Evaluation of Land Utilization Types of Major Land Resource Areas of Western Ghat Region of Kerala

I. Introduction

The world’s population continues to rise. Today’s population of around 7 billion is expected to increase to about 9 billion by 2050. By this time, another one billion tonnes of cereals and 200 million extra tonnes of livestock products will need to be produced every year. The imperative for such agricultural growth is strongest in developing countries like India, where the challenge is not just to produce food but to ensure that families have access that will bring them food security. Such growth would imply agriculture remaining an engine of growth, vital to economic development, environmental services and central to rural poverty reduction. For nutrition to improve and for food insecurity and undernourishment to recede, future agricultural production will have to rise faster than population growth. This will have to occur largely on existing agricultural land. Rainfed agriculture is the world’s predominant agricultural production system, but also hosts the majority of the rural poor. The largest contribution to increases in agricultural output will most likely come from intensification of production on existing agricultural land.

There is scope for governments and the private sector including farmers to be much more proactive in enabling and promoting the general adoption of more sustainable land and water management practices. These have the potential to expand production efficiently to address food insecurity while limiting impacts on other ecosystem values. However, this will require profound changes in the way land, water and other natural resources are managed. National policies will need to be aligned and institutions transformed to become genuine collaborators in applying knowledge and in responsible regulation of the use of natural resources.
How, where, when and what to cultivate are the main issues that farmers have to face day to day. Therein lays the paramount role of proper land use planning.

A grouping of lands is therefore essential to achieve this goal. Land resource regions and major land resource areas (MLRA’s) are separated on the basis of significant differences in use and management of the soils as reflected in land use patterns. These regions and areas represent nearly homogeneous areas of soil, climate, land use, water resources, elevation, topography, and potential natural vegetation. Within a particular MLRA, lands may be put to different uses. Land utilization studies are important procedures in land evaluation and it plays a balancing role in soils, land mapping, and resource survey. Land Utilization Type (LUT) has been defined by FAO (1984) as - "A Land Utilization Type consists of a set of technical specifications within a socio-economic setting”.

Kerala with its unique physiography, climate, soils, geology and soils is perfectly amenable for systematic appraisal and grouping into homogeneous regions for planning appropriate land use. The Western Ghat area of Kerala is the most agriculturally productive and most populous piece of land, the land use planning of which can make or break Kerala agriculture. Therefore any study which aims to group and classify productive and unproductive lands in the tract is both welcome and necessary.

Understanding the necessity for soil and land resource inventory studies in the Western Ghats, the Western Ghats Cell sanctioned a grant-in-aid scheme “Evaluation of Land Utilization Types of Major Land Resource Areas of Western Ghat Region of Kerala” in 2006-07 to the Soil Survey Organization. This report is a compilation of the work undertaken in this respect on completion of the project tenure of 5 years.

2. Objective

Land Utilization Type is one of the important procedures in land evaluation and it plays a balancing role in soils and land mapping and resource survey. Under the project, effort is made to classify major agricultural land utilization types.
1. Comparative assessment of major Land Utilization Types of MLRAs of Western Ghat region of Kerala
2. Identification of most widespread agricultural land utilization type
3. Evaluation of major Land use types under rainfed and irrigated agriculture
4. To evolve suitable strategies for the alternate land use planning involving agriculture-forestry and silvipastural components for the area.

This study aims at the identification and comparative evaluation of various Land Utilization Types in the Major Land Resource Areas of Western Ghat region. Based on this, suitable strategies can be evolved for alternate land use planning involving agriculture, forestry and silvipastural components for the area which will finally help in the enhancement of the productivity and income of the families and employment generation.

The technical programme of the study involves
1. Collection of data on soil and land characteristics like physiography and drainage, geology, climate, crops and soils.
2. Interpretation of the data collected for identifying the major land resource areas of the Western Ghat region.
3. Identification of major land utilization types of the region
4. Assessment of present land use system on the basis of the type of crops grown, size of land holdings, soil characteristics, cropping intensity etc.
5. Developing alternate land utilization types wherever possible.
6. Preparation of perspective plan with reports and maps in digital format for developing sustainable land management systems.

3. Materials and methods

MAJOR LAND RESOURCE AREAS IN KERALA BY THE SOIL SURVEY ORGANISATION
'Major Land Resources Areas of Kerala' is the brainchild of Sri. Hari Eswaran, Scientist, USDA conceived during the First International Forum on soil Taxonomy and Sustainable Land Management held in February-March 1993. The basic concept was built up on by Sri. P. T. Mathew, Deputy Director (soil Survey) who identified 27 resource areas in Kerala based on physiography, geology, climate, soils and crops as parameters. M. Jayasree, Senior Chemist and a host of others in the soil survey organization co-operated unreservedly in this massive venture. Nair S. Rajeev presented a paper on the subject (co-authored by Dr. K. Valsaji) at NBSS & LUP in February, 1995. Subsequently, the topic has been discussed in various fora and symposiums. The list of the MLRA units identified is presented below. With availability of more data, this publication is likely to be revised.

1. Southern dissected pedi plain
2. Southern coastal plain
3. Southern lower dissected piedmont plain
4. Southern upper dissected piedmont plain
5. Southern lower hill ranges
6. Southern upper hill ranges
7. Southern steep mountain ranges
8. Kuttanad coastal basin
9. Thrissur kole basin
10. Pokkali area
11. Central coastal plain
12. Central lower dissected piedmont plain
13. Central upper dissected piedmont plain
14. Central lower hill ranges
15. Central upper hill ranges
16. Central steep mountain ranges
17. Palakkad gap
18. Palakkad plain
19. Northern coastal plain
20. Northern lower dissected piedmont plain
21. Northern upper dissected piedmont plain
22. Northern lower hill ranges
23. Northern upper hill ranges
24. High mountain plateau
25. Wayanad plateau
26. Northern steep mountain range
27. Marayur rainshadow region

DESCRIPTION OF LAND UTILISATION TYPES USED IN THIS STUDY

The land characteristics/ social considerations to be described for evolving LUT’s from MLRA units are given below.

Physiography

Physiography is broad scale division based on terrain features like lay of the land, its slope and related terrain features. The grouping is

Lowland: <20m above MSL
Midland: 20-100m
Midupland: 100-300m
Upland: 300-600m
Highland: 600-1200m
Mountaineous region: >1200m

Crops

Cropping pattern

The cropping pattern followed in the locality is indicated

Crop suitability
The suitability of crops is assessed based on studies conducted by the Soil Survey Organisation in the Western Ghat tract under another R & D project

Microclimate
The temperature and moisture regimes are listed

Soils
While soil associations and reconnaissance soil survey details are followed in general, soil series level information is used wherever available

a. Soil fertility
The term fertility refers to the inherent capacity of the soil to supply nutrients to plants in adequate amounts and in suitable proportions. It is one of the important factors that determine the magnitude of crop yields. Surface soil, which is the major zone of root development, carries much of the nutrients available to the plants since it is this layer, which is ploughed and cultivated.

b. Drainage & permeability
Soil Drainage refers to the frequency and duration of wet periods. Drainage classes provide a guide to the limitations and potentials of the soil for field crops, forestry, wildlife, and recreational uses. The classes roughly indicate the degree, frequency, and duration of wetness, which are factors in rating soils for various uses.

Soil Permeability is the quality of a soil horizon that enables water or air to move through it. It can be measured quantitatively in terms of rate of flow of water through a unit cross section in unit time under specified temperature and hydraulic conditions. Values for saturated soils usually are called hydraulic conductivity. The permeability of a soil may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

c. Land capability classification
Land capability classification is an interpretative grouping of soils to show their suitability to different kinds of uses along with management based on the
limitations imposed on the sustained use of soils by their inherent soil characteristics, external land features and environmental characteristics. This classification is made on the basis of data obtained by standard soil survey. There are eight land capability classes. Class I land is the best, devoid of any limitation for intensive cultivation of all climatically adapted crops. Classes II to VIII lands have progressively increasing hazards or limitations. Land capability classes are again divided into subclasses that show the dominant limitations like erosion (e), excess water (w), root zone limitation (s) and climatic limitation (c). The subclasses provide information about the kind of problem involved. Climatic limitation (uneven rainfall distribution and high temperature) 'c', being common to the area has not been indicated along with the land capability class.

d. Land irrigability classification

Soil irrigability classes are useful to make grouping of soils according to their suitability for sustained use under irrigation. The classes are defined in terms of the degree of soil limitations. Thus, the soils are grouped into five soil irrigability classes viz., class A, B, C, D and E. In addition to the soil irrigability class, suitability of land for irrigation depends on physical and socio-economic features like a) Quality and quantity of water which includes equilibrium salinity level, equilibrium sodium exchange level and availability of water to the land in relation to water requirement of crops, b) Drainage requirements which include permeability of substrata, feasibility of providing needed drainage and cost of drainage measures and c) Other economic conditions like production cost and yield potential, land development cost and other factors affecting the cost-benefit ratio. The soil irrigability classes are further interpreted into land irrigability classes from class 1 to 6. Class 1 to 4 is irrigable, class 5 is temporarily non-irrigable and class 6 is non-irrigable. The land irrigability classes are further divided into subclasses depending on the nature of limitations like soil factor, 's', topographic factor or terrain conditions, 't', and drainage requirement, 'd'.
e. Productivity potential

Productive soils are indispensable to produce more from unit area of land. Crop yield is the result of the combination of interaction among seven different factors. The factors are climate, soil properties, crop characteristics, soil and water management, management skill and weather of that year. All these are interdependent. The potential of the soil to produce more is assessed based on the above characters. The three classes identified are High, Medium and Low.

Length of growing period

The concept of the growing period is essential as it provides a way of including seasonality in land resource appraisal. The correct choice of planting time is one of the most important decisions that a farmer needs to make. It can be critical as far as crop yields and quality achieved are concerned. It can have an important bearing on various costs of production, such as the costs of insect and disease control. Moreover, it determines the season of harvest, and this normally affects prices received for the product. The climatic requirements of the crop should be matched to the expected conditions applicable to the specific production site selected, if a successful crop is to be produced. In addition, production should, if possible, be aimed at a time of year when remunerative prices are more likely to be paid. In order for plant growth to take place during favourable conditions, and when aiming to harvest at a specific time, it is essential to know approximately how long it will take the crop to reach market maturity, as well as the length of the cropping season. Obviously these time spans will vary, depending upon the crop concerned and the cultivar, the cultural practices applied, and the environmental conditions prevailing during growth. The estimation of growing period is based on a water balance model which compares rainfall (P) with potential evapo-transpiration (PET). Experimental work indicates that the effectiveness of early rains increases considerably once P is equal to, or exceeds, half ET. The growing period continues beyond the rainy season, when crops often mature on moisture reserves stored in the soil profile. Soil moisture storage must therefore be considered in defining the length of the growing period.
Market orientation & availability

Availability of markets is primarily considered. Whether crop cultivation is undertaken as a subsistence activity or commercial activity?

Technical knowledge and attitudes

The technical knowledge and attitude of farmers refers to the levels of general education including literacy, levels of agricultural education and receptiveness to innovation and change. The locations of research centers and other technical training institutes are identified and nearby areas are assumed to be agriculturally educated on the latest trends and techniques.

Size of land holdings

The range in size of holdings indicated.

- Marginal ( < 1 ha)
- Small (1-2 ha)
- Medium (2-5 ha)
- Large (> 5 ha)

Alternate land use planning strategies

Having described the LUT's the next step in activities related to land use is to define the requirements for their successful operation. These are known as land use requirements. These land use requirements are later matched with land qualities to determine the suitability of a particular land unit for a particular land utilization type.

Each LUT consists of a crop or a number of crops in a technical and socio-economic setting. The first group of land use requirements are those related to the physiological requirements of the crop or crops. Next there are management requirements like in the case of mechanization. Thirdly conservation requirements are also considered for the avoidance of soil erosion or degradation.

DATA COLLECTION

Identification of Western Ghat tract
The panchayats under Western Ghat tract were identified from the list of administrative divisions provided by the Western Ghats Cell, Planning & Economic Affairs Department, Government of Kerala.

**Preparation of present cropping pattern map**

Spatial data on the present cropping pattern was extracted from Detailed Soil Survey maps of 1:4000 scale/1:5000 scale wherever Detailed Soil Survey was completed. In other panchayats, details of cropping pattern were collected from Krishi Bhavans and base line statistical data. Topography, geology, soil, slope, elevation soil erodibility are some of the other parameters collected. Data were also collected by ground fieldwork checking and observations in the study area. Panchayat-wise crop suitability was collected from the district soil survey offices of Thiruvananthapuram, Kollam, Pathanamthitta, Kottayam, Ernakulam, Idukki, Thrissur, Palakkad, Malappuram, Wayanad, Kozhikode, Kannur and Kasargod (except Alappuzha which does not come under the Western Ghat.

**Delineation of MLRA zones in the Western Ghat region**

The Major Land Resource Areas of Kerala prepared by the Soil Survey Organisation was taken as the base level categorization of land units.

**Derivation of LUT’s**

Normally, physiographic units are considered as the land mapping units from which LUT’s are derived. Other thematic data such as geology, soil, slope, elevation are considered as their attributes. In our study, MLRA units are the base. Based on physical data analysis, physiographic units/MLRA units and their associated land characteristics are determined in the study area and entered into the digital database ie by digitizing of the polygons’ boundaries. Eg., flood plains (physiographic unit) or Centrally dissected midland laterite (MLRA unit). The characteristics of these MLRA units are recorded from existing data sets using GIS analysis like elevation, average annual rainfall, effective soil depth, soil drainage,
available water capacity, soil texture, slope, soil pH, soil cation exchange
capacity, soil organic matter, soil base saturation, and soil erodibility.

The LUT descriptor's

Soil and land resource information collected from inventories, available
statistical data and reliable socio-economic data from farmer field interaction are
chosen for deriving LUT's

Diagnostic of proposed LUT’s is as follows

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>Extent</th>
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<tbody>
<tr>
<td>1. Physiography</td>
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<td>2. Crops</td>
<td></td>
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<tr>
<td>2.1. Cropping pattern</td>
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<td>2.2. Crop suitability</td>
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<td>3. Microclimate</td>
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<td>4. Soils</td>
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<tr>
<td>4.1. Soil series</td>
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<td>4.2. Soil fertility</td>
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<td>4.3. Drainage &amp; permeability</td>
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<td>4.4. Land capability classification</td>
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<td>4.5. Land irrigability classification</td>
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<td>4.6. Erosion hazard</td>
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<td>4.7. Productivity potential</td>
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<td>5. Length of growing period</td>
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</tbody>
</table>
6. Irrigated/ Rainfed

7. Market orientation and availability

8. Technical knowledge and availability

9. Size of land holdings

**DATA VECTORISATION**

*Software and hardware*

Pentium, workstation class hardware PC’s running ARC Info ver 9.3 and ARC view was the GIS platform used for the study.

In the GIS environment, the methodology consists of five steps:

1. Delineation of western ghat tract in kerala as per operational guidelines of Western Ghat Cell, Planning & Economic affairs department.
2. Digitization of Major Land Resource Area maps. Spatial and non-spatial data compilation
3. Clipping MLRA zones within the Western Ghat tract
4. Input of cropping pattern details along with non spatial data.
5. Overlay of cropping pattern units over MLRA zones within the Western ghat tract, clipping and spatial analysis
6. Input of data on LUT descriptor’s, specifying land use requirements of each land utilizations type (LUT ) and analysis of land suitability through a matching between MLRA units and land utilizations types.
5. Identification of final LUT’s

**LOCATION OF THE STUDY AREA**

*Western ghats- its significance*

Western Ghat lies along the west coast of Peninsular India in the north south direction from the mouth of Tapir river of Gujarat to Kanyakumari in Tamil Nadu, consisting a series of hills at an average elevation of 1500 m above MSL. Out of the
total length of 1600Km, the Kerala section is 450Km. The Western ghats of Kerala with a geographical area of 2132 Sq. Km is dotted with peaks ranging from 700 to 2100m. Anamudi is the highest peak with an altitude of 2690m above MSL. The Western ghat region is characterized by very steeply sloping mountains and hill slopes, rugged and undulating high lands, the steep or moderately steep mid lands with an elevation rising from 100m to 2690m (Anamudi).

The Western ghat extending along the eastern boundary of Kerala is endowed with rich natural resources—soil, water and bio-diversities and it covers about two third of the total area of the state. The western side of the Western ghats receives abundant annual rainfall of 2000-5000 mm during the months from June-September and hence support luxuriant vegetation. The eastern side of the ghat is on the leeward side and receives only poor rain fall and the vegetation is dominated by scrubs and dry deciduous forests. The mean annual temperature of the area ranges from $20^\circ$C to $24^\circ$C. This condition has endowed the region with a diversity of habitats mainly forests of different types, thorn (scrub), dry mixed and moist deciduous, semi evergreen and montanna wet temperature (Shola forests), grass lands and wet lands. All the 44 rivers of Kerala has its origin in Western ghats.

The topography of the area, soil, rain fall, temperature and abundant sunshine has resulted in diversity of habitats. Western ghats is considered as one of the world’s ten “Hottest Biodiversity Hot Spots”. It is estimated that the flora of Western ghat region contain about 4000 species of flowering plants of which 51 genera and 1600 species are endemic to the region. The Western ghats are house to thousands of animal species including atleast 325 globally threatened species. Many are endemic species especially in the amphibian and reptilian classes. Malabar large spotted Civet and Lion tailed Macque are the endangered mammal species of Western ghats. All the wild life sanctuaries of Kerala viz. Parambikulam, Periyar, Shendurney, Peppara, Eravikulam, Wayanad and Silent Valley National park form part of the Western ghat region.
The variation in topography, elevation, parent material, climate and vegetation has resulted in the occurrence of seven soil orders, out of the twelve orders recognized world over, in the Western ghat region. These facts point to the uniqueness of Western ghats.

THE WESTERN GHAT REGION IN KERALA

As per the detailed operational guidelines of Western Ghat Development Programme, (2002) the list of panchayats in the Western Ghats in Kerala has been published by Western Ghat Cell, Thiruvananthapuram.

MAJOR LAND RESOURCE AREAS IN THE WESTERN GHATS IN KERALA

The Major Land Resource Areas encountered in the districts in the Western Ghats region are given below.

THIRUVANANTHAPURAM DISTRICT

Thiruvananthapuram is the southern most district of Kerala state. Its headquarters, Thiruvananthapuram is the capital of the state. Thiruvananthapuram-Ananthapuri- means “The land of Lord Padmanabha”. The district comprises of four taluks, viz; Thiruvananthapuram, Nedumangad, Neyyattinkara and Chirayankizh. The district with an area of 2239.5 sq. km is situated between 8°17’ to 8°51’ N latitude and 76°41’ to 77°17’ E longitude.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

1. SOUTHERN DISSECTED PEDI PLAIN

The MLRA region extends over 12382 ha in Karode, Kulathoor, Chenkal (part), Athiyannoor (part) and Balaramapuram (part) panchayats.

Physiography & drainage
Undulating plain dissected with broad valleys and isolated low mounds. The side slopes are gentle to moderate. Neyyar river basin covers the entire area.

**Geology**

Major rocks are khondalite and charnockite groups. The undulating plains are covered by red terri soils of subrecent origin resting over tertiary sedimentary formations/laterites. The narrow valley fills are of alluvial origin.

**Climate**

Annual rain fall ranges from 1700 to 2000mm. The mean annual temperature is 27°C. The moist regime is ustic and temperature regime, isohyperthermic.

**Crops**

Coconut intercropped with tapioca, banana, arecanut, jack,mango etc. In the valleys, paddy, banana, vegetables are raised.

**Soils**

Rhodic Haplustalfs in undulating plains, Plinthustults in low mounds and ridges, Aquic Kandiudallfs and ridges, aquic Kandiudalfs and Tropofluvents in valley fills.

3. SOUTHERN LOWER DISSECTED PIEDMONT PLAIN

Extents over 53486 ha in Chenkal (part), Kollayil (part), Ahiyannoor (part), Balaramapuram (part), Pallichal, Maranalloor (part), Maranalloor (part), Malayinkeezh (part), Vilavoorkkal, Vilappil (part) and Parassala panchayats.

