges. Bamboo is sparse in the division, there are some bamboo plantations. Thenmala Division shares the boundary in the east with Tamil Nadu and Punalur Division in the west. In the south there is Shenduruny WLS and in the north Achenkovil and Punalur Division.



Map of Thenmala Division

Thenmala Range: Thenmala Range is situated in the western part of the division. In the east it shares the boundary with Arienkavu Range and in the west with Anchal Range of Punalur Division. Shendurney WLS is situated to the south and Pathanapuram Range of Punalur Division to the north.

Arienkavu Range: This range is situated in the eastern part of the division. Tamil Nadu shares the boundary in the east and Thenmala Range in the west. Shenduruny WLS is to the south and Tamil Nadu borders it in the north too.

Status of forest in Thenmala Division

Sl.No	Range	Forest area (km ²)
1	Arienkavu	74.34
2	Thenmala	131.83
	Total	206.17

Red colour is more in the RGB image showing the presence of evergreen forest throughout the division. The light blue colour in the image shows the existence of grasslands.

Topography

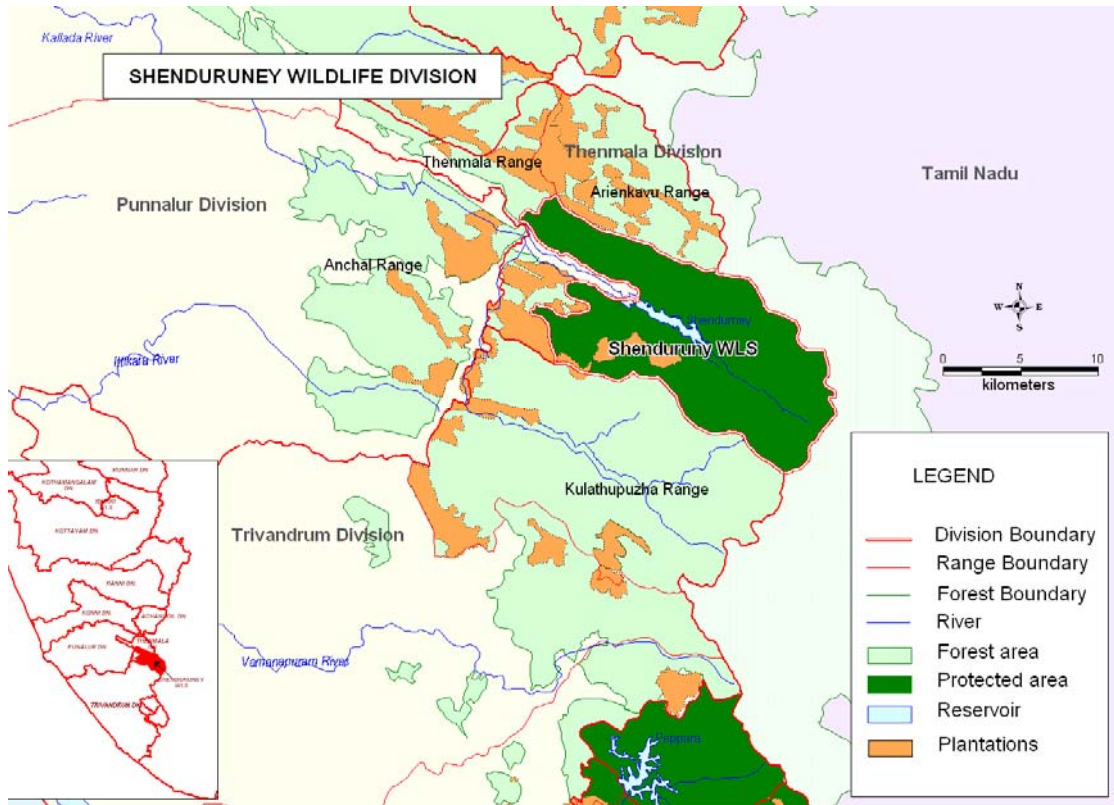
This area is almost plain and has only low valued contours. The maximum value is 900m in the Arienkad Range and the minimum value is 100m.

