

Final Report

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**Mapping Forest Resources of Kerala**

Research Project No. KFRI 412/2003

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## Project Proposal

Title	<b>Mapping forest resources of Kerala.</b>
Investi- gators	Dr. P. Vijayakumaran Nair
Intro- duction	<p>Existing data on land use, soils, flora and fauna of Kerala are intended to be brought into division wise GIS based level maps. The Central Circle will be taken up initially, during the first year.</p> <p>There is need to update many aspects of spatial data on forests. Forest plantations form an important component of forest vegetation. Recent changes in plantations in terms of area and species are yet to appear in maps. Even though vegetation have been mapped at association level a composite vegetation map along with plantation are yet to be prepared. Changes of settlements inside forests and in the periphery can be updated in the maps. Animal resources can also be examined on a spatial frame work.</p>
Objecti- ves	<p>The objective of the current project is to map the Central Circle. Other circles will be taken up as continuation.</p> <ol style="list-style-type: none"> <li>1) To prepare composite map of forest boundary, vegetation, plantations, reservoirs and settlements.</li> <li>2) To bring available data on distribution of plants and animals into a GIS based resource inventory and mapping system so that up to date state of forests can be generated.</li> </ol>
Method	<ol style="list-style-type: none"> <li>1) Forest types and Land use will be examined using supervised classification of satellite images.</li> <li>2) Plantations and settlements will be visited and details studied. Survey sketches of plantations that have not appeared in topo sheets will be compiled / GPS surveyed for incorporation into maps.</li> <li>3) Details of flora and fauna will be compiled from floras, research reports, census reports and sighting records.</li> </ol>
Output expected	<ol style="list-style-type: none"> <li>1) GIS based map of vegetation, plantations, soil, etc. Division wise with details of administrative boundaries and vegetation types.</li> <li>2) CD ROM with data in interactive form with user friendly search and retrieval mechanism.</li> </ol>
Duration	18 Months

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## **Acknowledgements**

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## **Abstract**

Forest boundaries were constructed from existing maps, topo sheets and forest department records. 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.

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 new conversion to plantations and no new submersion under hydro projects. Poster quality maps were generated at state, region 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(1938) 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 of continuums. These can effectively supplement vegetation maps. In the present study, forest is described with supporting maps.

## **Mapping forest resources of Kerala.**

### **Introduction**

This project examines the forests of central region of Kerala. In addition to the present central circle, geographically continuous areas such as Nemmara and Parambikulam are also considered. Objectives include generation of composite map of forest boundary, vegetation, plantations, reservoirs and settlements. Bringing available data on distribution of plants and animals into an information system was another objective.

### **Methods**

Forest boundaries are constructed from existing maps, topo sheets and forest department sources. Forest types and Land use are overlaid on this. Plantations and settlements were visited and details studied. Survey sketches of plantations that have not appeared in topo sheets were compiled / GPS surveyed for incorporation into maps. Details of flora and fauna were compiled from floras, research reports, census reports and sighting records.

### **Study area**

Study area covers mainly the Central Circle of Kerala Forest. For continuity sake adjoining Nemmara and Parambikulam Divisions are also covered. The region under consideration lies south of the Palghat gap. A series of low hills constitute the region. Geographically there is no clear demarcation to the southern and eastern sides. Unlike in many parts of Kerala even the state boundary does not run along a crest line in these areas. There is a large chain of hills on the eastern side of the region under consideration. They include Anamalai hills (TN), the Eravikulam plateau and the Palni hills (TN).

**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.

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

**Vazhachal Division:** The chain of hills from Chimmony Wildlife Sanctuary extends into Chalakudy and Vazhachal Divisions. Vazhachal Division has another series of flat hills on the eastern side.

**Parambikulam Wildlife Sanctuary:** Excepting the western region, Parambikulam Wildlife Sanctuary is more or less plain areas. 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.

**Rivers:** Four major rivers drain the area. Bharathapuzha river flows along the northern side of the area. Much of Nemmara division is drained by tributaries of this river. A short river, Vazhani, flows west. There is a small man made reservoir at Vazhani. The next major river system is Kurumali. It has two major components Manali stream originating in Peechi and Kurumali River originating in Chimmony. 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. Idamlayar drains the northern parts and Pooyamkutty and Pichiyar drain the southern regions.

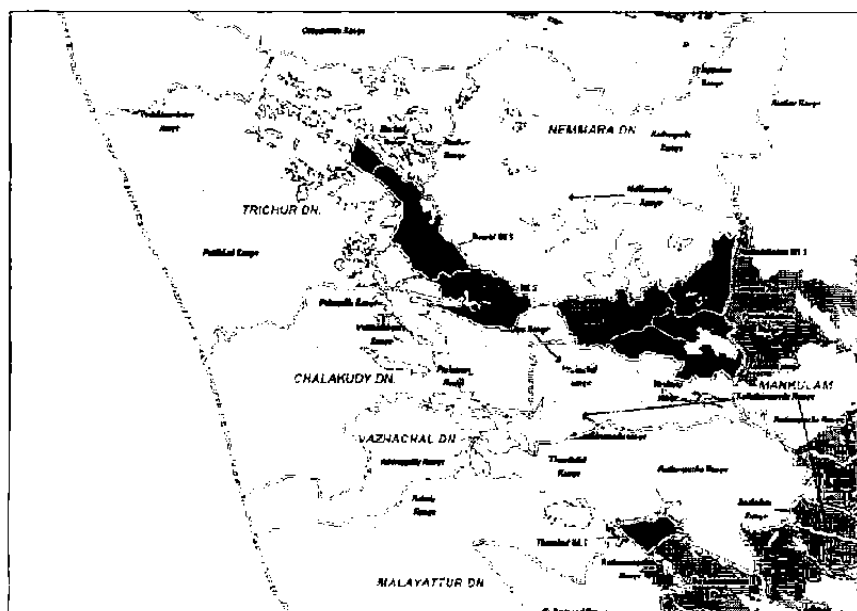
## **Central Region**

The Central Region comprises of Thrissur Division, Chalakudy Division, Vazhachal Division, Malayattur Division and Peechi Wild Life Sanctuary (WLS). The Palakkad Division and Nilambur South Divisions of the Olavakode Region form the northern boundary. In the east, Tamil Nadu is the boundary and in the west Arabian Sea. In the south lie Mankulam, Munnar, Kothamangalam and Kottayam Divisions of the High Range region.

