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VEGETATION MAPPING AND ANALYSIS OF PEPPARA WILDLIFE SANCTUARY USING REMOTE SENSING TECHNIQUES

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ABSTRACT

Vegetafion of Peppara Wildlife Sanctuary was mapped using remote sensing techniques. Maps were prepared in 1:15,000 scale using Black and White aerial photographs and in 1:25,000 scale using IRS IB geocoded satellite imagery. A set of supplementary maps viz. physical, digital. drainage, slope, digital elevation model were also prepared. Vegetation analysis of the area was also done and structural data supplemented.

Key words: Vegetation mapping, Phytosociology, Remote sensing, Photoinferpretation. Peppara Wildlife Sanctuary.

INTRODUCTION

The inventory and monitoring of forest resources over extensive areas have become increasingly important in recent years. Timely and accurate forest inventory information is essential for the management of regional and national resources. as well as for providing the basis for addressing current issues of national concerns such as deforestation. reforestation and decline or loss of biodiversity.

Forest surveys in India have traditionally been carried out through ground survey by the Survey of India: Such surveys are very time consuming. However. the process has been accelerated with the introduction of aerial photointerpretation. With thr development of remote sensing techniques, a new era has started in the field of resources survey. Management and monitoring the changes. forest inventory information like extent, location, types etc. may now be obtained at a very fast rate. almost in real time (Bansal. 1985).

Satellite remote sensing techniques are being put Continuous efforts are being made to standardize various methods of applications of remote sensing techniques. Vegetation maps provide a frame work for forest resources and serve as a standard record of time for comparative study about a stand of vegetation in future. Above all it helps considerably in designing the present and future management. It becomes multi purpose and predicts more valuable information about ecosystem when superimposed with soil and geological maps. In addition. vegetation maps help in manifold viz in easily locating sample stands. in helping analytical research of plant communities, and also in realizing the status of certain extinct species and to indicate information like endemism.

The remote sensing techno1ogy has emerged with a promising potential to fill up the long felt gap of getting timely repeated and synoptic information on the natural resources. Remote sensing data represent a mixture of information pertaining to land surface features. The objective of a user is to extract information as much precise as possible for his interest. Stratification of vegetation cover with respect to structural features is highly essential for resource evaluation. The estimation of actual area of different strata in each vegetation cover is most crucial part in resource evaluation. The satellite remote sensing technique coupled with aerial photographs has been found very useful in density stratification of forest types. This technique is not only far more accurate than the conventional one but is quick and cost effective. The forest resource stratification using remote sensing data was proved as an invaluable tool to carry out multiphase sampling (Hardig and Scott, 1978).

In India. at present there is a tremendous reduction in the forest areas. Similarly. much of the wildlife once widely distributed is now seen in certain pockets. In order to conserve the natural flora and fauna a minimum 5% of the geographical area should be conserved as Wildlife Sanctuaries and National Parks. In Kerala. at present there are 12 Wildlife Sanctuaries and 2 National Parks encompassing an area of about 5.78 % of the total geographic area of the State. The information on the spatial distribution of different cover classes and the pattern of their change is a pre-requisite for planning, utilisation and management of Wildlife sanctuaries and National Parks. The knowledge regarding structural status of the permanent vegetation and floristic composition of vegetation types is also essential for the better and effective management of Sanctuaries and National Parks.

To meet such an inevitable need of management, the present study has been undertaken and it includes broadly two aspects viz. 1. Vegetation mapping, 2. Vegetation Analysis. with the following objectives:

i. To map the vegetation (both small and large scale mapping)),
ii. To estimate the area of different major cover types,
iii. To prepare slope and drainage maps, etc. of the area,
iv. To study the structural aspects of permanent vegetation, and
v. Digital analysis of the area

METHODOLOGY

STUDY AREA

Location: The Peppara Wildlife Sanctuary, having an area of 76 km^2, is located on the Western slopes of the Western Ghats at South East comer, in Nedumangad taluk of Trivandrum district. The Sanctuary lies between 8° 34' 30" to 8° 41' 25" North latitude and 77° 6' 50" to 77° 14 5" East longitude (Fig.11.

Boundaries: The area of Peppara Wildlife Sanctuary is roughly coincides with the catchment area of the Peppara reservoir except in the Northern region where the Bonoccord Tea estate and some parts of Paruthipilly Range of Palode reserved forest come under the water shed line of the Peppara reservoir.

WEST: Starting from the Peppara dam along the left bank of the water spread area of the dam excluding the plantation areas and including all the natural reserve portion in the catchment area till it reaches the Vithura-Bonoccord road in the North running in the following heights. Orachankunnu. Vattaparakunnu, Kalluparakunnu (473m) and Pumadathukunnu.

NORTH: From the point where Vithura-Bonaccord road enters the catchment area of the Peppara dam. the boundary runs along the watershed line of the catchment area till it reaches the boundary of Bonaccord Tea estate. From there it passes along the Southern boundary between the estate and reserved forest till it reaches the Eastern point boundary of the estate, from where it runs along the watershed area of Peppara dam to Chemmunjimottai.

EAST: From Chemmunjimottai the boundary runs along the inter state boundary of Kerala and Tamil Nadu passing Arumukhamkunnu (1457 m. msl) till it reaches the Athirumalai peak (1594 m. msl). From Athirurnalai peak (1594 m. msl) the boundary runs along the water shed line between Neyyar Wildlife Sanctuary and Karamana river basin till it reaches the Kadiramudi malai along the following heights. Nachiyadkunnu (988 m. msl). Kannan kunnu and Karimala-kari (636m).

SOUTH-WEST: From Kadiramudi the boundary follows the water shed area of Peppara dam along the Agasthyavanam Biological Park till it reaches the Peppara dam.

Climate: The difference in elevation between West and North East regions (100-1717m. msl) makes appreciable variations in their climatic conditions. The sanctuary consists of two zones. tropical and subtropical. The climate in the tropical zone is moderately hot and humid. It is fairly equable. Diurnal variation in temperature is not more than 100°C. The maximum mean daily

temperature in the plains during the hottest month of March is about 32°C. While that in the coldest month of January is about 20°C. The maximum mean daily temperature of the upper Ghat during the hottest month is about 35°C. While that in the coldest month of January is about 17°C. The mean maximum temperature of subtropical region is 24°C. and mean minimum is 13.7°C.

Interior Boundaries: The Sanctuary is divided into core and buffer zones. The core zone is a protected zone where human interference is totally prohibited. This zone supports the prime wildlife habitats and dense vegetation. This zone is located on the eastern part of the sanctuary and has forest on the north, east and south border and huffer zone around the western portion. The extent of the core zone is around 32 km^2.

The buffer zone is located on the western portion of the sanctuary with the core area on the east. The buffer zone comes to about 21 sq. km. which is 40% of the total sanctuary area in which 5 to 8 sq. km. of the waterspread area is also included.

Tribal settlements: Thirteen settlements of "Kani" tribes are located within the sanctury. The list of tribal settlements seen in the sanctury are given below:

1. Podiyakala
2. Kuravan para
3. Chemmankala
4. Kamalakom
5. Kombodinjal
6. Podiyam
7. Pattampara
8. Kunnathery
9. Parandodue
10. Amode
11. Mlavila
12. Cherumangal
13. Pattinipara
14. Pothodu
15. Erampiadu
16. Thondangal

Fauna: The area is rich with animals including endemic and endangered species.

Indian Wild Boar	*(Susscrofa* Linnaeus)
Indian elephant	*(Elephas maximus* Linnaeus)
Nilgiri langur	*(Presbytis johni* (Fischer)
Bonette macaque	*(Macaca radiata*(Geoffroy)
Wild dog (Dholes)	*(Cuon alpinus* (Pallas)
Indian giant squirrel	*(Ratufa indica)*
Indian porcupine	*(Hystrix indica* Kerr)
Sambar	*(Cervus unicolor* Kerr)
Common flying giant squirrel	*(Petaurista petaurista* (Pallas)
Lion tailed macaque	*(Macacasilenus* Linnaeus)
Barking deer	*(Montiacus muntijack* (Zimmermann)
Sloth bear	*(Melursus ursinus* (Shaw) and
Leopard (Panther1	*(Pathera pardus* Linnaeus)

are some of them

The most common avifauna found in this sanctuary are.

Common King Fisher	*(Alcedo atthis taprobana* Kleinschmidt
White breasted water hen	*(Amauromis phoenicurus phoenicurus* (Pennant)
Little Green Heron	*(Butorides striatus* Bonaparte
Indian Cuckoo	*(Cuculus rnicropterus micropterus* Could
Koel	*(Eudynamis scolopacea scolopacea* Lennaeus
Grey jungle Fowl	*(Gallus sonneratii* Temminck)
Darter	*(Anhingarufa melanogaster* pennant)
Little Cormorant	*(Phalacrocorax niger* (Viellot)
Little Egret	*(Egretta garzetta garzetta* Linnaeus)
Rocket tailed drongo	*(Dicrurus paradiseus paradiseus* Linnaeus)
Chestnut headed bee eater	*(Merops leschenaulli leschenaulti* Vieillot)
Malabar trogen	*(Harpactes fasciatus malabaricus* (Could)
Blossam headed parakaeet	*(Psittacula cyanocephala* Linnaeus)
Hill myna	*(Gracularegiosa indica* (Suvier)
Malabar grey hornbill	*(Ocyceros griseus* Latham)

Indian python and Pit vipers are common reptailes.

Flora: The forest in this area exhibits considerable variations in floristic composition and structure due to the changes in climatic, altitudinal and geographical factors.

VEGETATION MAPPING

To meet 1he aim and objectives of the study on standard remote sensing techniques were adopted using different remotely sensed data products.

DATA PRODUCTS

The following data wcrr used in the present study.

(A) Aerial photographs

The black and white arcial photoghraps were used with the following details.

Task No NRSA	- 108
Scale	1.15.000
Camera	- RMK 15/23
Focal length	- 155mm
Format size	- 23X23
Nature of the print	- Glossy and single weight
Overlap	- Forward 60-80%
	- Lateral 10-40%
Diration of flight	- West - East
Film	- Kodak XX Aeroghraphic film 2405 B&W
Run Nos.	- 31B, 32A, 33A. 34A. 35A. and 36A
Date of flying	- 23-02-1990
Sortie No./Spool No.	- TVA 28. 30/39
Lens No.	- 127804
Topo No.	- 58 H/2

(B) Satellite data products

Satellite: data products arr available in the form of either computer compatible tapes (CCTs) or in the form of false colour composite. The Image products can be analysed visually. In the present study Image products like Geocoded Imagery, standard False Colour Composite and the CCT of Indian remote sensing satellite were used (IRSIA. lRSIB and IRSIC).

(B-1) Standard False colour composite of IRS 1A in 1:1,25.000 scale

To get a synoptic view and idea of Peppra wildlife Sanctuary and its environs. False colour composite (FCC) of IRS-lA,LISS 1. Bands 2. 3 and 4 in blue (0.52-0.59 microns) green (0.62-0.68) red (0.79-0.86 microns) respectively of 17th April 1989 was used for visual interpretation.

(B-2) Geocoded false colour composite

To mret the geometric accuracies. precision data product like, Geocoded false colour composite of IRS lB. LlSS 2 B2 was used. The data product. processed with radiometric and geometric corrections with orientation to true north,

with the following specifications: Photo product scale 1:50.000. Output resolution - 25 x 25 (meters).

Path & row	- 25 - 62
Bands	- 210.52-0.59 microns)
	- 310.62-0.68 ¨)
	- 4(0.77-0.86 ¨)
Acquired data	- 07-Feb-93.11:07:12
Processed data	- 25-Aug-94.11:51:27

(B-3) Computer compatible tape

The satellite data product is available in the form of computer compatible tape (CCT). can be analysed digitally using computer. In the presents study 1RS-lA, LlSS 2 A2 data of December 1988 and IRSIC data of February. 1998 were used.

Visual interpretation of aerial photographs and satellite imageries

The recognition of objects on aerial photographs and satellite imageries was done with the help of photo elements like tone, texture, pattern. etc. **A** interpretation key as prepared with the help of above mentioned pictorial elememts for aerial photographs and satellite imageries.

Digital image analysis

The digital image processing was carried out on VAX 11/780 system using VIPs 32 software available at (Regional Remote Sensing Service Centre) Bangalore. Supervised classification technique using maximum likehood classifier was adopted to classify the landcover classes.

PHYTOSOCIOLOGICAL STUDIES

Champion and Seth's (1968) classification system was used for the identification of vegetation types. After a reconaissance survey and vegetation mapping of the study area, it was divided into **four** compartments in Tropical and two in sub-tropical regions based on drainage, altitude and habitation, Census quadrat techniques were adopted to gather vegetation data from each forest type. The quadrat data thus obtained were analyzed to under-stand the structure and composition of the community.

PRIMARY ANALYSIS

Primary analysis of the vegetation was carried out to obtain the values of various parameters like density, frequency, abundance, basal area. and (Importance Value Index) (Gates, 1949: Curtis and McIntosh, 1950: Misra and Puri, 1954: Curtis, 1951: Phillips, 1959: Misra. 1969; Muller-Dombois and Ellenberg. 1974). using the standard formula:

1. Density $= \frac{\text{Total no.of individuals}}{\text{Total no. of quadrats studied}}$

2. Relative density $= \frac{\text{No of individuals of the species}}{\text{No. of individuals of all species}} \times 100$

3 . % frequency (PF) $= \frac{\text{No. of Quadrats in which species occurred}}{\text{Total no. of quadrats studied}} \times 100$

4. Relative frequency $= \frac{\text{Abundance of individual species}}{\text{Abundance of all species}} \times 100$

5. Abundance $\frac{\text{Total no. of individuals of the species}}{\text{Total no. of quadrats of occurrence}}$

6. Basal Area = Gbh2/4pi[pi=3.14]

7. Relative Basal Area $= \frac{\text{Total basal area of the species}}{\text{Total basal area of all species}} \times 100$

8. Importance Value Index (IVI)

A total picture of the ecological status of a species with respect to a community structure can be obtained only by synthesising the percentage values of relative frequency, relative density and relative basal area. The values when added together give the IVI based on which an association is derived (Phillips. 1959).

SECONDARY ANALYSIS

Maturity Index

The term Maturity Index (MI) was coined by Pichi-Sermolli (1948) to assess the status of a community in relation to successional stages. It is calculated as follows:

$$\text{Maturity Index (MI)} = \frac{\text{Total frequency of a community}}{\text{Total no. of spccies present}}$$

Distribution Pattern

Abundance/frequency ratio was worked out to study the nature of distribution of species (Whitford.

Continuum concept

Cleason (1926. 1939) pointed out that there is no absolute boundaries between adjacent plant communities and proposed the 'Continuum concept'. For calculating the continuum index. each species is given a climax adaptation number. based on the important value index (IVl). ranging from 1-10 for species at the other extreme. A high value of adaptation number means better adaptations to all rnvironmental conditions present in teriminal strands (Mullcr-Dombois and Ellenberg. 1974). To assess the position of a single stand the important value indices of different species present in the stand were weighed against their adaptation numbers. The values are added to give the total value for a stand. This is the continuum index value for the stand.

Similarity Index/Community Coefficient

In order to compare two plant communities which resemble each other in appearance. the concrpt was put forth by Jaccard (1912).Jaccard's formula has undergone several quantitative. (Gleason, 1920: Ellenberg. 1956: modifical ions (Sorenson. 1948). Sorenson's modification is widely accepted since it i:i mathematically more satisfactory in terms of statistical probability. The community coefficient' is expressed in terms of Similarity Index. Sorenson's (1948) formula for Similarity Index is:

$$IS = \frac{2C}{A + B} \times 100$$

where 'C." is the no. of species common to two releves
'A is the total no. of species in releve A
'B' is the total no. of species in releve B

Diversity Index

Margalef's (1968) formula was used for calculating Shannon Index (Shannon and Weaver, 1963) of General Diversity' i.e.,

$$H = -\sum \frac{ni}{N} \log \frac{ni}{N}$$

where H = Shannon index of general diversity
ni = No: of individuals of the species
N = No: of individuals of all species

Concenteration of Dominance

To evaluate the concentration of dominance in a species within a community Simpson's (1949)index of dominance is used:

$$C = C = \sum_{i=1}^{s} (ni/N)^2$$

ni = no: of individuals of the species
N = no: of individuals of all species

PREPAFUTION OF DRAINAGE MAP

A drainage map was prepared using 1:15,000 B & W aerial photographs and Survey of India Topograhic sheets. All the major and minor rivers were marked from photographs.

PREPARATION OF SLOPE MAP

The slope map of the study area was prepared following Wentworths method. Area under different slope category and their percentage was calculated using planimeter.

Preparation and Digital Elevation Model (DEM)

DEM of the study area was prepared by ILWIS package with contours from S.O.I'S toposheets and the digital imagery of IRS

RESULTS AND DISCUSSION

REMOTE SENSING

1. Map prepared from aerial photographs

The area of the different land cover classes was estimated from the land cover map prepared from 1:15,000 B&W aerial photographs (Fig. 10) by using planimeter (Table 11. The area calculated for different land cover classes was as follows: the total area of the sanctuary is 75.589 sq km. of this 4.921 sq km. (6.510%) comes under reservoir.

The wet evergreen forest of the Sanctuary comprises a total area of 10,918 sq km (14.443 %). of this 10.442 sq km (13.814%) comes under West coast tropical evergreen forest and rest 0.457 sq km (0.604 %) under Southern hill top tropical evergreen forest. Of the 0.457 sq km area of the Southern hill top tropical evergreen forest, 0.025 sq km (5.470%) had medium density and 0.423 sq km high density.

The area estimated for West coast semi-evergreen forest was 14.267 sq km (18.874 %) occupying the second largest vegetation unit of this sanctuary. In the 14.267 sq km of this type 4.872 sq km (34.148 %) had low density. 4.934 sq km (34.583 %) medium density and 4.461 sq km. (31.261 %) have high density.

The west coast semi-evergreen forest was mixed with bamboo at some places. The density of West coast semi- evergreen forest with the percentage of the bamboo coverage sq km are as follows:

Semi evergreen low density forest with below 25% bamboo cover - 0.293 sq km Semi evergreen low density forest with 26.50% bamboo cover - 0.298 sq km Semi evergreen medium density forest with below 25% bamboo coverage - 0.038 sq km Semi-evergreen high density forest with below 25% bamboo cover is 0.013 sq km and medium density with 26%-50% bamboo cover is 0.325 sq km. A total area of 0.967 sq km (1.279%) of Semi evergreen forest are found mixed with bamboo.

The seral type of West coast semi-evergreen forest, i.e., pioneer euphorbiaceous scrub had an area of 0.555 sq km (0.734 %). The total area of the west coast semi-evergreen with its edaphic and seral types was to around 15.789 sq km Southern secondary moist mixed deciduous forest occupy the largest area in the Sanctuary. i.e.. 28.996 sq km (38.36%).The area occupied by each density class is given below:

Density class	Area (Sq km)	Percentage of total
5 - 20 %	4.394	
21 - 40%	17.316	59.718
41 - 60 %	5.032	17.354
61 - 80%	2.096	7.228
> 81 %	0.158	6.544

The common edaphic type met with this type was bamboo brakes that comes to 0.448 sq km (0.5926%)of the Sanctuary. Out of this 0.004 sq km (0.892%) sq km belonged to 51%-75% cover category and 0.444 sq km (0.444%)in the above 76% category. Besides. this bamboo were commonly mixed with the moist deciduous forest.