Shenduruny Wildlife Sanctuary

The Sanctuary is located at 8°48'N-8°57'N latitude and 77°4'E-77°16'E longitude. It is in the Kollam (Quilon) Revenue district and the drainage basin is Kallada River. The Mean annual rainfall is 2500 mm and total area is 100 km². The major attractions are Tropical wet evergreen forests (Rain Forests), grasslands and shola forests, valleys and peaks, lion tailed macaques and a variety of other wildlife.

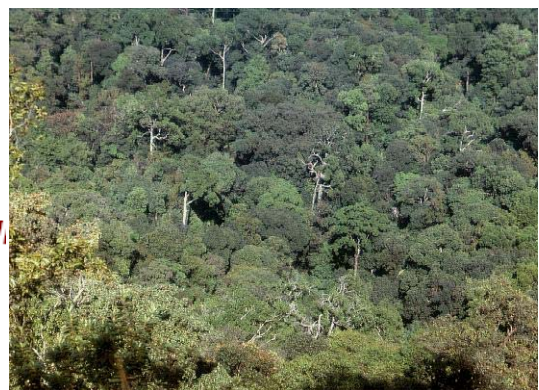
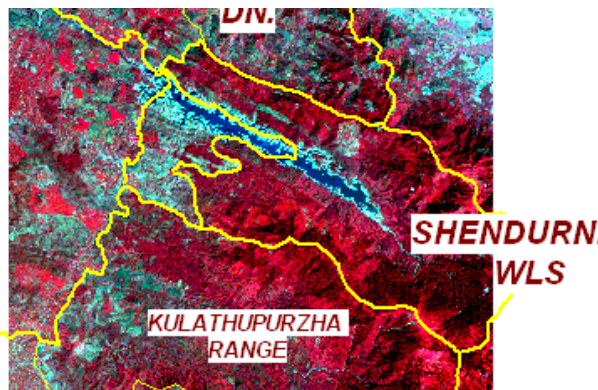
The Schenduruny wildlife sanctuary has an area of 100.32 km² and it is situated in Pathanapuram taluk in Kollam district. The headquarters of the sanctuary is located at Thenmala dam site. The sanctuary is the catchment area of the Shenduruny reservoir which has a waterspread of 13.72 km². The sanctuary is contiguous with the Mundanthurai Wildlife Sanctuary in Tamil Nadu and is connected to the Peppara Wildlife

Sanctuary to the south by a 15 -18 km wide reserved forest tract. The famous Palaruvi falls is nearby. Recently proofs of megalithic civilization in Chenduruny valley have been obtained. Caves with carvings on rocks claimed to be contemporary to Mohanjedaro-Harappa civilization.



Map of Shendurney Wildlife Division

Topography and climate: The elevation in the sanctuary varies from 800 to 1920m above MSL with a general slope towards the west. The temperature varies between 20 and 30 ° C and the annual rainfall ranges from 2500 to 5000 mm and the dry season is one to two months



RGB image of Shenduruny WLS

Evergreen forest

The whole Wildlife division has evergreen forest. Grasslands are there in the central part of the division. There is no deciduous forest in this area.

Vegetation is mainly evergreen forests with occasional deciduous forests and grasslands. The name 'Chenduruny' is believed to be originated from a tree called 'Chenkurungi' (*Gluta travancorica*), the wood of which is famous for its red hue and black grains. The following vegetation types are seen in the sanctuary: 1. Southern hilltop tropical evergreen forest 2. West coast tropical evergreen forest 3. Cane brakes 4. Wet bamboo brakes 5. West coast semi-evergreen forest 6. Southern moist mixed deciduous forest 7. Myristica swamp forest 8. Sub-montane hill valley swamp forest 9. Riparian fringing forests 10. Reed brakes 11. South Indian sub-tropical hill savannah woodland 12. Southern montane wet temperate forest 13. Southern montane wet grassland