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 lie 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 in the east by Tamil Nadu and in the west by Arabian Sea. Chalakudy Division and Parambikulam WLS of the Olavakode Region border it in the north and Malayattur Division in the south. 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.

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 region under consideration. They include Anamalai hills (TN), the Eravikulam plateau and the Palni hills (TN).





Map of central region

### Administrative units

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

**Nemmara Division:** Forests immediately south of the Palghat gap come 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.

**Chalakyudi Division:** The chain of hills from Chimmony Wildlife Sanctuary extends into Chalakyudy and Vazhachal Divisions.

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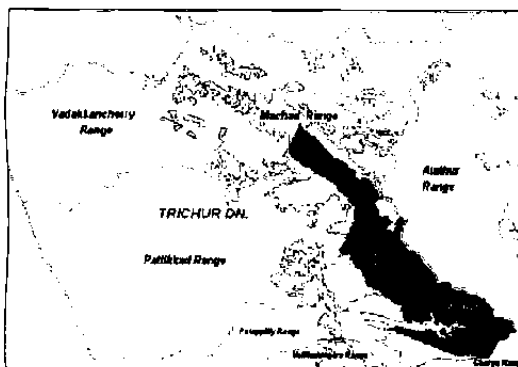
**Parambikulam Wildlife Sanctuary:** Excepting the western region, Parambikulam Wildlife Sanctuary is more or less plain areas. There is a chain of hills adjoining hills of Nelliayampathy on the western side.

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

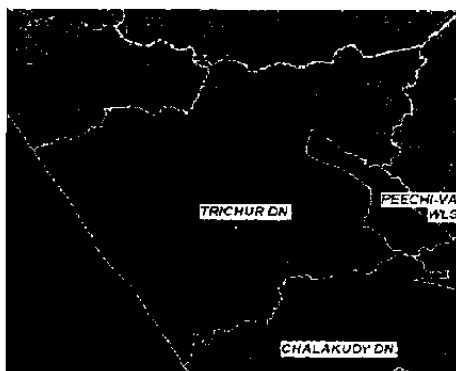
Forests form a more or less continuous stretch from Palghat gap to Periyar River. The forest adjoining inhabited plains are highly fragmented. Satellite image shows the overall vegetation clearly. Division wise description follows.

### **Thrissur Forest Division**

Thrissur Forest Division consists of Vadakkanchery, Pattikkad and Machad Ranges. 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 circle 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.



Map of Thrissur Forest Division



RGB image of Thrissur Division

**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 Kalikavu Range of Nilambur south Division to the north.

**Pattikkad Range:** Pattikkad 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. To the south there is Palappilly Range of Chalakudy Division and to the north there is Vadakkanchery 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 Vadakkanchery Range in the west. Pattikkad Range and Peechi-Vazhani WLS are to the south and Vadakkanchery Range to the north.

#### **Area break up of forest in Thrissur Division**

	<b>Range</b>	<b>Forest area (Km<sup>2</sup>)</b>
1	Vadakkancherry	58.86
2	Pattikkad	59.44
3	Machad	92.34
4	Peechi WLS	126.73
	<b>Total</b>	<b>337.37</b>

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. 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.

#### **History of the forests**

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 a part of forests in this division. It was not brought into operation due to the proposal to assign large areas of forest lands for cultivation. The forests were continued to be managed on the basis of Annual plan of operations. Between 1921 and 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 land that were clear felled for "grow more food programme", were protected with natural regeneration operations. 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 Circles, Conversion Working Circle, Selection Working Circle, Protection Working Circle, Bamboo Working Circle and MFP Working Circle. 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 Circles: they were Teak plantation Working Circle, Teak cum

softwood Working Circle, Industrial wood Working Circle, Cashew Working Circle, Bamboo Working Circle, MFP Working Circle, Protection Working Circle and Miscellaneous Working Circle. Large areas under teak plantations in a way reduced illegal wood cutting. A number of industrial plantations were also raised during 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, to improve productivity of plantations, to improve living conditions of hill men and to inspire people and improve their outlook towards forests. To achieve all these objectives, six Working Circles: 1) Watershed management Working Circle (3911 Ha), 2) Industrial plantation Working Circle (5790 Ha eucalyptus, acacia and mixed softwood), 3) Teak plantation Working Circle (2679Ha), 4) Cashew plantation Working Circle (640 Ha), 5) Bamboo Working Circle (1210 Ha) and 6) NWFP & Tribal welfare Working Circle were constituted. In addition to this, there are chapters on Salvage felling, Wildlife management, Participatory Forest Management and Miscellaneous prescriptions.

### **Topography**

The eastern part of the division is steep. The highest hill 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 high value is 1200m.

### **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.



Three-d view of the central region

### **Constituent Ranges**

The area under the division is divided into three ranges, Pattikkad, Machad and Vadakkanchery. Of these Machad is the largest with about 100km<sup>2</sup> 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 lease 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 Kurumali River drain the area. Some of the irrigation canals pass through forest areas and contribute to increased water availability. The NH is cut through the hills in the Kuthiran region and a tunnel is planned for future.