In total. the Southern secondary moist mixed deciduous forest and its edaphic type occupied an area of 29.256 sq km (29.70%). In the Littoral and Swamp forest groups only Riparian fringing forest of the sub-group tropical fringing forest could be identified through aerial photographs. Although tropical fresh water swamp forests like Myristica swamp forest and Submontane hill valley swamp forest were present in this Sanctuary, they could not be identified from the aerial photographs, The Riparian fringing forest of this sanctuary had an area of 2.537 sq km (3.35%). Of which only 0.106 sq km (4.17%) shows high density, 1.100 sq km (43.35%) medium density and remainingl.331 sq km (52.46 %) low density.

The Montane sub tropical forest of this Sanctuary comes under the group - Sub tropical broad leaved hill forests and the sub group Southern sub tropical hill forests. The area estimated for different types of this category is as follows:

A total area of 1.057 sq km (1.42 %) comes under Nilgiri sub tropical forest. of this 0.055 sq km show low density and 1.057 (94.88%) medium density. In the 5.11 sq km of low density forests, 0.018 sq km had mixed vegetation mainly with *Bentinckia condapanna* Nilgiri sub tropical hill forests do not exhibit high density in this Sanctuary.

Ochlandra (reed) brakes had a total area of 2.218 sq km (2.93%). Of this. 1.790 sq km (80.70%) had pure thick patches of reeds of high density followed by 0.356 sq km (16.05%) of medium density and 0.073 sq km 13.29%)of low density.

In some areas of the sub tropical region small pure patches of *Bentinckia condapanna* are seen. They are successfully delineated in the aerial photographs and have a total area of 0.207 sq km (0.247%). of this 0.026 sq km (12.560%) show high density, 0.112 sq km (54.11%) medium density. and 0.069 sq km (33.333%)low density. Reed patches of 0,112 sq km are medium density and 0.009 sq km in patches. Thus a total of 3.943 sq km (5.21%) of subtropical forests occur in this Sanctuary.

Besides the above mentioned forest types, plantations, scrubs and other land use classes were also present in the Sanctuary. An area of 1.832 sq km (2.42%)of low level grass lands occurs. An area of 3.11 sq km scrubs lands are also seen among the 3.116 sq km (4.12%) of scrub lands. Open scrub lands are1.666 sq km (53.46%)and dense scrub lands 1.450 sq km (46.53%).

The Eucalyptus plantations of this tract occupy an area of 0.050 sq km (0.66%).Asmall portion of encroached tea estate present in the area of the Sanctuary comes to around 0.069 sq km (0.09%).The other categories in this Sanctuary are 1.723 sq km (2.27%) of tribal settlements, 0.975 sq km (1.28%)of exposed rocks. 0.031 sq km (0.04%)of marsh and 0.015 sq km. of quarry area.

2. Map prepared from Geo-coded imagery

The area estimated from map of geo-coded imagery (Fig. 9) for West coast semi-evergreen forest was 16.658 sq km (22.03%)(Table 1).The edaphic and seral stages of this type whicti could not be delineated through the false colour composite, would be marked through this techniques hence there was an increase of 0.896 sq km of West coast semi-evergreen forest, than that of aerial photographs. This increase of area was due to the merging of Southern hill top evergreen forests, tribal settlements and the West coast tropical evergreen forest into this type. The area under various density classes for this forest type was 5.152 sq km. for high density, 5.331 sq km for medium density and 6.200 sq. km, for low density. The area increase in the high and medium density classes than aerial photographs was mainly due to the merging of the Southern hill top evergreen forest and the change of West coast evergreen forest into west coast semi-evergreen forests due to biotic influences.

There was a slight incrcasc of 0.085 sq. km. in the area occupied by the Southern secondary moist mixed deciduous forest in Geo-coded imagery when compared to the aerial photographs. In the Geo-coded imagery the edaphic and seral types would not be delineated. The increase of 0.085 sq km was mainly due to the merging of tribal settlements into the moist deciduous type, The area under various density classes of moist deciduous forest was as follows:

High density 10.418 sq km. medium density 14.864 sq km and low density 4.507 sq km. The Riparian fringing forest in Geo-coded imagery had an area of 3.782 sq km(5.00%). A total area of 1.958 sq km (2.59%)was estimated for the Subtropical hill forest. The increase in area of this forest type was mainly due to the merging of reed brake and *Bentinckia condapanna* brake into this forest.

The reed brake showed decrease in the area than that of aerial photographs. The merging of reed brake with subtropical hill forests was the main reason for this decrease. The area under different density classes was as follows:

An area of 0.949 sq km show high density 0.295 sq km medium density and 0.767 sq km low density. The Bentinckia condapanna brake is not be identifiable through the geo-coded imagery. The other vegetational/landuse type delineated in the Geo-coded false colour composite was as follows:

Low level grassland occupies an area of 2.333 sq km, while Eucalyptus plantation and scrublands have an area of 0.042 sq km and 1.919 sq km respectively. Of the latter. 1.405 sq km scrub land 0.363 is open scrub land and 1.557 is dense scrub lands. The low area of scrubland in imagery than aerial photographs is due to the merging of scrubs into the grass lands. The landuse classes delineated from the imagery included Barren area (0.059 sq km) and Exposed rock of (0.966 sq km).

3. Map prepared from Standard false colour composite

The standard false colour composite chosen for the present study is mainly to get an idea of the vegetation of the sanctuary and its environs (Fig.8). In this imagery only 9 land use classes are identified within the sanctuary.

The area estimated from standard false colour composite for different land cover types are as follows. i.e. wet evergreen forest. 10.723 (14.19 %): Semi-evergreen forest 14.85 sq km (19.65 %): moist deciduous, 36.69 sq km (48.54%): Grass land 2.24 sq km (2.97 %): Southern sub-tropical hill forest 1.94 sq km (2.57 %) Degradation stage of Southern sub-tropical forest 0.502 sq km (0.66%) Ochlandra reed brake 1.534 sq km: exposed rock 1.982 sq km (2.62 %): and Reservoir 5.124 sq km (6.78 %).

4. Digital mapping

The digital map of the area was generated (Plate 1) from 1RS 1A LISS-II CCT of February 1989 using Supervised Classification technique and supplemented, to show the distribution of various forest types. The DEM of the study area was also prepared using ILWIS package.

5. Drainage map

A drainage map in the scale of 1:50.000 was also prepared [Fig. 7) from the 1:50.000 B & W aerial photographs. The watershed area of Peppara reservoir is not fully extended within the sanctuary area.

6. Slope map

Slope map of the sanctuary was prepared (Fig. 8) using Wentworth method. The area under ditfrrent slope classes in sq km were as follows. i.e. <15o slope - 3.034: 15 to 20' slope- 21.915: 20" to 25" slope - 21.577: 2 5 to 30" slope 11.790: 30" to 35"slope 8.580: > 35" slope 3.772 and reservoir 4.921.

7. Zonation and physiographic map

The area estimated in the Zonation map (Fig. 3) for buffer and core zone is 29.738 sq km and 45.851 sq km respectively. The area of Thodayar and

Athirumalai section was 33.241 sq km and 42.348 sq km respectively. There is no existing maps showing the new roads, unmetelled roads, footpath, reservoir. the distribution of tribal settlements and location of different places. Through the stereoscopic interpretation of aerial photographs combined with the aid of GPS. a physiographic map was also prepared (Fig. 4) showing the above mentioned features.

PHYTOSOCIOLOGY

As per the revised Classification of Champion and Seth (1968) the major forest found in this sanctuary are Tropical forests and Montane subtropical forests. All the four types of the Moist tropical forests (1. Tropical wet evergreen forest. 2. 'Tropical semi-evergreen forest, 3. Tropical moist deciduous forest, 4. Swamp forest (Littoral and swamp forest) were represented in this tract. In tropical wet evergreen forests the following climatic climax forest types were seen in the sub group (1A) Southern tropical wet evergreen forest. They are Southern hilltop tropical evergreen forest (C3) and West Coast tropical evergreen forest (C4).

In the group 2. tropical semi evergreen forest only one climatic climax type was observed that comes under the sub group Southern tropical semi-evergreen forest(2A). The other edaphic and seral types comes under this group were the Moist bamboo brake (E3) and Pioneer Euphorbiaceous scrub (2S1). In the group 3. tropical moist deciduous forest, no climatic climax stage was noticed. One seral type occurring in this sanctuary comes under the sub-group (3B) of South Indian moist deciduous forest, i.e. Southern secondary moist mixed deciduous forest (2s 1).

One edaphic type found in this group was the moist bamboo brake (E3). In group 4. ie. the Littoral and Swamp forests three types of forests were seen in this tract. They were Myristica Swamp forest (Fsl) & Sub montane hill valley swamp forest (Fs2) both comes under the sub group (4C) tropical fresh water swamp forests and Riparian fringing forest of the sub-group (4E) tropical riparian fringing forest.

The montane sub-tropical forests of this sanctuary comes under the group (8) sub-tropical broad-leaved hill forests. The climatic climax forest type found in this group was sub-tropical hill forest (C1) of the sub-group (8A) Southern sub-tropical broad-leaved hill forests. The other edaphic and degradation stages found in this sub-group were *Ochlandra* reed breaks [E1) and degradation stage of Southern sub-tropical hill forest. In addition to the above type, pure patches of *Bentinckia condapanna* were also seen in some areas of the sub-tropical region.

In addition to the above mentioned major forest types the following vegetation classes were also seen as: Low level grassland, Scrubland and Eucalyptus plantation. For the phytosociological studies the sanctuary was divided into four localities in tropical region and two localities in sub-tropical region (Fig.

1. SOUTHERN HILL TOP TROPICAL. EVERGREEN FOREST (1A/C3)

CHARACTERS

This type of forest is of stunted evergreen found on the top of hills and along the slopes of ridges. This type is confined to altitudes ranging between 1000 and 1300 m, above sea level. Height of the trees are less, not more than 10m. hight was observed. The boles are much shorter and crowns are round to oblong in shape. The branches are crooked in growth. The low stature of trees of this type are mainly due to high velocity of wind and less favourable condition of soil. There are number of epiphytes on the trees and the branches appear shabby on account of mosses and lichen. This is considered to be a transition stage from tropical to sub-tropical forest.

DENSITY

Among the 27 species recorded, *Mesua nagasarium* is having highest density of 2.70 followed by *Carallia brachiata* (0.80), *Diospyros candolleana* (0.70). *Syzygium cuminii* (0.50), *Xanthophyllum arnottianum* (0.50) *Vernonia travancorica* (0.50) and *Agrostistachys borneensis* (0.50) respectively.

ABUNDANCE

The species with abundance value of 2.00 and above are *Mesua nagasarium* (3.00), *Diospyros candolleana* (2.33), *Tarenna alpestris* (2.00) and *Wendlandia bicuspidata* (2.00)(Appendix).

PERCENTAGE FREQUENCY

Mesua nagasanurn records very high percentage frequency (90.00). *Carallia brachiata* (50.00) and *Agrostistachys borneensis* (50.00) shows medium frequency. South Indian hill top evergreen forest of this sanctuary shows homogeneous vegetation nature with respect to class frequencies as: A (55.55%) > B (33.33 %)1 > C (7.04 %) > = < D < E (3.70 %),

BASAL AREA

Knema attenuata (1070.5) shows Basal area values above 1000. The other species having comparative high basal areas are *Litsea oleoides* (827.68) *Mastixia arborea*subsp. *meziana* (779.71)

Importance value index (IVI)

The IVl of Mesua nagasarium is comparatively very high (44.20). The IVI recorded for other species are *Carallia brachiata* (17.65). *Xanthophyllum arnottianum* (16.40), *Knema attenuata* (15.52) and *Actinodaphne bourdillonii* (14.98). Of this *Knema attenuata* exhibits 'false dominance' due to the high basal area. All other species found in this type have comparatively low IVI (Appendix 1).

SPECIES DISTRIBUTION (AB/F)

Out of 27 species recorded 11 species shows random distribution and rests are of contiguous distribution (>0.5).The species exhibit very random (0.025-0.5) distribution are *Agrostistachys borneensis* (0.02). *Carallia brachiata* (0.03). *Mesua nagasarim* (0.03), and *Hydnocarpus pentandra* (0.03).*Tarenna* alpestris alone shows high contiguous value of 20.00. Maturity index This type shows maturity index of 24.44.

SIMILARITY INDEX

This type shows 50.75% similarity to evergreen forest of Karamana locality, 50.85%similarity to the subtropical high altitude locality. 44.45% to the low altitude Iocality and comparatively low similarity to the other evergreen forest of Bonoccord 131.25%)and Podium locality (37.29%).

CONTINUUM INDEX

The continuum index value of this type is 1137.79.

DIVERSITY INDEX

Shannon wiener index of this type is 2.7988 and Concentration of dominance is 0.10.

2. WEST COAST TROPICAL EVERGREEN FOREST

CHARACTERS

This forest is characterised by the luxurious growth of evergreen trees of different size and arranged in serial tiers and storeys. Above the ground layers of herb and shrubs, the crown of the trees form 3 or more superposed storeys, but strata of trees are some times never clearly defined as they are continuously growing. The crown of trees in each storey have distinguished shape. In the top storey the trees are usually umbrella shaped, in the middle storey they are more or less candle flame shaped and are markedly conical in the bottom storey. Buttress root are characteristic in this type. The following species exhibit buttress formation. They are *Elaeocarpus tuberculata. Cullenia exarillata, Palaquium ellipticum.* and *Poeciloneuron indicum.* Another feature of this type forest is 'Cauliflory'. The presence of *Cullenia exarillata. Poeciloneuron indicum* and the high propor-tion of *Mesua, Calophyllum* etc. *indicate* that west cost tropical evergreen forest of this sanctuary belongs to high level evergreen forest. (Chandrasekharan. 1962). *Cullenia exarillata* and *Poeciloneuron indicum* are exclusively limited to this type. The most noticeable dilference from the low evergreen forest is the high percentage of occurrence of above species which develop in localities where the precipitation is particularly heavy or the soil moisture is particularly favourable.

DISTRIBUTION

The west coast tropical evergreen forest of the Peppara wild life sanctuary occurs at higher slopes of the ridges along eastern border especially in the upper source of the Thodayar, Kuttiyar, Karamanayar. Vazhaparathiyar. Attaiyar under the high peaks of Kovilthen malai. Arumukhamkunnu, Draivyamottai. Adirumalai, Nachiyadikunnu and Kannankunnu. This belt of forest occurs a continuous patch from the point of north eastern boundary of the sanctuary to the Kannankunnu near Nachiyadikunnu. This type is seen between 600 m. to 1100 m. above medium sea level.

DENSITY

The mean density of species of this type are calculated (Appendix 5) and the following species show high density values: *Dimocarpus longan* (0.90), Cinnamomum verum (0.70). *Cullenia exarillata* (0.631, *Vateria indica* (0.60). and *Diospyros candolleana* (0.56).

In Bonoccord region *Dimocarpus longan* (1.00) and *Diospyros candolleana* (0.70) exhibit high rate of density above 0.50 (Table 5). In Karamana locality *Dimocarpus longan* (1.10). *Vateria indica* (0.90), *Cullenia exarillata* (0.70) and *Mesua nagasarium* (0.50) have 0.50 and above density (Appendix 2).

In Podium locality eight species exhibits more than 0.50 density, they are *Cinnamornum verum* (1.80) *Syzygium cuminii* (1.20). *Cullenia exarillata* (1.10). *Aporusa lindleyana* (1.00), (0.80). *Xanthophyllum arnottianum* (0.70), *Dimocarpus longan* (0.60). *Diospyros candolleana* (0.60) and *Polyalthia coffeoides* (Appendix 4).

ABUNDANCE

More than 19 species have high abundance value of 1.00 and above (Appendix 5). Out of this *Polyalthia coffeoides* (1.66). *Xanthophyllum arnottianum* (1.66). *Diospyros candolleana* (1.50) and *Dimocarpus longan* (1.49) have high rate of abundance.

In Bonoccord locality *Leea indica* (4.00), *Mallotus tetracoccus* (3.00). *Dipterocarpus bourdilloni* (3.0). *Polyalthia coffeoides* (2.0). *Holigarna arnottiana* (2.00). *Bischofia javanica* (2.0), and *Polyalthia suberosa* (2.00) show above abundance value of 1.00, In Karamana three species shows high degree of Abundance and are *Xanthophyllum arnottianum* (3.25). *Gluta travancorica* (3.00). *Mastixia arborea* subsp. *meziana* (2.00). In Podium locality *Syzygium cuminii* (3.01, *Cinnamomum verum* (3.0). *Polyalthia coffeoides* (3.00). *Vitex altissima* (2.00) and *Wendlandia bicuspidata* (2.00) shows high degree of abundance (Appendix 3).

PERCENTAG EFREQUENCY

The species which have high mean frequency for this type are *Dimocarpus longan* (60.00). *Cullenia exarillata* (43.00). *Diospyros candolleana* (36.66),

Vateria indica (36.66). *Mesua nagasarium* (30.00). *Cinnamomum verum* 130.33)and *Aporusa lindleyana* (30.00)(Appendix 5). Raunkiaer's (1934) Law of Frequency 'indicates heterogeneous nature of vegetation in all localities of for this type.

In Bonoccord locality only one species exhibit high degree of frequency. i.e. *Dimocarpus longan* (60.001. Raunkiaer's 'Low of frequency 'for this locality shows 31 183.78)> 5 (13.511>I<=> 0 <0. Indicating heterogeneous nature of vegetation.

In Karamana area large number of species show high percentage frequency rate than Bonoccord area and are *Dimocarpus longan* (80.00).*Vateria indica* (50.00) and *Cullenia exarillata* (50.001. The species show 40 percentage frequency value are; *Mesua nagasarium* (40.00) *Wendlandia bicuspidata* (40.001, *Syzygium mundagam* (40.00) and *Xanthophyllum arnottianum* (40.00). 'Law of frequency' indicates the heterogeneous nature of the vegetation for this locality.

In Podium locality the following species show 50.00 and more frequency. they are *Cullenia exarillata* (70.00), *Aporusa lindleyana* (70.00). *Ixora nigricans* (60.00) and *Cinnamomum verum* (60.00).According to Raunkiaer's (1934)'low of frequency' this locality also show heterogeneous vegetation.

BASAL AREA

The species which have maximum mean basal area is Bischofia javanica (3289.95) to be followed by *Cullenia exarillata* (1856.36). Mesua nagasarium (1780.16) and *Calophyllum apetalum* (1764.24). The species which shows minimum mean basal area are *Leea indica* (5.96),*Sterculia urens* (5.96). *Kingiodendron pinnatum* (5.96)(Appendix 5).

In Bonoccord locality the basal area ranges between 17.90 to 3711.7 (Appendix 2). The high basal area is of the species *Gluta travancorica* (3711.7) followed by *Ailanthus triphysa* (3508.41. *Mesua nagasarium* (2932.71, *Syzygium caryophyllatum* 12902.2). *Cullenia exarillata* (2036.6),*Hydnocarpus macrocarpa* (1184.11 and *Dimocarpus longan* (1033.9).The following species shows low basal area *Sterculia urens* (17.90), *Leea indica* (17.90). and *Kingiodendron pinnatum* (17.90).

In Karamana locality Bischofia javanica have the high basal area of 9196.5. but is only represented by one individual (Appendix 3). *Bischofia javanica* is followed by *Holigarna arnottiana* (3343.3). *Syzygium hemispericum* (3278.4), *Cullenia exarillata* (3246.1). *Hydnocarpus macrocarpa* (3214.1). *Ormosia trauancorica* (3182.2). *Vitex altissima* (3182.2) and *Palaquium ellipticum* (1052.11.

Most species of Podium locality is having low basal area than that Karamana locality (Appendix 4). *Ficus hispida* shows very high basal area at 11488.00. it is only represented by one individual. The other species which shows high basal area are *Calophyllum apetalum* (4544.2), *Terminalia bellirica* (3508.4).