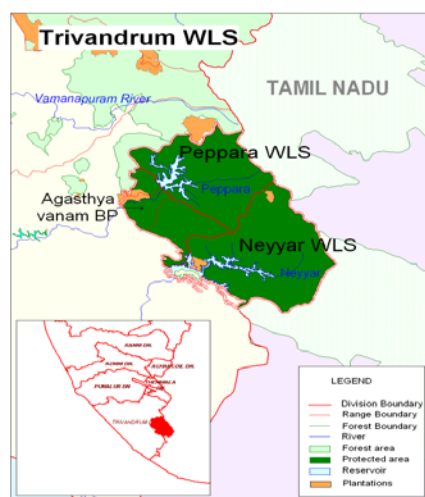
The lower reaches of Chenduruny had been selection felled and reed collection had also been carried out extensively. There are a few enclosures of recent settlements. Although the perimeter of the reservoir and the lower reaches of the earlier worked forests had undergone some degradation, primarily from fire, the upper reaches are well preserved southern hilltop tropical evergreen forests extending over at least 50 km² in a composite segment. There are a few well-preserved stretches of southern montane wet temperate forest, West Coast semi evergreen forests and West Coast tropical evergreen forests apart from the various edaphic sub types.

The common wild animals seen are elephant, tiger, leopard, wild dog, civet cat, sloth bear, pangolin, monitor lizard, Nilgiri langur, bonnet macaque, malabar giant squirrel, python, cobra, king cobra, krait, russels' viper, jungle fowl, wood pecker, king fisher, parakeet, mynahs etc.

Trivandrum Forest Division

Trivandrum Division consists of Kulathupuzha, Palode and Paruthipally Ranges. In the Paruthipally Range, bamboo is distributed along the western side patches. Trivandrum Division is the southernmost division in Kerala. Arabian Sea is in the western side while Tamil Nadu in the east and south. Punalur Division shares the boundary in the north. Shenduruny WLS is situated to the north east of the division. Peppara and Neyyar WLS are situated in the eastern part of the division.

Agasthyavanam BP is also situated to the east of the division and to the west of Peppara and Neyyar WLS.



Map of Trivandrum Division

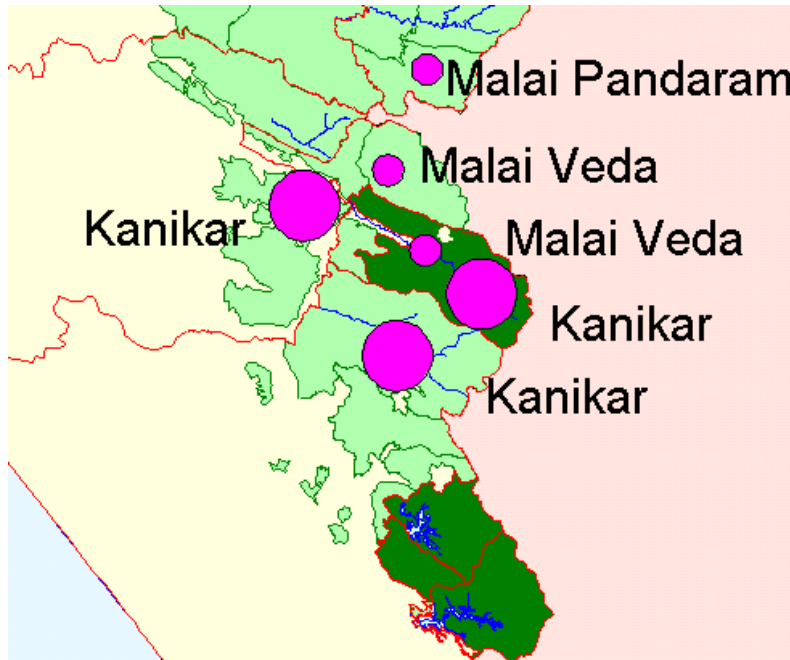
Palode Range: Palode Range is situated in the northwest of the division. The Palode Range shares its eastern boundary with Kulathupuzha Range and Arabian Sea is in the western side. In the south it shares the boundary with Paruthipally Range and the northern side is Anchal Range of Punalur Division.