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

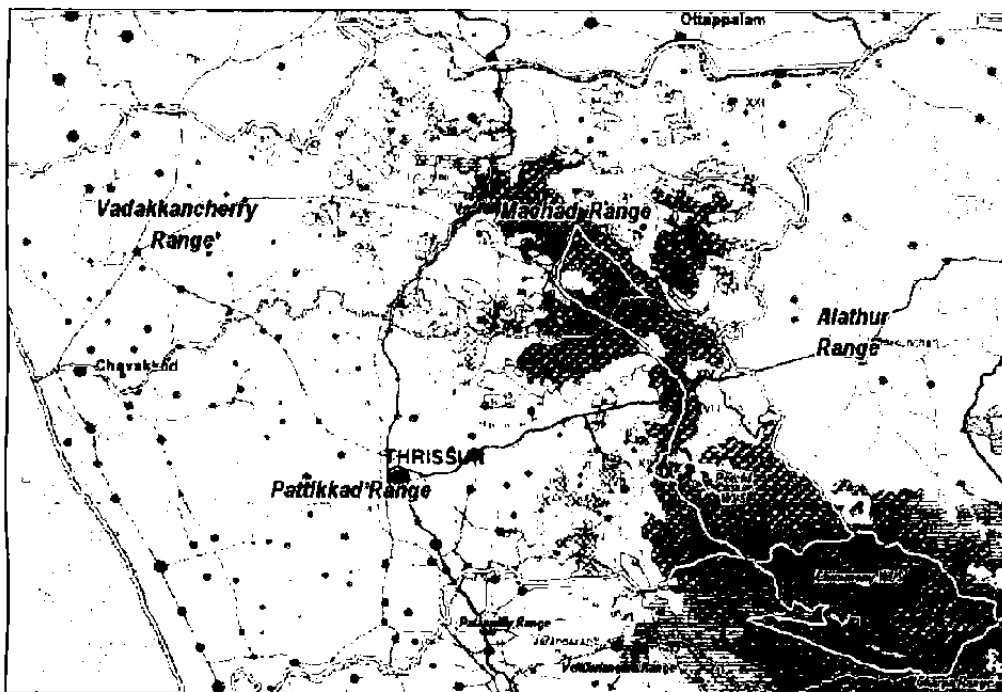
**Forest continuity:** There are two large isolated patches of forest. There are two large continuous parts, one adjoining Peechi-Chimmony wildlife sanctuaries and the other on either side of Machad Mala.

**Vegetation:** FIP map shows most of the region as degraded deciduous. A small region near Chimmony-Peechi wildlife sanctuary is shown as degraded evergreen 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 semi evergreen forest.

**Plantations:** There are teak plantations inside the range.

**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.

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



FIP map showing major vegetation types

### **Machad Range**

Forests of Machad Range form the catchment area of Vazhani reservoir. Part of the range has been demarcated as wildlife sanctuary along watershed. There is difference of opinion regarding the viability of region on the western side of NH as a separate entity.

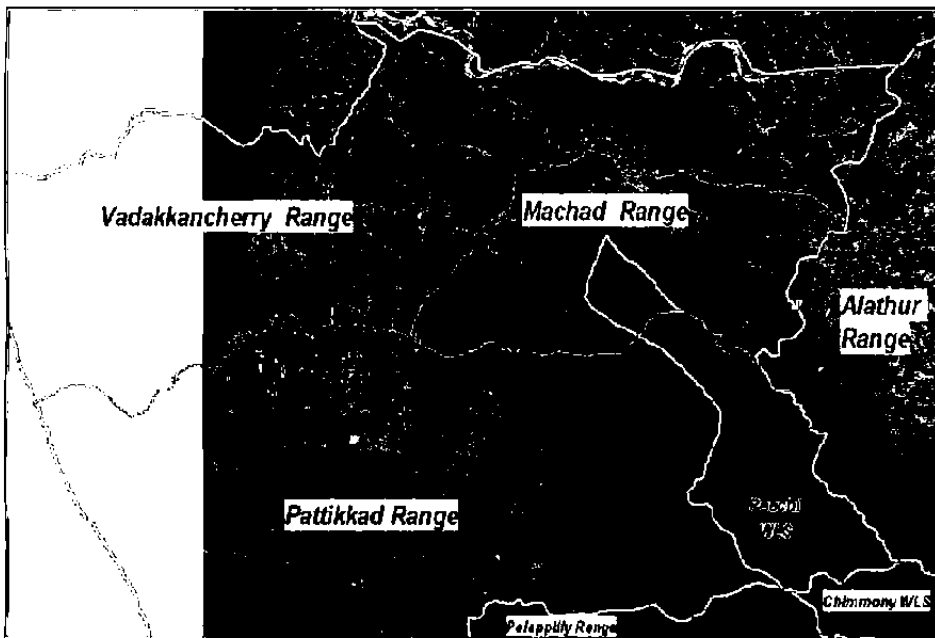
**Topography:** The forest is on either side of hill that runs in NW direction. The region is drained by streams leading to Vazhani reservoir. Vazhani river flows west and joins a series of coastal canals.

**Accessibility:** Machad range is accessible from the Pattikkad 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. Map shows that the vegetation is mostly degraded moist deciduous, though 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 this range.



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-Shornur 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.

### **Peechi-Vazhani Wildlife sanctuary**

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 km<sup>2</sup>. The Vazhani region is still under the administrative control of Machad Range. Two reservoirs Peechi and Vazhani are situated in the sanctuary.

**History:** Between 1760 and 1780 control of forests changed 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. 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 of 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 km<sup>2</sup>. 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 triphysa* and *Acacia auriculiformis*. The area under Teak is 363.507 ha, that under soft wood: 582.437 ha, belt plantation: 44.400 ha and miscellaneous plantation: 692.57 ha.

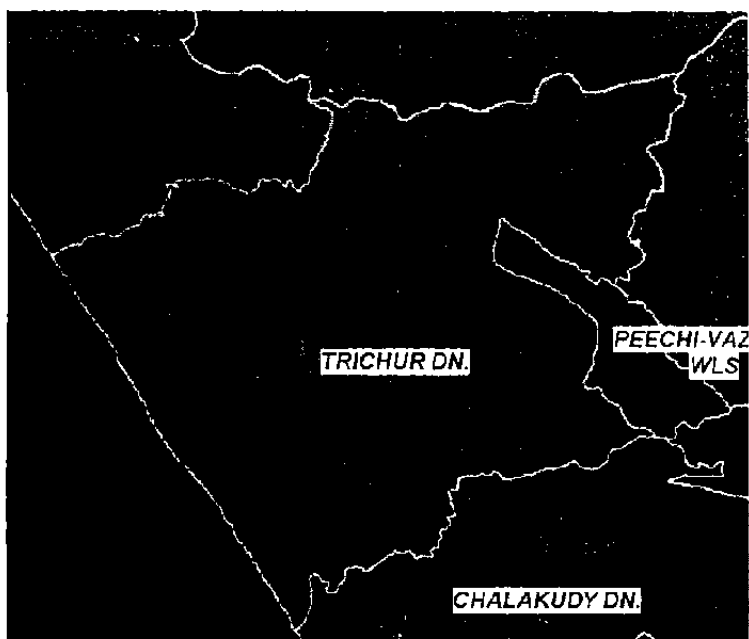
**Animals:** Elephant, gaur, sambar deer, sloth bear, bonnet macaque, Malabar giant squirrel and wild dog are found in the area. Movement of tiger and leopard from adjoining Parambikulam areas is also reported,

### **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 was from 1990-2000. The current working plan was made with stake holder participation. The Wildlife Sanctuary was formed from parts of Palappilly Range. Total area is 85.067 km<sup>2</sup>. The entire area is one section.