**Physiography & drainage**

Undulating to rolling lands interspersed by broad valleys with occassional low laterite mounds. Neyyar, Karamana are the important rivers.

**Geology**

Recent to subrecent alluvium over tertiary formation & Crystallines. Laterites developed over both tertiaries & crystallines.

**Climate**
Annual rainfall ranges from 2500 to 3000 mm. The mean annual temperature is 27° C. Ustic moisture regime. Aquic moisture regime in valleys with Isohyperthermic temperature regime.

**Crops**

Coconut-predominant mixed cropping with arecanut, tapioca, fruit trees, pepper, yams etc, in garden lands. Paddy, banana, sesameum, vegetables, pulses etc., raised in broad valleys.

**Soils**

Plinthustults & Kandiustults dominant. & Ustifluvents and Aquents in the flood plains & valleys.

4. SOUTHERN UPPER DISSECTED PIEDMONT PLAIN

Extents over 57511 ha in Kunnathukal, Perumkadavila (part), Vellarada (part), Aryancode (part), Ottasekharamangalam (part), Kattakkada, Maranalloor (part), Malayinkeezh (part), Vilappil (part), Poovachal (part), Kuttichal (part), Aryanad (part), Vellanad, Uzhamalakkal (part), Anad (part), Karakulam (part), Aruvikkara, Vembayam (part), Panavoor (part), Manikkal (part), Pullampara (part), Nellanad (part), Vamanapuram (part) and Kallar panchayats.

**Physiography & drainage**

Dissected laterite landscape with low laterite mounds & interfluves. Isolated hills of low altitude. Gently sloping to flat bottom broad valleys. Neyyar, Karamana and vamanapuram are the major rivers.

**Geology**

Alternate layers of khondalite, garnet-biotite gneiss. Basic intrusives like dolerite & Ultrabasic rocks. Recent to subrecent sediments dominate the lower topographic sites.

**Climate**
Annual rainfall ranges from 2500 to 3000mm. The mean annual temperature is 26-28°C. Ustic moisture regime. Aquic moisture regime in wetlands. Isohyperthermic temperature regime.

**Crops**

Coconut-predominant mixed cropping system. Rubber as monocrop. Tapioca, pepper, cashew banana, fruit trees etc. are also raised. In flood plains, paddy, banana, vegetables and pulses are grown.

**Soils**

Plinthustults & Kandiustults in gardenlands. Tropepts, Aquepts, Aquents & Fluvents in wetlands.

5. SOUTHERN LOWER HILL RANGES

Extents over 30574 ha in Vellarada (party), Aryancode (part), Ottassekharamangalam (part), Poovachal (part), Kuttichal (part), Aryanad (part), Vilappil (part), Aruvikkara (part), Vellanad, Uzhamalakkal (part), Tholikkode (part), Anad (part), Karakulam (part), Vembayam, Manikkal, Pullampara (part), Nellanad, Kallara (part) and Vamanapuram (part) panchayats.

**Physiography & drainage**

Narrow ridges, residual uplands, residual laterite hills, flood plains, valleys, side slopers, rolling to hilly terrain, elongated alluvial basins and narrow valleys. Neyyar, Karamana and Vamanapuram are the major rivers.

**Geology**

Khondalites seen on the southern portion with quartz, biotite, sillimanite, feldspar & graphite, charnockites on the north. Dominant minerals are orthopyroxene, amphibole, clinopyroxene, plagioclase & quartz. Recent to subrecent sediments seen in alluvial basins.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 26-27°C. Ustic moisture regime. Aquic in wetlands. Isohyperthermic temperature regime.

**Crops**
Moist deciduous & dry deciduous forests occupy major portion. Eucalyptus, teak, bamboo seen on lower reaches. Rubber, tapioca, coconut, cashew, pepper, arecanut etc. grown. In valleys, paddy, banana, vegetables, pulses etc. raised.

**Soils**
Kandihumults, Plinthustults, Aquepts and Humitropepts

6. SOUTHERN UPPER HILL RANGES
Extents over 44316 ha in Vellarada (part), Amboori (part), Kallikkad (part), Kuttichal (part), Aryanad (part), Vithura (part) and Peringamala (part) panchayats.

**Physiography & drainage**
Major terrain units are ridges, narrow valleys, denudational slopes, rocky cliff, rocky scarp, dissected scarp etc. Neyyar, Karamana, Vamanapuram, and Kallada are the major rivers.

**Geology**
Khondalites & charnokite form the major rock types.

**Climate**
Annual rainfall ranges from 2000 to 3000mm. In certain pockets, it exceeds 3000mm. The mean annual temperature ranges from 24-25° C. Ustic moisture regime. Isohyperthermic temperature regime.

**Crops**
Major portion under moist deciduous forests wet evergreen in patches. Plantations of eucalyptus, teak and rubber.

**Soils**
Haplohumults in the hilly forests. Ustorthents on hills & ridges. Humitropepts on steep gradients. Fluvents & Tropepts in valleys.

7. SOUTHERN STEEP MOUNTAIN RANGES
Extent over 11317 ha in Kallikad, Kuttichal, Aryanad, Vithura, Peringamala all panchayats in parts.
Physiography & drainage

Hilly terrain which includes denudational hills, denudational slopes, rocky cliffs, scarp slopes, narrow valleys, terraces etc. Neyyar, Karamana, Vamanapuram and Kallada are the major rivers.

Geology

Khondalites & charnockite are the major rock types. Crests of peaks generally expose rock outcrops.

Climate

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 22-24°C. Udic & Ustic moisture regimes. Isohyperthermic temperature regime.

Crops

Wet evergreen forests predominant. Semi-evergreen moist deciduous forest plantations also seen. Tea grown as pure crop.

Soils

Troporthents, Humitropepts, Palehumults, Haplustalfs & Hapludolls.

Kollam District

The word Kollam has the meaning “The King's Palace” and is derived from the two words 'Ko' and 'Illum'. Kollam District is located on the Southern part of Kerala and is bounded on the south by Thiruvananthapuram District, on the north by Alappuzha District, on the west by Arabian Sea and Thirunelveli District of Tamil Nadu on the east. It is located between 8°45' to 9°28' north latitude and 76°28' to 77°17' east longitude and geographical area is 2,51,838 ha comprising of 13 blocks and 71 Grama Panchayats.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows
3. SOUTHERN LOWER DISSECTED PIEDMONT PLAIN

Extents over 22500 ha in Soornad North (part), Sooranad (part), Sasthamkotta (part) and Kallada panchayats.

**Physiography & drainage**

Undulating to rolling lands interspersed by broad valleys with occasional low laterite mounds. Kallada and Pallikkal thode are the major rivers.

**Geology**

Recent to subrecent alluvium over tertiary formation & Crystallines. Laterites developed over both tertiarys & crystallines.

**Climate**

Annual rainfall ranges from 2500 to 3000 mm. The mean annual temperature is 27°C. Ustic moisture regime. Aquic in valleys. Isohyperthermic temperature regime.

**Crops**

Coconut-predominant mixed cropping with arecanut, tapioca, fruit trees, pepper, yams etc., in garden lands. Paddy, banana, sesame, vegetables, pulses etc., raised in broad valleys.

**Soils**

Plinthustults & Kandiustults dominant. Ustipsamments in central part & Ustifluvents and Aquents in the flood plains & valleys

4. SOUTHERN UPPER DISSECTED PIEDMONT PLAIN

Extent over 82140 ha in Sooranad north (part), Poruvazhi, Kunnathoor, Pavithreswaram, Kulakkada, Pattazhi, Mylom, Neduvathoor, Ezhukone, Kottarakkara, Kareepra, Thalavoor, Vilakudy (part), Melila, Vettikavala, Veliyam, Pooyapally, Velinalloor, Elamadu, Ummannoor, Edamulackal (part), Anchal (part), Ittiva (part), Chadayamangalam (part) and Nilamel (part) panchayats

**Physiography & drainage**
Dissected laterite landscape with low laterite mounds & interfluves. Isolated hills of low altitude. Gently sloping to flat bottom broad valleys. Ithikara, Kallada, Pallikal thode are the major rivers.

**Geology**

Alternate layers of khondalite, garnet-biotite gneiss. Basic intrusives like dolerite & Ultrabasic rocks. Recent to subrecent sediments dominate the lower topographic sites.

**Climate**

Annual rainfall ranges from 2500 to 3000mm. The mean annual temperature is 26-28°C. Ustic moisture regime. Aquic in wet lands. Isohyperthermic temperature regime.

**Crops**

Coconut-predominant mixed cropping system. Rubber as monocrop. Tapioca, pepper, cashew banana, fruit trees etc. are also raised. In flood plains, paddy, banana, vegetables and pulses are grown.

**Soils**

Plinthustults & Kandiustults in gardenlands. Tropepts, Aquepts, Aquents & Fluvents in wetlands.

5. SOUTHERN LOWER HILL RANGES

Extents over 87995 ha in Nilamel (part), Kadakkal, Kummil, Chithara, Ittiva (part), Alayamon, Eroor (part), Anchal (part), Edamulackal (part), Karavaloor, Vettikavala, Melila (part), Vilakudy, Kulathoopuzha (part), Thenmala (part), Piravanthoor (part), Pathanapuram, Pattazhy Vadakkekara panchayats.

**Physiography & drainage**

Narrow ridges, residual uplands, residual laterite hills, flood plains, valleys, side slopers, rolling to hilly terrain, elongated alluvial basins and narrow valleys. Kallada, Ithikkara, Vamanapuram, Achankovil are the major rivers.

**Geology**
Khondalites seen on the southern portion with quart,s, biotite, sillimanite, feldspar & graphite, charnockites on the north. Dominant minerals are orthopyroxene, amphibole, clinopyroxene, plagioclase & quart,s. Recent to subrecent sediments seen in alluvial basins.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 26-27°C. Ustic moisture regime. Aquic in wetlands. Isohyperthermic temperature regime.

**Crops**

Moist deciduous & dry deciduous forests occupy major portion. Eucalyptus, teak, bamboo seen on lower reaches. Rubber, tapioca, coconut, cashew, pepper, arecanut etc. grown. In valleys, paddy, banana, vegetables, pulses etc. raised.

**Soils**

Kandihumults, Plinthustults, Aquepts and Humitropept

6. SOUTHERN UPPER HILL RANGES

Extents over 25625 ha in Kulathoopuzha (part), Aryankavu (part), Thenmala (part), and Piravanthoor (part) panchayats.

**Physiography & drainage**

Major terrain units are ridges, narrow valleys, denudational slops, rocky cliff, rocky scarp, dissected scarp etc. Kallada and Achankovil are the major rivers.

**Geology**

Khondalites & charnockite form the major rock types.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. In certain pockets, it exceeds 3000mm. The mean annual temperature ranges from 24-25°C. Ustic moisture regime. Isohyperthermic temperature regime.

**Crops**

Major portion under moist deciduous forests wet evergreen in patches. Plantations of eucalyptus, teak and rubber.
Soils
Haplohumults in the hilly forests. Ustorthents on hills & ridges. Humitropepts on steep gradients. Fluvents & Tropepts in valleys.

7. SOUTHERN STEEP MOUNTAIN RANGES
Extents over 1328 ha in Kulathoopuzha (part), Aryankavu (part) and Thenmala (part) panchayats

Physiography & drainage
Hilly terrain which includes denudational hills, denudational slopes, rocky cliffs, scarp slopes, narrow valleys, terraces etc. Kallada and Achancoil are the major rivers.

Geology
Khondalites & charnockite are the major rock types. Crests of peaks generally expose rock outcrops.

Climate
Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 22-24°C. Udic & Ustic moisture regimes. Isohyperthermic temperature regime.

Crops
Wet evergreen forests predominant. Semi-evergreen moist deciduous forest plantations also seen. Tea grown as pure crop.

Soils
Troporthents, Humitropepts, Palehumults, Haplustalfs & Hapludolls.

PATHANAMTHITTA DISTRICT
Pathanamthitta district is situated in the south eastern portion of Kerala. It came into being in 1982 by merging portions of Kollam, Alappuzha and a little portion of Idukki district. The district extends over an area of 2,68,750 ha. The district lies between 9°4’ to 9°30’N latitude and 76°30’ to 77°17’ E longitude.
The Major Land Resource Areas identified in the district in the western ghat tract is as follows

3. SOUTHERN LOWER DISSECTED PIEDMONT PLAIN

   Extents over 10088 ha in Aranmula panchayat.

   **Physiography & drainage**

   Undulating to rolling lands interspersed by broad valleys with occasional low laterite mounds. Pamba is the major river.

   **Geology**

   Recent to subrecent alluvium over tertiary formation & Crystallines. Laterites developed over both tertiaries & crystallines.

   **Climate**

   Annual rainfall ranges from 2500 to 3000 mm. The mean annual temperature is 27° C. Ustic moisture regime. Aquic in valleys. Isohyperthermic temperature regime.

   **Crops**

   Coconut-predominant mixed cropping with arecanut, tapioca, fruit trees, pepper, yams etc, in garden lands. Paddy, banana, sesame, vegetables, pulses etc., raised in broad valleys.

   **Soils**

   Plinthustults & Kandiustults dominant. Ustipsamments in central part & Ustifluvents and Aquents in the flood plains & valleys.

4. SOUTHERN UPPER DISSECTED PIEDMONT PLAIN

   Extents over 66590 ha in Kadambanad, Erath, Pallikkal, Ezhamkulam, Enadimangalam, Kalanjoor (part), Pramadam (part), Kodumon, Pandalam-Thekkkekara, Thumpamon, Pandalam, Kulanada, Mezuveli, Chennerkara, Omalloor, Vallikkode, Konni (part), Ilanthoor, Aranmula, Mallapuzhassery,
Physiography & drainage
Dissected laterite landscape with low laterite mounds & interfluves. Isolated hills of low altitude. Gently sloping to flat bottom broad valleys. Pamba, Achankovil, Pallikal thode and Kallada are the major rivers.

Geology
Alternate layers of khondalite, garnet-biotite gneiss. Basic intrusives like dolerite & ultrabasic rocks. Recent to subrecent sediments dominate the lower topographic sites.

Climate
Annual rainfall ranges from 2500 to 3000mm. The mean annual temperature is 26-28°C. Ustic moisture regime. Aquic in wet lands. Isohyperthermic temperature regime.

Crops
Coconut-predominant mixed cropping system. Rubber as monocrop. Tapioca, pepper, cashew banana, fruit trees etc. are also raised. In flood plains, paddy, banana, vegetables and pulses are grown.

Soils
Plinthustults & Kandiustults in gardenlands. Tropepts, Aquepts, Aquents & Fluvents in wetlands.

5. SOUTHERN LOWER HILL RANGES
Extents over 82742 ha Kalanjoor (part), Enadimangalam (part), Pramadam (part), Thannithode (part), Aruvappulam (part), Seethathode, Chittar (part), Vechuchira, Ranni- Angadi, Ranni-Pazhavangadi, Naranamoozhi, Ranni-Perunad, Ranni, Vadasserikkara, Mylapra, Naranganum (part), Malayalapuzha, Konni (part) and Cherukole (part) panchayats.
Physiography & drainage
Narrow ridges, residual uplands, residual laterite hills, flood plains, valleys, side slopers, rolling to hilly terrain, elongated alluvial basins and narrow valleys. Pamba, Achankovil, Manimala and Kallada are the major rivers.

**Geology**

Khondalites seen on the southern portion with quartz, biotite, sillimanite, feldspar & graphite, charnockites on the north. Dominant minerals are orthopyroxene, amphibole, clinopyroxene, plagioclase & quarts. Recent to subrecent sediments seen in alluvial basins.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 26-27°C. Ustic moisture regime. Aquic in wetlands. Isohyperthermic temperature regime.

**Crops**

Moist deciduous & dry deciduous forests occupy major portion. Eucalyptus, teak, bamboo seen on lower reaches. Rubber, tapioca, coconut, cashew, pepper, arecanut etc. grown. In valleys, paddy, banana, vegetables, pulses etc. raised.

**Soils**

Kandihumults, Plinthustults, Aquepts and Humitropept

**6. SOUTHERN UPPER HILL RANGES**

Extents over 39717 ha in Aruvappulam, Thannithode, Seethathode, Chittar (part), and Ranni-Perunad panchayats

**Physiography & drainage**

Major terrain units are ridges, narrow valleys, denudational slops, rocky cliff, rocky scarp, dissected scarp etc. Pamba and Achankovil are the major rivers.

**Geology**

Khondalites & charnockite form the major rock types.

**Climate**
Annual rainfall ranges from 2000 to 3000mm. In certain pockets, it exceeds 3000mm. The mean annual temperature ranges from 24-25°C. Ustic moisture regime. Isohyperthermic temperature regime.

Crops
Major portion under moist deciduous forests wet evergreen in patches. Plantations of eucalyptus, teak and rubber.

Soils
Haplohumults in the hilly forests. Ustorthents on hills & ridges. Humitropepts on steep gradients. Fluvents & Tropepts in valleys.

7. SOUTHERN STEEP MOUNTAIN RANGES
Extent in 46900 ha in Aruvappulam (part) and Seethathode (part) panchayats

Physiography & drainage
Hilly terrain which includes denudational hills, denudational slopes, rocky cliffs, scarp slopes, narrow valleys, terraces etc. Pamba and Achankovil are the major rivers.

Geology
Khondalites & charnokite are the major rock types. Crests of peaks generally expose rock outcrops.

Climate
Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 22-24°C. Udic & Ustic moisture regimes. Isohyperthermic temperature regime.

Crops
Wet evergreen forests predominant. Semi-evergreen moist deciduous forest plantations also seen. Tea grown as pure crop.

Soils
Troporthents, Humitropepts, Palehumults, Haplustalfs & Hapludolls.
25. HIGH MOUNTAIN PLATEAU

Extents in 12835 ha in Aruvappulam (part) and Seethathode (part) panchayats.

**Physiography & drainage.**

Rocky cliffs, rocky scraps, denudational slopes, undulating summit tops, rocky & stony phases with little soil cover. Pamba and Achankoivilare the major rivers.

**Geology**

Precambrian charnockite, cordierite gneiss, hornblende- biotite gneiss & non-dated granites.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 18-22°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Grass & shrub vegetation and shola forests.

**Soils**

Hapludolls, Humitropepts & Orthents.

KOTTAYAM DISTRICT

The word “Kottayam” is derived from the Malayalam word, “Kottayakom” which means the interior of a fort. Thazhathangadi was the town and the seat of Munjanad rajas and the Thekkamkur rajas in the past and was locally known as “Kottavathil”. The district is bounded on the north by Ernakulam district, east by Idukki district, south by Pathanamthitta districts and west by Alappuzha district. Kottayam district lies between 9° 24’ to 9° 53’ N latitude and 76° 22’ to 77° E longitude. It covers an area of 2,19,550 ha. There are five taluks in this district namely Kottayam, Changanacherry, Kanjirappally, Meenachil and Vaikom.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows
3. SOUTHERN LOWER DISSECTED PIEDMONT PLAIN

Extents over 47685 ha in Kidangoor (part), Kadaplamattom (part), Kuravilangadu (part), Ayarkunnam (part) and Kanakkary (part) panchayats

Physiography & drainage

Undulating to rolling lands interspersed by broad valleys with occasional low laterite mounds. Meenachil is the major river.

Geology

Recent to subrecent alluvium over tertiary formation & Crystallines. Laterites developed over both tertiaries & crystallines.

Climate

Annual rainfall ranges from 2500 to 3000 mm. The mean annual temperature is 27°C. Ustic moisture regime. Aquic in valleys. Isohyperthermic temperature regime.

Crops

Coconut-predominant mixed cropping with arecanut, tapioca, fruit trees, pepper, yams etc, in garden lands. Paddy, banana, sesame, vegetables, pulses etc., raised in broad valleys.