Spondias indica (2218.7). *Ficus tsjahela* (2326.3). *Mesua nagasarium* (1911.3). and *Lagerstroemia microcarpa*(1493.2).

IMPORTANCE VALUE INDEX [IVI]

Total 71 species are enumerated in this of forest. The species which have maximum IVI found in this type are *Cullenia exarillata* (49.41), *Dimocarpus* longan (18.14) and *Mesua nagasarium* (13.07). The IVI of *Cullenia exarillata* stands are very high than that of the other two species. *Mesua nagasarium* is well represented in high altitudes but it has a limited occurrence in the medium elevation. that is why it shows a low IVI of 13.07 in the mean IVI table of all localities. The IVI of Ficus hispida (12.84) is near to Mesua *nagasarium*. because of the 'false dominants' nature due to its high basal area . The IVI of the species which comes next to the above mentioned species are *Dimocarpus candolleana* (11.12), *Bischofia javanica* (10.66). *Hydnocarpus macrocarpa* (10.611 and *Vateria indica* (10.34) (Appendix 5). The high IVI value of *Cullenia exarillata* denotes its ecological success in establishing as a character species.

In Bonoccord locality *Dimocarpus longan* has the highest IVI (24.86) followed *Gluta travancorica* (22.46) *Syzygium caryophyllatum* (22.02) and *Mesua nagasarium, Ailanthus triphysa* and *Diospyros candolleana* have the IVI of 16.27 and 16.02 respectively. Of this *Ailanthus triphysa* has only represented by one individual and its high IVI is due to the 'false dominance by virtue of relatively high basal area (Appendix 2).

In Karamana locality *Cullenia exarillata* (20.58) and *Dimocarpus longan* (20.05) association is seen. Although *Bischofia javanica* has the maximum IVI of 25.53. it is due to the 'false dominance' because it is only represented by one individual and have a high basal area (340). The other species which have relatively high IV1 are *Xanthophyllum arnottianum* (16.80). *Hydnocarpus macrocarpa* (15.40), *Syzygium hemispericum* (14.65) and *Vateria indica* (14.39) (Appendix 3).

In Podium locality the plant association is between *Cinnamomum verum* (20.40) and *Cullenia exarillata* (17.08). Here also *Ficus hispida* shows maximum IVI due to the 'false dominance'. The other species which have considerable high IVI are *Calophyllum apetalum* (16.63), *Aporusa lindleyana* (15.83)and *Syzygium cuminii* (14.67) (Table 7). In Podium region west coast tropical evergreen is represented by small patches at high elevations. The high IVI of *Cinnamomum verum* and *Syzygium cuminii* can be attributed to this.

SPECIES DISTRIBUTION (AB/F)

In Bonoccord locality none of the species shows regular distribution (< 0.0251. Out of 29 species registered 12 species exhibit random distribution (0.025-0.5) and rest 17 species shows contiguous distribution (> 0.05). The species shows very random distribution of 0.03 are Dimocarpus longan. *Mesua nagasarium. Syzygium caryophyllatum, Gluta travancorica.*

Wendlandia bicuspidata, and Diospyros candolleana Out of 17 species which have contiguous distribution only five show very contiguous distribution. i.e. Bischofia javanica (0.20). Polyalthia coffeoides (0.20). Dipterocarpus bourdilloni (0.30). Mallotus tetracoccus (90.30) and Leea indica (0.40) (Appendix 2).

In Karamana locality one species shows regular distribution out of 40 species recorded. In the rest 39 species 15 species shows random distribution. The species which have very random distribution arc Cinnamomum verum (0.03). Mesua nagasarium (0.03), Cullenia exarillata (0.03) Wendlandia bicuspidata (0.03) Syzygium mundagam (0.03). Syzygium hemispericum (0.03). Knema attenuata (0.03), Calophyllum apetalum (0.04), Hydnocarpus macrocarpa (0.04). Vateria indica (0.04) and Diospyros candolleana (0.04) (Appendix 3). Out of 24 species with contiguous distribution: the following shows high rate of contiguousness. They are Gluta travancorica (0.0301 and Mastixia arborea subsp. meziana (0.20).

In Podium locality the regular distribution of species is seen. Those species which have regular distribution are Cullenia exarillata (0.02). Aporusa lindleyana 10.02). and Ixora nigricans (0.02). In the rest 29 species 11 species shows random distribution and majority of species (18) exhibit contiguous distribution. The species show high rate of random distribution of (0.03) are Knema attenuata. Hydnocarpus macrocarpa Diospyros candolleana etc. (Appendix 4).

Although 18 species show contiguous distribution, high value of contiguousness is absent only Polyalthia coffeoides shows contiguous value of 0.15 above 0.10.

Maturity Index

The maturity index of different localities worked out are 17.57 for Bonoccord locality 21.00 for Karamana locality, and 26.56 for Podium locality (Appendix 2-41,

Similarity index

The karamana locality and Podium locality are more similar (49.271 than Karamana - Bonoccord (44.15) or Bonoccord - Podium (40.621 localities.

Continuum Index

The continuum index of this type forest in various locality exhibits not marked variations. The continuum index of various locality are. 1442.30 for Bonoccord. 1424.84 for Karamana. and 1234.51 for Podium locality (Appendix 2-4),

Diversity Index

The Shannon wiener index for species diversity records highest value at Bonoccord locality (3.3691). followed by Karamana locality (3.3081) and Podium locality (3.0962).Generally all the localities shows diversity index more than 3 value. Podium locality shows the highest value of concentrations of dominance value 0.06. Karamana comes next by 0.05 followed by Bonoccord locality of 0.04 (Appendix 2-4).

3. WEST COAST SEMI-EVERGREEN FORESTS (C2)

Characters

It is a closed high forest with heterogeneous mixture of evergreen and deciduous species. the former generally predominating. This type is found adjoining the evergreen forest, mostly along the lower slopes. The lower slopes being more easily accessible, have been subjected to heavy interference in the past. Floristic composition of this type depends on the components species of the original evergreen forest and those of the deciduous sera1 communities occurring around. Percentage of the evergreen species and deciduous species in this heterogeneous mixture varies depending of various factors. The species diversity is high, but, many of the typical evergreen species are absent. Buttressed stems continued to be frequent and occur in both evergreen and deciduous species. Bark tends to be thick and rough and Cauliflory is not common. The general Canopy is typically less dense than in the true evergreen and the evergreen undergrowth rather more copious; climbers tend to be very heavy. Bamboo and reeds are usually present in certain localities. Epiphytes are abundant including many ferns and orchids.

Distribution

This type occurs throughout the tract below 700m. and is mainly represented between 300 and 700m. above sea level. This type mainly occurs at Podiyakala. Karumanpara. below Vellipara. near Pachanituval falls, below Nachiyadi kunnu and Kadiramudimalai.

Density

In semi-evergreen forest the species showing high densities are Aporusa lindleyana (0.90), Mesua nagasarium (0.50), Vitex altissima (0.30)and Terminalia paniculata (0.30) (Appendix 10). In Podiumkala locality four species shows density value of 0.50 and above and are Aporusa lindleyana 11.60). Alstonia scholaris (0.70). Terminalia paniculata (0.60), and Actinodaphne bourdillonii (0.50).Podiumkala locality represents 22 species. of which Aporusa is having considerable high density value(Appendix 6). In Bonoccord only 3 species shows above 0.50 density they are Aporusa lindleyana (1 .00). Hopea parviflora (0.60) and Wendlandia bicuspidata (0.60) (Appendix 7). Seven species shows 0.50 and above density in Karamana locality they are Mesua nagasarium (1.90), Dimocarpus longan (0.80).

Syzygium mundagam (0.80). Hydnocarpus pentandra (0.80). Dwspyros candolleana (0.601. Gluta travancorica (0.60), and Knema attenuata (Appendix 8). In Podium five species shows high frequency (0.50 and above), They are Aporusa lindleyana (0.90). Vitex altissima (0.70), Ixora arborea (0.70) and Xanthophyllum arnottianum (0.50) (Appendix 9).

Abundance

The most abundant species of Podiumkala are Aporusa lindleyana (2.00) Elaeocarpus glandulosus (2.00). Olea dioica (2.00) Vitex altissima (2.00). and Ixora arborea (2.00).In Bonoccord Wendlandia bicuspidata (3.00), Aporusa lindleyana (2.00) Knema attenuata (2.00) and Hopea parviflora (2.00) have the high abundance value. In Karamana locality the following species show high abundance. and are Syzygium mundagam (2.00). Mesua nagasarium (2.1I), Hydnocarpus pentandra (2.00). Gymnacranthera fnrguhariana (2.00). Dimocarpus longan (2.00). Diospyros candolleana (2.00). and Carallia brachiata (2.00).Gluta travancorica (2.50) Pterospermum rubiginosum (0.20) and Symplocos macrophylla subsp. zeylanicus (2.00) show high rate of abundance in Podium locality.

Frequency

In this type of forest *Aporusa* lindleyana record the high mean percentage frequency value of 47.50, followed far behind by Terminalia paniculata and Mesua nagasarium, both have the mean percentage frequency of 25.00. The following species show the mean percentage frequency of 20.00. They are Artocarpus hirsutus. Alstonia scholaris and Vitex altissima Raunkiaer's 'Law of frequency' for this type indicates heterogeneous nature for all localities. In Podiyakala locality only one species shows high percentage value of 80.00. i.e. Aporusa lindleyana Alstonia scholaris shows medium frequency value of 60.00. All other species have the percentage frequency below 41.00. The prominent among them are Persea macrantha (40.00). Artocarpus hirsutus (40.00) and Terminalia paniculata The vegetation of this locality shows heterogeneous nature. In Bonoccord no species show high percentage frequency value of more than 60.00. Only one species comes under medium percentage frequency, Aporusa lindleyana (50.00). All other species have less than 41.00 percentage frequency. For this locality Raunkiaer's 'Law of frequency ' indicates heterogeneous nature.

In Karamana locality Mesua nagasarium shows very high percentage of 90.00. followed by the medium frequency of 50.00 by Gluta travancorica All other species shows low and very low percentage frequency. The prominent species which show low frequency are Knema attenuata (40.00). Dimocarpus longan (40.00). Hydnocarpus pentandra (40.00) and Syzygium mundagm (40.00). As per the Law of frequency' this locality shows heterogeneous nature.

In Podium locality only Aporusa lindleyana (50.00) shows medium frequency. All the other species have less than 41.00 percentage frequency. In this Xanthophyllum arnottianum, Vitex altissima. Ixora arborea shows 40.00

percentage frequency. A (81.48%) > B (18.51%) > C (3.70%) <=> D (0%) < E (0%) is the nature of vegetation of this locality as per the 'Law of frequency' and the vegetation is heterogeneous in nature.

Basal area

In this type the following species shows maximum mean basal areas. They are Mangifera indica (2612.65), Persea macrantha (2244.02), Terminalia paniculata (2086.91). Bridelia retusa (1962.95). Stereospermum chelonoides (1253.87). Artocarpus hirsutus (1211.30) and Mallotus philippensis (1136.65) (Appendix 10).
In Podiumkala locality Mangifera indica have the high basal area of 9305.00 followed by Pterocarpus marsupium (4356.I), Persea macrantha (4099.4), Stereospermum chelonoides (2994.1). Teminalia bellirica (1604.l), Bombax ceiba (1537.1). Artocarpus hirsutus (1515.00), Terminalia paniculata (1365.20). Artocarpus heterophyllus (1223.2) and Mallotus philippensis (1223.2) (Appendix 6).

In Bonoccord locality Terminalia paniculata (3609.3) shows maximum basal area to be followed by Persea macrantha (2299.1). Sterculia urens (2299.1). Lagerstroemia microcarpa (2036.6). Brideliaretusa (1742.6). Stereospermum chelonoides (1303.4) and Lannea coromandelica (1015.8) (Appendix 7).

In Karamana locality Terminalia paniculata and Persea macrantha have the highest basal area of 2577.6. followed by Garcinia gummi-gutta (2464.3). Gmelina arborea (2358.5). Mallotus philippensis (2299.1). Bridelia retusa (2036.6). Elaeocarpus tuberculata (1695.8), Vitex altissima (1344.5) and Mangifera indica (1145.6) (Appendix 8).

In Podium locality the number of species which shows high basal area are comparatively low. The high basal area exhibited by Artocarpus hirsutus (2994.1) followed by Dipterocarpus bourdilloni (1790.0). Vitex altissima (1766.2). and Macaranga peltata (1263.0) (Appendix 9). Importance value index (IVl)

The dominant species of this type based on mean IVl are Aporusa lindleyana (23.39). Terminalia paniculata (17.63) and Artocarpus hirsutus (16.73). The following species also exhibit high IV1. They are Vitex altissima (11.761 and Mesua nagasarium (11.11). Aporusa lindleyana (40.64). Mangifera indica (30.83) and Persea macrantha association is seen in Podiumkala region. Alstonia scholaris (23.75) and Terminalia paniculata (20.83) have also shown comparatively high M. In Bonoccord locality Terminalia paniculata (28.90) and Aporusa lindleyana (24.67) association is seen.

Species distribution

In Podiumkala locality only Alstonia scholaris exhibit regular distribution (0.02). Out of 22 species recorded 7 species shows random distribution. Aporusa lindleyana (0.03). Persea macrantha (0.03), Terminalia

(0.03), Artocarpus hirsutus (0.03), Terminalia paniculata (0.04) and Vateria indica (0.05)are some of them. The species show highly contiguous distribution are Elaeocarpus glandulosus (0.20). Olea dioica (0.20), Vitex altissima (0.20).and Ixora arborea (0.20).

Maturity index

This type of forest shows maximum maturity index at Podiumkala locality (22.73). followed by Karamana (20.32), Bonoccord (19.66) and Podium locality (18.52).

Similarity index

This type shows low similarity value between localities in the range of 35-37 except for Podiumkala and Karamana localities (30.18). The other similarity index between localities are as follows: Podiumkala-Bonoccord 35.29, Podiumkala-Podium 36.73. Bonoccord-Karamana 36.66, Bonoccord-Podium 35.71 and Karamana-Podium 37.93. Karamana-Podium represent the highest similarity index. This type shows more similarity to the evergreen forest (Bonoccord 24.24%. Karamana 39.44%, Podium 37.29%) than moist deciduous forest(Podiumkala 30.77%. Bonoccord 17.78%. Karamana 28% and Podium 9.30%).

Continuum index

The continuum index type show a great variation in Karamana locality (684.62) from the other localities like Podiumkala (1473.86) and Bonoccord (1409.71). There is a slight increase in the continuum index of Podiumkala from the other two.

Diversity index

The highest diversity index of Shannon wiener registered at Bonoccord locality is 3.1366. followed by Podium, 2.9910, Karamana, 2.9295. and Podiumkala locality.2.7080. The diversity index of this type of forest ranges from 2.7080 to 3.1366. The Simpson's concentration of dominance value of this forest ranges from 0.10 to 0.5. highest value recorded at Podiumkala (0.10) and the lowest at Bonoccord locality (0.5). Karamana and Podium localities recorded 0.08 and 0.07 respectively.

4. PIONEER EUPHORBIACEOUS SCRUB (2S1)

Characters

Before the declaration of the Peppara wild life sanctuary the tribals practised shifting cultivation. In semi-evergreen forest where tribals abandoned their settlements or practised shifting cultivation or if a heavy clear felling is made and area is then left to its natural regrowth it very commonly occurs that a cover of quick growing but short lived trees is quickly established. due to

disturbance in the micro climate of the area. The seedlings of the species constituting the original vegetation thus find themselves exposed to direct radiation and drier atmosphere. The Euphorbiaceous genera like Macaranga, Mallotus and Trerna usually predominate as a first stage in the secondary sere providing regeneration to other species.

Distribution

In Peppara wild life sanctuary this type of forest are seen in the Southern part of the tract, where the tribals settlements are mainly located. The Pioneer Euphorbiaceous scrub type is observed below Nachiyar mottai and along with the Muttupara thodu (Anjunazhikathodu).

Density

In pioneer euphorbiaceous scrub Aporusa lindleyana shows high density of 1.10 followed by Macaranga peltata (0.90). Trerna orientalis (0.70). Mallotus tetracoccus (0.60)and Olea dioica.

Abundance

Only Ficus hispida shows abundance value of 2.00. The other species show abundance value below 2.00 are Aporusa lindleyana (1.57). Macaranga peltata (1.50)and Mallotus tetracoccus (1.50).

Percentage Frequency

Aporusa lindleyana records the highest percentage frequency of 70.00 followed by Olea dioica (60.00). Macaranga peltata (60.00) and Trema orientalis (50.00).

Basal area

Tamarindus indica record the highest basal area of 3508.4 followed by Terminalia paniculata (893.87). No other species exhibit basal area more than 500. The other species which show comparatively high basal area are Albizia odoratissima (423.95), Sterculia urens (367.86) and Actinodaphne bourdillonii (367.86) (Appendix 11).

Importance value index

The highest IVI recorded in this type is 46.00 of Tamarindus indica and its high IVI is due to the high basal area. The species which shows dominance in this type are Aporusa lindleyana (25.89), Macaranga peltata (25.60). Olea dioica (20.06) and Trema orientalis (18.16).

Species distribution

Out of 21 species recorded 15 species shows random distribution and 6 species show contiguous distribution. The species show very random distribution are Aporusa lindleyana (0.02), Olea dioica (0.02). Macaranga peltata (0.03). Trema orientalis (0.03). Mallotus philippensis (0.03). etc.

Maturity index

The maturity index of this cover type is 30.00.

Similarity index

This type shows comparatively high similarity index value of 37.20 to the semi-evergreen forest of Podiumkala locality followed by evergreen forest of Bonoccord (31.03), moist deciduous forest of Podiumkala (31.570).

Continuum index

The continuum index value for this locality is 1343.21.

5. MOIST BAMBOO BRAKES (E3)

Characters

The Bamboo brakes occur in this tract are found along the stream sides and shady slopes and found as secondary associations. In Peppara wild life sanctuary Bamboo brakes are seen in West coast tropical semi-evergreen forest and Southern secondary moist mixed deciduous forest ,fairly common in latter type. Bamboo are seen in either pure patches with occasional stand of deciduous trees or is mixed with evergreen or deciduous type.

Distribution

The bamboo brakes in this sanctuary mainly located below 300.m along the sides of Mutupara thodu. Pnampara thodu. Kaviyar and below Poomandthu-kunnu.

6. SOUTHERN SECONDARY MOIST MIXED DECIDUOUS FOREST

Characters

Closed high forest of about 30 to 36m. in height, the dominant species are deciduous. Due to the availability of considerably high soil moisture a few evergreen species are also seen. Bamboo are commonly seen in some areas especially in the low lands near reservoir. Bamboo tends to spread when the canopy is open. The undergrowth is luxuriant where the ground is not covered by grasses. Epiphytes are seen and climbers are abundant. The trees mostly have rounded crown and tall cylindrical bole. Buttress formation is also found in some species. The tree in this type generally have thick bark, mostly fibrous and fissured in all shapes. The chief feature of the moist deciduous forest is a leaf less period in the dry season typically is March-April. When the upper canopy is almost entirely leafless through there is often a good sprinkling of evergreen in the under wood and shrub cover. An appreciable number of the deciduous trees. however, come into new leaf (and often flower) long before the monsoons unexpectedly spreading there new foliage at a time when one would expect them to experience great difficulty in

obtaining enough moisture for the intense transpiration which must lake place.

The under ground in almost all places of this type covered by grasses. The fires result in the spread of the grass which become heavy and continuous especially where the canopy is open.