**History:** Before 1900, various lease systems existed for extraction of timber and fire wood. Cyclone of 1940 and clearance of forests under 'Grow more food' schemes affected forests adversely. Till the formation of the Peechi Wildlife Division, administration by Chalakudy Division and Parmbikulam 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.



RGB image showing major vegetation features

**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 km<sup>2</sup>. The Chimmony reservoir is inside the sanctuary.

**Accessibility:** The area is accessible from NH 47 through a tarred road. There are about 10km of forest roads inside the sanctuary.

**Vegetation:** Vegetation consist of moist deciduous, semi evergreen and evergreen forests. Teak and teak mixed with *Bombax malabaricum* occur in an area of 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, Malabar giant squirrel are reported.

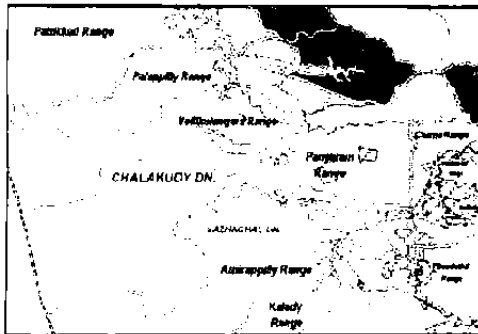
**NTFP:** Palappally Girijan Society collects MFP from the sanctuary. Mostly medicinal plants. Tribals residing in submersion area were shifted few times, and finally to a location outside forest in 1993.

### **Chalakydy Forest Division**

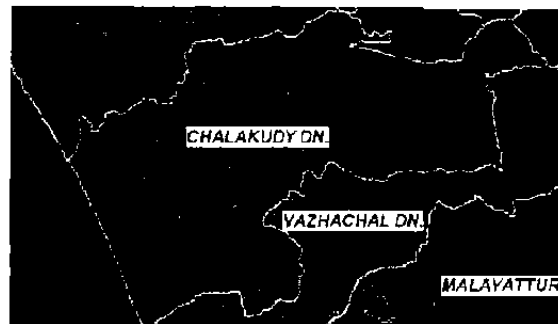
**Distribution of area**

Chalakydy 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 north there is Thrissur Division and to the north there is Vazhachal Division.



Chalakudy Division Map



RGB image

**Palappilly Range:** Palappilly Range is situated in the northern part of the division. In the east Chimmony WLS border it and Arabian Sea is on 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 Palappilly Range and Arabian Sea is on the western side. To the south there is Pariyaram Range and to the north there is Palappilly Range.

**Pariyaram Range:** Pariyaram Range is on the southern part of the division. Charpa Range of Vazhachal Division borders it in the east and Arabian Sea is on 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 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 value ranges from 10m to 1500m. The eastern part of the Pattikkad Range is steep. The western part of Palappilly Range and Vellikulangara Range

are mostly steep. The western part of Palappilly Range and Vellikulangara Range and Pariyaram Range are almost plains.

### **Status of forest in Chalakudy Division**

	<b>Range</b>	<b>Forest area (km<sup>2</sup>)</b>
1	Pariyaram	115.31
2	Palappilly	56.00
3	Vellikulangara	108.40
4	Chimmony WLS	75.00
	<b>Total</b>	<b>354.71</b>

**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 TP 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 tramway and the Orukomban Working Circle. Before the tramway the timber extraction, 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 circle, selection working circle, bamboo working circle, MFP working circle and protection working circle. A large number of plantations were made under this working plan.

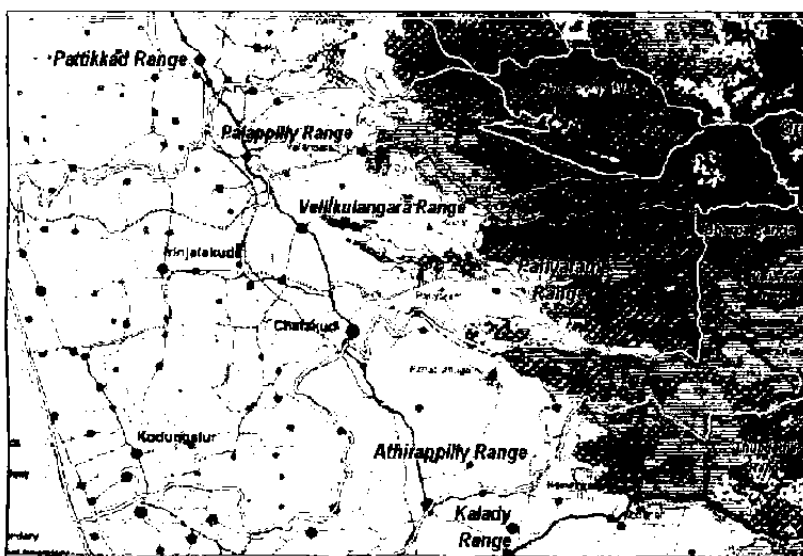
Working plan by John Koil Parambil cover the period from 1969-70 to 1978-79. Further reorganization of the ranges took place after 1958.

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 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.