Soils

Plinthustults & Kandiustults dominant. Ustipsamments in central part & Ustifluvents and Aquents in the flood plains & valleys

4. SOUTHERN UPPER DISSECTED PIEDMONT PLAIN

Extents over 94997 ha in Kuravilangad (part), Kanakkary (part), Kadaplamattom (part), Kidangoor (part), Marangattupally, Uzhavoor, Veliyannoor, Ramapuram, Karoor, Kadanadu (part), Mutholy, Bharananganum, Melukavu, Kozhuvanal (part), Meenachil, Thalappalam, Munnilavu(part), Thalanad (part), Theekoyi (part), Erattupetta, Thidanad, Poonjar (part), Poonjar-Thekkekara (part), Koottikkal (part), Parathode (part), Kanjirapally (part), Mundakkayam (part), Erumeli (part), Manimala (part) panchayats.
Physiography & drainage

Dissected laterite landscape with low laterite mounds & interfluves. Isolated hills of low altitude. Gently sloping to flat bottom broad valleys. Manimala, Meenachil, Muvattupuzha are the major rivers.

Geology

Alternate layers of khondalite, garnet-biotite gneiss. Basic intrusives like dolerite & Ultrabasic rocks. Recent to subrecent sediments dominate the lower topographic sites.

Climate

Annual rainfall ranges from 2500 to 3000mm. The mean annual temperature is 26-28°C. Ustic moisture regime. Aquic in wetlands. Isohyperthermic temperature regime.

Crops

Coconut-predominant mixed cropping system. Rubber as monocrop. Tapioca, pepper, cashew banana, fruit trees etc. are also raised. In flood plains, paddy, banana, vegetables and pulses are grown.

Soils

Plinthustults & Kandiustults in gardenlands. Tropepts, Aquepts, Aquent & Fluvents in wetlands.

5. SOUTHERN LOWER HILL RANGES

Extents over 29140 ha in Manimala (part), Erumeli(part), Mundakayam(part), Parathode(part), kanjirapally(part), Koottikkal(part), Poonjar-Thekkekara(part), Poonjar(part), Thidanad, Theekoyi(part), Thalanad(part), Thalappalam (part), Bharananganum (part), Munnilavu(part), Melukavu(part), Kadanad(part), Ramapuram (part) panchayats.

Physiography & drainage
Narrow ridges, residual uplands, residual laterite hills, flood plains, valleys, side slopers, rolling to hilly terrain, elongated alluvial basins and narrow valleys. Manimala, Meenachil are the major rivers.

**Geology**

Khondalites seen on the southern portion with quarts, biotite, sillimanite, feldspar & graphite, charnockites on the north. Dominant minerals are orthopyroxene, amphibole, clinopyroxene, plagioclase & quarts. Recent to subrecent sediments seen in alluvial basins.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 26-27°C. Ustic moisture regime. Aquic in wetlands. Isohyperthermic temperature regime.

**Crops**

Moist deciduous & dry deciduous forests occupy major portion. Eucalyptus, teak, bamboo seen on lower reaches. Rubber, tapioca, coconut, cashew, pepper, arecanut etc. grown. In valleys, paddy, banana, vegetables, pulses etc. raised.

**Soils**

Kandihumults, Plinthustults, Aquepts and Humitropept

6. SOUTHERN UPPER HILL RANGES

Extents over 12616 ha in Erumely (part), Mundakkayam (part), parathode (parrt), Kootikkal (part), Poonjar- Thekkekara (part), Poonjar (part), Theekoyi (part), Thalanad (part), Munnilavu (part), Melukavu (part) panchayats.

**Physiography & drainage.**

Major terrain units are ridges, narrow valleys, denudational slops, rocky cliff, rocky scarp, dissected scarp etc. Meenachil, Manimala, Pamba are the major rivers.

**Geology**
Khondalites & charnockite form the major rock types.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. In certain pockets, it exceeds 3000mm. The mean annual temperature ranges from 24-25\(^o\) C. Ustic moisture regime. Isohyperthermic temperature regime.

**Crops**

Major portion under moist deciduous forests wet ever green in patches. Plantations of eucalyptus, teak and rubber.

**Soils**

Haplohumults in the hilly forests. Ustorthents on hills & ridges. Humitropepts on steep gradients. Fluvents & Tropepts in valleys.

7. **SOUTHERN STEEP MOUNTAIN RANGES**

Extsents over 4772 ha in Melukavu (part), Munnilavu (part), Thalanad (part), Theekoyi (part), Poonjar-Thekkekara(part), and Kootikkal (part) panchayats

**Physiography & drainage**

Hilly terrain which includes denudational hills, denudational slopes, rocky cliffs, scarp slopes, narrow valleys, terraces etc. Meenachil, Manimala are the major rivers.

**Geology**

Khondalites & charnockite are the major rock types. Crests of peaks generally expose rock outcrops.

**Climate**

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 22-24\(^o\) C. Udic & Ustic moisture regimes. Isohyperthermic temperature regime.

**Crops**
Wet evergreen forests predominant. Semi-evergreen moist deciduous forest plantations also seen. Tea grown as pure crop.

**Soils**

Troportents, Humitropepts, Palehumults, Haplustalfs & Hapludolls.

**ERNAKULAM DISTRICT**

According to ancient legend, the name Ernakulam is derived from the word "Erainarkulam’ meaning, the abode of Lord siva. The district headquarters, Kochi, is acclaimed as the commercial capital of the state and the harbour as the Queen of the Arabian sea. Ernakulam district lies between 9°42' and 10°17’ N latitude and 76°9' and 77°2’ E longitude. The total geographical area is 237783 ha. The district comprises of seven taluks, namely, Kochi, Kannyannur, North Paravoor, Aluva Kunnathunadu, Muvattupuzha, Kothamangalam.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

11.**CENTRAL LOWER DISSECTED PIEDMONT PLAIN**

Extents over 79019 ha in Piravom(part), Elanjji(part), Maneed(part), Ramamangalam(part), Valakam(part), Mazhuvannur(part), Ikkarnad (part), Poothrika (part), Thiruvaniyoor (part), Vadavucode-Puthencruz(part), Kunnathunadu(part), Rayamangalam (part), Okkal (part), Koovappady (part), Vengoork (part) panchayats.

**Physiography & drainage**

Undulating to rolling laterite plains dissected by alluvial broad valleys. Isolated laterite mounds have moderately to steeply sloping side slopes. Periyar, Muvattupuzha drain the tract.

**Geology**

Recent to sub recent quaternary with miocene & pliocene sedimentary formations in the SW. The alluvial plains are recent rivirine deposits. Lowland laterite are very deep & quarrible.
Climate

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 25-28°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Coconut is the predominant crop. Other crops include fruit crops, banana, clove and nutmeg. In wet valleys, paddy, banana, vegetables, pulses and tapioca are raised.

Soils

Tropepts, Kandiustults, Kanhaplustalfs in gardenlands. Fluvents & aquents in alluvial plains.

12. CENTRAL UPPER DISSECTED PIEDMONT PLAIN

Extents over 120692 ha in Elanji (part), Koothattukulam, Palakuzha, Thirumarady, Pampakuda, Ramamangalam (part), Marady (part), Arakuzha, Avoly, Manjallow, Kalloorkkad, Ayavana, Pothanikkad, Paingottur, Maneed, Thiruvanionoor (part), Vadavucode-Puthencruz, Ikkarnad (part), Kunnathunad (part), Mazhuvannur (part), Pallarimanagalam, Varapetty, Kavalangad, Keerampara, Paipra, Mazhuvannur(part), Nellikuzhi, Rayamangalam, Asamannoor, Okkal(part), Koovappady (part), Mudakuzha (part), Vengoor (part), Kottappadi, Pindimana, Keerampara & Kuttampuzha panchayats.

Physiography & drainage

Rolling laterite terrain highly dissected by alluvial broad valleys. Isolated denudational ridges, laterite plains & terraces. Muvattupuzha and Periyar are the major rivers.

Geology

Charnokite predominant rock type with non-dated granite intrusive and pre-cambrian basic intrusions (Dolerite). Recent deposits in flood plains.

Climate
Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 26-28°C. Ustic, udic & aquic soil moisture regimes. Isohyperthermic temperature regime.

*Crops*

Rubber and coconut dominate. Coconut mixed with cocoa, pepper, tapioca, arecanut & banana. Paddy, banana & vegetables raised in valleys.

*Soils*

Plinthustults, Haplustults, Haplohumults, Tropepts, Haplustalfs, plinthoqualfs, Fluvents & aquents.

13. CENTRAL LOWER HILL RANGES

Extents over 32740 ha in Paingottur (part), Kavalangad (part), Keerampara (part) and Kuttampuzha panchayats.

*Physiography & drainage.*

Rolling hilly terrain with narrow ridges, residual hills, steep side slopes, narrow valleys & flood plains. Periyar & Muvattupuzha rivers drain the area.

*Geology*

Presence of Charnokite less; biotite gneiss, hornblende-biotite gneiss & cordierite gneiss is more. Occurrence of granite bodies also noticed especially in central & northern.

*Climate*

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 26-27°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

*Crops*

Rubber and coconut, tapioca, pepper, and arecanut in gardenlands. Paddy & legumes in wetlands. Forest plantations of Eucalyptus and teak also observed.

*Soils*

Dystropepts and Haplohumults.
13. CENTRAL UPPER HILL RANGES

Extents over 23208 ha in Kuttampuzha panchayat

**Physiography & drainage**

Hill ranges, denudational hills, scarp slopes, narrow valleys & terraces are the major land forms. Highly eroded rocky summits & side slopes of Western Ghat regions. Periyar river drains the entire area.

**Geology**

Hilly terrain with hypersthenite gneiss of charnockite group predominating in the south. The rest comprises of granite gneiss & migmatites which shows well-foiled, stranded texture.

**Climate**

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 24-26°C. Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Under reserve forests. Forest type semi-evergreen deciduous wet evergreen.

**Soils**

Humitorepeats, Haplohumults, Haplustalfs.

15. CENTRAL STEEP MOUNTAIN RANGES

Extents over 11228 ha in Kuttampuzha panchayat.

**Physiography & drainage**

Mountainous terrain with denudational slopes, denudational hills, hummocky terrain, isolated hills, rocky cliffs, terraces & narrow valleys. Highly eroded rocky summits & steep side slopes of mountains prominent. Periyar drains the area.

**Geology**

Precambrian harnokite, cordierite gneiss, hornblende-biotite gneiss & non-dated granites are the major rock.
**Climate**

Annual rainfall ranges from 2000 to 3500mm. The mean annual temperature ranges from 22-24°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Major area under reserve forests, wet evergreen, semi evergreen, moist & dry deciduous forest plantations. Tea plantations, cardamom, pepper, garlic, ginger, cool season vegetables, etc. raised.

**Soils**

Troporthents, Humitropepts, Hapludolls, Kandihumults.

25. **HIGH MOUNTAIN PLATEAU**

Extents over 5898 ha in Kuttampuzha panchayat.

**Physiography & drainage**

Rocky cliffs, rocky scraps, denudational slopes, undulating summit tops, rocky & stony phases with little soil cover. Periyar drains the entire area.

**Geology**

Precambrian charnockite, cordierite gneiss, hornblende-biotite gneiss & undated granites.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 18-22°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Grass & shrub vegetation and shola forests.

**Soils**

Hapludolls, Humitropepts & Orthents.

**IDUKKI DISTRICT**

Idukki, the largest district of the state was formed on 26th January 1972 encarving Devikulam, Peermedu and Udumbanchola taluks from Kottayam district
and Thodupuzha taluk from Ernakulam district. The name Idukki was derived from the malayalam word "Idukku" meaning constriction. The district is also said to be named after the mighty Idukki hills. It is bounded on the north by Thrissur district, on the south by Pathanamthitta district, on the west by Ernakulam and Kottayam districts and on the east and north-east by Tamil Nadu state. The district lies between 9° 16' to 10° 22' N latitude and 76° 37' to 77° 25' E longitude. The total geographic area of the district is 5,14,962 ha.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

3. SOUTHERN LOWER DISSECTED PIEDMONT PLAIN

Extents over 32852 ha in Kudayathoor (part), Muttom (part), Karinkunnam (part), Purapuzha (part), Manakkad, Idavetty, Alakkode, Velliyanattom, Kumaramangalam, Kodikulam, Karimannoor (part), Udumbannoor (part) and Vannapuram (part) panchayats

Physiography & drainage

Undulating to rolling lands interspersed by broad valleys with occasional low laterite mounds. Muvattupuzha is the major river.

Geology

Recent to subrecent alluvium over tertiary formation & Crystallines. Laterites developed over both tertiaries & crystallines.

Climate

Annual rainfall ranges from 2500 to 3000 mm. The mean annual temperature is 27° C. Ustic moisture regime. Aquic in valleys. Isohyperthermic temperature regime.

Crops

Coconut-predominant mixed cropping with arecanut, tapioca, fruit trees, pepper, yams etc, in garden lands. Paddy, banana, sesamum, vegetables, pulses etc., raised in broad valleys.

Soils
Plinthustults & Kandiustults dominant. Ustipsamments in central part & Ustipsamments in central part & Ustipsamments in central part & Ustifluvents and Aquents in the flood plains & valleys

5. SOUTHERN LOWER HILL RANGES

Extents over 26553 ha in Peermade(part), Peruvanthanum(part), Kokkayar (part), Purapuzha (part), Karinkunnam (part), Muttom (part), Kudayathoor (part), Arakulam (part), Velliyamattom (part), Idavetty (part), Udumbanoor (part), Karimannoor (part), Vannapuram (part) & Alakkode (part) panchayats.

Physiography & drainage

Narrow ridges, residual uplands, residual laterite hills, flood plains, valleys, side slopers, rolling to hilly terrain, elongated alluvial basins and narrow valleys. Pamba, Manimala, Moovattupuzha, Meenachil are the major rivers.

Geology

Khondalites seen on the southern portion with quartz, biotite, sillimanite, feldspar & graphite, charnockites on the north. Dominant minerals are orthopyroxene, amphibole, clinopyroxene, plagioclase & quarts. Recent to subrecent sediments seen in alluvial basins.

Climate

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 26-27° C. Ustic moisture regime. Aquic in wetlands. Isohyperthermic temperature regime.

Crops

Moist deciduous & dry deciduous forests occupy major portion. Eucalyptus, teak, bamboo seen on lower reaches. Rubber, tapioca, coconut, cashew, pepper, arecanut etc. grown. In valleys, paddy, banana, vegetables, pulses etc. raised.

Soils

Kandihumults, Plinthustults, Aquepts and Humitropepts
6. SOUTHERN UPPER HILL RANGES

Extents over 8254 ha in Kumily, Peermade, Peruvanthanum, Kokkayar panchayats.

**Physiography & drainage**

Major terrain units are ridges, narrow valleys, denudational slopes, rocky cliff, rocky scarp, dissected scarp etc. Pamba and Manimala are the major rivers.

**Geology**

Khondalites & charnokite form the major rock types.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. In certain pockets, it exceeds 3000mm. The mean annual temperature ranges from 24-25°C. Ustic moisture regime. Isohyperthermic temperature regime.

**Crops**

Major portion under moist deciduous forests wet evergreen in patches. Plantations of eucalyptus, teak and rubber.

**Soils**

Haplohumults in the hilly forests. Ustorthents on hills & ridges. Humitropepts on steep gradients. Fluvents & Tropepts in valleys.

7. SOUTHERN STEEP MOUNTAIN RANGES

Extents over 260020 ha in Kumily, Vandiperiyar, Peermade (part), Peruvanthanum (part), Kokkayar (part), Elappara, Ayyapancoil, Chakkupallam, Elappara, Upputhara, Kanchiyar, Kattappana, Vandanmedu, Karunapuram, Panpadumpara, Irattayar, Kamakshy, Vazhathope, Idukki-Kanjikuzhy (part), Mariyapuram, Nedumkandam, Vathikudy, Udumbanchola, Udumbanooor (part), Udumbanchola, Santhanpara, Senapathi, Rajakumari, Konnathady, Rajakkad, Bison valley, Vellathooval, Pallivasal (part), Adimali, Mankulam (part) & Chinnakanal panchayats.
Physiography & drainage

Hilly terrain which includes denudational hills, denudational slopes, rocky cliffs, scarp slopes, narrow valleys, terraces etc. Periyar, Muvattupuzha, Meenachil, Manimala and Pamba are the major rivers.

Geology

Khondalites & charnockite are the major rock types. Crests of peaks generally expose rock outcrops.

Climate

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 22-24°C. Udic & Ustic moisture regimes. Isohyperthermic temperature regime.

Crops

Wet evergreen forests predominant. Semi-evergreen moist deciduous forest plantations also seen. Tea grown as pure crop.

Soils

Troporthents, Humitropepts, Palehumults, Haplustalfs & Hapludolls

14. CENTRAL UPPER HILL RANGES

Extents over 10187 ha in Udumbannoor (part), Karimannoor (part), Vannapuram (part), Adimali (part) and Mankulam (part) panchayats.

Physiography & drainage

Hill ranges, denudational hills, scarp slopes, narrow valleys & terraces are the major land forms. Highly eroded rocky summits & side slopes of Western Ghat regions. Periyar drains the entire tract.

Geology
Hilly terrain with hypersthene gneiss of charnockite group predominating in the south. The rest comprises of granite gneiss & migmatites which shows well-foilated, stranded texture.

**Climate**

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from \(24-26^\circ C\). Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Under reserve forests. Forest type semi-evergreen deciduous wet evergreen.

**Soils**

Humitropepts, Haplohumults, Haplustalfs.

15. CENTRAL STEEP MOUNTAIN RANGES

Extents over 15660 ha Vattavada (part), Kanthalloor (part), Munnar (part) and Marayoor (part) panchayats.

**Physiography & drainage**

Mountainous terrain with denudational slopes, denudational hills, hummocky terrain, isolated hills, rocky cliffs, terraces & narrow valleys. Highly eroded rocky summits & steep side slopes of mountains prominent. Pambar is the major river.

**Geology**

Precambrian harnokite, cordierite gneiss, hornblende-biotite gneiss & non-dated granites are the major rock.

**Climate**

Annual rainfall ranges from 2000 to 3500mm. The mean annual temperature ranges from \(22-24^\circ C\). Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Major area under reserve forests, wet vergreen, semi evergreen, moist & dry deciduous forest plantations. Tea plantations, cardamom, pepper, garlic, ginger, cool season vegetables, etc. raised.
**Soils**

Troporthents, Humitropepts, Hapludolls, Kandihumults.

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25. HIGH MOUNTAIN PLATEAU

Extents over 66124 ha in Kumily, Munnar, Mankulam (part), Pallivasal (part), Bison valley (part), and Chinnakanal (part) panchayat.

**Physiography & drainage.**

Rocky cliffs, rocky scraps, denudational slopes, undulating summit tops, rocky & stony phases with little soil cover. Periyar drains the entire tract.

**Geology**

Precambrian charnockite, cordierite gneiss, hornblende- biotite gneiss & non-dated granites.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 18-22°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Grass & shrub vegetation and shola forests.

**Soils**

Hapludolls, Humitropepts & Orthents.

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26. MARAYUR RAINSHADOW REGION

Extents over 19390 ha in Marayur, Kanthallur panchayats

**Physiography & drainage**

Denudational hills, denudational slopes, rocky cliffs, scrapslopes, terraces. Pambar is the major river. Pambar is the main drainage

**Geology**

Precambrian metamorphics represented by charnockites, garnet sillimanite gneiss and garnet biotite gneiss.

**Climate**
Annual rainfall ranges from 800 to 1100 mm. The mean annual temperature ranges from 16.5°C. Ustic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Dry deciduous, temperate shola reeds are the major forest types. Potato, miiets, cabbage, cauliflower, sugarcane etc. are raised.

**Soils**

Argiustolls, paleustalfs, Ustorthents. In lower topographic sites, Umbraqualfs & Tropaqepts.