Density

In this type of forest 39 species were recorded. The species show more than 50 mean densities are Terminalia paniculata (1.37). Pterocarpus rnarsupium (1.051, Careya arborea (0.70) and Dillenia pentagyna (0.65) (Appendix 17). Three species show more than 50 density in Podiumkala locality are Pterocarpus rnarsupium (1.60). Careya arborea (1.20) and Terminalia paniculata (0.601 (Appendix 121. In Bonoccord four species shows high densities. They are Terminalia paniculata (1.10). Pterocarpus marsupium (1.10). Dillenia pentagyna (0.90) and Careya arborea (0.70). Terminalia paniculata (2.30) recorded very high density in Bonoccord region compared to the other localities. Other species which have 0.50 and more densities are Olea dioica (1.20). Buchanania longan (0.90), Dillenia pentagyna (0.50) and Phyllanthus emblica (0.50) (Appendix 13).

In Podium locality Terminalia paniculata (1.50). Pterocarpus marsupium (1.10). Dillenia pentagyna (0.901, Phyllanthus emblica (0.70) and Careya arborea(0.60) exhibits densities in and above 0.50 (Appendix 14).

Abundance

The species shows Abundance in Podiumkala locality are Pterocarpus rnarsupium (2.67). Olea dioica (2.00), Tabernaemontana divaricata (2.00). Lannea corornandelica (2.00) and Dalbergia lanceolaria (2.00). Only Dalbergia lahtifolia (3.00) show high abundance in Bonoccord region. The other species shows abundance are Terminalia paniculata (1.83) and Pterocarpus rnarsupium (1.83).

In Karamana locality Olea dioica (3.00) and Terminalia panicdata (2.88) shows high rate of abundance, followed by Dillenia pentagyna (1.69) and Phyllanthus ernblica (1.69) (Appendix 15). Terminalia paniculata (2.50), Careya arborea (2.00), and Buchanania lanzan (2.00) exhibits 2.00 and more density values in Podium locality.

Percentage Frequency

Terminalia paniculata (62.50). Pterocarpus rnarsupium (52.501, Dillenia pentagyna (47.50) and Careya arborea (45.00) shows high rate of mean percentage frequency in this type (Appendix 171. All the three localities exhibit heterogeneous nature of vegetation. In Podiumkala Careya arborea (70.00) and Pterocarpus rnarsupiurn (60.00) shows high percentage frequency. Terminalia paniculata shows medium frequency (0.50). The 'low of frequency' shows the heterogeneous nature for this locality. Dillenia pentagyna (70.00) exhibits high frequency in Bonoccord area followed by Terminalia paniculata

(60.00) and Pterocarpus marsupium (60.00) Careya arborea (50.00) shows medium frequency. In Karamana locality Terminalia paniculata recorded the high frequency of 80.00 and Buchanania lanzan shows medium percentage frequency of 50.00. Karamana locality shows heterogeneous nature of vegetation. Uniform high frequency of 60.00 exhibited by Pterocarpus marsupium, Terminalia paniculata and Dillenia pentagyna in Podium locality. The 'law of frequency' states that the vegetation is heterogeneous. Only Terminalia paniculata registered high percentage frequency of (70.00) followed by Buchanania lanzan shows medium percentage frequency of 60.00 for law status forest (Appendix 16).

Basal area

The mean basal areas of this type is very lower than the forest types mentioned above. Only one species Schleichera oleosa (1243) shows basal area value of more than 1000. The other species shows comparatively high basal areas are Pterocarpus marsupium (994.5), Terminalia paniculata (742.31) and Dillenia pentagyna (644.11) (Appendix 17). Mitragyna parviflora (1604.1), Bridelia retusa (1493.2). Phyllanthus emblica (1303.4). Lannea coromandelica (1184.1). Pterocarpus marsupium (1070.5) and Dalbergia lanceolaria (1015.8) shows high basal area in Podiumkala locality.

In Bonoccord locality Schleichera oleosa shows high basal area of 4972.2 followed by Grewia tiliifolia (1515.0), Pterocarpus marsupium (1303.4). and Lagerstroemia microcarpa (1089.00). In Karamana locality only one species registered basal area value of more than 1000 i.e. Pterocarpus marsupium (1015.8). The other species which shows comparative high basal areas are Hopea parviflora (795.54) and Syzygium cuminii (673.35).

In Podium locality also only one species above 1000 basal area value that is, Bombax insigne (1386.2). The other species which shows comparative high basal area values are Lagerstroemia microcarpa (997.93). Prunus zeylanica (827.68). Terminalia paniculata (748.53) and Pithecellobium monadelphum (602.15).

Importance value index [IVI]

When the mean IVI of species occurring in this type are taken a very conspicuous association of Terminalia paniculata (42.34). Pterocarpus marsupium (37.91). Dillenia pentagyna (27.17) and Careya arborea (21.50) is seen.

In Podiumkala locality highest IVI recorded are for the species Pterocarpus marsupium (51.09), Careya arborea (44.46) and Terminalia paniculata (30.27). The conspicuous association of Pterocarpus marsupium (42.93), Terminalia paniculata (41.67)-Dillenia pentagyna (39.24), and Careya arborea (28.36) is seen in Bonoccord locality. The Schleichera oleosa has also shows high IVI of 39.62. but it is due to the 'false dominance' by its high basal area and more over it is only represented by one species in sample plots studied. Karamana locality recorded comparatively high rate of IVI for Terminalia

(52.86). The other dominant species of this locality based on IVI are Buchanania lanzan (29.22), Olea dioica (28.14) and Pterocarpus marsupium (27.66). The dominance of Terminalia paniculata (46.06), Pterocarpus marsupium (38.081, Dillenia pentagyna (34.10) etc. are seen in Podium locality.

Species distribution

In Podiumkala two species exhibits regular distribution they are Terminalia paniculata (0.02) and Careya arborea (0.02). Three species have random distribution Viz.: Dillenia pentagyna (0.03), Pterocarpus marsupium (0.04) and Bridelia retusa 13 species shows contiguous distribution. The species which have high contiguous distribution are Olea dioica (0.20) and Lannea coromandelica (0.20).

In Bonoccord region two species exhibits regular distribution i.e. Dillenia pentagyna (0.018). and Careya arborea (0.028). Terminalia paniculata (0.03) Pterocarpus marsupium (0.03) and Grewia tiliifolia are (0.05)having random distribution. Dalbergia latifolia shows high contiguousness (0.30) in this locality.

In Karamana locality none of the species exhibits regular distribution. The species which have random distribution are Careya arborea (0.03). Buchanania lanzan (0.04). Terminalia paniculata (0.04). Pterocarpus marsupium (0.04) and Syzygium cuminii (0.05).The rest 14 species exhibits contiguous distribution.

In Podium locality out of 16 species recorded, 8 species exhibits random distribution and 8 shows contiguous distribution. Like in the Karamana locality this locality also has not shown high rate of contiguous distribution of species. The species show random distribution are Pterocarpus marsupium (0.03).Dillenia pentagyna (0.03). Cinnamomum malabatrum (0.03). Terminalia paniculata (0.04). Terminalia chebula (0.04). Phyllanthus emblica (0.04). Bombax insigne (0.05) and Sterculia villosa (0.05).

Maturity index

The Podium locality have comparative high maturity of 26.25 followed by Bonoccord locality (25.00). The other two localities Podiumkala and Karamana have comparative low maturity index of 21.76 and 22.11 respectively.

Similarity index

The Podiumkala locality and Bonoccord localities show comparative high similarity value of 54.54. The Podiumkala and Karamana localities. Bonoccord and Podium localities and Karamana and Podium localities shows

more or less uniform similarity index of 50.00. The localities shows considerably low similarities are Bonoccord - Karamana localities (34.28) and Podiumkala and Podium localities (36.36).

Continuum index

The continuum index of this forest type shows considerable variations ranging between 1494.31 to 2111.42. In this Bonoccord locality shows high continuum index value of 2111.42 followed by 1661.2 for Podium locality, 1542.31 for Podiumkala locality and 1494.31 for Karamana locality.

Diversity index

The Shannon wiener diversity index of this type is considerably stable of 2.3 for type. The diversity index for different localities are 2.3704 for Bonoccord. 2.3389 for Podium, 2.3237 for Podiumkala and 2.3036 for Karamana locality. The Simpson's index of Concentration of dominance for this type ranging between 0.12 to 0.15. The Karamana locality record the highest Concentration of dominance value of 0.15 followed by 0.14 for Podiumkala. for Bonoccord and 0.12 for Podium locality.

7. MYRISTICA SWAMF' FOREST

Characters

This is a characteristic edaphic formation found in the bottom of valleys which is subjected to inundation throughout the year. The characteristic feature of this type is the abundance of Myristicaceae, particularly two species which are not common under other conditions viz. Gymnacranthera faguhariana and Myristica fatua var. magnifica This species have very dense stilt roots, some of which sprout six meter above the soil. The floor of this swamp is covered by looped knee-roots of Myristica species. The soil in which this association stands is alluvium brought down from the surrounding slopes and containing a large proportion of humified sand. The whole association is evergreen in character and occurs in midst of west coast tropical evergreen forest. First reported by Krishnamoorthy (1960) in the valleys of Shendurney. Kullathupuzha and Anchal ranges of Travancore. Champion and Seth (1968) have classified them in to the sub group 'tropical fresh water swamp forests'.

Distribution

This type of forest restricted to the sluggish streams as fringing forest below 300m. This type is mainly represented in Karikulathukavu near Cherukadu and found in the following places Pangattumothala, Mlavattipara, manpuram. Anachira. Pannumpara. and Vazhukummpara.

Density

Total 18 species are recorded in this type. Out of 18 species registered Gymnacranthera fraguhariana (1.20) show high density of 1.20 followed by Knema attenuata (0.80) and Myristica malabarica (0.50) (Appendix 18).

Abundance

Four species shows 2.00 and more abundance they are Gymnacranthera farguhariana (3.00), Myristica malabarica (2.50), Knerna attenuata (2.00). Holigarna arnottiana (2.00) and Vateria indica (2.00) (Appendix 18).

Percentage frequency

None of the species in this type shows frequency more than 40.00. The species shows frequency of 40.00 are Gymnacranthera farguhariana Myristica dactyloides and Knema-attenuata As per the law of frequency this type shows heterogeneous.

Basal area

In this type of forest Persea macrantha recorded the highest value of basal area i.e. 4582.3 followed by Myristica dactyloides (2963.3), Vateria indica (2606.3). Mesua nagasarium (2577.6). Myristica fatua (1742.6) and Myristica malabarica (1604.1).

Importance Value Index [IVI]

The dominant species of this type are Gymnacrantherafarguhariana (38.15). Myristica dactyloides (33.69). Persea macrantha, (31.37) and Knerna attenuata 128.71).

Species distribution

None of the species of this type shows regular distribution out of 18 species recorded four species show random distribution Viz.: Myristica dactyloides (0.03). Myristica fatua (0.03). Persea macrantha (0.05) and Knerna attenuata (0.05). In among the rest 14 species of contiguous distribution only Vateria indica (0.20) shows high aggregation.

Maturity Index

The Myristica swamp shows maturity index of 2.5098.

Similarity index

This type shows comparatively high similarity index to semi-evergreen forest(Bonoccord 40.02%. Karamana 54.55% and Podium 63.16%) than

moist deciduous forest(Bonoccord 10.81%. Karamana 27.91% and Podium 4.35%). Myristica swamp shows more similarity to evergreen forest(23.97%) than semi-evergreen forest(20.70%) when the mean similarity index is taken.

Continuum index

This type shows comparatively high Continuum index value of 1800.85.

Diversity Index

Shannon wiener diversity index for this type is 2.5098. The concentration of dominance show 0.11 value.

8 .TROPICAL SUB-MONTANE HILL VALLEY SWAMP FOREST (FS2)

Characters

This type of forest occurs in narrow strips which are water-logged or are under water continuously for a fairly long time during rains and found mostly depressions. The important factor is prolonged summer flood. Between the floods the soil dries out to a varying extent and where it is heavy and retentive the available water supply may be scanty and resulting in poor growth. Soil is rich in humus and continuously wet or at least moist. This forest consists of rather open crops of evergreen trees, able to withstand the wetness of the sites occupied. The trees are of medium height of 50 to 80. Density of under growth varies and climbers are few. This type is of limited occurrence in this sanctuary.

Species distribution

This type is commonly seen in Karikulathukavu. Kuttimuttumambaram. Panagattumothala. Anachira. Mlavitypara etc.

Density

The species show 0.50 and above densities in this type are Symplocos cochinchinensis (1.20). Pandanus thwaitesii (1.40). Gymnacranthera fraguhariana(0.50)and Holigarna arnottiana (0.50)(Table 22).

Abundance

The species show high abundance values in this forest are Pandanus thwaitesii (4.67) Symplocos cochinchinensis (2.00) and Aporusa lindleyana (2.00).

Percentage frequency

Symplocos cochinchinensis shows medium percentage frequency of 60.00. All other species have percentage frequency less than 41.00. The species which have the percentage frequency of 40.00 are Gymnacranthera farguhariana

and Holigarna arnottiana. This type shows Heterogeneous nature in this sanctuary as shown by Raunkiaer's (1938)'law of frequency'.

Basal area

In this type of forest only two species show more than 1000 basal area values, They are Myristica dactyloides (1790.0). Mastixia arborea subsp.. meziana(1344.5). The other species show comparatively high basal area are Gymnacranthera fraguhariana (9 10.82). Persea macrantha (843.99), Myristica malabarica (843.99) and Vateria indica (795.54).

Importance value index

The dominant species of this type are Symplocos cochinchinensis (31.24). Gymnacranthera fraguhariana (24.25) and Holigarna arnottiana (22.10). Pandanus thwaitesii 127.20) has also comparatively high IVI. Species distribution None of the species exhibit regular distribution. Out of 23 species recorded in this type 8 species shows random distribution and rest of 15 species are contiguous in distribution. in this Aporusa lindleyana (0.20) and Pandanus thwaitesii (0.16) show high rate of abundance value.

Maturity index

This type shows maturity index value of 20.

Similarity index

This type shows 43.90% similarity to Myristica swamp.

Continuum index

This locality records continuum index value of 1588.41.

Diversity index

The Shannon wiener diversity index recorded in this type is 2.7140. Concentration of dominance for this type is 0.10.

9. RIPARIAN FRINGING FOREST

Characters

In addition to the above mentioned edaphic types Riparian fringing forest a characteristic vegetation is found along the streams of this tract, which runs through the Moist deciduous forest. This type is found along water courses where the moister regime is very favourable to the growth of species.

Distribution

This type of forest are seen in the moist deciduous forest along the Panampara thodu. Kaviyar. Karamanayar. Kuttiyar. Ottakalluthodu. Panniyamkaduthodu etc. below 600m.

Density

48 species are recorded in this type of forest (Appendix 23). The highest mean densities exhibited by Madhuca neriifolia (0.60), Hopea parviflora (0.53). Holigarna arnottiana (0.26). Artocarpus hirsutus (0.23). Aporusa lindleyana (0.23). Calophyllum apetalum (0.20).

In Bonoccord region (Appendix *20)* Madhuca nerifolia have high density (1.30) followed by Aporusa lindleyana (0.60) and Ixora arborea (0.50).The species which shows 0.40 density are Hopea parviflora and Holigarna arnottiana In Karamana locality(Tab1e 25) Calophyllum apetalum exhibit high density of 1.10 value followed. by Lophopetalum wightianum (0.70) Hopea parviflora (0.70). In Podium locality(Tab1e 26) Gluta trauancorica (0.70). Vateria indica (0.60). Madhuca neriifolia (0.50) and Hopea parviflora (0.50) shows 0.50 and more density.

Abundance

Calophyllum apetalum (1.58) has the high abundance value when the mean abundance value of this type is taken followed by Lophopetatum wightianum (1.50), Vateria indica (1.50).Holigarna arnottiana (1.27) and Persea macrantha (1.16).In Bonoccord locality only Knema attenuata and Antiaris toxicaria exhibit 2.00 abundance value. The other species which shows comparatively high abundance are Madhuca neriifolia (1.80) and Persea macrantha (1.50). In Karamana locality Lophopetatum wightianum (3.50) shows high abundance value followed 'by Dimocarpus longan (3.00). Calophyllum apetalum (2.751. Vateria indica (2.00) and Persea macrantha (2.00).

Podium locality have the abundance of the following species, Gluta travancorica (2.33), Syzygium cuminii (2.00) and Carallia brachiata (2.00) etc.

Percentage Frequency

Hopea parviflora (40.00). Madhuca neriifolia (36.66), Calophyllum apetalum (30.00), Vateria indica (23.33) and Artocarpus hirsutus (23.33) shows high mean frequency in this type. All the three localities show heterogeneous nature of the vegetation as per 'the low of frequency'

In Bonoccord locality only one species registered with high percentage frequency i.e. Madhuca nerifolia (80.00).Of the other species Ixora arborea is having medium percentage frequency of 50.00 and two species are having 40.00 percentage frequency, Viz.: Aporusa lindleyana and Hopea parviflora In Karamana locality all species shows percentage frequency less than 41.00. The species having 40.00 percentage frequency are Calophyllum apetalum.

Knema attenuata and *Hopea parviflora* In Podium locality no species is having percentage frequency of 41.00 and above. Three species with 40.00 frequency. are *Calophyllum apetalum. Vateria indica* and *Hopea parviflora*

Basal area

The average basal area of the type shows high values for the following species. They are *Vateria indica* (3378.76),*Calophyllum apetalum* (2411.19), *Gymnacranthera farguhariana* (1680.60). *Ficus hispida* (1527.43), *Dipterocarpus bourdilloni* (1103.56) and *Vitex altissima* (1066.37). In Bonoccord locality a large number of species show above 1000 basal area value. They are *Vateria indica* (5799.5). *Calophyllum apetalum* (4972.2).*Ficus hispida* (4582.3). *Antiaris toxicaria* (2272.21, *Alstonia scholaris* (2036.6). *Hopea parviflora* (1813.9). *Carallia brachiata* (1695.8). *Persea macrantha* (1283.1). *Garcinia gummi-gutta* (1164.8), *Artocarpus hirsutus* (1126.6) and *Lannea coromandelica* (1052.1).

In Karamana locality only five species show above 1000 basal area value they are *Gymnacranthera farguhariana* (4582.3). *Lannea coromandelica* (1790.0). *Syzygium cuminii* (1790.01. *Vateria indica* (1672.6) and *Persea macrantha* (1559.3).

In Podium locality *Dipterocarpus bourdilloni* shows high basal area of 3310.7 followed by *Vateria indica* (2664.2), *Vitex altissima* (2664.2). *Lophopetatum wightianum* (2381.00). *Calophyllum apetalum* (1813.9). *Toona ciliata* (1493.2). *Artocarpus hirsutus* (1344.5). *Hydnocarpus macrocarpa* (1243.0). *Hopea parviflora* (1107.7)and *Gluta travancorica* (1015.8).

Importance value index [IVl]

The dominant species of this type based on mean IVl (Appendix 23). are *Calophyllum apetalum* (22.43). *Vateria indica* (21.92). *Hopea parviflora* (20.75). and *Madhuca neriifolia* (18.88).1n Bonoccord locality *Madhuca neriifolia* shows high importance value index (42.11) compared to the other species like *Hopea parviflora* (20.69),*Aporusa lindleyana* (20.35) and *Ixora arborea* (20.16). *Vateria indica* shows 'false dominance' in this locality (20.92) (Appendix22).

In Karamana the association is mainly between *Calophyllum apetalum* (29.45) and *Hopea parviflora* (22.65).Although *Gymnacranthera farguhariana* (26.87) has high IV1 it is due to 'false dominance' caused by its girth (Appendix 21). Vateria indica (25.30), *Gluta* trauancorica (19.73), *Calophyllum apetalum* (19.54) and *Hopea parviflora* (18.36) association is seen in Podium locality [Appendix 22).