Status of forest in Trivandrum Division

Sl.No	Range	Forest area (km ²)
1	Kulathupuzha	219.69
2	Palode	107.50
3	Paruthipally	42.69
	Total	369.88

Kulathupuzha Range: It forms the north eastern part of the division. In the east the boundary is shared by Tamil Nadu and Palode Range in the West. Paruthippally Range is to the south and Palode Range to the north. On the eastern side there is Trivandrum WLS.

Paruthipally Range: Paruthipally Range is the southernmost range in the division and of Kerala. In the east it shares the boundary with Tamil Nadu and, Peppara and Neyyar WLS. Arabian Sea is in the western side and Tamil Nadu in the south. Palode Range is to the north of the Paruthipally Range. Agasthyavanam BP is situated to the east of this range.

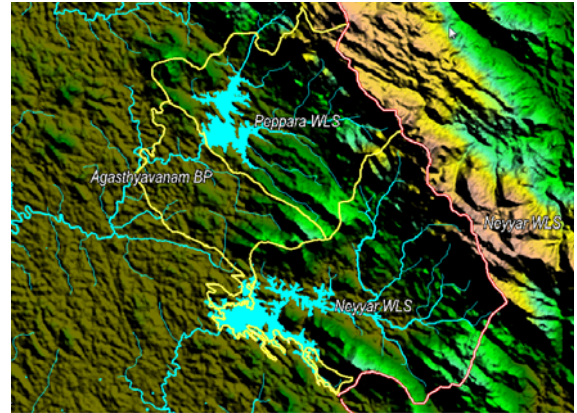
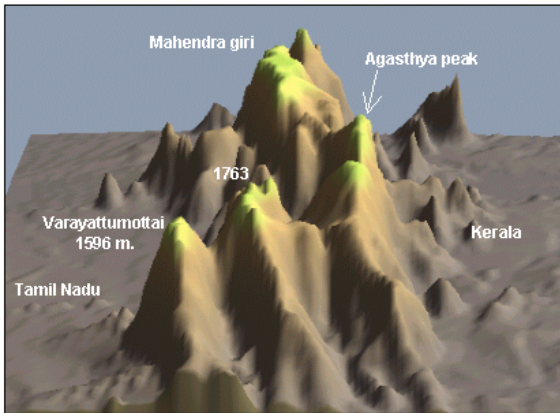


Tribes present in the Trivandrum Division

The region is almost steep. Higher valued are distributed mostly in the eastern part and lower valued in the western side of the division. The highest value is 1200m and is present in the eastern part. The lowest value is 10m and exists in the southern part.

Trivandrum Wildlife Division

Neyyar, Peppara, Shendurney and Agasthyavanam BP come under this. Shendurney has already been described. Area breakup follow.



Three D image of the Trivandrum WLS area

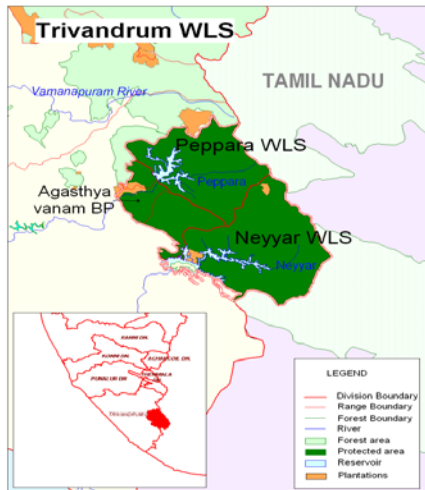
Three D image of the Peppara, Neyyar, Agasthya BP

Status of forest in Trivandrum Wildlife Division

	Range	Forest area (km ²)
1	Neyyar	128.00
2	Peppara	53.00
3	Shenduruny	100.32
4	Agasthyavanam I & II	31.12
	Total	312.44

Neyyar Wildlife Sanctuary

The Sanctuary is located at 8°30'N-8°37'N latitude and 77°8'E-77°17'E longitude. It comes under the revenue district of Thiruvananthapuram and the drainage basin is Neyyar River. The mean annual rainfall is 2800 mm and the total area is 128km². The major attractions are Tropical wet evergreen forests (Rain Forests), grasslands and shola forests, valleys and peaks, a variety of wildlife.