**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.



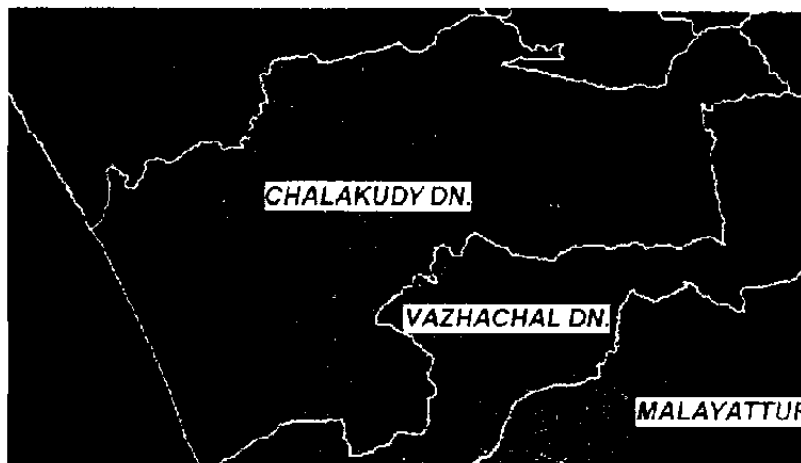
Chalakudy Division Map

**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 and hence 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 ecosystems.

**Bamboos and reeds:** As per the 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 were 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: There are 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 n 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 contnous with Chimmony and Peechi wild life sanctuaries. The area is drained by Mupli river.

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

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

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

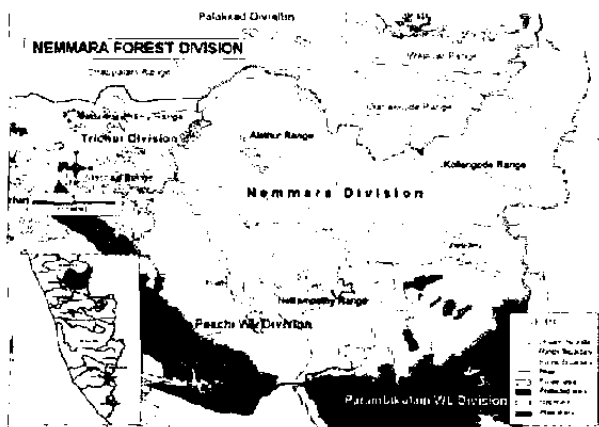


FIP map shows degraded deciduous and evergreen forests. Map does not show enclosures or plantations. Forest plantations include rubber.

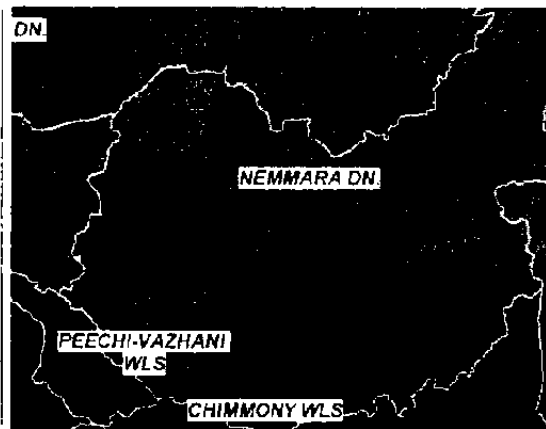
**Nemmara Forest Division** Nemmara Division is situated in the central part of Kerala. It shares its boundary in the east with Tamil Nadu and in the west with Thrissur Division. To the southwest there is Peechi WLS and Chimmony WLS. Chalakudy Division shares the boundary in the south along with the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

### Status of forest in Nemmara Division

	Range	Forest area (km <sup>2</sup> )
1	Nelliampathy	205.94
2	Kollengode	51.79
3	Alathur	81.68
	<b>Total</b>	<b>339.41</b>



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.

**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. Less 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 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.

The south western part consists of evergreen forests as they appear in red colour 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 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 20,437 hectares of forest area with head quarter at Parambikulam, while Nelliampathy Range and Sungam Ranges had 21,398 hectares and 6,977 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 in 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 20,005.177ha. 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.

In addition to these diversions of forest land, 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 yet 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 of 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 that 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 extend 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 351.2032km<sup>2</sup>. 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 influence 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, in spite 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, 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 thier 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 increase, because of the attractive prices that these items fetch. The important non-timber forest products 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 Nellyampathy 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 Nellyampathy 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. The patches in the plains appear mostly deciduous with some reddish areas. RGB image shows large stretch 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 a road to Nellyampathy from NH 47. There is a large patch of estates occupying valleys on top of the hills. Pothundi dam is inside this area. The forest in the upper reaches, including the trees in the estate region look mostly evergreen. Forest consist of evergreen, deciduous and degraded stages.

### **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 was 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 lakh rupees. Peacocks are found in a better concentration in the vested forest of Choolannur area. There will be 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.

### **Vazhachal Forest Division**

Vazhachal Division consists of Charpa, Vazhachal, Sholayar, Kolathirumedu 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 western boundary with Arabian Sea. Chalakudy Division and Parambikulam WLS are to the north of the division and Malayattur Division to the south.

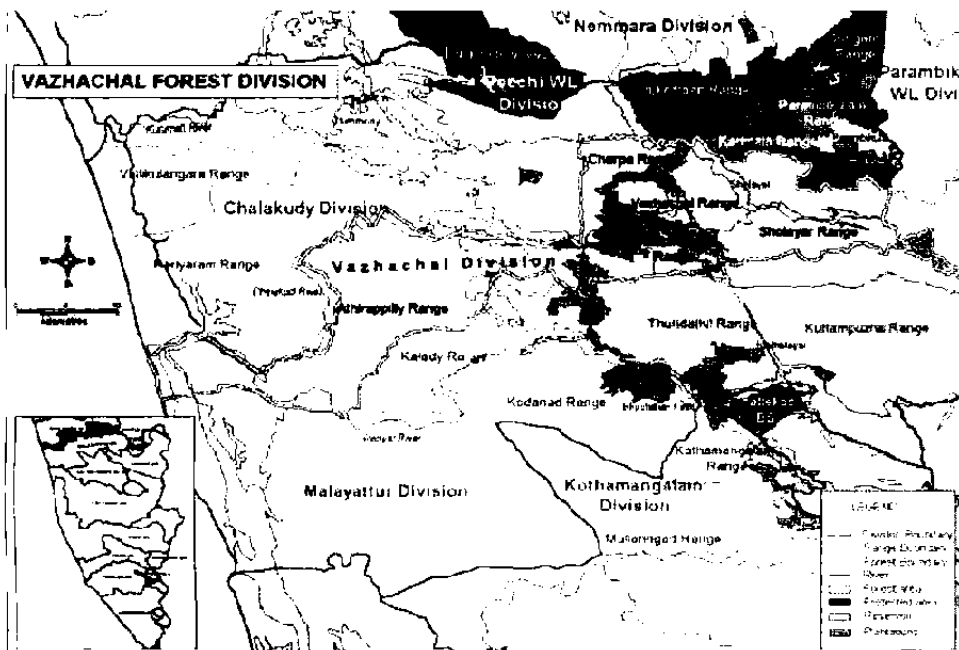
#### **Status of forest in Vazhachal Division**

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

**Athirappilly Range:** Athirappilly Range is situated to the western part of the division. The eastern side is bounded by Kollathirumedu 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.