Species distribution

In Bonoccord locality the species with regular distribution are *Madhuca neriifolia* (0.02) and *Ixora arborea* (0.02). Nine species shows random distribution i.e. *Hopea parviflora* (0.03),*Artocarpus hirsutus* (0.03).*Aporusa*

lindleyana (0.04) etc. Ten species show contiguous distribution. Of this Knema attenuata and Antiaris toxicaria are highly contiguous value of 0.20.

In Karamana locality none of the species shows regular distribution. Out of 24 species recorded only five species show random distribution, and the rest 19 species show contiguous distribution. Dimocarpus *longan* (0.30). Persea macrantha (0.20) and Allophylus serrulatus (0.20) etc. are highly contiguous. In Podium locality 8 species shows random distribution and 22 species have contiguous distribution. Artocarpus hirsutus (0.03). Olea dioica (0.03). Calophyllum apetalum (0.03). Hopea parviflora (0.03). etc. are some among them with random distribution. Caralliaa brachiata shows high contiguous value of 0.20.

Maturity index

The maturity index of the Riparian fringing forest of Bonoccord shows comparative high maturity (22.38) than the other localities. The Karamana locality and Podium locality shows more or less same maturity values of 17.08 and 17.33 respectively.

Similarity index

The Riparian fringing forest of Bonoccord - Podium localities and Karamana - Podium localities shows similarity of 47.05 and 48.14 respectively. The Bonoccord - Karamana localities shows comparative low rate of similarity value of 40.00.

Continuum index

In Riparian fringing forest, the Bonoccord locality shows continuum index value of 1264.00, in Karamana locality it is 1557.89 and in Podium locality it is 1433.86.

Diversity index

A high rate of diversity index of Shannon wienner recorded at Podium locality (3.1438) followed by Karamana (2.8490) and Bonoccord (2.7137).The concentration of dominance in Bonoccord shows 0.09, Karamana shows 0.08 and Podium have 0.05.

10. LOW LEVEL GRASS LANDS

Characters

As per the classification of Chandrasekharan (1962 a, b and the grasslands are divided in to two, the grasslands occurring at elevations below 4000 feet (Low level grasslands) and grasslands occurring at elevations above 4000 with temperate forests occurring in protected pockets (High level grasslands). According to Chandrasekharan low level grasslands are secondary forest type of evergreen forest.

The grass land occurring in Nachiyar mottai is due to past clearing and subsequent abandonment followed by repeated annual fires and the effects of strong winds. The other small grass lands is due to the retrogression stages from forest land.

Distribution

The grasslands occurring at elevations below 4000' are situated mainly at Nachiyar mottai.

11. SOUTHERN SUB-TROPICAL HILL FORESTS

Characters

This type of forest is comparable to the tropical evergreen forest that has been described as 'stunted rain forest'. The vegetation is not very luxuriant, The trees are smaller and with less shapely boles. The low stature of trees of this types are mainly due to the high velocity of wind and less favourable conditions of soil.

Distribution

Southern sub-tropical hill forest occur at Chemmunjimottai and Arumukhamkunnu above 1300 m.

Density

When the mean density of the two localities of the subtropical region are taken (Appendix 26) Syzygium cuminii (2.301 exhibit the highest density to be followed by Atalantia racemosa (2.00). Cinnamomum verum (1.95). Xanthophyllum arnottianum (1.70) and Cullenia exarillata (1.05).

The subtropical region has divided in to two localities i.e. Kaalimalaiparambu and Chemunjimottai regions. The Kaalimalaiparambu region have very high densities of Atalantia racemosa (3.00) followed by Syzygium cuminii (2.70). Carallia brachiata (1.50), Schrebera swietenioides (1.10) and Mesua nagasarium (1.00) (Appendix 24).

The Chemunjimottai of subtropical region have high density of Cinnamomum verum (3.60). followed by Xanthophyllum arnottianum (2.50). Syzygium cuminii (1.90). Mastixia arborea subsp. meziana (1.50). Elaeocarpus munronii (1.40), Atalantia racemosa (1.00). Cullenia exarillata (1.10) and Actinodaphne bourdillonii (1.00) (Appendix 25.) The species in this region shows high rate of density.

Abundance

The subtropical region exhibits high rate of abundance. The following species shows high abundance value. They are Carallia brachiata (5.25).

Xanthophyllum arnottianum (4.25), Atalantia racemosa (4.00). Syzygium cuminii (3.60), Cinnamomum uerum (3.75).Mesuanagasarium(2.66). Cullenia exarillata(2.35) and Elaeocarpus munronii (2.23). In the Kaalimalaiparambu locality 10 species shows more than 2.00 abundance value. The highest abundance value recorded by Carallia brachiata (7.50) followed by Atalantia racemosa (6.00). Syzygium cuminii (4.50). Mesua nagasarium (3.33). Ixora arborea (3.00).Cullenia exarillata (2.50). Xanthophyllum arnottianum (2.25). Schrebera swietenioides (2.20), Actinodaphne companulata var. obtusa (2.00) and Ixora nigricans (2.00).

In Chemunjimottai region 12 species have the abundance value more the 2.00. The prominent among them are Xanthophyllum arnottianum (6.25), Cinnamomum *verum* (6.00). Mastixia arborea subsp. meziana (3,75), Antidesma menasu (3.00) and Carallia brachiata (3.00) etc.

Percentage frequency

Syzygium cuminii (65.00) and Atalantia racemosa (50.00) shows more the 50.00 mean percentage frequency for the two regions. The low of frequency worked for the two localities shows heterogeneous nature of the vegetation.

Only three species show percentage frequency for 41 and above in Kaalimaliparambu region. They are Syzygium cuminii (60.00). Atalantia racemosa (50.001 and Schrebera swietenioides (50.00). In Chemunjimottai rcgion two species shows 61.00 and more percentage frequency. They are Syzygium cuminii (70.00) and Actinodaphne bourdillonii (70.00). Cinnamomum uerum (60.00). Elaeocarpus munronii (50.00), Atatantia racemosa (53.00) and Cullenia exarillata (50.00) shows medium frequency.

Basal area

The mean basal area of this forest type shows very low values. None of the species exhibit above five hundred basal area value. The speci-s shows comparative high basal area values are Hydnocarpus macrocarpa (481.30), Poeciloneuron indicum (472.59). Vateria indica (470.05) and Hopea parviflora (455.411.

In Kaalimalaiparambu region of this type shows comparatively high basal area of 910.82 for Hopea parviflora. followed by Elaeocarpus tuberculatus (574.78). Vatria indica (561.34) and Mesua nagasarium (459.51). In Chemunjimottai regions the following species show comparatively high basal areas, i.e. Hydnocarpus macrocarpa (962.61).Poeciloneuron indicum (945.19), Anthocephalus chinensis (658.79) and Cullenia exarillata (534.92).

Importance value index

In the subtropical region the moist dominant species is Syzygium cuminii (40.24) followed by Atalantia racemosa (21.04). Cinnamomum verum (17.64). Cullenia exarillata (17.20) and Xanthophyllum arnottianum (17.11).The Kaalimalaiprambu region have the association of Syzygium cuminii (2941).

Atalantia racemosa (28.99) and Mesua nagasarium (19.81). Hopea parviflora exhibits false dominance in this region (24.50) because of its high basal area. In Chemunjimottai locality the association is between Cinnamomum verum (27.48). Syzygium cuminii (21.67). Cullenia exarillata (19.23) and Xanthophyllum arnottianum (19.31).

Species distribution

In Kaalimalaiparambu locality out of 37 species five species exhibits random distribution and the rest 22 species shows contiguous distribution. None of the species exhibits regular distribution. The species which show random distribution are Hopea parviflora (0.04). Schrebrra swietenioides (0.04). Artocarpus heterophyllus (0.05) and Diospyros candolleana (0.05). The species which snow very contiguous distribution are Carailia brachiata (0.28). Ixora arborea (0.30) and Ixora nigricans (0.20).In Chemunjimottai locality 11 species show random distribution and 20 species show contiguous distribution out of 32 species recorded. The species which shows regular distribution is Actinodaphne bourdillonii 3.02). The species which show random distribution are Syzygium cuminii (0.04). Atalantia racemosa (0.04), Cullenia exarillata (0.04). Vateria indica (0.04) etc. The species which show high rate of contiguousness are Carallia brachiata (0.30) and Aporusa lindleyana (0.20).

Maturity Index

This type shows the maturity index value of 22.96 for low altitude locality and 25.31 for high altitude locality.

Continuum Index

This type exhibit slight variation from Kaalimalaiprambu to Chemunjimottai. Kaalimalaiparambu locality have 1580.97 continuum index and Chemunji-mottai shows 1498.49 continuum index value.

Diversity Index

The Shannon wiener indes for diversity shows 3.8269 Chemmunjimottai locality and 2.7223 for Kaalimalaiparambu locality. Simpson's index shows not much variations in concentration of dominance: 0.09 lor Chemunjimottai locality and 0. 10 for Kaalimalaiparambu locality.

12. OCHLANDRA REED BRAKES

Characters

The Ochlandra reed brakes found in this tract are almost pure patches of impenetrable thickets of reeds about 3 to 4m. height. The scattered overwood of evergreen species is very rare, almost absent. In some areas especially on rocky groundpatches of Bentinckia *condapanna* are seen above 1300m. As the reeds are varyaggressive and capable of withstanding partial shade. they colonise very quickly to large populations where there is a break in the

canopy or gaps created by felling. It has been observed that where ever forests fire occurs, the area would be soon covered by the reeds.

Distribution

This type mainly confined to the eastern region of the sanctuary above 900ms. where the interstate boundary of Tamil Nadu and Kerala coincides with the Peppara wild life sanctuary boundary. This region comes both on tropical and sub-tropical region. This type is in between the west cost evergreen forest and Southern sub-tropical hill forest. In some areas sub-tropical hill forests is seen in the middle of reeds breaks. The reed breaks are seen in this tract as a narrow belt just below the following heights of Chemmunji mottai. Koviltheri malai, Arumukham kunnu. Adirumalai etc.

13. BENTINCKIA CONDAPANNA

Besides the above mentioned forests types found in the sub-tropical region in some places especially on rocky outcrops pure patches of Bentinckia condapanna brakes are seen. The *Bentinckia condapanna* brakes seen in this sanctuary is restricted between 1200m. to 1300m. above sea level. In the following localities this type are seen i.e. below Kaalimalaiparambu. in the right side of Karamanayar. etc.

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Table 1. Area estimated from 1:50,000 black and white aerial photographs

Sl.	Forest type	Density		Total
1.	Southern hill top tropical evergreen forest	Low density	0.000	
		Medium density	0.025	
		High density	0.432	0.457
2.	West coas tropical evergreen forest	Low density	0.000	
		Medium density	0.313	
		High density	10.129	10.422
3.	West coast semi-evergreen forest	Low density	4.872	
		Medium density	4.934	
		High density	4.461	14.267
4.	West coast semi-evergreen forest with bamboos	< 25%	0.344	
		26-50	0.623	0.967
5.	Pioneer Euphorbiaceous scrub		-	0.555
6.	Southern secondary moist mixed deciduous forest	5-20%	4.394	
		21-40%	17.316	
		41-60%	5.032	
		61-80%	2.096	
		> 81%	0.158	28.996
7.	Southern secondary moist mixed deciduous forest with bamboos	< 25%	0.089	
		26-50%	0.171	0.260
8.	Bamboo brake	51-75%	0.004	
		>76%	0.444	0.448
9.	Riparian fringing forest	Low density	1.331	
		Medium density	1.100	
		High density	1.106	2.537
10.	Low level grassland		-	1.832
11.	Southern subtropical hill forest	Low density	0.055	
		Medium density	1.020	
		High density	0.000	1.075
12.	Ochlandra reed brake	Low density	0.073	
		Medium density	0.356	
		High density	1.790	2.218
13.	Bentinkia condappana	Low density	0.069	
		Medium density	0.112	
		High density	0.026	0.207
14.	Scrubland	Open	1.666	
		Dense	1.450	3.116
15.	Plantation Eucalyptus		-	0.050
16.	Plantation tea		-	0.069
17.	Marsh		-	0.031
18.	Exposed rock		-	1.723
19.	Tribal settlements		-	0.975
20.	Reservoir		-	4.921

Table 2. Area estimated from 1: 50,000 IRS geocoded imagery

No.	Forest Type	Density (in Sq. Kms)	Total (in Sq. Kms)
1	West coast tropical evergreen forest		
	Low density		10.77
	Medium density	0.47 (4.37%)	(14.24%)
	High density	10.30 (95.62%)	
		0.00	
2.	West coast semi-evergreen forest		16.65
	Low density	6.20 (37.21%)	(22.03%)
	Medium density	5.30 (31.85%)	
	High density	5.15 (30.98%)	
3.	Southern secondary moist mixed deciduous forest		29.78 (39.40%)
	Low density	4.50 (15.12%)	
	Medium density	14.86 (49.89%)	
	High density	10.41 (34.98%)	
4.	Riparian fringing forest		3.78 (5.00%)
	Low density	2.82 (74.72%)	
	Medium density	0.95 (25.27%)	
	High density	0.00	
5.	Low level grass land		2.33 (3.08%)
6.	Southern sub-tropical hill forest		1.95 (2.59%)
	Low density	0.78 (40.14%)	
	Medium density	1.17 (59.85%)	
	High density	0.00	
7.	Degradation stage of Southern sub-tropical hill forest		0.41 (0.54%)
8.	Ochlandra reed brake		2.01 (2.66%)
	Low density	0.76 (38.14%)	
	Medium density	0.29 (14.66%)	
	High density	0.94 (47.19%)	
9.	Scrub land		1.91 (2.53%)
	Open	0.36(18.84%)	
	Dense	1.55(81.15%)	
10.	Plantation Eucalyptus		0.04 (0.52%)
11.	Exposed rock		0.96 (1.27%)
12.	Barren land		0.05 (0.07%)
13.	Reservoir		4.94 (6.53%)
	GRAND TOTAL		75.58

Appendix 1. Vegetation analysis

SOUTHERN HILL TOP TROPICAL EVERGREEN FOREST

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1	*Mesua nagasarium*	2.70	3.00	90.00	336.12	26.47	13.64	4.09	44.20	0.033
2	*Carallia brachiata*	0.80	1.60	50.00	183.29	7.84	7.58	2.23	17.65	0.032
3	*Xanthophyllum arnottianum*	0.50	1.25	40.00	447.49	4.90	6.06	5.44	16.40	0.031
4	*Knema attenuata*	0.10	1.00	10.00	1070.5	0.98	1.52	13.02	15.52	0.100
5	*Actinodaphne bourdillonii*	0.40	1.33	30.00	534.92	3.92	4.55	6.51	14.98	0.044
6	*Gluta travancorica*	0.30	1.00	30.00	561.34	2.94	4.55	6.83	14.32	0.033
7	*Agrostistachys borneensis*	0.50	1.00	50.00	140.33	4.90	7.58	1.71	14.19	0.020
8	*Diospyros candolleana*	0.70	2.33	30.00	206.92	6.86	4.55	2.52	13.93	0.077
9	*Vernonia travancorica*	0.50	1.25	40.00	206.92	4.90	6.06	2.52	13.48	0.031
10	*Syzygium mundagam*	0.40	1.33	30.00	357.12	3.92	4.55	4.34	12.81	0.044
11	*Litsea oleoides*	0.10	1.00	10.00	827.68	0.98	1.52	10.07	12.57	0.100
12	*Mastixia arborea subsp. meziana*	0.10	1.00	10.00	779.71	0.98	1.52	9.48	11.98	0.100
13	*Dimocarpus longan*	0.40	1.33	30.00	276.93	3.92	4.55	3.37	11.84	0.044
14	*Hydnocarpus pentandra*	0.30	1.00	30.00	357.12	2.94	4.55	4.34	11.83	0.033
15	*Syzygium cuminii*	0.50	1.67	30.00	58.00	4.90	4.55	0.71	10.16	0.055
16	*Wendlandia bicuspidata*	0.40	2.00	20.00	140.33	3.92	3.03	1.71	8.66	0.100
17	*Ficus tsjahela*	0.30	1.50	20.00	206.92	2.94	3.03	2.52	8.49	0.075
18	*Actinodaphne salicina*	0.20	1.00	20.00	127.29	1.96	3.03	1.55	6.54	0.050
19	*Artocarpus heterophyllus*	0.10	1.00	10.00	286.40	0.98	1.52	3.48	5.98	0.100
20	*Symplocos macrophylla subsp.zeylanicus*	0.10	1.00	10.00	267.62	0.98	1.52	3.26	5.76	0.100
21	*Tarenna alpestris*	0.20	2.00	10.00	140.33	1.96	1.52	1.71	5.19	0.200
22	*Diospyros ferrea var.angustifolia*	0.10	1.00	10.00	183.29	0.98	1.52	2.23	4.73	0.100
23	*Poeciloneuron indicum*	0.10	1.00	10.00	140.33	0.98	1.52	1.71	4.21	0.100
24	*Elaeocarpus tuberculata*	0.10	1.00	10.00	133.73	0.98	1.52	1.63	4.13	0.100
25	*Ardisia depressa*	0.10	1.00	10.00	127.29	0.98	1.52	1.55	4.05	0.100
26	*Calophyllum apetalum*	0.10	1.00	10.00	91.96	0.98	1.52	1.12	3.62	0.100
27	*Olea dioica*	0.10	1.00	10.00	31.82	0.98	1.52	0.39	2.89	0.100

Maturity-24.44, Continuum-1137.79, Diversity-2.7988, Dominance-0.10

Appendix 2. Vegetation analysis

WEST COAST TROPICAL EVERGREEN FOREST-BONOCCORD- LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	AB
1.	*Dimocarpus longan*	1.00	1.67	60.00	1033.90	11.63	9.23	4.00	24.86	0.027
2.	*Gluta travancorica*	0.30	1.00	30.00	3711.70	3.49	4.62	14.35	22.46	0.033
3.	*Syzygium caryophyllatum*	0.40	1.00	40.00	2902.20	4.65	6.15	11.22	22.02	0.025
4.	*Mesua nagasarium*	0.30	1.00	30.00	2932.70	3.49	4.62	11.34	19.45	0.033
5.	*Ailanthus triphysa*	0.10	1.00	10.00	3508.40	1.16	1.54	13.57	16.27	0.100
6.	*Diospyros candolleana*	0.70	1.75	40.00	447.49	8.14	6.15	1.73	16.02	0.043
7.	*Wendlandia bicuspidata*	0.40	1.00	40.00	315.75	4.65	6.15	1.22	12.02	0.025
8.	*Cullenia exarillata*	0.10	1.00	10.00	2036.60	1.16	1.54	7.88	10.58	0.100
9.	*Hydnocarpus macrocarpa*	0.20	1.00	20.00	1184.10	2.33	3.08	4.58	9.99	0.050
10.	*Holigarna arnottiana*	0.40	2.00	20.00	296.02	4.65	3.08	1.14	8.87	0.100
11.	*Syzygium mundagam*	0.30	1.50	20.00	336.12	3.49	3.08	1.30	7.87	0.075
12.	*Polyalthia suberosa*	0.40	2.00	20.00	35.08	4.65	3.08	0.14	7.87	0.100
13.	*Goniothalamus rhynchantherus*	0.20	1.00	20.00	602.15	2.33	3.08	2.33	7.74	0.050
14.	*Actinodaphne bourdillonii*	0.20	1.00	20.00	561.34	2.33	3.08	2.17	7.58	0.050
15.	*Olea dioica*	0.20	1.00	20.00	509.15	2.33	3.08	1.97	7.38	0.050
16.	*Artocarpus gomezianus subsp. zeylanicus*	0.20	1.00	20.00	369.82	2.33	3.08	1.51	6.92	0.050
17.	*Vateria indica*	0.20	1.00	20.00	305.81	2.33	3.08	1.18	6.59	0.050
18.	*Aporusa lindleyana*	0.20	1.00	20.00	286.40	2.33	3.08	1.11	6.52	0.050
19.	*Bischofia javanica*	0.20	2.00	10.00	673.35	2.33	1.54	2.60	6.47	0.200
20.	*Leea indica*	0.40	4.00	10.00	17.90	4.65	1.54	0.07	6.26	0.400
21.	*Mallotus tetracoccus*	0.30	3.00	10.00	249.48	3.49	1.54	0.96	5.99	0.300
22.	*Dipterocarpus bourdillonii*	0.30	3.00	10.00	161.10	3.49	1.54	0.62	5.65	0.300
23.	*Macaranga peltata*	0.10	1.00	10.00	574.78	1.16	1.54	2.22	4.92	0.100
24.	*Buchanania lanzan*	0.10	1.00	10.00	509.15	1.16	1.54	1.97	4.67	0.100
25.	*Metogyne pannosa*	0.10	1.00	10.00	447.49	1.16	1.54	1.73	4.43	0.100
26.	*Polyalthia coffeoides*	0.20	2.00	10.00	140.33	2.33	1.54	0.54	4.41	0.200
27.	*Ficus hispida*	0.10	1.00	10.00	389.82	1.16	1.54	1.51	4.21	0.100
28.	*Artocarpus hirsutus*	0.10	1.00	10.00	336.12	1.16	1.54	1.30	4.00	0.100
29.	*Humboldtia trijuga*	0.10	1.00	10.00	258.47	1.16	1.54	1.00	3.70	0.100
30.	*Knema attenuata*	0.10	1.00	10.00	198.89	1.16	1.54	0.77	3.47	0.100
31.	*Canarium strictum*	0.10	1.00	10.00	161.10	1.16	1.54	0.62	3.32	0.100
32.	*Stereospermum chelonoides*	0.10	1.00	10.00	161.10	1.16	1.54	0.62	3.32	0.100
33.	*Ficus tsjahela*	0.10	1.00	10.00	71.60	1.16	1.54	0.28	2.98	0.100
34.	*Canthium pergracile*	0.10	1.00	10.00	49.72	1.16	1.54	0.19	2.89	0.100
35.	*Casearia ovata*	0.10	1.00	10.00	25.78	1.16	1.54	0.10	2.80	0.100
36.	*Kingiodendron pinnatum*	0.10	1.00	10.00	17.90	1.16	1.54	0.07	2.77	0.100
37.	*Sterculia urens*	0.10	1.00	10.00	17.90	1.16	1.54	0.07	2.77	0.100

Maturity-17.57, Continuum-1441.87, Diversity-3.3691, Dominance-0.04.