Map of Trivandrum Division



Crocodile problem

The Neyyar Wildlife Sanctuary is situated in the extreme southern tip of Kerala State, 30kms away from Thiruvananthapuram, the capital city. This area was notified as a wildlife sanctuary in 1958 and forms the catchment of Neyyar Reservoir. It is contiguous with Kalakkadu Tiger Reserve and Mundanthurai Wildlife Sanctuary of Tamil Nadu. The famous Agasthyamalai is a part of the Sanctuary, A good number of people have settled in and around the tract. There are 14 settlements of the Kani tribe within the sanctuary. The tract abodes substantial natural forests ranging from montane sub-tropical and tropical evergreen to degraded moist deciduous types. The complexity and diversity of flora make it an ideal sanctuary. The topography is rugged with flat meadows and gentle to steep slopes. The altitude ranges from 90 m to 1,868 m. The climate is moderately hot and humid. The temperature varies from 16° C to 35° C. The mean annual rainfall is 2,800 mm and the tract receives both south-west and northeast monsoons. The red colour in the Neyyar region shows the presence of evergreen forest. The green colour in the southern part and other parts of the division shows the presence of deciduous forests.

Due to the varied climatic and topographic conditions, the sanctuary presents very remarkable diversity in vegetation. The forest types in the area are West coast tropical evergreen, West coast semi-evergreen, Southern hilltop tropical evergreen, Southern wet temperate, Southern moist mixed deciduous and Southern montane grassland. At elevations between 100-800 m, moist deciduous and semi-evergreen forests dominate, the latter mostly confining to river courses and the streams. From 700-1300 m, the vegetation is predominantly evergreen forest the major types and subtypes of vegetation occurring in the sanctuary are: Southern hilltop tropical evergreen forest, West coast tropical evergreen forest, West coast semi-evergreen forest, Pioneer Euphorbiaceous scrub,

Southern secondary moist mixed deciduous forest, Riparian fringing forests, Myristica swamp forest, Tropical hill valley swamp forest, Reed brakes and South Indian sub-tropical hill Savannah (Woodlands)

Sanctuary has a variety of animals. The contiguous tracts with the adjoining protected areas of Tamil Nadu, support viable populations of the endangered Lion-tailed macaque and Nilgiri langur: The other arboreals include Bonnet macaque and Malabar giant squirrel Nilgiri tahr is also seen in the Higher peaks of the area. Elephants and Sambar deer are the most commonly seen animals. Gaur, Barking deer, Mouse deer and Wild boar are the other major herbivores. Tiger and Leopard are also reported from the Sanctuary. Avifauna of the Sanctuary is highly diverse and rich. Darter, Little cormorant, Hill myna, Little green heron, Brahminy kite, Racket-tailed drongo, Emerald dove and Grey jungle fowl are a few to mention. A variety of snakes like python, cobra, viper, etc. are also seen. The reservoir of the Neyyar Dam supports a good population of crocodiles and otters.

Crocodile farm

A Crocodile farm was established in 1977 and is located near the administrative complex at Neyyar. The main objective of the farm is to establish a breeding stock of this endangered reptile for reintroduction in its known former ranges. More than a hundred crocodiles of different age groups are kept in specially designed tanks.