**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 on the eastern part of the division. Sholayar Range border it on the east and Charpa Range on the west. Kollathirumedu Range is in the south and Karimala Range of the Parambikulam Wildlife Sanctuary on the north.



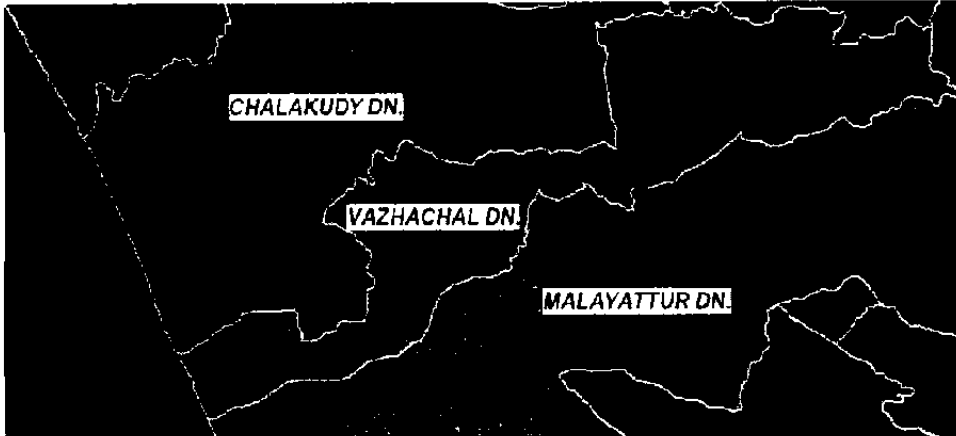
Map of Vazhachal Division

**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



Kollathirumedu 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 western part is Athirappally Range. 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. 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 (in RGB image). 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. Most of the range is under teak and Eucalyptus plantations. As per 1:50 K toposheet, the western portions are under teak and eastern portions 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 Chalakudy 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 as boundaries on almost all sides. 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 evergreen elements on the northern side. The terrain is very hilly. There are plantations along road beside Charpa thodu .

### **Sholayar Range**

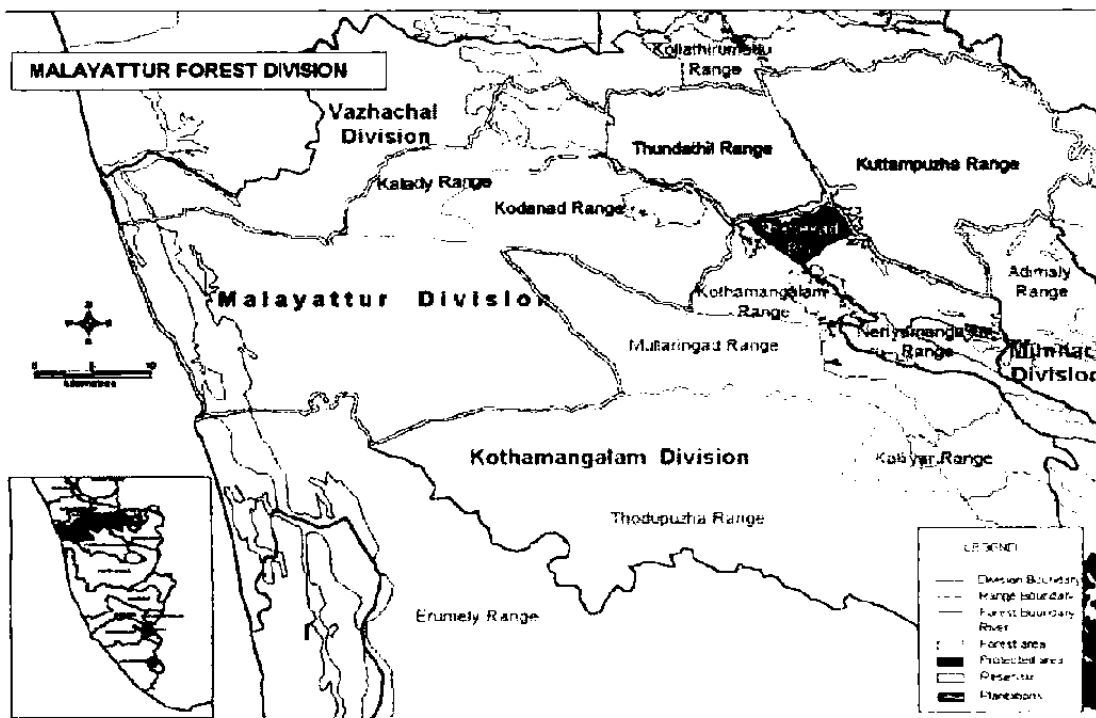
There is a reservoir inside, all the area under jurisdiction is forest. The western parts drain to the Poringal reservoir. Other parts are also drained by the Chalakudy river in circuitous manner through Orukomban and Karappara rivers. The interstate road from Chalakudy pass through the middle of the range. No enclosures are present 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 plantations are present, 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.

### Status of forest in Malayattur Division

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

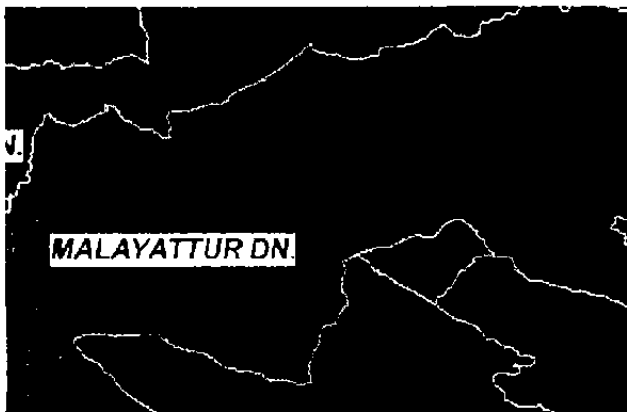


## Map of Malayattur Division

**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 Kollathirumedu Range along with the Athirappilly range of Vazhachal Division borders it in the north.