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**THRISUR DISTRICT**

The district headquarters Thrissur is acclaimed as the cultural capital of the state. Thrissur is the abbreviated term of the Malayalam word ‘Thrissivaperur’ meaning the town in the name of Lord Siva. The total geographic area of the district is 2,99,390 ha. It lies between 10°10’ and 10°46’ N latitude and 75°55’ and 76°55’ E longitude. The district comprises of five taluks namely Talapilly, Chavakkad, Thrissur, Mukundapuram and Kodungalloor.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

**10. CENTRAL COASTAL PLAIN**

Extents over 36945 ha in Poyya (part), Vellangallur (part), Poomangalam (part), Padiyur (part), Kaippamangalam (part), Edathiruthy (part), Kattur (part) panchayats.

**Physiography & drainage**

Gently sloping coastal belt with sandy plains, low dunes, beach, ridges, backwamps, marshes, lagoons and tidal mudflats. Karavannur and Periyar drain the area.
Geology

Recent to subrecent quaternary formations consisting of great thickness of sand with shell fragments, sticky black clays & peat beds of both marine & fluvial environments.

Climate

Annual rainfall ranges from 2500 to 3000mm. The mean annual temperature ranges from 26-28°C. Ustic soil moisture regime in garden lands aquic in wetlands. Isohyperthermic temperature regime.

Crops

Coconut is the major crop. In wetland, paddy, banana, sesamum, vegetables, pulses etc. are grown. Pokkali cultivation of paddy is taken up in salt water inundated lowlands.

Soils

Quartzipsamments, Ustipsamments, Aquents, Fluvents & Aquepts.

11.CENTRAL LOWER DISSECTED PIEDMONT PLAIN

Extents over 75308 ha in Kuzhur, Annamanada, Poyya (part), Puthernchira (part), Mala, Kadukutty, Koratty, Melur (part), Pariyaram (part), Vellangallur (part), Velukkara, Alur, Muniyad, Karalam, Kattur (part), Karalam (part), Porathissery, Parappukkara, Pudukkad (part), Vallachira, Alagappa Nagar, Nenmanikkara, Varantharappilly (part), Mattathur (part) and Kodakara (part) panchayat.

Physiography & drainage

Undulating to rolling laterite plains dissected by alluvial broad valleys. Isolated laterite mounds have moderately to steeply sloping side slopes. Karuvannur and Periyar drain the area.

Geology

Recent to sub recent quaternary with miocene & pliocene sedimentary formations in the SW. The alluvial plains are recent rivirine deposits. Lowland laterite are very deep & quarrible.
Climate

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 25-28°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Coconut is the predominant crop. Other crops include fruit crops, banana, clove and nutmeg. In wet valleys, paddy, banana, vegetables, pulses and tapioca are raised.

Soils

Tropepts, Kandiustults, Kanhaplustalfs in gardenlands. Fluvents & aqvents in alluvial plains.

12. CENTRAL UPPER DISSECTED PIEDMONT PLAIN

Extents over 109580 ha in Koratty (part), Melur (part), Pariyaram (part), Kodassery (part), Mattathur (part), Varanthurappilly (part), Pudukkad (part), Alagappa Nagar (part) and Thrikkur (part) panchayats

Physiography & drainage

Rolling laterite terrain highly dissected by alluvial broad valleys. Isolated denudational ridges, laterite plains & terraces. Karuvannur and Chalakudy are the major rivers.

Geology

Charnokite predominant rock type with non-dated granite intrusive and pre-cambrian basic intrusions (Dolerite). Recent deposits in flood plains.

Climate

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 26-28°C. Ustic, udic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Rubber and coconut dominate. Coconut mixed with cocoa, pepper, tapioca, arecanut & banana. Paddy, banana & vegetables raised in valleys.
**Soils**

Plinthustults, Haplustults, Haplohumults, Tropepts, Haplustalfs, plinthaqualfs, Fluvents & aquents.

**13. CENTRAL LOWER HILL RANGES**

Extents over 50,567 ha in Athirapally (part), Kodassery (part), Mattathur (part) and Varantharappilly (part) panchayats.

**Physiography & drainage**

Rolling hilly terrain with narrow ridges, residual hills, steep side slopes, narrow valleys & flood plains. Karuvannur and Chalakudy rivers drain the area.

**Geology**

Presence of Charnockite less; biotite gneiss, hornblende-biotite gneiss & cordierite gneiss is more. Occurrence of granite bodies also noticed especially in central & northern.

**Climate**

Annual rainfall ranges from 3000 to 4000 mm. The mean annual temperature ranges from 26-27°C. Ustic & aquic soil moisture regimes. Isothermal temperature regime.

**Crops**

Rubber and coconut, tapioca, pepper, and arecanut in gardenlands. Paddy & legumes in wetlands. Forest plantations of Eucalyptus and teak also observed.

**Soils**

Dystropepts and Haplohumults.

**14. CENTRAL UPPER HILL RANGES**

Extents over 24,658 ha in Athirapally (part), Kodassery (part), Mattathur (part) and Varantharappilly (part) panchayats.

**Physiography & drainage**
Hill ranges, denudational hills, scarp slopes, narrow valleys & terraces are the major land forms. Highly eroded rocky summits & side slopes of Western Ghat regions. Karuvannur, Chalakudy are the major rivers.

**Geology**

Hilly terrain with hypersthene gneiss of charnockite group predominating in the south. The rest comprises of granite gneiss & migmatites which shows well-foillated, stranded texture.

**Climate**

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 24-26°C. Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Under reserve forests. Forest type semi-evergreen deciduous wet evergreen.

**Soils**

Humitropepts, Haplohumults, Haplustalfs.

**PALAKKAD DISTRICT**

Palakkad might have been the place called ‘Palakada’, one of the headquarters of the Pallava dynasty during the second and third century A.D. Palakkad district has been carved out of the Nedumpureiyur district of erstwhile Malabar province and portion of erstwhile Cochin state comprising Chittur, Tattamangalam, Pattancherry and Nallepilly Desoms and Kadakarannadu. The district as an administrative unit consisting of Palakkad, Mannarkad, Chittur, Alathur and Ottapalam taluks was formed on the first of January 1957. Palakkad district with an area of 4389.8 Sq. km is situated between 10°19’ and 11°13’ N latitude and 76°02’ and 76°55’ E longitude.

The Major Land Resource Areas identified in the district in the Western ghat tract is as follows
11. CENTRAL LOWER DISSECTED PIEDMONT PLAIN

Extent: 20863 ha

**Physiography & drainage.**

Undulating to rolling laterite plains dissected by alluvial broad valleys. Isolated laterite mounds have moderately to steeply sloping side slopes. Bharathapuzha and Kanjiramukku drain the tract.

**Geology**

Recent to sub recent quaternary with miocene & pliocene sedimentary formations in the SW. The alluvial plains are recent rivirine deposits. Lowland laterite are very deep & quarrible.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 25-28°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Coconut is the predominant crop. Other crops include fruit crops, banana, clove and nutmeg. In wet valleys, paddy, banana, vegetables, pulses and tapioca are raised.

**Soils**

Tropepts, Kandiustults, Kanhaplustalfs in gardenlands. Fluvents & aquents in alluvial plains.

13. CENTRAL LOWER HILL RANGES

Extent: 10705 ha

**Physiography & drainage**
Rolling hilly terrain with narrow ridges, residual hills, steep side slopes, narrow valleys & flood plains. Bhavani, Kadalundi, Bharathapuzha and Chalakudy are the major rivers.

**Geology**

Presence of Charnokite less; biotite gneiss, hornblende-biotite gneiss & cordierite gneiss is more. Occurrence of granite bodies also noticed especially in central & northern.

**Climate**

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 26-27°C. Ustic & Aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Rubber and coconut, tapioca, pepper, and arecanut in gardenlands. Paddy & legumes in wetlands. Forest plantations of Eucalyptus and teak also observed.

**Soils**

Dystropepts and Haplohumults.

14. CENTRAL UPPER HILL RANGES

Extent: 7127 ha

**Physiography & drainage.**

Hill ranges, denudational hills, scarp slopes, narrow valleys & terraces are the major land forms. Highly eroded rocky summits & side slopes of Western Ghat regions. Bhavani, Bharathapuzha and Chalakudy are the major rivers.

**Geology**

Hilly terrain with hypersthene gneiss of charnockite group predominating in the south. The rest comprises of granite gneiss & migmatites which shows well-foiled, stranded texture.

**Climate**
Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 24-26° C. Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Under reserve forests. Forest type semi-evergreen deciduous wet evergreen.

**Soils**

Humitropepts, Haplohumults, Haplustalfs.

15. CENTRAL STEEP MOUNTAIN RANGES

**Extent:** 21333 ha

**Physiography & drainage**

Mountainous terrain with denudational slops, denudational hills, hummocky terrain, isolated hills, rocky cliffs, terraces & narrow valleys. Highly eroded rocky summits & steep side slops of mountains prominent. Bhavani, Kadalundi, Bharathapuzha and Chalakudy are the major rivers.

**Geology**

Precambrian harnokite, cordierite gneiss, hornblende-biotite gneiss & non-dated granites are the major rock.

**Climate**

Annual rainfall ranges from 2000 to 3500mm. The mean annual temperature ranges from 22-24° C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Major area under reserve forests, wet vergreen, semi evergreen, moist & dry deciduous forest plantations. Tea plantations, cardamom, pepper, garlic, ginger, cool season vegetables, etc. raised.

**Soils**

Troporthents, Humitropepts, Hapludolls, Kandihumults.
16. PALAKKAD GAP

Extent: 93872 ha

Physiography & drainage.
Undulating to rolling plains, isolated hills, alluvial plains, flood plains, terraces, alluvial basins & reclaimed backwambs. Bharathapuzha drains the tract.

Geology
Migmatites, hornblende-biotite gneiss with intercalation of charnockite. In Walayar, gneiss belonging to Khondalite group are noticed. Here, they alternately overlie the hypersthene bearing rocks. Crystalline limestones are seen associated with calc-silicates.

Climate
Annual rainfall ranges from 1000 to 2000mm. The mean annual temperature ranges from 28-29°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops
Coconut, sugarcane, groundnut, cotton, horsegram are raised in gardenlands. Paddy & sugarcane in wet valleys,

Soils
Ustifluvents, Dystropepts, Haplustalfs & Paleustalfs.

17. PALAKKAD PLAIN

Extent: 169168 ha

Physiography & drainage.
Undulating to rolling plains, broad isolated low hills, residual hill with rock exposures, flood plains, river cones, terraces & alluvial fans. Bharathapuzha, Kadalundi and Kanjirimukku are the major rivers.

Geology
Migmatites are the predominant rock types. Charnockites generally seen in hill ridges & isolated hills. There is an increase in hypersthene bearing granulites
and gneisses towards western parts. The country rocks are traversed by gabbrobasic dykes.

**Climate**

Annual rainfall ranges from 2000 to 2500mm. The mean annual temperature ranges from 28-29°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Coconut, banana, vegetables, sesamum etc., raised in gardenlands.

**Soils**

Ustifluvents, Fluваquents, Tropaquents in wetlands, Haplustalfs, Plinthustults & Dystropepts in gardenlands. Ustrorthents on stony hill enriched summits.

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**MALAPPURAM DISTRICT**

Malappuram district was formed on 16th June 1969, by merging portions of Kozhikode and Palakkad districts. “Malappuram” literally means a terraced place atop a hill, is remarkable for its unique natural beauty. The district also contributed much to the cultural artistic traditions of the state. The district comprises of 5 municipalities, fourteen blocks and hundred panchayats. This district lies between 10° 42' to 11° 32' N latitude and 75° 48' to 76° 33' E longitude. The extent of the district is 3550 Sq.km.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

19. **NORTHERN LOWER DISSECTED PIEDMONT PLAIN**

Extents over 45612 ha in Kottakkal, Urakam, Pallikkal, Kondotty, Chelambra panchayats all in parts.

**Physiography & drainage**
Rolling to undulating plains, laterite mounds, isolated hills, lateric mesa, flat-bottomed valleys, laterite benches, flood plains, fall face are the dominant land forms. Kadalundi is the major river.

**Geology**

Laterite becomes more prominent with isolated hills of crystallines. Deep weathering of laterisation is a common feature. Bauxite is seen associated with laterite cover. The unique Ezhimala complex lithologically consists of igneous bodies with a number of dykes cutting the country rock.

**Climate**

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 27-28°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Coconut arecanut, pepper, cashew, paddy, banana & yams are raised.

**Soils**

Ustorthents, Ustifluvents, Plinthustults, Kandiustults dominate the laterite belt.

**20. NORTHERN UPPER DISSECTED PIEDMONT PLAIN**

Extents over 217700 ha in Irimpiliyam, Moorkkanad, Pulamanthode, Elamkulam, Aliparamba, Thazhekkode, Vettathur, Angadipuram, Puzhakkattiri, Valancherry, Edayoor, Marakkara, Vettathur, Kottakkal (part), Ponmala, Kodur, Makkaraparamba, Mankada, Keezhhattur, Melattur, Edappatta, Thuvvur, Pandikkad, Anakkayam, Urakam, Pookottur, Morayur, Nediyruppu, Kondotty (part), Pallikkal (part), Chelambra (part), Cherukavu, Pulickal, Vazhayoor, Vazhakkad, Keezhparambu, Cheekkode, Areekkode, Kuzhimanna, Pulpatta, Kavannur, Urngattiri (part), Edavanna (part), Thrikkalangode, Anakkayam, Pandikkad, Porur, Thiruvalli, Wandoor, Mambad, Karuvarakundu (part), Kalikavu (part), Chokkade (part), Amarambalam, Karulai (part), Vazhikkadavu (part), Edakkara (part), Pothukallu (part), Chungathara (part) and Chaliyar (part) panchayats
Physiography & drainage

Rolling laterite plains, laterite mesa, laterite mounds, isolated hills, flat bottomed valleys, flat-topped ridges, laterite benches, flood plains, low land terraces & narrow valleys. Laterite mesa over crystalline rocks is the most prominent feature. Chaliyar, Kadalundi and Bharathapuzha are the major rivers.

Geology

Rock exposures belonging to granulitic terrain (south) and the granite terrain (north). Ultramafic and layered complexes belonging to the Sargur & Dharwar group is the transitional zone.

Climate

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 26-27°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Coconut, arecanut, rubber, cashew, vegetables, paddy, banana & pulses are raised. Dry deciduous forest plantations.

Soils

Plinthustults, Kandiustults, Ustorthents, Haplohumults & Paleustalfs in the lateric belt & Ustifluvents, Eutropepts, Aquepts in the flood plain valleys.

21. NORTHERN LOWER HILL RANGES

Extents over 19584 ha in Edapatta (part), Karuvarakundu (part), Kalikavu (part), Chokkade (part), Amarambalam (part), Karulai (part), Vazhikkadavu (part), Edakkara (part), Pothukallu (part), Chungathara (part), Chaliyar (part), Mambad (part), Edavanna (part) and Urngattiri (part) panchayats

Physiography & drainage
Laterite mesa, stepped mesa, residual uplands, undulating terrain, narrow valleys & enclosed alluvial basin. Chaliyar and Kadalundi are the major rivers.

**Geology**

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

**Climate**

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 25-26°C. Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Forest plantations & plantation crops, Coconut, tapioca, banana raised in gardenlands; paddy, banana in valley fills.

**Soils**

Palehumults, Kandiustults, Plinthustults, Haplustalfs, Humitropepts, Ustorthents, Fluvents & Aquen.

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**22. NORTHERN UPPER HILL RANGES**

Extends over 513 ha in Karuvarakundu (part), Kalikavu (part), Chokkade (part), Amarambalam (part), Karulai (part), Vazhikkadavu (part), Edakkara (part), Pothukallu (part), Chungathara (part), Chaliyar (part), Mambad (part), Edavanna (part) and Urngattiri (part) panchayats

**Physiography & drainage.**

Steep ridges, narrow valleys, rocky cliffs, rocky scrap, denudational hills, scrap slopes are the major land forms. Chaliyar and Kadalundi are the major rivers.

**Geology**

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.
Climate

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 24-26°C. Ustic soil moisture regime. Isohyperthermic temperature regime.

Crops

Deciduous forest & forest plantations constitute the major portion. Rubber, pepper, coconut, arecanut, ginger and cashew raised.

Soils

Haplohumults, Haplustalfs, Humitropepts & Ustorthents.

23. NORTHERN STEEP MOUNTAIN RANGE

Extents over 26539 ha in Karuvarakundu (part), Kalikavu (part), Chokkade (part), Amarambalam (part), Karulai (part), Vazhikkadavu (part), Pothukallu (part), Chungathara (part), Chaliyar (part) and Urngattiri (part) panchayats

Physiography & drainage

Mountainous terrain comprising of denudational slopes, denudational hills, hummocky terrain, rocky cliffs, highly undulating terrain, isolated hills, scrap slopes of mountains are prominent. Chaliyar and Bharathapuzha are the major rivers.

Geology

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

Climate

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 24-25°C. Udic soil moisture regime. Isohyperthermic temperature regime.

Crops

Wet evergreen forests & moist deciduous forest.

Soils

Troporthents, Humitropepts, Hapludolls & Kandihumults.
25. HIGH MOUNTAIN PLATEAU

Extents over 19393 ha in Karuvarakundu (part), Kalikavu (part), Chokkade (part), Amarambalam (part), Karulai (part), Vazhikkadavu (part), Pothukallu (part), Chungathara (part), Chaliyar (part) and Urngattiri (part) panchayats

Physiography & drainage

Rocky cliffs, rocky scraps, denudational slopes, undulating summit tops, rocky & stony phases with little soil cover. Chaliyar and Bharathapuzha re the major rivers.

Geology

Precambrian charnockite, cordierite gneiss, hornblende- biotite gneiss & non-dated granites.

Climate

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 18-22°C. Udic soil moisture regime. Isohyperthermic temperature regime.

Crops

Grass & shrub vegetation and shola forests.

Soils

Hapludolls, Humitropepts & Orthents.

KOZHIKODE DISTRICT

Kozhikode district is situated on the northwest portion of Kerala. The term Kozhikode means Koyil (palace) Kodu (fortified). The district is bounded on the north by Kannur district, on the east by Wayanad district, on the south by Malappuram district and on the west by Lakshadweep Sea. It lies between 11° 09’ - 11° 49’ N latitude and 75° 32’ - 76° 9’ E longitude and extend to 2333 sq.km.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows
18. NORTHERN COASTAL PLAIN

Extents over 17947 ha in Kadalundi, Beypore, Elathur, Thalakulathur, Chemmancherry, Chengottukavu, Moodadi, Thikkodi, Payyoli and parts of Keezhariyoor panchayat.

Physiography & drainage

Characterized by beach ridges, Paleo sands, sandflats, tidal mudflats, marshes, tidal estuaries, tidal creeks, lakes, coastal alluvial plains & low laterite cliffs. Kadalundi, Kallai, Korapuzha and Kuttiyadi are the major rivers.

Geology

Recent to sub recent quaternary deposits over tertiary sediments. The quaternary formations are separated from tertiary rocks by polymict pebble beds, black clays. Peat beds of both marine & fluvial environment underlay sand deposits. Bauxite & clay are the important minerals in the region.

Climate

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 26-28° C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Coconut is predominant. Tobacco cultivated in Kanhangad & Pallikara sandy belt. In wetlands, paddy, banana, vegetables are raised.

Soils

Ustipsamments, Quartzipsamments, Psammaquents, Fluvaquents.

19. NORTHERN LOWER DISSECTED PIEDMONT PLAIN

Extents over 26534 ha in Feroke, Ramanattukara, Cheruvannur, Nallalam, part of Olavanna, part of Kakkodi, part of Chelavannur, part of Thrikkulathur, part of Atholi, part of Ulliyeri, Naduvannur, part of Arikkulam, part of Keezhariyoor,
part of Meppayur, Thurayur part, part of Payyoli, Maniyur part, Villiyapally(part) and Cherode(part) panchayats

**Physiography & drainage**

Rolling to undulating plains, laterite mounds, isolated hills, lateric mesa, flat-bottomed valleys, laterite benches, flood plains, fall face are the dominant land forms. Chaliyar, Kallai, Korapuzha, Kuttiyadi and Mahe are the major rivers.