Appendix 3. Vegetation analysis

WEST COAST TROPICAL EVERGREEN FOREST - KARAMANA- LOCALITY

No.	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Bischofia javanica*	0.10	1.00	10.00	9196.50	0.91	1.19	23.43	25.53	0.100
2.	*Cullenia exarillata*	0.70	1.40	50.00	3246.10	6.36	5.95	8.27	20.58	0.028
3.	*Dimocarpus longan*	1.10	1.38	80.00	206.92	10.00	9.52	0.53	20.05	0.017
4.	*Xanthophyllum arnottianum*	1.30	3.25	40.00	86.63	11.82	4.76	0.22	16.80	0.081
5.	*Hydnocarpus macrocarpa*	0.40	1.33	30.00	3214.10	3.64	3.57	8.19	15.40	0.044
6.	*Syzygium hemispericum*	0.30	1.00	30.00	3278.40	2.73	3.57	8.35	14.65	0.033
7.	*Vateria indica*	0.90	1.80	50.00	103.10	8.18	5.95	0.26	14.39	0.036
8.	*Holigarna arnottiana*	0.20	1.00	20.00	3343.30	1.82	2.38	8.52	12.72	0.050
9.	*Mesua nagasarium*	0.50	1.25	40.00	496.50	4.55	4.76	1.26	10.57	0.031
10.	*Vitex altissima*	0.10	1.00	10.00	3182.20	0.91	1.19	8.11	10.21	0.100
11.	*Ormosia travancorica*	0.10	1.00	10.00	3182.20	0.91	1.19	8.11	10.21	0.100
12.	*Mallotus philippensis*	0.40	1.33	30.00	980.19	3.64	3.57	2.50	9.71	0.044
13.	*Syzygium mundagam*	0.40	1.00	40.00	346.54	3.64	4.76	0.88	9.28	0.025
14.	*Calophyllum apetalum*	0.40	1.33	30.00	748.53	3.64	3.57	1.91	9.12	0.044
15.	*Wendlandia bicuspidata*	0.40	1.00	40.00	147.10	3.64	4.76	0.37	8.77	0.025
16.	*Diospyros candolleana*	0.40	1.33	30.00	305.81	3.64	3.57	0.78	7.99	0.044
17.	*Cinnamomum verum*	0.30	1.00	30.00	286.40	2.73	3.57	0.73	7.03	0.033
18.	*Knema attenuata*	0.30	1.00	30.00	161.10	2.73	3.57	0.41	6.71	0.033
19.	*Palaquium ellipticum*	0.10	1.00	10.00	1052.10	0.91	1.19	2.68	4.78	0.100
20.	*Olea dioica*	0.20	1.00	20.00	215.12	1.82	2.38	0.55	4.75	0.050
21.	*Symplocos macrocarpa subsp.rosea*	0.20	1.00	20.00 -	215.12	1.82	2.38	0.55	4.75	0.050
22.	*Garcinia gummi-gutta*	0.10	1.00	10.00	795.54	0.91	1.19	2.03	4.13	0.100
23.	*Schleichera oleosa*	0.10	1.00	10.00	795.54	0.91	1.19	2.03	4.13	0.100
24.	*Gluta travancorica*	0.30	3.00	10.00	62.37	2.73	1.19	0.16	4.08	0.300
25.	*Artocarpus heterophyllus*	0.10	1.00	10.00	644.39	0.91	1.19	1.64	3.74	0.100
26.	*Mastixia arborea subsp.meziana*	0.20	2.00	10.00	240.65	1.82	1.19	0.61	3.62	0.200
27.	*Dichapetalum gelonoides*	0.10	1.00	10.00	509.15	0.91	1.19	1.30	3.40	0.100
28.	*Metogyne pannosa*	0.10	1.00	10.00	447.49	0.91	1.19	1.14	3.24	0.100
29.	*Mangifera indica*	0.10	1.00	10.00	286.40	0.91	1.19	0.73	2.83	0.100
30.	*Syzygium cumini*	0.10	1.00	10.00	286.40	0.91	1.19	0.73	2.83	0.100
31.	*Agrostistachys borneensis*	0.10	1.00	10.00	240.65	0.91	1.19	0.61	2.71	0.100
32.	*Gordonia obtusa*	0.10	1.00	10.00	198.89	0.91	1.19	0.51	2.61	0.100
33.	*Hydnocarpus alpina*	0.10	1.00	10.00	161.10	0.91	1.19	0.41	2.51	0.100
34.	*Carallia brachiata*	0.10	1.00	10.00	161.10	0.91	1.19	0.41	2.51	0.100
35.	*Aglaia elaeagnoidea*	0.10	1.00	10.00	127.29	0.91	1.19	0.32	2.42	0.100
36.	*Macaranga peltata*	0.10	1.00	10.00	81.46	0.91	1.19	0.21	2.31	0.100
37.	*Poecilonеuron indicum*	0.10	1.00	10.00	71.60	0.91	1.19	0.18	2.28	0.100
38.	*Canthium pergracile*	0.10	1.00	10.00	71.60	0.91	1.19	0.18	2.28	0.100
39.	*Syzygium occidentale*	0.10	1.00	10.00	49.72	0.91	1.19	0.13	2.23	0.100
40.	*Dipterocarpus bourdillonі*	0.10	1.00	10.00	31.82	0.91	1.19	0.08	2.18	0.100

Maturity-21.00, Continuum-1424.28, Diversity-3.3081, Dominance-0.05

Appendix 4. Vegetation analysis

WEST COAST TROPICAL EVERGREEN FOREST - PODIUM- LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Ficus hispida*	0.10	1.00	10.00	11488.00	0.73	1.18	32.41	34.32	0.100
2.	*Cinnamomum verum*	1.80	3.00	60.00	71.60	13.14	7.06	0.20	20.40	0.050
3.	*Cullenia exarillata*	1.10	1.57	70.00	286.40	8.03	8.24	0.81	17.08	0.022
4.	*Calophyllum apetalum*	0.20	1.00	20.00	4544.20	1.46	2.35	12.82	16.63	0.050
5.	*Aporusa lindleyana*	1.00	1.43	70.00	103.10	7.30	8.24	0.29	15.83	0.020
6.	*Syzygium cumini*	1.20	3.00	40.00	423.95	8.76	4.71	1.20	14.67	0.075
7.	*Ixora nigricans*	0.80	1.33	60.00	62.37	5.84	7.06	0.18	13.08	0.022
8.	*Terminalia bellirica*	0.10	1.00	10.00	3508.40	0.73	1.18	9.90	11.81	0.100
9.	*Ficus tsjahela*	0.20	1.00	20.00	2326.30	1.46	2.35	6.56	10.37	0.050
10.	*Xanthophyllum arnottianum*	0.70	1.75	40.00	127.29	5.11	4.71	0.36	10.18	0.043
11.	*Vateria indica*	0.70	1.75	40.00	81.46	5.11	4.71	0.23	10.05	0.043
12.	*Dimocarpus longan*	0.60	1.50	40.00	154.02	4.38	4.71	0.43	9.52	0.037
13.	*Garcinia gummi-gutta*	0.60	1.50	40.00	114.88	4.38	4.71	0.32	9.41	0.037
14.	*Diospyros candolleana*	0.60	1.50	40.00	91.96	4.38	4.71	0.26	9.35	0.037
15.	*Mesua nagasarium*	0.20	1.00	20.00	1911.30	1.46	2.35	5.39	9.20	0.050
16.	*Palaquium ellipticum*	0.30	1.50	20.00	1537.10	2.19	2.35	4.34	8.88	0.075
17.	*Spondias indica.*	0.10	1.00	10.00	2218.70	0.73	1.18	6.26	8.17	0.100
18.	*Vitex altissima*	0.40	2.00	20.00	811.54	2.92	2.35	2.29	7.56	0.100
19.	*Polyalthia coffeoides*	0.60	3.00	20.00	231.98	4.38	2.35	0.65	7.38	0.150
20.	*Hydnocarpus macrocarpa*	0.30	1.00	30.00	258.47	2.19	3.53	0.73	6.45	0.033
21.	*Knema attenuata*	0.30	1.00	30.00	168.34	2.19	3.53	0.47	6.19	0.033
22.	*Lagerstroemia microcarpa*	0.10	1.00	10.00	1493.20	0.73	1.18	4.21	6.12	0.100
23.	*Wendlandia bicuspidata*	0.40	2.00	20.00	121.00	2.92	2.35	0.34	5.61	0.100
24.	*Toona ciliata*	0.10	1.00	10.00	1203.60	0.73	1.18	3.40	5.31	0.100
25.	*Semecarpus travancorica*	0.30	1.50	20.00	81.46	2.19	2.35	0.23	4.77	0.075
26.	*Ixora arborea*	0.30	1.50	20.00	76.45	2.19	2.35	0.22	4.76	0.075
27.	*Strychnos nux-vomica*	0.10	1.00	10.00	927.92	0.73	1.18	2.62	4.53	0.100
28.	*Litsea ligustrina*	0.10	1.00	10.00	484.01	0.73	1.18	1.37	3.28	0.100
29.	*Holigarna arnottiana*	0.10	1.00	10.00	367.86	0.73	1.18	1.04	2.95	0.100
30.	*Baccaurea courtallensis*	0.10	1.00	10.00	71.60	0.73	1.18	0.20	2.11	0.100
31.	*Mastixia arborea subsp.meziana*	0.10	1.00	10.00	62.37	0.73	1.18	0.18	2.09	0.100
32.	*Symplocos macrophylla subsp.zeylanicus*	0.10	1.00	10.00	38.50	0.73	1.18	0.11	2.02	0.100

Maturity-26.56. Continuum-1234.61. Diversity~3.0962. Dominance-0.06

Appendix 5. Vegetation analysis

WEST COAST TROPICAL EVERGREEN FOREST

No	SPECIES	D	AB	PF	BA	IVI	PIVI
1.	*Cullenia exarillata*	0.63	1.32	43.33	1856.36	49.41	14.89
2.	*Dimocarpus longan*	0.90	1.49	60.00	464.94	18.14	5.46
3.	*Mesua nagasarium*	0.33	1.08	30.00	1780.16	13.07	3.94
4.	*Ficus hispida*	0.06	0.66	6.66	168.23	12.84	3.87
5.	*Diospyros candolleana*	0.56	1.50	36.66	281.75	11.12	3.35
6.	*Bischofia javanica*	0.10	1.27	6.66	3289.95	10.66	3.21
7.	*Hydnocarpus macrocarpa*	0.30	1.11	26.66	1552.22	10.61	3.19
8.	*Vateria indica*	0.60	1.51	36.66	163.45	10.34	3.11
9.	*Cinnamomum verum*	0.70	1.33	30.33	119.33	9.14	2.75
10.	*Xanthophyllum arnottianum*	0.33	1.66	26.66	71.30	8.99	2.71
11.	*Gluta travancorica*	0.20	1.33	13.33	1258.02	8.84	2.66
12.	*Wendlandia bicuspidata*	0.40	1.00	33.33	194.36	8.80	2.65
13.	*Calophyllum apetalum*	0.20	0.77	16.66	764.24	8.58	2.58
14.	*Holigarna arnottiana*	0.23	1.33	16.66	1335.72	8.18	2.46
15.	*Aporusa lindleyana*	0.40	0.81	30.00	129.83	7.45	2.24
16.	*Syzygium caryophyllatum*	0.13	0.33	13.33	967.40	7.34	2.21
17.	*Vitex altissima*	0.16	1.00	10.00	1331.24	5.92	1.78
18.	*Syzygium cuminii*	0.10	1.33	16.66	236.78	5.83	1.75
19.	*Syzygium mundagam*	0.16	0.50	20.00	227.55	5.71	1.57
20.	*Knema attenuata*	0.23	1.00	23.33	176.11	5.45	1.64
21.	*Ailanthus triphysa*	0.03	0.33	3.33	1169.49	5.42	1.63
22.	*Syzygium hemispericum*	0.10	0.33	10.00	092.80	4.88	1.47
23.	*Palaquium ellipticum*	0.13	0.83	10.00	863.06	4.55	1.37
24.	*Garcinia gummi-gutta*	0.23	0.83	16.66	303.47	4.51	1.35
25.	*Ficus tsjahela*	0.10	0.66	10.00	799.30	4.45	1.34
26.	*Ixora nigricans*	0.26	0.44	20.00	20.79	4.36	1.31
27.	*Olea dioica*	0.13	0.66	3.33	241.42	4.04	1.21
28.	*Terminalia bellirica*	0.03	0.33	3.33	1169.46	3.93	1.18
29.	*Polyalthia coffeoides*	0.26	1.66	10.00	124.10	3.93	1.18
30.	*Ormosia travancorica*	0.03	0.33	3.33	1060.73	3.40	1.02
31.	*Mallotus philippensis*	0.13	0.44	10.00	326.73	3.23	0.97
32.	*Spondias indica*	0.03	0.33	3.33	739.56	2.72	0.82
33.	*Polyalthia suberosa*	0.13	0.66	6.66	11.69	2.62	0.78
34.	*Dipterocarpus bourdilloni*	0.13	1.33	6.66	64.30	2.61	0.78
35.	*Goniothalamus rhynchantherus*	0.06	0.33	6.66	200.71	2.58	0.77
36.	*Meiogyne pannosa*	0.06	0.66	6.66	298.32	2.55	0.76
37.	*Actinodaphne bourdillonii*	0.06	0.33	6.66	189.33	2.52	0.75

(Continued)

38.	*Macaranga peltata*	0.06	0.66	6.66	218.74	2.41	0.72
39.	*Artocarpus gomezianus subsp.zeylanicus*	0.06	0.33	6.66	129.94	2.30	0.69
40.	*Leea indica*	0.13	1.33	3.33	5.96	2.08	0.62
41.	*Lagerstroemia microcarpa*	0.03	0.33	3.33	497.73	2.04	0.61
42.	*Mallotus tetracoccus*	0.10	1.00	3.33	83.16	1.99	0.59
43.	*Mastixia arborea subsp.meziana*	0.10	1.00	6.66	101.00	1.90	0.57
44.	*Toona ciliata*	0.03	0.33	3.33	401.20	1.77	0.53
45.	*Canthium pergracile*	0.06	0.66	6.66	40.44	1.72	0.51
46.	*Semecarpus travancorica*	0.10	0.50	6.66	27.15	1.59	0.47
47.	*Ixora arborea*	0.10	0.50	6.66	25.48	1.58	0.47
48.	*Buchanania lanzan*	0.03	0.33	3.33	169.71	1.55	0.46
49.	*Strychnos nux-vomica*	0.03	0.33	3.33	309.30	1.51	0.45
50.	*Schleichera oleosa*	0.03	0.33	3.33	265.18	1.37	0.41
51.	*Humboldtia trijuga*	0.03	0.33	3.33	86.15	1.23	0.37
52.	*Artocarpus heterophyllus*	0.03	0.33	3.33	214.79	1.20	0.37
53.	*Dichapetalum gelonoides*	0.03	0.33	3.33	169.71	1.13	0.34
54.	*Stereospermum chelonoides*	0.03	0.33	3.33	53.70	1.10	0.33
55.	*Canarium strictum*	0.03	0.33	3.33	53.70	1.10	0.33
56.	*Litsea ligustrina*	0.03	0.33	3.33	161.33	1.09	0.32
57.	*Artocarpus hirsutus*	0.03	0.33	3.33	112.04	1.00	0.30
58.	*Mangifera indica*	0.03	0.33	3.33	95.46	0.94	0.28
59.	*Casearia ovata*	0.03	0.33	3.33	8.59	0.93	0.28
60.	*Sterculia urens*	0.03	0.33	3.33	5.96	0.92	0.27
61.	*Kingiodendron pinnatum*	0.03	0.33	3.33	5.96	0.92	0.27
62.	*Agrostistachys borneensis*	0.03	0.33	3.33	80.21	0.90	0.27
63.	*Gordonia obtusa*	0.03	0.33	3.33	66.29	0.87	0.26
64.	*Hydnocarpus alpina*	0.03	0.33	3.33	53.70	0.83	0.25
65.	*Carallia brachiata*	0.03	0.33	3.33	53.70	0.83	0.25
66.	*Aglaia elaeagnoidea*	0.03	0.33	3.33	42.43	0.80	0.24
67.	*Poeciloneuron indicum*	0.03	0.33	3.33	23.60	0.76	0.22
68.	*Syzygium occidentale*	0.03	0.33	3.33	16.57	0.74	0.22
69.	*Symplocos macrophylla subsp.zeylanicus*	0.03	0.33	3.33	12.83	0.67	0.20
70.	*Symplocos macrocarpa subsp.rosea*	0.06	0.33	6.66	71.70	0.63	0.18
71.	*Baccaurea courtallensis*	0.03	0.33	3.33	23.86	0.52	0.15