Lion safari park

Lion Safari Park, situated in an island near Neyyar is open to tourists on all days except Mondays. The lions in the park roam freely in an area of about four hectares. The visitors are taken in a bus. The magnificent waterfall at Meenmutty and the trekking to Agasthyar Peak is an added attraction to wildlife enthusiasts. Boating in the Neyyar Reservoir is yet another attraction. A rest house and a youth hostel are available for tourists near the dam site. At Meenmutty there is another rest house in the wilderness. The Sanctuary is approachable from Thiruvananthapuram by road. Thiruvananthapuram city, 30 kms away, is the nearest airport/rail head. Link services are available throughout the day and the Kerala Tourism Development Corporation arranges conducted tours to Neyyar. Nature education camps are organised at the sanctuary. December-May is the appropriate season for visiting the area.

The Neyyar Wildlife Sanctuary comes under Thiruvananthapuram Wildlife Division and is administered by an Assistant Wildlife Warden at Neyyar Dam site. The magnificent waterfall at Meenmutty and the trekking to Agasthyar Peak is an added attraction to wild- life enthusiasts. In addition, the Sanctuary manages a Lion Safari Park and a Crocodile farm.

Boating in the Neyyar Reservoir is yet another attraction. A rest house and a youth hostel are available for tourists near the dam site. At Meenmutty, there is another rest house in the wilderness.

This sanctuary was established in 1958. The main scenic attraction of the sanctuary is the Neyyar reservoir. The reservoir is easily navigable and boats can be arranged for cruise in the reservoir. The extent of water spread in the reservoir is 9.06 sq. km. Long narrow creeks and channels, islands and peninsula supporting varied vegetations bestow upon Neyyar a distinctive charm. The vegetation varies from tropical wet evergreen to grasslands. Agasthyagoodam of 1890m elevations is in this sanctuary. According to Hindu mythology, Agasthya, the ascetic performed penance.

There is a wide range of herbivores carnivores and onivores in this sanctuary. The main feature is the elephant. There are also gaur, sloth bear, Nilgiri tahr, jungle cat, wild dog, wild boar lion tailed macaque and Nilgiri langur. Chances of seeing tiger and leopard are very remote and depend on luck. This sanctuary is also endowed with rich bird life and strikingly coloured insects. For increasing the meagre population of crocodiles, a crocodile-rearing centre has been started in the reservoir. In 1983 a deer farm was also established. Action is under way for opening a Lion Safari Park here. Trivandrum, which is 32 km away, is the nearest railway station and airport. Motor transport is available from Trivandrum to Neyyar. Accommodation can be arranged at Neyyar in the Inspection Bungalow and dormitory of the Irrigation Department.

Peppara Wildlife Sanctuary

The Sanctuary is located at 8°34'N-8°42'N latitude and 77°7'E-77°15'E longitude. It comes under the revenue district of Thiruvananthapuram and the drainage basin is Karamana River. The mean annual rainfall is 3200 mm and the total area is 53 km². The major attractions are Tropical wet evergreen forests (Rain Forests), grasslands and shola forests, valleys and peaks; Lion tailed Macaque and variety of wildlife.

Peppara wildlife sanctuary was established in 1983 in an area of 53 km² to conserve the catchment area of Peppara reservoir and the wildlife of that area. The sanctuary is located about 46 km northeast of Thiruvananthapuram city. The nearest township is Vithura. The sanctuary is situated in the Nedumangad taluk of Thiruvananthapuram district. Across the state border, to the east of the Peppara Sanctuary, is the Mundanthurai Wildlife Sanctuary.

Red colour in the eastern part of the division shows the presence of evergreen forest. Green colour in the central part and the south eastern part shows the presence of deciduous forest. The mean elevation of the

sanctuary is 700m above MSL while the highest point is 1580 m. The temperature varies from 16-35°C and the annual rainfall is 3200mm. The easiest way to Agasthyar peak -through Bonacaud - is through this sanctuary. The average annual rainfall is 1800-3000 mm with a dry season lasting for only one to two months.