**Geology**

Comparable to unit 18. Laterite becomes more prominent with isolated hills of crystallines. Deep weathering of laterisation is a common feature. Bauxite is seen associated with laterite cover. The unique Ezhimala complex lithologically consists of igneous bodies with a number of dykes cutting the country rock.

**Climate**

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 27-28$^\circ$ C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Coconut arecanut, pepper, cashew, paddy, banana & yams are raised.

**Soils**

Ustorthents, Ustifluvents, Plinthustults, Kandiustults dominate the laterite belt.

20. **NORTHERN UPPER DISSECTED PIEDMONT PLAIN**

Extents over 141443 ha in Azhiyur, Eramala, Onchiyam, Cherode, Ayancheri, Purameri, Edacheri, Thuneri, Chekyad, Valayam, Vanimel (part), Naripetta (part), Nadapuram, Villiyapally (part), Ayancheri, Thiruvallur, Velom, Kuttiyadi, Kayakkodi, Maniyur (part), Cheruvannur (part), Perambra, Koothali, Changaroth, Maruthomkara, Kavilumpara, Chakkittapara, Meppayur (part), Nochad, Arikkulam (part), Naduvannur (part), Kottur, Kayanna, Kurachundu, Ulliyeri (part), Atholi (part), Balusseri, Panangad, Nanmanda, Unnikulam, Thamarassery(part), Puthuppadi(part), Kodenchery (part), Omassery, Koduvally, Kizhakkoth, Narikkuni, Kakkur, Thalakulathur(part), Chelannur (part), Kakkodi (part), Madavoor,
Koduvally, Kuruvathur, Kunnamangalam, Olavanna (part), Perumanna, Peruvayal, Mavoor, Chathamangalam, Kodyathur, Mukkam, Karassery, Koodaranji, Thiruvampadi (part) panchayats.

**Physiography & drainage**

Rolling laterite plains, laterite mesa, laterite mounds, isolated hills, flat bottomed valleys, flat-topped ridges, laterite benches, flood plains, low land terraces & narrow valleys. Laterite mesa over crystalline rocks is the most prominent feature. Chaliyar, Kallai, Korapuzha, Kuttiyadi and Mahe are the major rivers.

**Geology**

Rock exposures belonging to granulitic terrain (south) and the granite terrain (north). Ultramafic and layered complexes belonging to the Sargur & Dharwar group is the transitional zone.

**Climate**

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 26-27° C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Coconut, arecanut, rubber, cashew, vegetables, paddy, banana & pulses are raised. Dry deciduous forest plantations.

**Soils**

Plinthustults, Kandiustults, Ustorthents, Haplohumults & Paleustalfs in the lateric belt & Ustifluvents, Eutropepts, Aquents in the flood plain valleys.

**21. NORTHERN LOWER HILL RANGES**

Extents over 15519 ha in Chekyad (part), Valayam (part), Vanimel (part), Narippatta (part), Kayakkodi (part), Kavilumpara (part), Maruthomkara (part), Chakkittapara (part), Kurachundu (part), Kayanna (part), Kottur (part), Panangad (part), Thamarassery (part), Puthupadi (part), Kodancheri (part), Thiruvambadi (part) & Koodaranji (part) panchayats.
**Physiography & drainage**

Laterite mesa, steped mesa, residual uplands, undulating terrain, narrow valleys & enclosed alluvial basin. Chaliyar, Korapuzha, Kuttiyadi and Mahe are the major rivers.

**Geology**

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

**Climate**

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 25-26°C. Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Forest plantations & plantation crops, Coconut, tapioca, banana raised in gardenlands; paddy, banana in valley fills.

**Soils**

Palehumults, Kandiustults, Plinthustults, Haplustalfs, Humitropepts, Ustorthents, Fluvents & Aquen.

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22. NORTHERN UPPER HILL RANGES

Extents over 14397 ha in Chekyad (part), Valayam (part), Vanimel (part), Naripatta(part), Kayakkodi (part), Kavilumpara (part), Chakkittapara (part), Kurachundu (part), Thamarassery (part), Puthuppadi (part), Koadancheri (part), Thiruvampadi (part) & Koodaranji (part) panchayats.

**Physiography & drainage**

Steep ridges, narrow valleys, rocky cliffs, rocky scrap, denudational hills, scrap slops are the major land forms. Chaliyar, Korapuzha, Kuttiyadi and Mahe are the major rivers.

**Geology**
Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

**Climate**

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 24-26°C. Ustic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Deciduous forest & forest plantations constitute the major portion. Rubber, pepper, coconut, arecanut, ginger and cashew raised.

**Soils**

Haplohumults, Haplustalfs, Humitropepts & Ustorthents.

23. NORTHERN STEEP MOUNTAIN RANGE

Extents over 19209 ha in Chekyad(part, Vanimel (part), Naripetta(part), Kavilumpara (part), Chakkittapara (part), Kurachunu (part), Thamarassery (part), Puthuppadi (part), Kodancheri (part), Thiruvambadi (part) & Koodaranji (part) panchayats.

**Physiography & drainage**

Mountainous terrain comprising of denudational slopes, denudational hills, hummocky terrain, rocky cliffs, highly undulating terrain, isolated hills, scrap slopes of mountains are prominent. Chaliyar, Kuttiyadi, Mahe and Korapuzha are the major rivers.

**Geology**

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

**Climate**

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 24-25°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**
Wet evergreen forests & moist deciduous forest.

**Soils**

Troporthents, Humitropepts, Hapludolls & Kandihumults.

### 25. HIGH MOUNTAIN PLATEAU

Extent over 4769 ha in Kavilumpara (part), Koorachundu(part), Thiruvambadi (part), Koodaranji (part) panchayats.

**Physiography & drainage.**

Rocky cliffs, rocky scraps, denudational slopes, undulating summit tops, rocky & stony phases with little soil cover. Chaliyar, Kabini and Kuttiyadi are the major rivers.

**Geology**

Precambrian charnockite, cordierite gneiss, hornblende- biotite gneiss & non-dated granites.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 18-22°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Grass & shrub vegetation and shola forests.

**Soils**

Hapludolls, Humitropepts & Orthents.

### WAYANAD DISTRICT

Wayanad district was formed in the year 1980 by merging South Wayanad taluk of Kozhikode district and North Wayanad taluk of Kannur district. The name “Wayanad” is derived from two words viz., "Vayal" and "Nadu" meaning - the land of paddy fields. The district is bounded on the east by Nilgiris of Tamil Nadu and
Mysore of Karnataka, on the north by Coorg district of Karnataka and Kannur district, on the south by Malappuram district and on the west by Kozhikode district. It lies between 11° 27' - 12° N latitude and 75° 46' - 76° 27' E longitude.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

24. WAYANAD PLATEAU

Extents over 207232 ha in Noolpuzha, Nenmeni, Sulthan Batheri, Moopainadu, Ambalavayal, Meenangadi, Poothadi, Pulpally, Mullankolli, Thirunelli, mananthavady, Panamaram, Kaniyambatta, Muttil, Vythiri, Pozhuthana (part), Thariyode (part), Kottathara, Padinjarethara (part), Vellamunda (part), Vengapally, edavaka, Thondrenadu (part) & Thavinjal panchayats.

Physiography & drainage

Denudational plateau slopes, escarpments, rocky hills, gently sloping to rolling lands & plains, dissected plateau, inter mountaineous broad valleys and high level flood plains. Kabini, Mahe, Chaliyar, Kuttiyadi and Valapattanam are the major rivers.

Geology

Precambrian metamorphic complex includes charnockite gneiss & granites. Recent and subrecent alluvium.

Climate

Annual rainfall ranges from 2000 to 3500mm. The mean annual temperature ranges from 23-24°C in lower elevations and less than 22°C in places with elevation more than 900m. Ustic, Udic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Crops raised include coffee, tea, as plantations, pepper, ginger, turmeric, paddy, banana & vegetables. Moist deciduous and dry deciduous forests cover the east of the unit and wet evergreen forests in hills adjoining Kalpetta.

Soils
Haplustalfs, Haplustults, Humitropepts, Haplustolls, Ustorthents, Tropaquepts, Fluvaquents & Ochraqualfs.

25. HIGH MOUNTAIN PLATEAU

Extents over 10460 ha in Meppadi, Vythiri, Pozhuthana, Thariyode, Padinjarethara, Vellmunda and Thondernadu all parts of panchayats.

**Physiography & drainage**

Rocky cliffs, rocky scraps, denudational slopes, undulating summit tops, rocky & stony phases with little soil cover. Kabini, Kuttiyadi and Chaliyar are the major rivers.

**Geology**

Precambrian charnockite, cordierite gneiss, hornblende- biotite gneiss & non-dated granites.

**Climate**

Annual rainfall ranges from 2000 to 3000mm. The mean annual temperature ranges from 18-22°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Grass & shrub vegetation and shola forests.

**Soils**

Hapludolls, Humitropepts & Orthents.

**KANNUR DISTRICT**

Kannur district came into existence as an administrative unit on 1st January 1957. Kannur is a variation of the name 'Kanathur' a village in Kannur district. It is believed that the word Kannur is the compound of two words, Kannan meaning Lord Krishna and Ur, meaning place, the place of Lord Krishna. The district is bounded on the east by Western Ghats (Coorg district of Karnataka), on the south by Kozhikode and Wayanad districts and on the west by Lakshadweep Sea and on
the north by Kasargod district. It lies between 11° 40' - 12° 18' N latitude and 75° 10' to 75° 57' E longitude.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

18. NORTHERN COASTAL PLAIN

Extents over 25638 ha in Kariyad (part), Chokli (part), Kathirur (part), Eranholi (part), Dharmadom (part), Pinarayi (part), Pattuvam (part) Ramanthali (part) and Kanvellur-Peralam (part) panchayats.

Physiography & drainage

Characterized by beach ridges, Paleo sands, sandflats, tidal mudflats, marshes, tidal estuaries, tidel creeks, lakes, coastal alluvial plains & low laterite cliffs. Kavvayi, Peruvemba, Ramapuram, Kuppam, Valapattanam, Thalassery, Mahe and Anjarakandi are the major rivers.

Geology

Recent to sub recent quaternary deposits over tertiary sediments. The quaternary formations are separated from tertiary rocks by polymict pebble beds, black clays. Peat beds of both marine & fluvial environment underlay sand deposits. Bauxite & clay are the important minerals in the region.

Climate

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 26-28° C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Coconut is predominant. Tobacco cultivated in Kanhangad & Pallikara sandy belt. In wetlands, paddy, banana, vegetables are raised.

Soils

Ustipsamments, Quartzipsamments, Psammaquents, Fluvaquents.
19. NORTHERN LOWER DISSECTED PIEDMONT PLAIN

Extents over 56785 ha in Kariyad (part), Chokli (part), Peringalam, Thriprangottur(part), Panoor (part), Mokeri (part), Panniyannur (part),, Kathirur (part), Pattiom (part), Kottayam (part), Pinarayi (part), Eranholi (part), Peralassery (part), Vengad (part), Kolacherry (part), Kurumathur (part), Pariyaram (part), Pattuvam (part), Ramanthali (part), Kankole- Alapadamba (part) and Erimam-Kuthoor (part) panchayats

Physiography & drainage

Rolling to undulating plains, laterite mounds, isolated hills, lateric mesa, flat-bottomed valleys, laterite benches, flood plains, fall face are the dominant land forms. Mahe, Thalassery, Anjarakandy, Valapattanam, Kuppam, Ramapuram, Peruvemba and Kavvayi are the major rivers.

Geology

Comparable to unit 18. Laterite becomes more prominent with isolated hills of crystallines. Deep weathering of laterisation is a common feature. Bauxite is seen associated with laterite cover. The unique Ezhimala complex lithologically consists of igneous bodies with a number of dykes cutting the country rock.

Climate

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 27-28° C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops

Coconut arecanut, pepper, cashew, paddy, banana & yams are raised.

Soils

Ustorthents, Ustifluvents, Plinthustults, Kandiustults dominate the laterite belt.
20. NORTHERN UPPER DISSECTED PIEDMONT PLAIN

Extents over 135,452 ha in Kunnothuparamba, Pattiom (part), Chittariparamba, Kottayam (part), Pinarayi (part), Vengad (part), Mangattidom, Malur, Peravoor, Kolavade (part), Muzhakkunnu, Aralam (part), Ayyankunnu (part), Payam (part), Keezhur-Chavassery, Thillankeri, Ancharakandy (part), Keezhallur, Koodali, Kuttiyattoor, Padiyurkalliad, Ulickal (part), Payyavoor (part), Eruvassery (part), Sreekandapuram (part), Malapattom, Irikkur, Mayyil (part), Chengalai (part), Naduvil (part), Kurumathur (part), Pariyaram (part), Chapparapadavu (part), Alacode (part), Kadannapalli-panapuzha (part), Erimam-Kuttoor, kankole-Alipadamba (part), Peringome-Vayakkara (part), Cherupuzha (part) and Udayagiri (part) panchayats

Physiography & drainage

Rolling laterite plains, laterite mesa, laterite mounds, isolated hills, flat bottomed valleys, flat-topped ridges, laterite benches, flood plains, low land terraces & narrow valleys. Laterite mesa over crystalline rocks is the most prominent feature. Valapattanam, Anjarakandi, Thalassery, Mahe, Kuppam, Peruvemba, Kariangote and Kavvayi are the major rivers.

Geology

Rock exposures belonging to granulitic terrain (south) and the granite terrain (north). Ultramafic and layered complexes belonging to the Sargur & Dharwar group is the transitional zone.

Climate

Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 26-27°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

Crops
Coconut, arecanut, rubber, cashew, vegetables, paddy, banana & pulses are raised. Dry deciduous forest plantations.

**Soils**

Plinthustults, Kandiustults, Ustorthents, Haplohumults & Paleustalfs in the lateric belt & Ustifluvents, Eutropepts, Aquepts in the flood plain valleys.

21. NORTHERN LOWER HILL RANGES

Extents over 51888 ha in Kunnothuparamba (part), Pattiom (part), Kolavade (part), Kanichar (part), Kelakom (part), Aralam (part), Ayyankunnu (part), Ulickal (part), Payyavoor (part), Eruvassery (part), Naduvil (part), Sreekandapuram (part), Chengalai (part), Chapparapadavu (part), Alacode (part), Udayagiri (part), Cherupuzha (part), Peringome-Vayakkara (part) and Erimam-Kuttoor (part) panchayats.

**Physiography & drainage**

Laterite mesa, stepped mesa, residual uplands, undulating terrain, narrow valleys & enclosed alluvial basin. Mahe, Thalassery, Anjarakandi, Valapattanam, Kuppam, Peruvemba and Karaingote are the major rivers.

**Geology**

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

**Climate**

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 25-26°C. Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Forest plantations & plantation crops, Coconut, tapioca, banana raised in gardenlands; paddy, banana in valley fills.

**Soils**
Palehumults, Kandiustults, Plinthustults, Haplustalfs, Humitropepts, Ustorthents, Fluvents & Aquen.

22. NORTHERN UPPER HILL RANGES

Extents over 23832 ha Pattiom (part), Kunnothuparamba (part), Kanichar (part), Kelakom (part), Kottiyoor (part), Aralam (part), Ayyankunnu (part), Payyavoor (part), Eruvassery (part), Naduvil (part), Alacode (part), Udayagiri (part) and Cherupuzha (part) panchayats.

Physiography & drainage.

Steep ridges, narrow valleys, rocky cliffs, rocky scrap, denudational hills, scrap slopes are the major land forms. Karaingote, Kuppam, Valapattanam, Anjarakandi, Thalassery and Mahe are the major rivers.

Geology

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

Climate

Annual rainfall ranges from 2500 to 3500 mm. The mean annual temperature ranges from 24-26°C. Ustic soil moisture regime. Isohyperthermic temperature regime.

Crops

Deciduous forest & forest plantations constitute the major portion. Rubber, pepper, coconut, arecanut, ginger and cashew raised.

Soils

Haplohumults, Haplustalfs, Humitropepts & Ustorthents.

23. NORTHERN STEEP MOUNTAIN RANGE

Extents over 10489 ha Kunnothuparamba (part), Pattiom (part), Kanichar (part), Kelakom (part), Kottiyoor (part), Ayyankunnu (part), Payyavoor (part), Eruvassery (part), Naduvil (part), Alacode (part)

Physiography & drainage
Mountainous terrain comprising of denudational slopes, denudational hills, hummocky terrain, rocky cliffs, highly undulating terrain, isolated hills, scrap slopes of mountains are prominent. Kuppam, Valapattanam, Anjarakandi, Mahe are the major rivers.

**Geology**

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

**Climate**

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 24-25°C. Udic soil moisture regime. Isohyperthermic temperature regime.

**Crops**

Wet evergreen forests & moist deciduous forest.

**Soils**

Troporthents, Humitropepts, Hapludolls & Kandihumults.

**KASARAGOD DISTRICT**

Kasargod, the northern most district of Kerala was formed in the year 1984 by bifurcating Hosdurg and Kasaragod taluks of former Kannur district. The name, Kasaragod, is said to be derived from the word Kusirakood meaning Kanjirakuttam. The district is bounded on the east by Karnataka state, west by Lakshadweep Sea, north by Canara district of Karnataka and on the south by Kannur district. It lies between 12°2' - 12°48' N latitude and 74°51' - 75°25' E longitude. Area 1961 sq.km.

The Major Land Resource Areas identified in the district in the western ghat tract is as follows

18. **NORTHERN COASTAL PLAIN**

Extents over 1961 ha in Valiyaparamba (part), Padanna (part) panchayats.

**Physiography & drainage**
Characterized by beach ridges, Paleo sands, sandflats, tidal mudflats, marshes, tidal estuaries, tidal creeks, lakes, coastal alluvial plains & low laterite cliffs. Kavvayi, Peruvemba, Kariangote, Nileswaram and Chittari are the major rivers.

**Geology**
Recent to sub recent quaternary deposits over tertiary sediments. The quaternary formations are separated from tertiary rocks by polymict pebble beds, black clays. Peat beds of both marine & fluvial environment underlay sand deposits. Bauxite & clay are the important minerals in the region.

**Climate**
Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 26-28°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**
Coconut is predominant. Tobacco cultivated in Kanhangad & Pallikara sandy belt. In wetlands, paddy, banana, vegetables are raised.

**Soils**
Ustipsamments, Quartzipsamments, Psammaquents, Fluvaquents.

19. **NORTHERN LOWER DISSECTED PIEDMONT PLAIN**
Extents over 9328 ha in Pilicode, Kayyur-Cheemeni (part), Kinanoor-Karindalam (part), Madikkai (part), Pullur-Periya,

**Physiography & drainage**
Rolling to undulating plains, laterite mounds, isolated hills, lateric mesa, flat-bottomed valleys, laterite benches, flood plains, fall face are the dominant land forms. Kavvayi, Kariangote, Nileswaram, Chittari and Chandragiri are the major rivers.

**Geology**
Laterite becomes more prominent with isolated hills of crystallines. Deep weathering of laterisation is a common feature. Bauxite is seen associated with
laterite cover. The unique Ezhimala complex lithologically consists of igneous bodies with a number of dykes cutting the country rock.

**Climate**

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 27-28°C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Coconut arecanut, pepper, cashew, paddy, banana & yams are raised.

**Soils**

Ustorthents, Ustifluvents, Plinthustults, Kandiustults dominate the laterite belt.

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**20. NORTHERN UPPER DISSECTED PIEDMONT PLAIN**

Extents over 56626 ha in Kayyur-Cheemeni (part), Kinanoor-Karindalam, Madikai (part), Kodom-Belur, Pullur-Periya (part), West-Eleri (part), East-Eleri (part), Balal(part), Kallar (part), Panathady (part) panchayats.

**Physiography & drainage**

Rolling laterite plains, laterite mesa, laterite mounds, isolated hills, flat bottomed valleys, flat-topped ridges, laterite benches, flood plains, low land terraces & narrow valleys. Laterite mesa over crystalline rocks is the most prominent feature. Chandragiri, Chittari, Nileswaram, Karingote and Kavvayi are the major rivers.