**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.



RGB image of Malayattur Division

Reeds

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 present in the central and in the western part. The eastern part of the division is steep with a highest value of 1200m in the Kuttampuzha Range. The Kalady Range and Kodanad Range are in relatively level

areas. 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. Once, this range was better connected with outside world through the Alwaye-Munnar road. The road was made motorable by about 1900, before which it was an important trade route on foot. 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 top to this region. Muduvass occupying the hill tops use it. There are no enclosures with in 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 form the boundary also on one side. Buthathan kettu reservoir come on the southern side. The region contain 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 Idamalayar 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. Buthathan kettu reservoir come on the southern side. Large areas are shown as teak plantations in FIP map. 50 K Topo sheet show teak plantations on the NW corner and eucalyptus plantations along Periyar. Large tracts on the southern side is also teak plantation.

Vegetation on the northern part appear reddish (evergreen) on the southern side. It is mostly deciduous. 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.

### **Kalady Range**

It is the western most range in the division. Jurisdiction is deep into cultivated areas, but forest is on the eastern sides only. Kurisumudi comes in this area. There are 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 this 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 east-west 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 only 100 m. It is accessible from Perumbavur and Kothamangalam. There are no enclosures. Small streams drain to Periyar. As per topo sheet 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. But why most of the northern parts appear red is not clear.

### **Thattekkad Bird Sanctuary**

Thattekkad bird sanctuary is situated in the Idukki district. The sanctuary is a peninsular land between the branches of Periyar river in Malayattor 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 has reported to have identified 167 species of birds and his student, Dr. Sugathan 207. The Bombay Natural History Society has identified 253 kinds of birds. Spread over an extent of 25.16 km<sup>2</sup>, 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. 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, Kambakom , etc. and trees of commercial value like teak, rose wood, Venteak, Venga, Maruth also grow in the are.

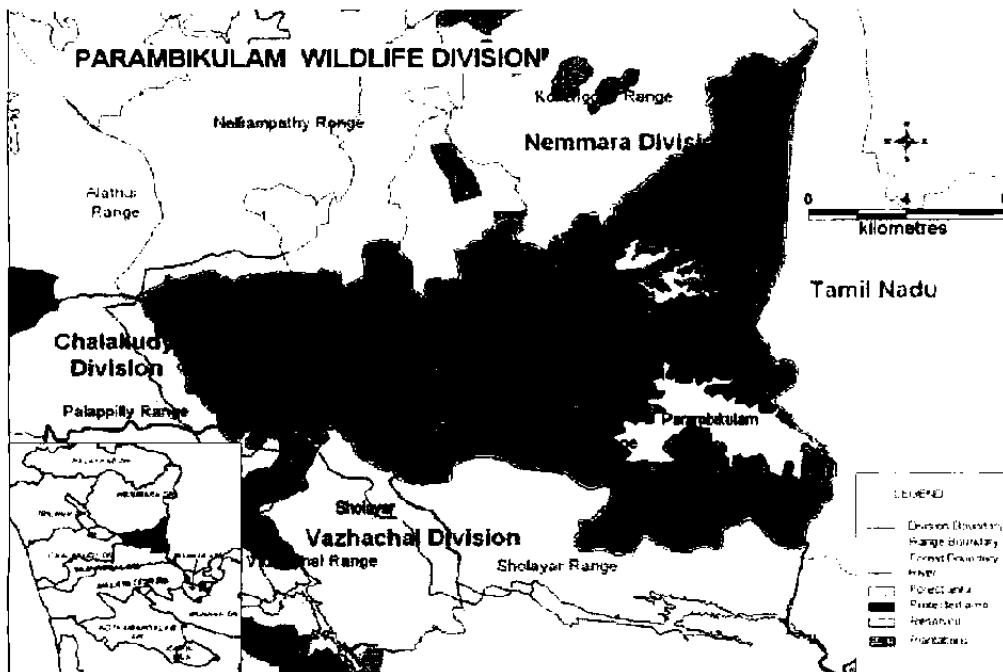
Elephant is sighted occasionally. Leopard, Bear, Porcupine, Python, Cobra are also sighted. Mammals such as flying squirrel, sloth bear, elephant, lion-tailed macaque , etc. are seen. The avifauna of the sanctuary include residents and migratory birds. Crismson-throated Barbet, Bee-eater, Sunbird, Shrike,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



The Sanctuary is 13 km 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. Forms continuous area along with Malayattur Divsion. It is wedged between Kuttampuzha and Thundathil ranges. Almost all sides are surrounded by rivers.

### Parambikulam Wildlife Sanctuary

The sanctuary is located at 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 Chalakkudi River. The mean annual rainfall is 2,590 mm and the total area is 285 km<sup>2</sup>. 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.



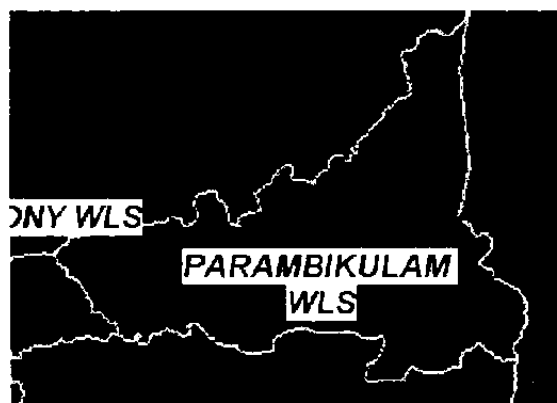
Map of Parambikulam Wildlife Division

### Status of forest in Parambikulam Wildlife Sanctuary

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

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 km<sup>2</sup>. 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 km<sup>2</sup> 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 Muduvass live inside the sanctuary in five settlements.