The forest type varies from evergreen to dry deciduous, grassland and shola. The Common wildlife are elephant, sambar, leopard, lion-tailed macaque, slender loris, wild boar, malabar giant squirrel, gaur, wild dog, tiger, sloth bear and a variety of hill birds. The major vegetation types occurring in this sanctuary are: 1. Southern hilltop tropical evergreen forest. 2. West coast tropical evergreen forest. 3. West coast semi-evergreen forest. 4. Pioneer Euphorbiaceous scrub. 5. Southern secondary moist mixed deciduous forest. 6. Reed brakes. 7. South Indian tropical hill Savannah woodlands

The sanctuary has floristically valuable locations, such as Chemmunji peak area, from where a number of plants with extremely restricted distribution have been collected earlier. This sanctuary has less than 20 km² of intact southern hilltop tropical evergreen forest along the crestline continuous with that of the Neyyar Sanctuary. The degradative processes this sanctuary is subjected to is as severe as in Neyyar, and are primarily due to a number of scattered tribal hamlets whose agricultural land use has been destabilized, severe annual fire damage, large scale illicit felling of wood and the presence of a tea estate in the very core of the sanctuary close to the most valuable forest. The extensive eucalyptus plantations all along the margin of the sanctuary, their routine working, and the social forestry planting in grasslands cause considerable disturbance. There is no effective buffer margin for insulating and protecting the remaining intact vegetation.

Peppara abound in wildlife because the forest stretch is connected to the larger forest tracts of the Agasthyamala region. Following mammals are seen in the sanctuary: Elephant, Gaur, Barking deer, Wild boar, Indian porcupine, Three-striped Palm Squirrel, Tiger, Lion-tailed Macaque, Mouse deer, Bonnet Macaque, Nilgiri Langur etc. Reptilian fauna includes Cobra, Viper, Python, Rat Snake, Flying snake, Lizard etc. Peppara is well connected by road and air. Nearest air terminal is Thiruvananthapuram (50 km) Nearest Rail head is at Thiruvananthapuram. The sanctuary complex is at Peppara. The complex includes an information centre and office. Tourists can visit the Sanctuary and enjoy boat ride in the lake. This sanctuary with its rich mammalian fauna and birds is emerging as a big attraction to wildlife enthusiasts and ornithologists. It was established in 1983 over an area of 53 sq. km. In the Western Ghats of Trivandrum

Forest Division this is dotted with large hills and numerous hillocks with evergreen forest and Eucalyptus plantations.



Kani Tribals



Basket weaving

Elephant, sambar, leopard and Lion tailed macaque are commonly seen as also cormorant. Peppara is accessible from vithurai on Trivandrum-Ponmudi road and is about 50 km from Trivandrum. Ponmudi, 61 km from Trivandrum, is a delightful hill resort of 1000m elevations. Board and lodging facilities are available in the Tourist Complex in cottages and dormitories. The trails marked by the Forest Department will be of interest for hikes and treks.



A traditional Kani man

Discussion and Conclusions

Status of the forest at the level of forest range has been examined. The vested forests have practically been amalgamated into the reserve forest system and management of integrated area under two working plans is almost complete. The forest boundary in most parts of the state has been demarked with cairns or walls, excepting in few places, change in boundary or area under forest is not expected. There has been hardly any new conversion to plantations and no new submersion under hydro projects.

Poster quality maps were generated at state, circle and division level. These are included in KFRI web site and can be searched and downloaded.

One glaring lack of accurate vegetation map for forests of Kerala is evident. With widespread agreement of not following Champion and Seth classification at subtype level, new mapping schemes at association level or RGB/NDVI parameters have to be developed. Effective fire protection is also changing the forest composition. Stoppage of selection felling and flowering of bamboo is also changing the vegetation. Allowing natural growth in plantations of protected areas is making updating of maps even more important.

Satellite images have been available from 1974 onwards. Recorded details of tree composition/IVI tables are the main source of information for periods prior to 1980. Initial images of 50m resolution are hardly comparable with high resolution images of recent years. Multispectral images of 1980 onwards at 35, 28, 15 and 5.8 m permit supervised classification to identify vegetation. Latest sub meter images require another approach as identification can be carried out at tree level.

Wide spread availability of composition data from geo-referenced locations in forests and sacred groves make spatial plotting and continuums can effectively supplement vegetation maps.