Appendix 6. Vegetation analysis

WEST COAST SEMI EVERGREEN FOREST PODIUMKALA-LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Aporusa lindleyana*	1.60	2.00	80.00	378.76	23.53	16.00	1.11	40.64	0.025
2.	*Mangifera indica*	0.10	1.00	10.00	9305.00	1.47	2.00	27.36	30.83	0.100
3.	*Persea macrantha*	0.40	1.00	40.00	4099.40	5.88	8.00	12.05	25.93	0.025
4.	*Alstonia scholaris*	0.70	1.17	60.00	496.50	10.29	12.00	1.46	23.75	0.019
5.	*Terminalia paniculata*	0.60	1.50	40.00	1365.20	8.82	8.00	4.01	20.83	0.037
6.	*Artocarpus hirsutus*	0.40	1.00	40.00	1515.00	5.88	8.00	4.46	18.34	0.025
7.	*Pterocarpus marsupium*	0.10	1.00	10.00	4356.10	1.47	2.00	12.81	16.28	0.100
8.	*Actinodaphne bourdillonii*	0.50	1.67	30.00	688.07	7.35	6.00	2.02	15.37	0.055
9.	*Terminalia bellirica*	0.30	1.00	30.00	1604.10	4.41	6.00	4.72	15.13	0.033
10.	*Stereospermum chelonoides*	0.10	1.00	10.00	2994.10	1.47	2.00	8.80	12.27	0.100
11.	*Artocarpus heterophyllus*	0.30	1.50	20.00	1223.20	4.41	4.00	3.60	12.01	0.075
12.	*Cinnamomum verum*	0.20	1.00	20.00	602.15	2.94	4.00	1.77	8.71	0.050
13.	*Bombax ceiba*	0.10	1.00	10.00	1537.10	1.47	2.00	4.52	7.99	0.100
14.	*Vateria indica*	0.20	1.00	20.00	133.73	2.94	4.00	0.39	7.33	0.050
15.	*Mallotus philippensis*	0.10	1.00	10.00	1223.20	1.47	2.00	3.60	7.07	0.100
16.	*Olea dioica*	0.20	2.00	10.00	435.64	2.94	2.00	1.28	6.22	0.200
17.	*Holigarna arnottiana*	0.10	1.00	10.00	877.09	1.47	2.00	2.58	6.05	0.100
18.	*Vitex altissima*	0.20	2.00	10.00	286.40	2.94	2.00	0.84	5.78	0.200
19.	*Elaeocarpus glandulosus*	0.20	2.00	10.00	223.47	2.94	2.00	0.66	5.60	0.200
20.	*Ixora arborea*	0.20	2.00	10.00	154.02	2.94	2.00	0.45	5.39	0.200
21.	*Syzygium caryophyllatum*	0.10	1.00	10.00	367.86	1.47	2.00	1.08	4.55	0.100
22.	*Dalbergia lanceolaria*	0.10	1.00	10.00	140.33	1.47	2.00	0.41	3.88	0.100

Maturity-22.73, Continuum-1473.86, Diversity-2.7080, Dominance-0.10

Appendix 7. Vegetation analysis

WEST COAST SEMI EVERGREEN FOREST - BONOCCORD - LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Terminalia paniculata*	0.40	1.00	40.00	3609.30	5.48	7.02	16.40	28.90	0.025
2.	*Aporusa lindleyana*	1.00	2.00	50.00	484.01	13.70	8.77	2.20	24.67	0.040
3.	*Bridelia retusa*	0.30	1.00	30.00	1742.60	4.11	5.26	7.92	17.29	0.033
4.	*Persea macrantha*	0.20	1.00	20.00	2299.10	2.74	3.51	10.45	16.70	0.050
5.	*Lagerstroemia microcarpa*	0.20	1.00	20.00	2036.60	2.74	3.51	9.25	15.50	0.050
6.	*Stereospermum chelonoides*	0.30	1.00	30.00	1303.40	4.11	5.26	5.92	15.29	0.033
7.	*Hopea parviflora*	0.60	2.00	30.00	267.62	8.22	5.26	1.22	14.70	0.066
8.	*Sterculia urens*	0.10	1.00	10.00	2299.10	1.37	1.75	10.45	13.57	0.100
9.	*Wendlandia bicuspidata*	0.60	3.00	20.00	140.33	8.22	3.51	0.64	12.37	0.150
10.	*Lannea coromandelica*	0.30	1.50	20.00	1015.80	4.11	3.51	4.62	12.24	0.075
11.	*Schleichera oleosa*	0.30	1.50	20.00	764.04	4.11	3.51	3.47	11.09	0.075
12.	*Dillenia pentagyna*	0.20	1.00	20.00	962.61	2.74	3.51	4.37	10.62	0.050
13.	*Olea dioica*	0.30	1.00	30.00	215.12	4.11	5.26	0.98	10.35	0.033
14.	*Scolopia crenata*	0.30	1.50	20.00	509.15	4.11	3.51	2.31	9.93	0.075
15.	*Diospyros candolleana*	0.30	1.00	30.00	81.46	4.11	5.26	0.37	9.74	0.033
16.	*Haldinia cordifolia*	0.20	1.00	20.00	644.39	2.74	3.51	2.93	9.18	0.050
17.	*Paglantha dichotoma*	0.20	1.00	20.00	602.15	2.74	3.51	2.74	8.99	0.050
18.	*Holigarna arnottiana*	0.20	1.00	20.00	325.86	2.74	3.51	1.48	7.73	0.050
19.	*Spondias indica.*	0.10	1.00	10.00	877.09	1.37	1.75	3.99	7.11	0.100
20.	*Ixora arborea*	0.20	1.00	20.00	86.63	2.74	3.51	0.39	6.64	0.050
21.	*Knema attenuata*	0.20	2.00	10.00	183.29	2.74	1.75	0.83	5.32	0.200
22.	*Garcinia morella*	0.10	1.00	10.00	484.01	1.37	1.75	2.20	5.32	0.100
23.	*Mallotus philippensis*	0.10	1.00	10.00	435.64	1.37	1.75	1.98	5.10	0.100
24.	*Alstonia scholaris*	0.10	1.00	10.00	286.40	1.37	1.75	1.30	4.42	0.100
25.	*Semecarpus anacardium*	0.10	1.00	10.00	127.29	1.37	1.75	0.58	3.70	0.100
26.	*Elaeocarpus tuberculata*	0.10	1.00	10.00	62.37	1.37	1.75	0.28	3.40	0.100
27.	*Baccaurea courtallensis*	0.10	1.00	10.00	62.37	1.37	1.75	0.28	3.40	0.100
28.	*Allophylus serrulatus*	0.10	1.00	10.00	58.00	1.37	1.75	0.26	3.38	0.100
29.	*Hydnocarpus alpina*	0.10	1.00	10.00	42.08	1.37	1.75	0.19	3.31	0.100

Maturity-19.66, Continuum-1410.11, Diversity-3.1366, Dominance-0.05

Appendix 8. Vegetation analysis

WEST COAST SEMI-EVERGREEN FOREST - KARAMANA- LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Mesua nagasarium*	1.90	2.11	90.00	574.78	20.21	14.29	2.38	36.88	0.023
2.	*Knema attenuata*	0.50	1.25	40.00	1203.60	5.32	6.35	4.99	16.66	0.031
3.	*Syzygium mundagam*	0.80	2.00	40.00	198.89	8.51	6.35	0.82	15.68	0.050
4.	*Dimocarpus longan*	0.80	2.00	40.00	140.33	8.51	6.35	0.58	15.44	0.050
5.	*Hydnocarpus pentandra*	0.80	2.00	40.00	86.63	8.51	6.35	0.36	15.22	0.050
6.	*Gluta travancorica*	0.60	1.20	50.00	191.01	6.38	7.94	0.79	15.11	0.024
7.	*Vitex altissima*	0.30	1.00	30.00	1344.50	3.19	4.76	5.57	13.52	0.033
8.	*Terminalia paniculata*	0.10	1.00	10.00	2577.60	1.06	1.59	10.68	13.33	0.100
9.	*Persea macrantha*	0.10	1.00	10.00	2577.60	1.06	1.59	10.68	13.33	0.100
10.	*Garcinia gummi-gutta*	0.10	1.00	10.00	2464.30	1.06	1.59	10.21	12.86	0.100
11.	*Gmelina arborea*	0.10	1.00	10.00	2353.50	1.06	1.59	9.75	12.40	0.100
12.	*Diospyros candolleana*	0.60	2.00	30.00	267.62	6.38	4.76	1.11	12.25	0.066
13.	*Mallotus philippensis*	0.10	1.00	10.00	2299.10	1.06	1.59	9.53	12.18	0.100
14.	*Madhuca neriifolia*	0.40	1.33	30.00	616.07	4.26	4.76	2.55	11.57	0.044
15.	*Bridelia retusa*	0.10	1.00	10.00	2036.60	1.06	1.59	8.44	11.09	0.100
16.	*Elaeocarpus tuberculata*	0.10	1.00	10.00	1695.80	1.06	1.59	7.03	9.68	0.100
17.	*Mangifera indica*	0.10	1.00	10.00	1145.60	1.06	1.59	4.75	7.40	0.100
18.	*Vateria indica*	0.30	1.50	20.00	103.10	3.19	3.17	0.43	6.79	0.075
19.	*Canarium strictum*	0.20	1.00	20.00	133.73	2.13	3.17	0.55	5.85	0.050
20.	*Gymnacranthera farguhariana*	0.20	2.00	10.00	240.65	2.13	1.59	1.00	4.72	0.200
21.	*Alstonia scholaris*	0.10	1.00	10.00	412.41	1.06	1.59	1.71	4.36	0.100
22.	*Artocarpus hirsutus*	0.10	1.00	10.00	336.12	1.06	1.59	1.39	4.04	0.100
23.	*Carallia brachiata*	0.20	2.00	10.00	71.60	2.13	1.59	0.30	4.02	0.200
24.	*Anthocephalus chinensis*	0.10	1.00	10.00	325.86	1.06	1.59	1.35	4.00	0.100
25.	*Wendlandia bicuspidata*	0.10	1.00	10.00	206.92	1.06	1.59	0.86	3.51	0.100
26.	*Leptonychia moacurroides*	0.10	1.00	10.00	198.89	1.06	1.59	0.82	3.47	0.100
27.	*Lophopetalum wightianum*	0.10	1.00	10.00	97.45	1.06	1.59	0.40	3.05	0.100
28.	*Symplocos macrocarpa subsp.rosea*	0.10	1.00	10.00	71.60	1.06	1.59	0.30	2.95	0.100
29.	*Hopea parviflora*	0.10	1.00	10.00	58.00	1.06	1.59	0.24	2.89	0.100
30.	*Aporusa lindleyana*	0.10	1.00	10.00	58.00	1.06	1.59	0.24	2.89	0.100
31.	*Atlanthus triphysa*	0.10	1.00	10.00	45.82	1.06	1.59	0.19	2.84	0.100

Maturity-20.32, Continuum-679.90, Diversity-2.9295, Dominance- 0.08

Appendix 9. Vegetation analysis

WEST COAST SEMI-EVERGREEN FOREST - PODIUM -LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Vitex altissima*	0.70	1.75	40.00	1766.20	10.45	8.00	9.29	7.74	0.043
2.	*Artocarpus hirsutus*	0.30	1.00	30.00	2994.10	4.48	6.00	15.75	26.23	0.033
3.	*Aporusa lindleyana*	0.90	1.80	50.00	367.86	13.43	10.00	1.93	25.36	0.036
4.	*Ixora arborea*	0.70	1.75	40.00	121.00	10.45	8.00	0.64	19.09	0.043
5.	*Xanthophyllum arnottianum*	0.50	1.25	40.00	183.29	7.46	8.00	0.96	16.42	0.031
6.	*Gluta travancorica*	0.50	2.50	20.00	367.86	7.46	4.00	1.93	3.39	0.125
7.	*Dipterocarpus bourdillioni*	0.10	1.00	10.00	1790.00	1.49	2.00	9.42	12.91	0.100
8.	*Hopea parviflora*	0.30	1.00	30.00	401.03	4.48	6.00	2.11	12.59	0.033
9.	*Spondias indica.*	0.10	1.00	10.00	1581.60	1.49	2.00	8.32	11.81	0.100
10.	*Dimocarpus longan*	0.20	1.00	20.00	843.99	2.99	4.00	4.44	11.43	0.050
11.	*Macaranga peltata*	0.10	1.00	10.00	1263.00	1.49	2.00	6.64	10.13	0.100
12.	*Calophyllum apetalum*	0.20	1.00	20.00	574.78	2.99	4.00	3.02	10.01	0.050
13.	*Gymnacranthera farguhariana*	0.30	1.50	20.00	81.46	4.48	4.00	0.43	8.91	0.075
14.	*Anthocephalus chinensis*	0.20	1.00	20.00	346.54	2.99	4.00	1.82	8.81	0.050
15.	*Symplocos macrophylla subsp.zeylanicus*	0.20	2.00	10.00	644.39	2.99	2.00	3.39	8.38	0.200
16.	*Dillenia pentagyna*	0.10	1.00	10.00	843.99	1.49	2.00	4.44	7.93	0.100
17.	*Vateria indica*	0.20	1.00	20.00	154.02	2.99	4.00	0.81	7.80	0.050
18.	*Terminalia paniculata*	0.10	1.00	10.00	795.54	1.49	2.00	4.18	7.67	0.100
19.	*Mesua nagasarium*	0.10	1.00	0.00	779.71	1.49	2.00	4.10	7.59	0.100
20.	*Stereospermum chelonoides*	0.10	1.00	10.00	717.98	1.49	2.00	3.78	7.27	0.100
21.	*Poecilonewron indicum*	0.10	1.00	10.00	630.15	1.49	2.00	3.31	6.80	0.100
22.	*Mallotus philippensis*	0.10	1.00	10.00	588.39	1.49	2.00	3.09	6.58	0.100
23.	*Olea dioica*	0.10	1.00	10.00	496.50	1.49	2.00	2.61	6.10	0.100
24.	*Pterospermum rubiginosum*	0.20	2.00	10.00	114.88	2.99	2.00	0.60	5.59	0.200
25.	*Grewia tiliifolia*	0.10	1.00	0.00	378.76	1.49	2.00	1.99	5.48	0.100
26.	*Cyathocalyx zeylanicus*	0.10	1.00	10.00	103.10	1.49	2.00	0.54	4.03	0.100
27.	*Syzygium cuminii*	0.10	1.00	10.00	81.46	1.49	2.00	0.43	3.92	0.100

Maturity-18.52, Continuum-1532.71, Diversity-2.9910, Dominance- 0.07

Appendix 10. Vegetation analysis

WEST COAST SEMI EVERGREEN FOREST-MEAN

No.	SPECIES	D	AB	PF	BA	IVI	PIVI
1.	*Aporusa lindleyana*	0.90	1.70	47.50	322.15	23.39	7.56
2.	*Terminalia paniculata*	0.30	1.12	25.00	2086.91	17.68	5.72
3.	*Persea macrantha*	0.17	0.75	17.50	2244.02	13.99	4.52
4.	*Haldinia cordifolia*	0.05	0.25	5.00	161.09	12.29	3.97
5.	*Artocarpus hirsutus*	0.20	0.75	20.00	1211.30	12.15	3.93
6.	*Vitex altissima*	0.30	1.18	20.00	849.27	11.76	3.80
7.	*Mesua nagasarium*	0.50	0.77	25.00	338.62	11.11	3.59
8.	*Mangifera indica*	0.05	0.50	5.00	2612.65	9.55	3.09
9.	*Stereospermum chelonoides*	0.12	0.75	12.50	1253.87	8.70	2.81
10	*Alstonia scholaris*	0.22	0.79	20.00	298.82	8.13	2.63
11.	*Ixora arborea*	0.27	1.18	17.50	90.41	7.78	2.51
12.	*Mallotus philippensis*	0.10	1.00	10.00	1136.65	7.73	2.50
13.	*Hopea parviflora*	0.25	0.10	17.50	181.66	7.54	2.43
14.	*Gluta travancorica*	0.27	0.92	17.50	139.71	7.12	2.30
15.	*Ervatelia retusa*	0.10	0.50	10.00	1962.95	7.09	2.29
16.	*Dimocarpus longan*	0.25	0.75	15.00	246.08	6.71	2.17
17.	*Gluta dioica*	0.15	1.00	12.50	280.00	5.66	1.83
18.	*Diospyros candolleana*	0.22	0.75	15.00	87.27	5.49	1.77
19.	*Knema attenuata*	0.17	0.81	12.50	346.72	5.49	1.67
20.	*Vateria indica*	0.17	0.87	15.00	97.71	5.48	1.77
21.	*Syzygias umbra*	0.05	0.50	5.00	614.74	4.72	1.53
22.	*Dillenia pentagyna*	0.07	0.50	7.50	451.65	4.63	1.49
23.	*Xanthophyllum arnottianum*	0.12	0.31	10.00	45.82	4.10	1.32
24.	*Pterocarpus marsupium*	0.02	0.25	2.50	1089.02	4.07	1.31
25.	*Wendlandia glauspidata*	0.17	0.10	7.50	86.81	3.97	1.28
26.	*Strychnos nuxvomica*	0.02	0.50	10.00	49.72	3.92	1.26
27.	*Lagerstroemia microcarpa*	0.05	0.25	5.00	109.15	3.87	1.25
28.	*Artocarpus gourlliona*	0.12	0.41	7.50	172.01	3.84	1.24
29.	*Hydnocarpus pentandra*	0.20	0.50	10.00	21.65	3.80	1.22
30.	*Terminalia bellirica*	0.07	0.25	7.50	401.02	3.78	1.22
31.	*Ixonanthes arnottiana*	0.07	0.50	7.50	500.73	3.44	1.11

(Continued)

32.	*Gymnacranthera farguhariana*	0.12	0.87	7.50	80.52	3.40	1.10
33.	*Sterculia urens*	0.02	0.25	2.50	574.77	3.39	1.09
34.	*Elaeocarpus tuberculata*	0.05	0.50	5.00	439.54	3.27	1.05
35.	*Dipterocarpus bourdillonl*	0.02	0.25	2.50	447.50	3.22	1.04
36.	*Garcinia gummi-gutta*	0.02	0.25	2.50	616.07	3.21	1.03
37.	*Anthocephalus chinensis*	0.07	0.50	7.50	81.46	3.20	1.03
38.	*Gmelina arborea*	0.02	0.25	2.50	588.37	3.10	1.00
39.	*Lannea coromandelica*	0.07	0.37	5.00	253.95	3.06	0.99
40.	*Artocarpus heterophyllus*	0.07	0.37	5.00	30.58	3.00	0.97
41.	*Madhuca neriifolia*	0.10	0.33	7.50	154.01	2.89	0.92
42.	*Schleichera oleosa*	0.07	0.37	5.00	191.01	2.77	0.89
43.	*Macaranga peltata*	0.02	0.25	2.50	315.75	2.53	0.81
44.	*Calophyllum apetalum*	0.05	0.25	5.00	143.69	2.50	0.80
45.	*Scolopia crenata*	0.07	**0.37**	**5.00**	**127.28**	**2.48**	**0.80**
46.	*Paglantha dichotoma*	**0.05**	**0.25**	5.00	**150.53**	2.24	**0.72**
47.	*Cinnamomum verum*	**0.05**	**0.25**	**5.00**	**150.53**	**2.18**	**0.70**
48.	*Symplocos macrophylla subsp.zeylanicus*	0.05	0.50	2.50	161.09	2.09	0.67
49.	*Bombax ceiba*	0.02	0.25	2.50	384.27	1.99	0.64
50.	*Poeciloneuron indicum*	0.02	0.25	2.50	157.53	1.70	0.55
51.	*Canarium strictum*	0.05	0.25	5.00	33.43	1.46	0.47
52.	*Elaeocarpus glandulosus*	0.05	0.50	2.50	55.86	1.40	0.45
53.	*Pterospermum rubiginosum*	0.05	0.50	2.50	28.78	1.39	0.44
54.	*Grewia tiliifolia*	0.02	0.25	2.50	94.69	1.37	0.44
55.	*Garcinia morella*	0.02	0.25	2.50	121.00	1.33	0.43
56.	*Syzygium caryophyllatum*	0.02	0.25	2.50	91.96	1.13	0.36
57.	*Carallia brachiata*	0.05	0.50	5.50	17.90	1.00	0.32
58.	*Cyathocalyx zeylanicus*	0.02	0.25	2.50	25.77	1.00	0.32
59.	*Syzygium cuminii*	0.02	0.25	2.50	20.36	0.98	0.29
60.	*Dalbergia lanceolaria*	0.02	0.25	2.50	35.08	0.97	0.31
61.	*Semecarpus anacardium*	0.02	0.25	2.50	31.82	0.92	0.29
62.	*Leptonychia moacurroides*	0.02	0.25	2.50	49.72	0.86	0.27
63.	*Baccaurea courtallensis*	0.02	0.25	2.50	15.59	0.85	0.27
64.	*Allophylus serrulatus*	0.02	0.25	2.50	14.50	0.84	0.27
65.	*Hydnocarpus alpina*	0.02	0.25	2.50	10.52	0.82	0.26
66.	*Lophopetalum wightianum*	0.02	**0.25**	**2.50**	**24.36**	0.76	**0.24**
67.	*Symplocos macrocarpa subsp.rosea*	**0.02**	**0.25**	**2.50**	**17.90**	**0.73**	**0.23**
68.	*Ailanthus triphysa*	**0.02**	**0.25**	**2.50**	**11.45**	**0.71**	0.22