**Geology**

Rock exposures belonging to granulitic terrain (south) and the granite terrain (north). Ultramafic and layered complexes belonging to the Sargur & Dharwar group is the transitional zone.

**Climate**
Annual rainfall ranges from 3000 to 4000mm. The mean annual temperature ranges from 26-27º C. Ustic & aquic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Cocoanut, arecanut, rubber, cashew, vegetables, paddy, banana & pulses are raised. Dry deciduous forest plantations.

**Soils**

Plinthustults, Kandiustults, Ustorthents, Haplohumults & Paleустальfs in the lateric belt & Ustifluvents, Eutropepts, Aquepts in the flood plain valleys.

21. NORTHERN LOWER HILL RANGES

Extents over 9466 ha in East-Eleri, West-Eleri (part), Balal (part), Kallar, Panathady (part) panchayats.

**Physiography & drainage**

Laterite mesa, steped mesa, residual uplands, undulating terrain, narrow valleys & enclosed alluvial basin. Kariangote, Chandragiri are the major rivers.

**Geology**

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

**Climate**

Annual rainfall ranges from 3000 to 3500mm. The mean annual temperature ranges from 25-26º C. Ustic & udic soil moisture regimes. Isohyperthermic temperature regime.

**Crops**

Forest plantations & plantation crops, Coconut, tapioca, banana raised in gardenlands; paddy, banana in valley fills.

**Soils**

Palehumults, Kandiustults, Plinthustults, Haplustalfs, Humitropepts, Ustorthents, Flu vents & Aquents.
22. NORTHERN UPPER HILL RANGES

Extents over 1852 ha in Balal (part) and Panathady (part) panchayats.

Physiography & drainage

Steep ridges, narrow valleys, rocky cliffs, rocky scrub, denudational hills, scrub slopes are the major land forms. Karaiangote and Chandragiri are the major rivers.

Geology

Archaean gneiss and charnockites. Gneissic group mainly consists of biotite & biotite-hornblende gneiss.

Climate

Annual rainfall ranges from 2500 to 3500mm. The mean annual temperature ranges from 24-26°C. Ustic soil moisture regime. Isohyperthermic temperature regime.

Crops

Deciduous forest & forest plantations constitute the major portion. Rubber, pepper, coconut, arecanut, ginger and cashew cultivated.

Soils

Haplohumults, Haplustalfs, Humitropepts & Ustorthents.
4. Results and discussion

LAND UTILIZATION TYPES IN THE MAJOR LAND RESOURCE AREAS IN THE WESTERN GHATS OF KERALA

The land utilization types in under each major land resource area in each district is listed below (The MLRA unit is indicated by its number and name)

THIRUVANANTHAPURAM DISTRICT

1. SOUTHERN DISSECTED PEDI PLAIN

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.1.Cocoanut-tapioca/banana-pepper/pineapple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>4574 ha</td>
</tr>
</tbody>
</table>

1. Physiography

- Gently sloping to strongly sloping foot slopes in midlands. Gently sloping valleys. Colluvial deposits

2. Crops

2.1. Cropping pattern

- Coconut-tapioca/banana-pepper/pineapple

2.2. Crop suitability

- Coconut, banana, tapioca. Paddy in wetlands

3. Microclimate

- Isohyperthermic temperature regime, Ustic moisture regime.

4. Soils

4.1. Soil series

- Neyyatinkara, Marukil

4.2. Soil fertility

- Marukil low in fertility status. Low in nutrient holding capacity in Neyyatinkara series.

4.3. Drainage & permeability

- Neyyatinkara series is moderately well drained with slow permeability. Well drained with moderately rapid permeability. (Marukil).

4.4. Land capability classification

- IIIsw, IIle, IVe
<table>
<thead>
<tr>
<th>4.5. Land irrigability classification</th>
<th>3d, 3t, 4t</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6. Erosion hazard</td>
<td>Slight to moderate</td>
</tr>
<tr>
<td>4.7. Productivity potential</td>
<td>Medium</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>230±10 days</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>High</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>Medium to high</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.2. Paddy- vegetables-pulses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>771 ha</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. Physiography</th>
<th>Gently sloping to strongly sloping foot slopes in midlands with intermittent valleys.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Crops</td>
<td></td>
</tr>
<tr>
<td>2.1. Cropping pattern</td>
<td>Paddy-vegetables-pulses</td>
</tr>
<tr>
<td>2.2. Crop suitability</td>
<td>Paddy, vegetables, pulses, coconut, banana, tapioca</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime, Ustic moisture regime.</td>
</tr>
<tr>
<td>4. Soils</td>
<td></td>
</tr>
<tr>
<td>4.1. Soil series</td>
<td>Marukil, Neyyatinkara</td>
</tr>
<tr>
<td>4.2. Soil fertility</td>
<td>Marukil low in fertility status. Low in nutrient holding capacity in Neyyatinkara series.</td>
</tr>
<tr>
<td>4.3. Drainage &amp; permeability</td>
<td>Neyyatinkara series is moderately well drained with slow permeability. Well drained with moderately rapid permeability. (Marukil).</td>
</tr>
<tr>
<td>4.4. Land capability classification</td>
<td>IIIsw, Ille, IVe</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>4.5. Land irrigability classification</td>
<td>3d, 3t, 4t</td>
</tr>
<tr>
<td>4.6. Erosion hazard</td>
<td>Slight to moderate</td>
</tr>
<tr>
<td>4.7. Productivity potential</td>
<td>Medium</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>230±10 days</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>Irrigated</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>High</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>High</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.3. Coconut-tapioca-misc crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>1184 ha</td>
</tr>
</tbody>
</table>

1. Physiography
Gently sloping to strongly sloping foot slopes in midlands.

2. Crops
2.1. Cropping pattern
Coconut-tapioca-misc crops

2.2. Crop suitability
Coconut, banana, tapioca, rubber

3. Microclimate
Isohyperthermic temperature regime, Ustic moisture regime.

4. Soils
4.1. Soil series
Neyyatinkara

4.2. Soil fertility
Low in nutrient holding capacity in Neyyatinkara series

4.3. Drainage & permeability
Neyyatinkara series is moderately well drained with slow permeability

4.4. Land capability classification
Ille, IVe

4.5. Land irrigability classification
3t, 4t
<table>
<thead>
<tr>
<th>4.6. Erosion hazard</th>
<th>Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.7. Productivity potential</td>
<td>Medium</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>230±10 days</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>High</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>High</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

### 3. SOUTHERN LOWER DISSECTED PIEDMONT PLAIN

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.4. Coconut- rubber- Misc plantation crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>6757 ha</td>
</tr>
</tbody>
</table>

#### 1. Physiography
Gently sloping to strong sloping foot slopes in midlands. Moderately steep side slopes. Wetlands in valleys.

#### 2. Crops
- **2.1. Cropping pattern**: Coconut- rubber- Misc plantation crops
- **2.2. Crop suitability**: Coconut, rubber, tapioca, banana, Paddy, spices,

#### 3. Microclimate
Isohyperthermic temperature regime, Ustic moisture regime

#### 4. Soils
- **4.1. Soil series**: Trivandrum, Neyyatinkara, Vilappil, Marukil
- **4.2. Soil fertility**: Medium nitrogen, medium to high phosphorous and low to medium potassium (Trivandrum). Vilappil is poor in soil fertility as is Marukil series and Neyyatinkara series.
- **4.3. Drainage & permeability**: Well drained with moderate to moderately slow permeability.
<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.5. Coconut-Tapioca/Banana-Pepper/Pineapple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>3206 ha</td>
</tr>
<tr>
<td>1. Physiography</td>
<td>Gently sloping to strong sloping foot slopes in midlands. Wetlands in valleys.</td>
</tr>
<tr>
<td>2. Crops</td>
<td></td>
</tr>
<tr>
<td>2.1. Cropping pattern</td>
<td>Coconut-Tapioca/Banana-Pepper/Pineapple</td>
</tr>
<tr>
<td>2.2. Crop suitability</td>
<td>Coconut, tapioca, banana, paddy, spices, vegetables</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime, Ustic moisture regime</td>
</tr>
<tr>
<td>4. Soils</td>
<td></td>
</tr>
<tr>
<td>4.1. Soil series</td>
<td>Trivandrum, Neyyatinkara, Marukil</td>
</tr>
<tr>
<td>4.2. Soil fertility</td>
<td>Medium nitrogen, medium to high</td>
</tr>
<tr>
<td>4.3.Drainage &amp; permeability</td>
<td>Moderately well drained with slow permeability (Neyyatinkara). Well drained with moderately rapid permeability. (Marukil). Well drained with moderate to moderately slow permeability (Trivandrum)</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4.4.Land capability classification</td>
<td>Ille, IIIw, IIIse, IVse</td>
</tr>
<tr>
<td>4.5.Land irrigability classification</td>
<td>2st, 3d, 3t, 5st</td>
</tr>
<tr>
<td>4.6.Erosion hazard</td>
<td>Slight to Moderate</td>
</tr>
<tr>
<td>4.7.Productivity potential</td>
<td>Medium</td>
</tr>
<tr>
<td>5.Length of growing period</td>
<td>230±10 days</td>
</tr>
<tr>
<td>6.Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7.Market orientation and availability</td>
<td>High</td>
</tr>
<tr>
<td>8.Technical knowledge and availability</td>
<td>High</td>
</tr>
<tr>
<td>9.Size of land holdings</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.6. Paddy-vegetables-pulses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>696 ha</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.Physiography</th>
<th>Moderately sloping to moderately steep laterite mounds in midlands. Wetlands in valleys.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.Crops</td>
<td></td>
</tr>
<tr>
<td>2.1.Cropping pattern</td>
<td>Paddy-vegetables- pulses</td>
</tr>
<tr>
<td>2.2.Crop suitability</td>
<td>Paddy, spices, coconut, tapioca, banana</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime, Ustic moisture ergime</td>
</tr>
<tr>
<td>4.Soils</td>
<td></td>
</tr>
</tbody>
</table>
4.1. Soil series | Trivandrum, Marukil
--- | ---
4.2. Soil fertility | Medium nitrogen, medium to high phosphorous and low to medium potassium (Trivandrum). Poor in soil fertility in Marukil series.
4.3. Drainage & permeability | Well drained with moderate to moderately slow permeability (Trivandrum). Well drained with moderately rapid permeability (Marukil).
4.4. Land capability classification | IIIw, IIlse, IVse
4.5. Land irrigability classification | 3d, 3t, 5st
4.6. Erosion hazard | Slight to Moderate
4.7. Productivity potential | Medium
5. Length of growing period | 230+10 days
6. Irrigated/ rainfed | Irrigated
7. Market orientation and availability | High
8. Technical knowledge and availability | High
9. Size of land holdings | Small

### 4. SOUTHERN UPPER DISSECTED PIEDMONT PLAIN

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.7. Paddy-vegetables-rubber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>275 ha</td>
</tr>
</tbody>
</table>

1. Physiography | Strongly sloping hill slopes in miduplands with valleys |
2. Crops |
2.1. Cropping pattern | Paddy-vegetables-rubber |
2.2. Crop suitability | Paddy, coconut, tapioca, pepper, rubber, pineapple, banana, vegetables |
3. Microclimate

Isohyperthermic temperature regime, Ustic moisture regime

4. Soils

4.1. Soil series

Marukil, Nedumangad

4.2. Soil fertility

Marukil has low nutrient status. Nedumangad series has medium to high nitrogen and phosphorous and low potassium.

4.3. Drainage & permeability

Well drained with moderately rapid permeability. (Marukil). Well drained with moderate to moderately slow permeability (Nedumangad)

4.4. Land capability classification

IIId, IVse

4.5. Land irrigability classification

3d, 5st

4.6. Erosion hazard

Severe

4.7. Productivity potential

Medium

5. Length of growing period

240+10 days

6. Irrigated/ rainfed

Irrigated mainly

7. Market orientation and availability

High

8. Technical knowledge and availability

High

9. Size of land holdings

Marginal

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.8. Coconut-tapioca/banana-pepper/pineapple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>3110 ha</td>
</tr>
</tbody>
</table>

1. Physiography

Strongly sloping hill slopes in miduplands.

2. Crops

2.1. Cropping pattern

Coconut-tapioca/banana-pepper/pineapple
<table>
<thead>
<tr>
<th>2.2. Crop suitability</th>
<th>Coconut, tapioca, pepper, rubber, pineapple, banana</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime, Ustic moisture regime</td>
</tr>
<tr>
<td>4. Soils</td>
<td></td>
</tr>
<tr>
<td>4.1. Soil series</td>
<td>Nedumangad, Trivandrum</td>
</tr>
<tr>
<td>4.2. Soil fertility</td>
<td>In Trivandrum series, medium nitrogen, medium to high phosphorous and low to medium potassium. Medium to high nitrogen and phosphorous, low potassium in Nedumangad series.</td>
</tr>
<tr>
<td>4.3. Drainage &amp; permeability</td>
<td>Well drained with moderate to moderately slow permeability (Trivandrum), Well drained with moderate to moderately slow permeability (Nedumangad series)</td>
</tr>
<tr>
<td>4.4. Land capability classification</td>
<td>Illse, lVe</td>
</tr>
<tr>
<td>4.5. Land irrigability classification</td>
<td>2st, 3t, 5t</td>
</tr>
<tr>
<td>4.6. Erosion hazard</td>
<td>Severe</td>
</tr>
<tr>
<td>4.7. Productivity potential</td>
<td>Medium</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>240±10 days</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>High</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>High</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.9. Rubber-Tea-eucalyptus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>67 ha</td>
</tr>
<tr>
<td>1. Physiography</td>
<td>Steep foot hill slopes in miduplands</td>
</tr>
<tr>
<td>2.Crops</td>
<td></td>
</tr>
<tr>
<td>2.1.Cropping pattern</td>
<td>Rubber-tea-eucalyptus</td>
</tr>
<tr>
<td>2.2.Crop suitability</td>
<td>Plantation crops</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime, Ustic moisture regime.</td>
</tr>
<tr>
<td>4. Soils</td>
<td></td>
</tr>
<tr>
<td>4.1.Soil series</td>
<td>Kallar</td>
</tr>
<tr>
<td>4.2.Soil fertility</td>
<td>Medium to high nitrogen and phosphorus and low potassium.</td>
</tr>
<tr>
<td>4.3.Drainage &amp; permeability</td>
<td>Moderately well drained with moderately slow permeability</td>
</tr>
<tr>
<td>4.4.Land capability classification</td>
<td>VIe</td>
</tr>
<tr>
<td>4.5.Land irrigability classification</td>
<td>6t</td>
</tr>
<tr>
<td>4.6.Erosion hazard</td>
<td>Severe</td>
</tr>
<tr>
<td>4.7.Productivity potential</td>
<td>High</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>280+10 days</td>
</tr>
<tr>
<td>6.Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>High</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>High</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

| Name of LUT | 1.10 Rubber-pepper- Misc crops |
| Extent | 35140 ha |
| 1.Physiography | Strongly sloping to steep slopes of miduplands. Steep foot hill slopes |
| 2.Crops |  
| 2.1.Cropping pattern | Rubber-pepper-Misc crops |
2.2. Crop suitability | Coconut, rubber, tapioca, pepper
---|---
4. Soils |
4.1. Soil series | Kallar, Nedumangad, Vilappil, Neyyatinkara, Trivandrum
4.2. Soil fertility | In Kallar series, medium to high nitrogen and phosphorous and low potassium. Low nutrient status in Marukil series.
4.3. Drainage & permeability | Moderately well drained with slow permeability (Neyyatinkara). Well drained with moderate to moderately slow permeability in Nedumangad series. Moderately well drained with moderately slow permeability in Kallar series.
4.4. Land capability classification | IVe, VIIe
4.5. Land irrigability classification | 5t, 6t
4.6. Erosion hazard | Severe
5. Length of growing period | 280+10 days
6. Irrigated/ rainfed | Rainfed
7. Market orientation and availability | Medium
8. Technical knowledge and availability | High
9. Size of land holdings | Marginal to medium

**5. SOUTHERN LOWER HILL RANGES**

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.11. Rubber-coconut-misc crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>24857 ha</td>
</tr>
<tr>
<td>1. Physiography</td>
<td>Strongly sloping to steep slopes of hills in miduplands.</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>2. Crops</td>
<td>Rubber-coconut-Misc crops</td>
</tr>
<tr>
<td>2.1. Cropping pattern</td>
<td>Rubber, coconut, tapioca, pepper, Forest</td>
</tr>
<tr>
<td>2.2. Crop suitability</td>
<td>Isohyperthermic temperature regime, Ustic moisture regime</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Kallar, Nedumangad, Vilappil</td>
</tr>
<tr>
<td>4. Soils</td>
<td>Well drained with moderate to moderately slow permeability (Nedumangad), Moderately well drained with moderately slow permeability (Kallar). Excessively drained (Vilappil)</td>
</tr>
<tr>
<td>4.1. Soil series</td>
<td>Nedumangad and Kallar series has medium to high nitrogen and phosphorous, low potassium. Poor in soil fertility (Vilappil series)</td>
</tr>
<tr>
<td>4.2. Soil fertility</td>
<td>IVe, VIe, Vile</td>
</tr>
<tr>
<td>4.3. Drainage &amp; permeability</td>
<td>3t, 5t, 4t, 6t</td>
</tr>
<tr>
<td>4.4. Land capability classification</td>
<td>Severe</td>
</tr>
<tr>
<td>4.5. Land irrigability classification</td>
<td>Medium to high</td>
</tr>
<tr>
<td>4.6. Erosion hazard</td>
<td>280+10 days (Kallar)</td>
</tr>
<tr>
<td>4.7. Productivity potential</td>
<td>High</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>Marginal to medium</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>1.12. Rubber-Tea-Eucalyptus</td>
</tr>
<tr>
<td>Extent</td>
<td>4827 ha</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>1. Physiography</td>
<td>Strongly sloping to steep slopes of hills in miduplands</td>
</tr>
<tr>
<td>2. Crops</td>
<td></td>
</tr>
<tr>
<td>2.1. Cropping pattern</td>
<td>Rubber-Tea-Eucalyptus</td>
</tr>
<tr>
<td>2.2. Crop suitability</td>
<td>Rubber, coconut, tapioca, pepper, Forest</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime, Ustic moisture regime</td>
</tr>
<tr>
<td>4. Soils</td>
<td></td>
</tr>
<tr>
<td>4.1. Soil series</td>
<td>Kallar, Nedumangad</td>
</tr>
<tr>
<td>4.2. Soil fertility</td>
<td>Nedumangad and Kallar series has medium to high nitrogen and phosphorous, low potassium.</td>
</tr>
<tr>
<td>4.3. Drainage &amp; permeability</td>
<td>Well drained with moderate to moderately slow permeability (Nedumangad), Moderately well drained with moderately slow permeability (Kallar)</td>
</tr>
<tr>
<td>4.4. Land capability classification</td>
<td>IVe, VIIe, VIIIe</td>
</tr>
<tr>
<td>4.5. Land irrigability classification</td>
<td>3t, 5t, 6t</td>
</tr>
<tr>
<td>4.6. Erosion hazard</td>
<td>Severe</td>
</tr>
<tr>
<td>4.7. Productivity potential</td>
<td>High</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>280+10 days (Kallar)</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>High</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>High</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal to small</td>
</tr>
</tbody>
</table>
### 6. SOUTHERN UPPER HILL RANGES