RGB image of Parambikulam WLS

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 hills 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 Karappara River on two sides. 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. 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 Nelliampathy 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, Tunakadavu and Peruvapallam. The reservoir harbours several kinds of aquatic fauna.



Malabar Giant squirrel



Gaur

**Climate:** Mean annual rainfall is 2,590 mm. The sanctuary receives heavy 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 100km<sup>2</sup> 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 km<sup>2</sup> approximately) A wide variety of trees grow here. The top canopy consists of Pali, Punna, Nangu, Veditlavu, Kalpine, Aini, Vellapine, Kambakam, Vellagil, Pathiri, Nedunar, etc. Lower canopy predominantly consists of Vetti, Kara, Nasagam, Marotti, Kurukutti, Cheru, Mtililavu etc; Undergrowth comprises *Antidesma*, *Calamus*, *Glycosmis*, *Ixora* species, etc.

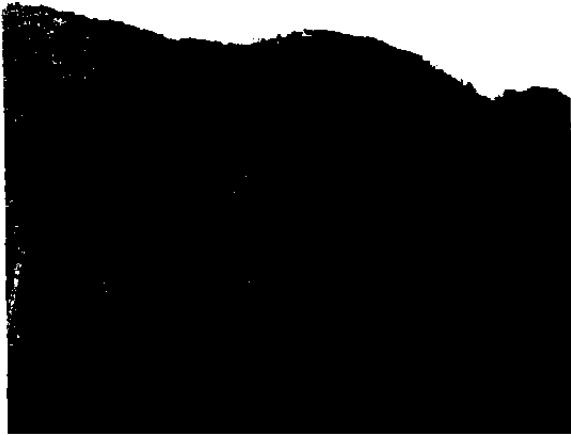
Semievergreen forests (Extent 30 km<sup>2</sup>) both evergreen and moist deciduous species are found in these areas.

Moist deciduous forests (Extent 70 km<sup>2</sup>) Top canopy: - Manjakadambu, Vaka, Pala, Elavu, Vembu, Rosewood, Aval, Venteak, Venga, Teak, Maruthi, Pathiri, etc. Lower canopy: - Arampuli, Pezhu, Konna, Kodapunna, Murukku, Kanjiram, Bamboos, etc.

Southern dry deciduous forests (Extent 15 km<sup>2</sup>) 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: The sanctuary harbours 26 species of large and medium sized 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 rurtle, 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, Exyprus, Taral, etc.

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 hombill, Broad billed roller, Black wood- pecker, etc. are seen commonly in the sanctuary.



Teak Plantations



Lion Tailed Macaque

The Sanctuary is headed by a Divisional Forest Officer with head quarters at Thunakadavu and is under the direct control of the Field Director, Project Tiger. The Sanctuary is accessible by road. Buses ply between Pollachi and Parambikulam. 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 Parambikulam Lake and tour the Sanctuary accompanied by guides. There is a forest rest house at Thunakadavu. The Parambikulam 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 Peruvarepallam 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 considerable extent of teak plantations also within the sanctuary. The '*Kannimara*' 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 Project 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.

## **Discussion and Conclusions**

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 consecutive working plans is almost complete. The forest boundary in most parts of the state has been demarked with cairns or low 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(1939) 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 of continuums. These can effectively supplement vegetation maps.

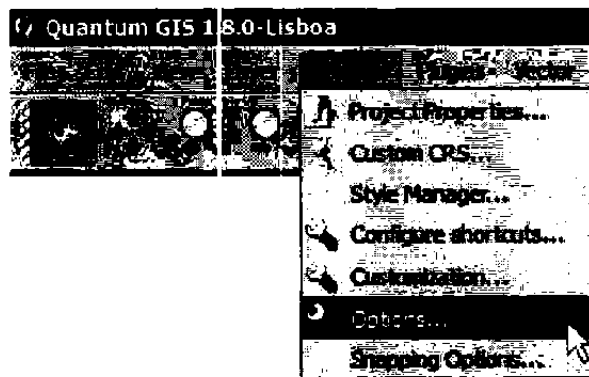
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2. George, VJ. 2002. Management plan for the Peechi-Vazhani Wildlife Sanctuary.
3. Sivaram, M. 2005. Calculation and interpretation of diversity indices. Lecture notes, Kerala Forest Research Institute.
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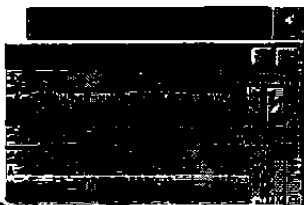


## Connecting QGIS & Google map

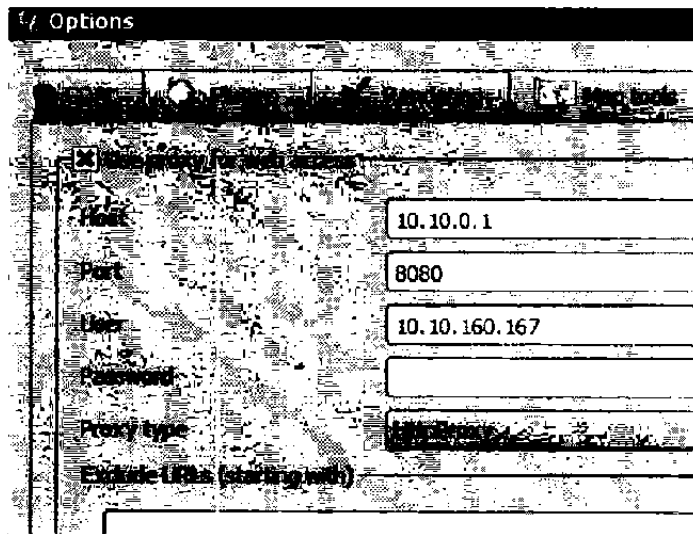
One can open Google maps inside QGIS. Few settings will have to be done for this. Run QGIS (Ver 1.8). From the Settings in main menu, branch to options.



QGIS Main menu → Settings → Options → A tabbed dialogue would appear. Choose network options



Set the setting  
as applicable to  
computer.  
[KFRI settings]



Home PC ??

- Plugins -> Fetch
- plugins -> Open layer
- plugins -> Install
- plugin -> IPlugin
- sinstalled successfully.