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.13. Rubber-pepper-tea</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Extent</strong></td>
<td>5586 ha</td>
</tr>
<tr>
<td><strong>Physiography</strong></td>
<td>Moderately steep to very steep side slopes of miduplands to uplands</td>
</tr>
<tr>
<td><strong>Crops</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2.1. Cropping pattern</strong></td>
<td>Rubber-pepper-tea</td>
</tr>
<tr>
<td><strong>2.2. Crop suitability</strong></td>
<td>Rubber, Plantation crops</td>
</tr>
<tr>
<td><strong>Microclimate</strong></td>
<td>Isohyperthermic temperature regime. Ustic moisture regime</td>
</tr>
<tr>
<td><strong>Soils</strong></td>
<td></td>
</tr>
<tr>
<td><strong>4.1. Soil series</strong></td>
<td>Kallar, Kottur, Vilappil</td>
</tr>
<tr>
<td><strong>4.2. Soil fertility</strong></td>
<td>Medium to high nitrogen and phosphorous, low potassium in Kallar series. Soils are low in organic matter and poor in soil fertility in Vilappil series. High humus content and highly fertility in Kottur series.</td>
</tr>
<tr>
<td><strong>4.3. Drainage &amp; permeability</strong></td>
<td>Moderately well drained with moderately slow/rapid permeability (Kallar, Kottur). Excessively drained (Vilappil)</td>
</tr>
<tr>
<td><strong>4.4. Land capability classification</strong></td>
<td>VIIe, VIIIe</td>
</tr>
<tr>
<td><strong>4.5. Land irrigability classification</strong></td>
<td>6t</td>
</tr>
<tr>
<td><strong>4.6. Erosion hazard</strong></td>
<td>Severe</td>
</tr>
<tr>
<td><strong>4.7. Productivity potential</strong></td>
<td>Medium to High</td>
</tr>
<tr>
<td><strong>Length of growing period</strong></td>
<td>280±10 days</td>
</tr>
<tr>
<td><strong>Irrigated/ rainfed</strong></td>
<td>Rainfed</td>
</tr>
<tr>
<td><strong>Market orientation and availability</strong></td>
<td>High</td>
</tr>
<tr>
<td><strong>Technical knowledge and</strong></td>
<td>High</td>
</tr>
<tr>
<td>availability</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.14. Rubber-tea-eucalyptus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>21840 ha</td>
</tr>
</tbody>
</table>

1. **Physiography**
   - Steep side slopes and very very steep slopes miduplands to uplands

2. **Crops**
   2.1. **Cropping pattern**
      - Rubber, tea, eucalyptus, forest
   2.2. **Crop suitability**
      - Forest, Plantation crops, Grassland, Tea

3. **Microclimate**
   - Isohyperthermic temperature regime. Ustic moisture regime

4. **Soils**
   4.1. **Soil series**
      - Kottur, Kallar
   4.2. **Soil fertility**
      - In Kallar series medium to high nitrogen, medium to high phosphorous and low potassium. Kottur series has high nitrogen and low potassium.
   4.3. **Drainage & permeability**
      - Moderately well drained with moderately slow permeability (Kallar). Moderately well drained with moderately rapid permeability (Kottur)
   4.4. **Land capability classification**
      - VIIe
   4.5. **Land irrigability classification**
      - 6t
   4.6. **Erosion hazard**
      - Severe
   4.7. **Productivity potential**
      - High

5. **Length of growing period**
   - 280+10 days

6. **Irrigated/ rainfed**
   - Rainfed
<table>
<thead>
<tr>
<th>7. Market orientation and availability</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Technical knowledge and availability</td>
<td>High</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>Marginal to small</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.15. Forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>16320 ha</td>
</tr>
</tbody>
</table>

<p>| 1. Physiography                  | Steep side slopes of very very steep uplands. |
| 2. Crops                         |                                                |
| 2.1. Cropping pattern            | Forest                                            |
| 2.2. Crop suitability            | Forest, Plantation crops, Grassland, Tea         |
| 3. Microclimate                  | Isohyperthermic temperature regime. Ustic moisture regime |
| 4. Soils                         |                                                |
| 4.1. Soil series                 | Ponmudi, Kottur, Kallar                         |
| 4.2. Soil fertility              | In Kallar series medium to high nitrogen, medium to high phosphorous and low potassium. Nitrogen medium to high, phosphorous medium to high and potassium low in Ponmudi series. Kottur series has high nitrogen and low potassium. |
| 4.3. Drainage &amp; permeability     | Moderately well drained with moderately slow permeability (Kallar). Well drained with moderately slow permeability in Ponmudi series. Moderately well drained with moderately rapid permeability (Kottur) |
| 4.4. Land capability classification | VIIe, VIIIe |
| 4.5. Land irrigability classification | 6t        |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6. Erosion hazard</td>
<td>Severe</td>
</tr>
<tr>
<td>4.7. Productivity potential</td>
<td>High</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>270+10 days</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>-</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>-</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>-</td>
</tr>
</tbody>
</table>

### 7. SOUTHERN STEEP MOUNTAIN RANGES

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.16. Forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>10649 ha</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. Physiography</th>
<th>Summits and very very steep side slopes in uplands and highlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Crops</td>
<td></td>
</tr>
<tr>
<td>2.1. Cropping pattern</td>
<td>Forest</td>
</tr>
<tr>
<td>2.2. Crop suitability</td>
<td>Grassland, tea, forest</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime. Ustic moisture regime</td>
</tr>
<tr>
<td>4. Soils</td>
<td></td>
</tr>
<tr>
<td>4.1. Soil series</td>
<td>Ponmudi, Kottur</td>
</tr>
<tr>
<td>4.2. Soil fertility</td>
<td>Nitrogen medium to high, phosphorous medium to high and potassium low (Ponmudi series). Kottur series has high nitrogen and low potassium.</td>
</tr>
<tr>
<td>4.3. Drainage &amp; permeability</td>
<td>Well drained with moderately slow permeability (Ponmudi). Moderately well drained with moderately rapid permeability (Kottur)</td>
</tr>
<tr>
<td>4.4. Land capability classification</td>
<td>Vile, Ville</td>
</tr>
<tr>
<td>4.5. Land irrigability classification</td>
<td>6t</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>4.6. Erosion hazard</td>
<td>Severe</td>
</tr>
<tr>
<td>4.7. Productivity potential</td>
<td>High</td>
</tr>
<tr>
<td>5. Length of growing period</td>
<td>270+10 days</td>
</tr>
<tr>
<td>6. Irrigated/ rainfed</td>
<td>Rainfed</td>
</tr>
<tr>
<td>7. Market orientation and availability</td>
<td>-</td>
</tr>
<tr>
<td>8. Technical knowledge and availability</td>
<td>-</td>
</tr>
<tr>
<td>9. Size of land holdings</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of LUT</th>
<th>1.17. Tea-Grassland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>519 ha</td>
</tr>
<tr>
<td>1. Physiography</td>
<td>Summits of very very steep uplands to highlands</td>
</tr>
<tr>
<td>2. Crops</td>
<td>Tea-grassland</td>
</tr>
<tr>
<td>2.1. Cropping pattern</td>
<td>Tea-grassland</td>
</tr>
<tr>
<td>2.2. Crop suitability</td>
<td>Grassland, tea, forest</td>
</tr>
<tr>
<td>3. Microclimate</td>
<td>Isohyperthermic temperature regime. Ustic moisture regime</td>
</tr>
<tr>
<td>4. Soils</td>
<td>Ponmudi</td>
</tr>
<tr>
<td>4.1. Soil series</td>
<td>Ponmudi</td>
</tr>
<tr>
<td>4.2. Soil fertility</td>
<td>Nitrogen medium to high, phosphorous medium to high and potassium low.</td>
</tr>
<tr>
<td>4.3. Drainage &amp; permeability</td>
<td>Moderately well drained with moderately slow permeability (Ponmudi).</td>
</tr>
<tr>
<td>4.4. Land capability classification</td>
<td>VIIe, VIIe</td>
</tr>
<tr>
<td>4.5. Land irrigability classification</td>
<td>6t</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>4.6. Erosion hazard</strong></td>
<td>Severe</td>
</tr>
<tr>
<td><strong>4.7. Productivity potential</strong></td>
<td>High</td>
</tr>
<tr>
<td><strong>5. Length of growing period</strong></td>
<td>270±10 days</td>
</tr>
<tr>
<td><strong>6. Irrigated/ rainfed</strong></td>
<td>Rainfed</td>
</tr>
<tr>
<td><strong>7. Market orientation and availability</strong></td>
<td>Low</td>
</tr>
<tr>
<td><strong>8. Technical knowledge and availability</strong></td>
<td>High</td>
</tr>
<tr>
<td><strong>9. Size of land holdings</strong></td>
<td>Medium</td>
</tr>
</tbody>
</table>

**LAND UTILIZATION TYPES DEMARCATED IN MLRA ZONES IN EACH DISTRICT**

**Thiruvananthapuram district**

**SOUTHERN DISSECTED PEDI PLAIN**

1.1. Coconut-tapioca/banana-pepper/pineapple (4574 ha); Rainfed; High market orientation; Medium to high technical knowledge

1.2. Paddy-vegetables-pulses (771 ha); Irrigated; High market orientation; High technical knowledge

1.3. Coconut-tapioca-misc crops (1184 ha); Rainfed; High market orientation; High technical knowledge

**SOUTHERN LOWER DISSECTED PIEDMONT PLAIN**

1.4. Coconut-rubber-Misc plantation crops (6757 ha); Rainfed; High market orientation; High technical knowledge

1.5. Coconut-Tapioca/Banana-Pepper/Pineapple (3206 ha); Rainfed; High market orientation; High technical knowledge

1.6. Paddy-vegetables-pulses (696 ha); Irrigated; High market orientation; High technical knowledge
SOUTHERN UPPER DISSECTED PIEDMONT PLAIN
1.7. Paddy-vegetables-rubber (275 ha); Irrigated; High market orientation; High technical knowledge
1.8. Coconut-tapioca/banana-pepper/pineapple (3110 ha); Rainfed; High market orientation; High technical knowledge
1.9. Rubber-Tea-eucalyptus (67 ha); Rainfed; High market orientation; High technical knowledge
1.10 Rubber-pepper- Misc crops (35140 ha); Rainfed; Medium market orientation; High technical knowledge

SOUTHERN LOWER HILL RANGES
1.11. Rubber-coconut-misc crops (24857 ha); Rainfed; Low to Medium market orientation; High technical knowledge
1.12. Rubber-Tea-Eucalyptus (4827 ha); Rainfed; High market orientation; High technical knowledge

SOUTHERN UPPER HILL RANGES
1.13. Rubber-pepper-tea (5586 ha); Rainfed; High market orientation; High technical knowledge
1.14. Rubber-tea-eucalyptus (21840 ha); Rainfed; Medium market orientation; High technical knowledge
1.15. Forest (16320 ha); Rainfed

SOUTHERN STEEP MOUNTAIN RANGES
1.16. Forest (10649 ha); Rainfed
1.17. Tea-Grassland (519 ha); Rainfed; Low market orientation; High technical knowledge
Kollam district

SOUTHERN LOWER DISSECTED PIEDMONT PLAIN
2.1. Coconut-banana-paddy (3909 ha); Rainfed; High market orientation; High technical knowledge
2.2. Coconut-pepper-paddy (1343 ha); Rainfed; High market orientation; Medium technical knowledge

SOUTHERN UPPER DISSECTED PIEDMONT PLAIN
2.3. Rubber-Coconut-Tapioca /Paddy (21218 ha); Rainfed; High market orientation; High technical knowledge
2.4. Coconut-rubber-banana (4519 ha); Rainfed; High market orientation; Medium technical knowledge
2.5. Rubber-tapioca-pepper (27987 ha); Medium market orientation; High technical knowledge
2.6. Rubber-oil palm-tapioca (3700 ha); Rainfed; High market orientation; High technical knowledge

SOUTHERN LOWER HILL RANGES
2.7. Rubber-oil palm- forest (14700 ha); Rainfed; Low market orientation; High technical knowledge
2.8. Rubber-Tapioca-Pepper (28657 ha); Rainfed; Medium market orientation; High technical knowledge
2.9. Forest-rubber-oil palm (40753 ha); Rainfed

SOUTHERN UPPER HILL RANGES
2.10. Forest- rubber-pepper (25307 ha); Rainfed

SOUTHERN STEEP MOUNTAIN RANGES
2.11. Forest (14220 ha); Rainfed
Pathanamthitta district

SOUTHERN LOWER DISSECTED PIEDMONT PLAIN
3.1. Paddy-banana-tapioca (858 ha); Irrigated; High market orientation; High technical knowledge
3.2. Coconut-Banana-Tapioca (510 ha); Rainfed; High market orientation; High technical knowledge

SOUTHERN UPPER DISSECTED PIEDMONT PLAIN
3.3. Coconut-pepper-banana (5209 ha); Rainfed; High market orientation; High technical knowledge
3.4. Rubber-coconut-pepper (2684 ha); Rainfed; High market orientation; High technical knowledge
3.5. Paddy-banana-tapioca (10160 ha); Irrigated; High market orientation; High technical knowledge
3.6. Coconut-banana-tapioca (3686 ha); Rainfed; Medium market orientation; Medium technical knowledge
3.7. Rubber-coconut-pineapple (100 ha); Irrigated; High market orientation; High technical knowledge
3.8. Rubber-pepper-pineapple (546 ha); Rainfed; High market orientation; High technical knowledge
3.9. Rubber (122 ha); Rainfed; High market orientation; High technical knowledge
3.10. Rubber-coconut-tapioca (22147 ha); Rainfed; High market orientation; High technical knowledge

SOUTHERN LOWER HILL RANGES
3.11. Rubber (21058 ha); Rainfed; High market orientation; High technical knowledge
3.12. Rubber-coconut-tapioca/ pepper (30113 ha); Rainfed; Low market orientation; High technical knowledge
3.13. Rubber-pepper-pineapple (3699 ha); Rainfed; High market orientation; High technical knowledge
3.14. Rubber-pineapple (8477 ha); Rainfed; High market orientation; High technical knowledge
3.15. Coconut-pepper-banana (1564 ha); Rainfed; Medium market orientation; Medium technical knowledge

**SOUTHERN UPPER HILL RANGES**
3.16. Rubber-coconut-pepper/ tapioca (15236 ha); Rainfed; Low market orientation; High technical knowledge
3.17. Rubber-forest (2053 ha); Rainfed; Low market orientation; High technical knowledge
3.18. Forest-rubber (36659 ha); Rainfed

**SOUTHERN STEEP MOUNTAIN RANGES**
3.19. Forest (46044 ha); Rainfed

**25. HIGH MOUNTAIN PLATEAU**
3.20. Forest (12603 ha); Rainfed

**Kottayam district**

**SOUTHERN LOWER DISSECTED PIEDMONT PLAIN**
4.1. Coconut- banana-paddy (3041 ha); Rainfed; High market orientation; Medium to high technical knowledge

**SOUTHERN LOWER HILL RANGES**
4.2. Rubber-coconut-pepper (18873 ha); Rainfed; Medium market orientation; Medium technical knowledge
4.3. Rubber-tapioca- coconut (4130 ha); Rainfed; High market orientation; High technical knowledge
4.4. Rubber-coconut-arecanut (307 ha); Rainfed; High market orientation; High technical knowledge

SOUTHERN UPPER DISSECTED PIEDMONT PLAIN
4.5. Rubber-arecanut/coconut (26561 ha); Rainfed; Medium market orientation; High technical knowledge
4.6. Rubber-coconut-pepper (26516 ha); Rainfed; Low to Medium market orientation; High technical knowledge
4.7. Rubber-coconut-arecanut/ yams (6197 ha); Rainfed; High market orientation; High technical knowledge

SOUTHERN UPPER HILL RANGES
4.8. Pepper- rubber -coconut (3512 ha); Rainfed; Medium market orientation; Medium technical knowledge
4.9. Rubber-coconut-pepper (7960 ha); Rainfed; Low market orientation; Medium technical knowledge

SOUTHERN STEEP MOUNTAIN RANGES
4.10. Forest-rubber-tea/coconut (3141 ha); Rainfed; Low market orientation; Medium technical knowledge
4.11. Rubber/Tea-forest-grassland (1483 ha); Rainfed; Low market orientation; High technical knowledge

Ernakulam district
CENTRAL LOWER DISSECTED PIEDMONT PLAIN
5.1. Rubber-coconut-banana/paddy (12605 ha); Rainfed; Medium to high market orientation; High technical knowledge
5.2. Coconut-banana-paddy (4268 ha); Rainfed; High market orientation; High technical knowledge
5.3. Coconut-paddy-vegetables (1645 ha); Rainfed; High market orientation; High technical knowledge
5.4. Rubber-coconut-nutmeg/ arecanut (551 ha); Irrigated; High market orientation; High technical knowledge
5.5. Paddy-coconut-rubber (462 ha); Irrigated; High market orientation; High technical knowledge

CENTRAL UPPER DISSECTED PIEDMONT PLAIN
5.6. Rubber-coconut-Paddy/banana (43076 ha); Rainfed; Medium market orientation; High technical knowledge
5.7. Coconut-rubber- banana/ paddy (838 ha); Rainfed; High market orientation; High technical knowledge
5.8. Rubber-coconut-nutmeg/ arecanut /pepper (7509 ha); Rainfed; High market orientation; High technical knowledge
5.9. Rubber-paddy (4743 ha); Rainfed; High market orientation; High technical knowledge
5.10. Rubber-pineapple-banana /coconut (12672 ha); Rainfed; Medium market orientation; High technical knowledge
5.11. Coconut-paddy/vegetables (4659 ha); Rainfed; High market orientation; High technical knowledge
5.12. Coconut-mixed crops-paddy (5010 ha); Rainfed; Medium market orientation; Medium technical knowledge
5.13. Rubber- nutmeg- arecanut (2864 ha); Rainfed; High market orientation; High technical knowledge

CENTRAL LOWER HILL RANGES
5.14. Rubber/forest-banana-arecanut (29480 ha); Rainfed; Low market orientation; Medium technical knowledge
5.15. Rubber-coconut-paddy (3810 ha); Rainfed; High market orientation; High technical knowledge
CENTRAL UPPER HILL RANGES
5.16. Forest/Rubber-banana-arecanut (16729 ha); Rainfed; Medium market orientation; High technical knowledge

CENTRAL STEEP MOUNTAIN RANGES
5.17. Forest-rubber (12825 ha); Rainfed; Low market orientation; Low technical knowledge

HIGH MOUNTAIN PLATEAU
5.18. Forest (5692 ha); Rainfed

Idukki district

SOUTHERN LOWER DISSECTED PIEDMONT PLAIN
6.1. Coconut -paddy-banana (32535 ha); Rainfed; Medium market orientation; Low technical knowledge

SOUTHERN LOWER HILL RANGES
6.2. Coconut-rubber-paddy/banana (28525 ha); Rainfed; Medium market orientation; Medium to high technical knowledge
6.3. Coconut-Rubber (234 ha); Irrigated; High market orientation; High technical knowledge

SOUTHERN UPPER HILL RANGES
6.4. Forest-coconut (4670 ha); Rainfed
6.5. Cardamom-Forest/Pepper (2831 ha); Rainfed; High market orientation; High technical knowledge
6.6. Forest (684 ha); Rainfed
6.7. Rubber-pepper-coffee (3258 ha); Rainfed; Medium market orientation; High technical knowledge
6.8. Tea- cardamom-pepper (212 ha); Rainfed; High market orientation; High technical knowledge

SOUTHERN STEEP MOUNTAIN RANGES
6.9. Rubber-Pepper-Coconut/ Coffee (7512 ha); Rainfed; Low market orientation; High technical knowledge
6.10. Tea- Cardamom-Coconut/Pepper (9501 ha); Rainfed; Medium market orientation; High technical knowledge
6.11. Tea -Pepper-Coffee/ Forest (151107 ha); Rainfed; Low market orientation; Low technical knowledge
6.12. Pepper-cardamom-coconut/ paddy/ rubber/ coffee (21037 ha); Rainfed; Low market orientation; Low technical knowledge
6.13. Forest (58758 ha); Rainfed

CENTRAL UPPER HILL RANGES
6.14. Pepper- coconut-paddy (76 ha); Irrigated; Medium market orientation; Medium technical knowledge
6.15. Rubber- coconut-paddy (409 ha); Rainfed; Low market orientation; Low technical knowledge
6.16. Pepper-Cardamom- Coconut/ rubber (9307 ha); Rainfed; Low market orientation; Medium technical knowledge
6.17. Forest (519 ha); Rainfed

CENTRAL STEEP MOUNTAIN RANGES
6.18. Fruits-vegetables (7887 ha); Rainfed; Low market orientation; Medium technical knowledge
6.19. Tea- Cardamom-Pepper (4093 ha); Rainfed; Medium market orientation; High technical knowledge
6.20. Sugarcane - forest- vegetables (3850 ha); Irrigated; Medium market orientation; High technical knowledge
6.21. Forest (1609 ha);

HIGH MOUNTAIN PLATEAU
6.22. Forest (58781 ha);
6.23. Tea- Pepper- Cardamom/Coffee (1694 ha); Irrigated (Tea) rainfed (other crops); Low market orientation; High technical knowledge
6.24. Tea- Cardamom- Pepper (5640 ha); Rainfed; Medium market orientation; High technical knowledge

MARAYUR RAINSHADOW REGION
6.25. Fruits-vegetables (5984 ha); Irrigated; Medium to High market orientation; Medium technical knowledge
6.26. Sugarcane-paddy-vegetables (3146 ha); Irrigated; High market orientation; High technical knowledge
6.27. Sugarcane- fruits-forest (4453 ha); Irrigated; High market orientation; High technical knowledge

Thrissur district
CENTRAL COASTAL PLAIN
7.1. Coconut-banana (2897 ha); Rainfed; High Market orientation; High Technical knowledge
7.2. Paddy- coconut (1155 ha); Irrigated; High Market orientation; High Technical knowledge
7.3. Coconut/Arecanut-pepper-banana (699 ha); Irrigated; High Market orientation; High Technical knowledge
7.4. Paddy puncha (227 ha); Irrigated; High Market orientation; High Technical knowledge
CENTRAL LOWER DISSECTED PIEDMONT PLAIN
7.5. Coconut/Arecanut- pepper-banana (19166 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
7.6. Coconut-Paddy (1676 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
7.7. Coconut-banana-paddy (5017 ha); Rainfed; Low Market orientation; Medium Technical knowledge
7.8. Coconut-nutmeg-arecanut (9650 ha); Rainfed; Medium Market orientation; Medium Technical knowledge

CENTRAL UPPER DISSECTED PIEDMONT PLAIN
7.9. Coconut-nutmeg-arecanut (11684 ha); Rainfed; Low Market orientation; Medium Technical knowledge
7.10. Rubber-other plantation crops (9507 ha); Rainfed; High Market orientation; High Technical knowledge
7.11. Forest- fruit trees (4022 ha); Rainfed
7.12. Coconut/arecanut- pepper- Banana (7700 ha); Rainfed; Medium Market orientation; Medium Technical knowledge

CENTRAL LOWER HILL RANGES
7.13. Rubber-other plantations (2823 ha); Rainfed; Medium Market orientation; High Technical knowledge
7.14. Forest- misc tree crops (28056 ha); Rainfed

CENTRAL UPPER HILL RANGES
7.15. Forest (22525 ha); Rainfed
7.16. Rubber- other plantations (572 ha); Rainfed

Palakkad district
CENTRAL LOWER DISSECTED PIEDMONT PLAIN
8.1. Paddy, Coconut, Banana/ Areca nut/Rubber (16732 ha); Rainfed; High Market orientation; High Technical knowledge
8.2. Paddy- Banana- Coconut (2125 ha); Rainfed; High Market orientation; High Technical knowledge
8.3. Coconut- Paddy- Areca nut (1586 ha); Rainfed; High Market orientation; High Technical knowledge

CENTRAL LOWER HILL RANGES
8.4. Paddy, Banana, Rubber/ Coconut (14640 ha); Rainfed; Low Market orientation; Medium Technical knowledge
8.5. Rubber- Coconut- Areca nut/ Banana (3613 ha); Rainfed; High Market orientation; High Technical knowledge
8.6. Forest (23896 ha);

CENTRAL UPPER HILL RANGES
8.7. Forest (63696 ha);
8.8. Tea-Coffee-Cardamom (24969 ha); Irrigated; Low Market orientation; Low Technical knowledge

PALANKAD GAP
8.9. Paddy-Coconut- Banana/ Vegetable/ Rubber/ Mango (37701 ha); Irrigated; High Market orientation; High Technical knowledge
8.10. Paddy- Banana/Vegetable, Coconut (23031 ha); Rainfed; High Market orientation; High Technical knowledge
8.11. Coconut-Mango-Paddy (7340 ha); Rainfed; High Market orientation; High Technical knowledge
8.12. Coconut-Vegetable/Banana, Paddy (12354 ha); Rainfed; Low Market orientation; Medium Technical knowledge

Palakkad plain
8.13. Coconut-Arecanut- Banana (4389 ha); Rainfed; Low Market orientation; Low Technical knowledge
8.14. Coconut-Paddy-Arecanut/ Banana (5725 ha); Rainfed; High Market orientation; High Technical knowledge
8.15. Banana, Coconut/Paddy, Pepper (6174 ha); Rainfed; High Market orientation; High Technical knowledge
8.16. Paddy- Banana-Coconut/ Rubber/ Arecanut/ Tapioca (26232 ha); Rainfed; High Market orientation; High Technical knowledge
8.17. Paddy- Rubber- Coconut/ Arecanut (9058 ha); Rainfed; High Market orientation; High Technical knowledge
8.18. Paddy, Coconut, Arecanut/ Banana/ Rubber (30376 ha); Rainfed; High Market orientation; High Technical knowledge
8.19. Paddy, Coconut, Arecanut/ Banana/ Rubber (17695 ha); Rainfed; High Market orientation; High Technical knowledge
8.20. Rubber, Paddy/Banana, Coconut (8180 ha); Rainfed; High Market orientation; High Technical knowledge
8.21. Rubber, Coconut, Arecanut/ Banana (10087 ha); Rainfed; High Market orientation; High Technical knowledge

CENTRAL STEEP MOUNTAIN RANGES
8.22. Forest (22149ha);

Malappuram district

NORTHERN LOWER DISSECTED PIEDMONT PLAIN
9.1. Coconut- cashew (2206 ha); Rainfed; High Market orientation; High Technical knowledge
9.2. Paddy-Tapioca-Banana (516 ha); Irrigated; High Market orientation; High Technical knowledge
9.3. Coconut-Arecanut-Cashew/Betel vine (2374 ha); Rainfed; High Market orientation; High Technical knowledge
NORTHERN UPPER DISSECTED PIEDMONT PLAIN
9.4. Coconut - Arecaanut - Fruit trees (34331 ha); Rainfed; High Market orientation; High Technical knowledge
9.5. Coconut-cashew (17243 ha); Rainfed; High Market orientation; High Technical knowledge
9.6. Arecaanut-Banana-Paddy (6141 ha); Rainfed; High Market orientation; High Technical knowledge
9.7. Coconut - rubber - fruit trees (36278 ha); Rainfed; High Market orientation; High Technical knowledge
9.8. Rubber-tapioca (40053 ha); Rainfed; High Market orientation; High Technical knowledge
9.9. Rubber-coconut-fruit trees (49925 ha); Rainfed; High Market orientation; High Technical knowledge
9.10. Forest-Rubber (2496 ha);

NORTHERN LOWER HILL RANGES
9.11. Rubber (7474 ha); Rainfed; High Market orientation; High Technical knowledge
9.12. Forest (11620 ha); Rainfed; High Market orientation; High Technical knowledge

NORTHERN UPPER HILL RANGES
9.13. Cashew- Forest (17460 ha); Rainfed; Low Market orientation; High Technical knowledge
9.14. Rubber- cashew (1825 ha); Rainfed; High Market orientation; High Technical knowledge

NORTHERN STEEP MOUNTAIN RANGE
9.15. Rubber-forest (160 ha); Rainfed; High Market orientation; High Technical knowledge
9.16. Forest (25798 ha);

HIGH MOUNTAIN PLATEAU
9.17. Forest (18920 ha);

KOZHIKODE DISTRICT
NORTHERN COASTAL PLAIN
10.1. Arecanut-coconut-paddy (237 ha); Rainfed; High Market orientation; Medium Technical knowledge
10.2. Coconut-cashew-rubber (1626 ha); Rainfed; High Market orientation; Medium Technical knowledge
10.3. Coconut-arecanut-banana (10187 ha); Rainfed; High Market orientation; Medium Technical knowledge
10.4. Paddy-coconut (293 ha); Irrigated; High Market orientation; High Technical knowledge

NORTHERN LOWER DISSECTED PIEDMONT PLAIN
10.5. Coconut-cashew-rubber (12798 ha); Rainfed; High Market orientation; Medium Technical knowledge
10.6. Coconut-arecanut- banana (5505 ha); Rainfed; High Market orientation; Medium Technical knowledge
10.7. Paddy- coconut (373 ha); Irrigated; High Market orientation; High Technical knowledge

NORTHERN UPPER DISSECTED PIEDMONT PLAIN
10.8. Coconut-arecanut-banana (2431 ha); Rainfed; High Market orientation; Medium Technical knowledge
10.9. Coconut-cashew- rubber (51556 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
10.10. Arecanut-coconut-paddy (4085 ha); Rainfed; High Market orientation; High Technical knowledge
10.11. Paddy-coconut-arecanut (5145 ha); Irrigated; High Market orientation; High Technical knowledge
10.12. Coconut-banana-paddy (182 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
10.13. Rubber- coconut- fruit trees (72079 ha); Rainfed; Medium Market orientation; High Technical knowledge

NORTHERN LOWER HILL RANGES
10.14. Rubber- pepper- coconut/ fruit crops (13741 ha); Rainfed; Low Market orientation; High Technical knowledge
10.15. Forest (1438 ha); Rainfed

NORTHERN UPPER HILL RANGES
10.16. Forest (6667 ha); Rainfed
10.17. Rubber-fruit crops-pepper (9388 ha); Rainfed; Low Market orientation; High Technical knowledge

23. NORTHERN STEEP MOUNTAIN RANGE
10.18. Forest (16432 ha); Rainfed
10.19. Rubber - coconut- pepper/ fruit crops (2320 ha); Rainfed; Low Market orientation; Medium Technical knowledge

HIGH MOUNTAIN PLATEAU
10.20. Forest (4550 ha); Rainfed

Wayanad district
WAYANAD PLATEAU
11.1. Forest (26815 ha);
11.2. Tea- coffee (15860 ha); Rainfed; High Market orientation; High Technical knowledge
11.3. Paddy- Banana - Ginger/Tuber crops (38929 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
11.4. Coconut- Areca nut - Ginger/Yams (25623 ha); Rainfed; Medium Market orientation; High Technical knowledge
11.5. Coffee-Pepper-Rubber (91803 ha); Rainfed; Low Market orientation; High Technical knowledge

HIGH MOUNTAIN PLATEAU
11.6. Tea-forest; Irrigated; High Market orientation; High Technical knowledge
11.7. Forest-coffee (4733 ha); Rainfed; Low Market orientation; High Technical knowledge
11.8. Coffee-pepper-rubber (3699 ha); Irrigated; Low Market orientation; High Technical knowledge

Kannur district
NORTHERN COASTAL PLAIN
12.1. Coconut-Paddy-Cashew (1106 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.2. Coconut-Paddy-Areca nut/Banana (3288 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.3. Coconut-Banana-Areca nut (1993 ha); Rainfed; High Market orientation; Medium Technical knowledge

NORTHERN LOWER DISSECTED PIEDMONT PLAIN
12.4. Coconut-Cashew-Rubber (4772 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.5. Rubber-Cashew-Coconut (1336 ha); Rainfed; High Market orientation; High Technical knowledge
12.6. Coconut-Banana-Arecanut (6729 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.7. Coconut-Paddy-Arecanut/Banana/Vegetables (6042 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.8. Coconut-Paddy-Rubber/Cashew (5318 ha); Rainfed; High Market orientation; Medium Technical knowledge

**NORTHERN UPPER DISSECTED PIEDMONT PLAIN**
12.9. Coconut-Rubber-Cashew/Arecanut (16043 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.10. Rubber-Cashew-Coconut (61863 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
12.11. Forest (1754 ha); Rainfed
12.12. Coconut-Paddy/Vegetables-Banana/Cashew (3878 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.13. Coconut-Cashew-Rubber (3082 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.14. Cashew-Coconut-Paddy (6408 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
12.15. Cashew-Rubber-Pepper/Coconut (17318 ha); Rainfed; Low Market orientation; Low Technical knowledge
12.16. Coconut-Banana-Arecanut (9437 ha); Rainfed; Low Market orientation; Low Technical knowledge

**NORTHERN LOWER HILL RANGES**
12.17. Coconut-Rubber-Cashew/Arecanut (16302 ha); Rainfed; Low Market orientation; Low Technical knowledge
12.18. Rubber-Cashew-Coconut (26499 ha); Rainfed; Low Market orientation; High Technical knowledge
12.19. Forest (6592 ha); Rainfed
12.20. Coconut-Banana-Arecanut (964 ha); Rainfed; High Market orientation; Medium Technical knowledge

NORTHERN UPPER HILL RANGES
12.21. Coconut-Rubber-Arecanut/Cashew (5055 ha); Rainfed; High Market orientation; Medium Technical knowledge
12.22. Rubber-Cashew-Coconut (8662 ha); Rainfed; High Market orientation; High Technical knowledge
12.23. Forest (9240 ha); Rainfed; High Market orientation; High Technical knowledge
12.24. Coconut-Banana-Arecanut (326 ha); Irrigated; Low Market orientation; Medium Technical knowledge

NORTHERN STEEP MOUNTAIN RANGE
12.25. Forest (9134 ha); Rainfed
12.26. Coconut-Rubber-Arecanut (140 ha); Irrigated; Low Market orientation; Low Technical knowledge
12.27. Rubber-Cashew-Coconut (977 ha); Rainfed; Low Market orientation; High Technical knowledge

Kasaragod district

NORTHERN COASTAL PLAIN
13.1. Paddy-coconut-vegetables (1701 ha); Rainfed; High Market orientation; High Technical knowledge
13.2. Coconut-cashew (214 ha); Rainfed; High Market orientation; High Technical knowledge
NORTHERN LOWER DISSECTED PIEDMONT PLAIN
13.3. Coconut-arecanut-banana (393 ha); Rainfed; High Market orientation; Medium Technical knowledge
13.4. Coconut-pepper-banana (823 ha); Rainfed; High Market orientation; Low Technical knowledge
13.5. Coconut-cashew (6017 ha); Rainfed; High Market orientation; Low Technical knowledge
13.6. Paddy-coconut-vegetables (1873 ha); Irrigated; High Market orientation; High Technical knowledge

NORTHERN UPPER DISSECTED PIEDMONT PLAIN
13.7. Rubber-coconut-cashew (17518 ha); Rainfed; High Market orientation; High Technical knowledge
13.8. Coconut-arecanut-pepper (4610 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
13.9. Coconut-vegetables (1551 ha); Rainfed; Low Market orientation; Medium Technical knowledge
13.10. Arecanut-coconut-rubber (4191 ha); Rainfed; Medium Market orientation; High Technical knowledge
13.11. Coconut-Cashew- Arecanut (7042 ha); Rainfed; Medium Market orientation; Medium Technical knowledge
13.12. Cashew-coconut (3589 ha); Rainfed; Low Market orientation; Medium Technical knowledge
13.13 Rubber-cashew (14598 ha); Rainfed; Low Market orientation; Medium Technical knowledge
13.14. Coconut-arecanut-pepper (2153 ha); Rainfed; Low Market orientation; Low Technical knowledge

NORTHERN LOWER HILL RANGES
13.15. Rubber-cashew- arecanut (6228 ha); Rainfed; Low Market orientation; High Technical knowledge
13.16. Coconut-pepper (2593 ha); Rainfed; Low Market orientation; Low Technical knowledge
13.17. Coconut- cashew (117 ha); Rainfed; Low Market orientation; Low Technical knowledge
13.18. Rubber- cashew - pepper (297 ha); Rainfed; Low Market orientation; Low Technical knowledge

NORTHERN UPPER HILL RANGES
13.19. Rubber-cashew (1407 ha); Rainfed; Low Market orientation; High Technical knowledge
13.20. Forest - rubber - cashew (400 ha); Rainfed

The total number of land utilization types identified in the different districts are given below

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<th>Sl no</th>
<th>District</th>
<th>No of LUT's</th>
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Thus the total number of LUT’s identified in Kerala in the 27 Major Land Resource Areas is 234.
Across districts, the maximum number of LUT’s are delineated in Idukki and Kannur districts and minimum in Wayanad district. In Thiruvananthapuram district, unit 1.10 extends over the maximum area followed by 1.11. In Kollam district, unit 2.9 extends over the major area. 2.5 and 2.10 are second and third in terms of extent. In Pathanamthitta district, 3.19 unit has the major extent followed by 3.18. 3.12. also occupies considerable area. Unit 4.5 in Kottayam district occupies the maximum extent followed by 4.6. In Ernakulam district, 5.6. unit covers major extent followed by 5.14. In Idukki, unit no 6.13. and 6.22 cover the major part. In Thrissur district, 7.14. has the major extent. Unit no 8.7 covers a major part of the district in Palakkad. In Malappuram district, 9.9 unit has the major extent. Unit no 10.9 in Kozhikode district covers the maximum extent. In Wayanad district, unit no 11.3 has the major extent. 12.18 in Kannur district has the maximum extent. Unit no 13.13. in Kasaragod district extends over the maximum extent in the district.

Alternate land use suggestions have been made in crop suitability component of the LUT descriptor tables. In addition units 4.10, 5.17, 5.18, 6.4., 12.25 and 12.27 are to be retained as forest an unit 4.11 is to be retained as grassland.

5. Summary

India’s record of progress in agriculture over the past four decades has been quite impressive. The agriculture sector has been successful in keeping pace with rising demand for food. The contribution of increased land area under agricultural production has declined over time and increases in production in the past two decades have been almost entirely due to increased productivity. Contribution of agricultural growth to overall progress has been widespread. Increased productivity has helped to feed the poor, enhanced farm income and provided opportunities for both direct and indirect employment. The success of India’s agriculture is attributed to a series of steps that led to availability of farm technologies which brought about dramatic increases in productivity in 70s and 80s often described as the Green Revolution era. The major sources of agricultural
growth during this period were the spread of modern crop varieties, intensification of input use and investments leading to expansion in the irrigated area. In areas where ‘Green Revolution’ technologies had major impact, growth has now slowed. New technologies are needed to push out yield frontiers, utilize inputs more efficiently and diversify to more sustainable and higher value cropping patterns. At the same time there is urgency to better exploit potential of rainfed and other less endowed areas if we are to meet targets of agricultural growth and poverty alleviation. Given the wide range of agro ecological setting and producers, Indian agriculture and also Kerala agriculture is faced with a great diversity of needs, opportunities and prospects. Future growth needs to be more rapid, more widely distributed and better targeted. These challenges have profound implications for the way farmers’ problems are conceived, researched and transferred to the farmers. On the one hand agricultural research will increasingly be required to address location specific problems facing the communities; on the other, the systems will have to position themselves in an increasingly competitive environment to generate and adopt cutting edge technologies to bear upon the solutions facing a vast majority of resource poor farmers.

Proper utilization of land is essential to sustainable agricultural production and economic development. Land-use planning must be based on reliable data and the application of scientific knowledge to conserve land resources and improve agricultural productivity. In other words, land evaluation using a scientific procedure is essential to assess the potential and constraints of a given land parcel for agricultural purposes. The problems of declining soil fertility, stagnant yield level and unfettered soil erosion, exploitation of natural resources are part and parcel of intensive agriculture. Land evaluation and crop suitability analysis would resolve these issues while providing better land use options to the farmer.

The Soil Survey Organisation has already developed a MLRA grouping of Kerala with 27 resource areas based on physiography, geology, climate, soils and crops as parameters. A more detailed grouping within each MLRA is the Land Utilization Type. This is more suited at the district level. A Land Utilization Type refers to a crop, crop combination or cropping system with specified irrigation and management methods in a defined technical and socio-economic setting. Land utilization systems, grouped based on land use requirements are developed to optimize the use of natural resources. In Kerala, 234 Land Utilization Types have been identified as part of this study. This baseline study has helped
to identify issues and strategies for improving the contribution of land utilization systems to enhanced agricultural productivity.