Appendix 11. Vegetation analysis

PIONEER EUPHORBIACEOUS SCRUB

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Tamarindus indicus*	0.10	1.00	10.00	3508.40	1.30	1.59	43.11	46.00	0.100
2.	*Aporusa lindleyana*	1.10	1.57	70.00	38.50	14.29	11.11	0.47	25.87	0.022
3.	*Macaranga peltata*	0.90	1.50	60.00	357.12	11.69	9.52	4.39	25.60	0.025
4.	*Olea dioica*	0.60	1.00	60.00	223.47	7.79	9.52	2.75	20.06	0.016
5.	*Trema orientalis*	0.70	1.40	50.00	91.96	9.09	7.94	1.13	18.16	0.028
6.	*Terminalia paniculata*	0.20	1.00	20.00	893.87	2.60	3.17	10.98	16.75	0.050
7.	*Mallotus tetracoccus*	0.60	1.50	40.00	121.00	7.79	6.35	1.49	15.63	0.037
8.	*Actinodaphne bourdillonii*	0.40	1.33	30.00	367.86	5.19	4.76	4.52	14.47	0.044
9.	*Artocarpus hirsutus*	0.30	1.00	30.00	346.54	3.90	4.76	4.26	12.92	0.033
10.	*Mallotus philippensis*	0.40	1.00	40.00	108.91	5.19	6.35	1.34	12.88	0.025
11.	*Tabernaemontana divaricata*	0.30	1.00	30.00	315.75	3.90	4.76	3.88	12.54	0.033
12.	*Helicteres isora*	0.40	1.33	30.00	198.89	5.19	4.76	2.44	12.39	0.044
13.	*Symplocos macrophylla subsp. zeylanicus*	0.30	1.00	30.00	121.00	3.90	4.76	1.49	10.15	0.033
14.	*Mesua nagassarium*	0.30	1.00	30.00	114.88	3.90	4.76	1.41	10.07	0.030
15.	*Alstonia scholaris*	0.30	1.00	30.00	45.82	3.90	4.76	0.56	9.22	0.033
16.	*Albizia odoratissima*	0.10	1.00	10.00	423.95	1.30	1.59	5.21	8.10	0.100
17.	*Vitex altissima*	0.20	1.00	20.00	161.10	2.60	3.17	1.98	7.75	0.050
18.	*Sterculia urens*	0.10	1.00	10.00	367.86	1.30	1.59	4.52	7.41	0.100
19.	*Ficus hispida*	0.20	2.00	10.00	198.89	2.60	1.59	2.44	6.63	0.200
20.	*Euodia lunu-ankenda*	0.10	1.00	10.00	86.63	1.30	1.59	1.06	3.95	0.100
21.	*Actinodaphne malabarica*	0.10	1.00	10.00	45.82	1.30	1.59	0.56	3.45	0.100

Maturity-30.00, Continuum-1343.21, Diversity-2.8042, Dominance- 0.07

Appendix 12. Vegetation analysis

SOUTHERN SECONDARY MOIST MIXED DECIDUOUS FOREST - PODIUMKALA - LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Pterocarpus marsupium*	1.60	2.67	60.00	1070.50	27.12	16.22	7.75	51.09	0.044
2.	*Careya arborea*	1.20	1.71	70.00	717.98	20.34	18.92	5.20	44.46	0.024
3.	*Terminalia paniculata*	0.60	1.20	50.00	910.82	10.17	13.51	6.59	30.27	0.024
4.	*Bridelia retusa*	0.20	1.00	20.00	1493.20	3.39	5.41	10.81	19.61	0.050
5.	*Dalbergia lanceolaria*	0.40	2.00	20.00	1015.80	6.78	5.41	7.35	19.54	0.100
6.	*Dillenia pentagyna*	0.30	1.00	30.00	860.46	5.08	8.11	6.23	19.42	0.033
7.	*Mitragyna parvifolia*	0.10	1.00	10.00	1604.10	1.69	2.70	11.61	16.00	0.100
8.	*Lannea coromandelica*	0.20	2.00	10.00	1184.10	3.39	2.70	8.57	14.66	0.200
9.	*Emblica officinalis*	0.10	1.00	10.00	1303.40	1.69	2.70	9.43	13.82	0.100
10.	*Tabernaemontana divaricata*	0.40	2.00	20.00	223.47	6.78	5.41	1.62	13.81	0.100
11.	*Olea dioica*	0.20	2.00	10.00	658.79	3.39	2.70	4.77	10.86	0.200
12.	*Grewia tiliifolia*	0.10	1.00	10.00	702.94	1.69	2.70	5.09	9.48	0.100
13.	*Wrightia tinctoria*	0.10	1.00	10.00	630.15	1.69	2.70	4.56	8.95	0.100
14.	*Aporusa lindleyana*	0.10	1.00	10.00	561.34	1.69	2.70	4.06	8.45	0.100
15.	*Vitex altissima*	0.10	1.00	10.00	534.92	1.69	2.70	3.87	8.26	0.100
16.	*Erythrina variegata*	0.10	1.00	10.00	267.62	1.69	2.70	1.94	6.33	0.100
17.	*Macaranga peltata*	0.10	1.00	10.00	76.45	1.69	2.70	0.55	4.94	0.100

Maturity-21.76, Continuum-1542.31, Diversity-2.3237, Dominance- 0.14

Appendix 13. Vegetation analysis

SOUTHERN SECONDARY MOIST MIXED DECIDUOUS FOREST -BONOCCORD - LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Pterocarpus marsupium*	1.10	1.83	60.00	1303.40	18.64	15.00	9.29	42.93	0.030
2.	*Terminalia paniculata*	1.10	1.83	60.00	1126.60	18.64	15.00	8.03	41.67	0.030
3.	*Schleichera oleosa*	0.10	1.00	10.00	4972.20	1.69	2.50	35.43	39.62	0.100
4.	*Dillenia pentagyna*	0.90	1.29	70.00	910.82	15.25	17.50	6.49	39.24	0.018
5.	*Careya arborea*	0.70	1.40	50.00	561.34	11.86	12.50	4.00	28.36	0.028
6.	*Grewia tiliifolia*	0.20	1.00	20.00	1515.00	3.39	5.00	10.80	19.19	0.050
7.	*Lagerstroemia microcarpa*	0.30	1.50	20.00	1089.00	5.08	5.00	7.76	17.84	0.075
8.	*Wrightia tinctoria*	0.30	1.50	20.00	521.96	5.08	5.00	3.72	13.80	0.075
9.	*Artocarpus hirsutus*	0.10	1.00	10.00	945.19	1.69	2.50	6.73	10.92	0.100
10.	*Helicteres isora*	0.30	1.50	20.00	71.60	5.08	5.00	0.51	10.59	0.075
11.	*Dalbergia latifolia*	0.30	3.00	10.00	336.12	5.08	2.50	2.40	9.98	0.300
12.	*Cassia fistula*	0.10	1.00	10.00	267.62	1.69	2.50	1.91	6.10	0.100
13.	*Emblica officinalis*	0.10	1.00	10.00	198.89	1.69	2.50	1.42	5.61	0.100
14.	*Trema orientalis*	0.10	1.00	10.00	114.88	1.69	2.50	0.82	5.01	0.100
15.	*Dalbergia lanceolaria*	0.10	1.00	10.00	49.72	1.69	2.50	0.35	4.54	0.100
16.	*Leea indica*	0.10	1.00	10.00	49.72	1.69	2.50	0.35	4.54	0.100

Maturity-25.00, Continuum-2511.42, Diversity-2.3704, Dominance- 0.12

Appendix 14. Vegetation analysis

SOUTHERN SECONDARY MOIST MIXED DECIDUOUS FOREST- PODIUM LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Terminalia paniculata*	1.50	2.50	60.00	748.53	22.39	14.29	9.38	46.06	0.041
2.	*Pterocarpus marsupium*	1.10	1.83	60.00	588.39	16.42	14.29	7.37	38.08	0.030
3.	*Dillenia pentagyna*	0.90	1.50	60.00	509.15	13.43	14.29	6.38	34.10	0.025
4.	*Bombax insigne*	0.20	1.00	20.00	1386.2 0	2.99	4.76	17.37	25.12	0.050
5.	*Emblica officinalis*	0.70	1.75	40.00	133.73	10.45	9.52	1.68	21.65	0.043
6.	*Careya arborea*	0.60	2.00	30.00	258.47	8.96	7.14	3.24	19.34	0.066
7.	*Terminalia chebula*	0.40	1.33	30.00	267.62	5.97	7.14	3.35	16.46	0.044
8.	*Lagerstroemia microcarpa*	0.10	1.00	10.00	997.93	1.49	2.38	12.51	16.38	0.100
9.	*Prunus ceylanica*	0.10	1.00	10.00	827.68	1.49	2.38	10.37	14.24	0.100
10.	*Buchanania lanzan*	0.40	2.00	20.00	86.63	5.97	4.76	1.09	11.82	0.100
11.	*Pithecellobium monadelphum*	0.10	1.00	10.00	602.15	1.49	2.38	7.55	11.42	0.100
12.	*Sterculia villosa*	0.20	1.00	20.00	258.47	2.99	4.76	3.24	10.99	0.050
13.	*Albizia odoratissima*	0.10	1.00	10.00	509.15	1.49	2.38	6.38	10.25	0.100
14.	*Cinnamomum malabatrum*	0.10	0.50	20.00	296.02	1.49	4.76	3.71	9.96	0.025
15.	*Cycas circinalis*	0.10	1.00	10.00	459.51	1.49	2.38	5.76	9.63	0.100
16.	*Dalbergia lanceolaria*	0.10	1.00	10.00	49.72	1.49	2.38	0.62	4.49	0.100

Maturity-26.25. Contlnuum- 1661.20. Diversity-2.3389, Dominance- 0.12

Appendix 15. Vegetation analysis

SOUTHERN SECONDARY MOIST MIXED DECIDUOUS FOREST-KARAMANA- LOCALITY

No.	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Terminalia paniculata*	2.30	2.88	80.00	183.29	31.08	19.05	2.73	52.86	0.036
2.	*Buchanania lanzan*	0.90	1.80	50.00	346.54	12.16	11.90	5.16	29.22	0.036
3.	*Olea dioica*	1.20	3.00	40.00	161.10	16.22	9.52	2.40	28.14	0.075
4.	*Pterocarpus marsupium*	0.40	1.33	30.00	1015.80	5.41	7.14	15.11	27.66	0.044
5.	*Dillenia pentagyna*	0.50	1.67	30.00	296.02	6.76	7.14	4.40	18.30	0.055
6.	*Syzygium cumini*	0.20	1.00	20.00	673.35	2.70	4.76	10.02	17.48	0.050
7.	*Emblica officinalis*	0.50	1.67	30.00	161.10	6.76	7.14	2.40	16.30	0.055
8.	*Hopea parviflora*	0.10	1.00	10.00	795.54	1.35	2.38	11.83	15.56	0.100
9.	*Careya arborea*	0.30	1.00	30.00	133.73	4.05	7.14	1.99	13.18	0.033
10.	*Vitex altissima*	0.10	1.00	10.00	561.34	1.35	2.38	8.35	12.08	0.100
11.	*Dalbergia latifolia*	0.10	1.00	10.00	484.01	1.35	2.38	7.20	10.93	0.100
12.	*Dimocarpus longan*	0.10	1.00	10.00	459.51	1.35	2.38	6.84	10.57	0.100
13.	*Lannea coromandelica*	0.10	1.00	10.00	325.86	1.35	2.38	4.85	8.58	0.100
14.	*Albizia odoratissima*	0.10	1.00	10.00	267.62	1.35	2.38	3.98	7.71	0.100
15.	*Bridelia retusa*	0.10	1.00	10.00	206.92	1.35	2.38	3.08	6.81	0.100
16.	*Erythrina variegata*	0.10	1.00	10.00	198.89	1.35	2.38	2.96	6.69	0.100
17.	*Wendlandia bicuspidata*	0.10	1.00	10.00	175.74	1.35	2.38	2.61	6.34	0.100
18.	*Terminalia chebula*	0.10	1.00	10.00	161.10	1.35	2.38	2.40	6.13	0.100
19.	*Mallotus philippensis*	0.10	1.00	10.00	114.88	1.35	2.38	1.71	5.44	0.100

Maturity-22.11, Continuum-1327.06, Diversity-2.3036, Dominance- 0.15

Appendix 16. Vegetation analysis

SOUTHERN SECONDARY MOIST MIXED DECIDUOUS FOREST -FIRE PRONE- LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Terminalia paniculata*	1.90	2.71	70.00	206.92	28.79	19.44	7.72	55.95	0.038
2.	*Buchanania lanzan*	1.10	1.83	60.00	191.01	16.67	16.67	7.13	40.47	0.030
3.	*Dillenia pentagyna*	0.60	1.50	40.00	258.47	9.09	11.11	9.65	29.85	0.037
4.	*Emblica officinalis*	0.70	1.75	40.00	121.00	10.61	11.11	4.52	26.24	0.043
5.	*Terminalia chebula*	0.40	1.33	30.00	305.81	6.06	8.33	11.41	25.80	0.044
6.	*Pterocarpus marsupium*	0.30	1.00	30.00	336.12	4.55	8.33	12.54	25.42	0.033
7.	*Careya arborea*	0.50	1.25	40.00	168.34	7.58	11.11	6.28	24.97	0.031
8.	*Olea dioica*	0.80	4.00	20.00	191.01	12.12	5.56	7.13	24.81	0.200
9.	*Syzygium cumini*	0.10	1.00	10.00	367.86	1.52	2.78	13.73	18.03	0.100
10.	*Lannea coromandelica*	0.10	1.00	10.00	325.86	1.52	2.78	12.16	16.46	0.100
11.	*Bridelia retusa*	0.10	1.00	10.00	206.92	1.52	2.78	7.72	12.02	0.100

Maturity-32.73. Cantinuum- 1532.22. Diversity-2.0652. Dominance- 0.16

Appendix 17, Vegetation analysis

SOUTHERN SECONDARY MOIST MIXED DECIDUOUS FOREST -MEAN

No	SPECIES	D	AB	PF	BA	IVI	PIVI
1.	*Terminalia paniculata*	1.37	2.10	62.50	742.31	42.72	14.24
2.	*Pterocarpus marsupium*	1.05	1.91	52.50	994.52	39.94	13.31
3.	*Dillenia pentagyna*	0.65	1.36	47.50	644.11	27.77	9.25
4.	*Careya arborea*	0.70	1.52	45.00	417.88	26.34	8.78
5.	*Emblica officinalis*	0.35	19.91	22.50	449.28	14.35	4.78
6.	*Buchanania lanzan*	0.32	0.95	17.50	108.29	10.26	3.42
7.	*Schleichera oleosa*	0.02	0.25	2.50	1243.0	9.91	3.30
8.	*Olea dioica*	0.10	1.25	5.00	204.97	9.75	3.25
9.	*Lagerstroemia microcarpa*	0.10	0.62	7.50	521.73	8.56	2.85
10.	*Grewia tillifolia*	0.07	0.50	7.50	554.48	7.17	2.39
11.	*Dalbergia lanceolaria*	0.15	10.00	10.00	278.81	7.14	2.38
12.	*Bridelia retusa*	0.07	0.50	7.50	425.03	6.61	2.20
13.	*Bombax insigne*	0.05	0.25	5.00	346.55	6.28	2.09
14.	*Lannea coromandelica*	0.07	0.75	5.00	377.79	5.81	1.93
15.	*Wrightia tinctoria*	0.10	0.62	7.50	445.56	5.69	1.89
16.	*Terminalia chebula*	0.12	0.58	10.00	07.18	5.65	1.88
17.	*Dalbergia latifolia*	0.10	10.00	5.00	05.03	5.23	1.74
18.	*Vitex altissima*	0.05	0.50	5.00	74.06	5.09	1.69
19.	*Albizia odoratissima*	0.05	0.50	5.00	94.19	4.49	1.49
20.	*Syzygium cumini*	0.05	0.25	5.00	68.33	4.37	1.45
21.	*Mitragyna parvifolia*	0.02	0.25	2.50	01.02	4.00	1.33
22.	*Hopea parviflora*	0.02	0.25	2.50	98.88	3.89	1.29
23.	*Prunus ceylanica*	0.02	0.25	2.50	06.92	3.56	1.18
24.	*Tabernaemontana divaricata*	0.20	0.50	5.00	55.86	3.37	1.12
25.	*Erythrina variegata*	0.05	0.50	5.00	116.62	3.26	1.08
26.	*Pithecellobium monadelphum*	0.02	0.25	2.50	150.53	2.86	0.95
27.	*Sterculia villosa*	0.05	0.25	5.00	64.61	2.75	0.91
28.	*Artocarpus hirsutus*	0.02	0.25	2.50	236.29	2.73	0.91
29.	*Helicteres isora*	0.07	0.37	5.00	17.90	2.65	0.88
30.	*Dimocarpus longan*	0.02	0.25	2.50	114.87	2.64	0.88
31.	*Cinnamomum malabatrum*	0.02	0.12	5.00	74.00	2.49	0.83
32.	*Cycas circinalis*	0.02	0.25	2.50	114.87	2.41	0.80
33.	*Aporusa lindleyana*	0.02	0.25	2.50	140.33	2.11	0.70
34.	*Wendlandia bicuspidata*	0.02	0.25	2.50	43.93	1.59	0.53
35.	*Cassia fistula*	0.02	0.25	2.50	66.90	1.53	0.51
36.	*Mallotus philippensis*	0.02	0.25	2.50	28.72	1.36	0.45
37.	*Trema orientalis*	0.02	0.25	2.50	28.72	1.25	0.41
38.	*Macaranga peltata*	0.02	0.25	2.50	19.11	1.24	0.41
39.	*Leea indica*	0.02	0.25	2.50	12.43	1.14	0.38

Appendix 18. Vegetation analysis

MYRISTICA SWAMP FOREST

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Gymnacranthera farguhariana*	1.20	3.00	40.00	630.15	23.08	12.12	2.95	38.15	0.075
2.	*Myristica dactyloides*	0.40	1.00	40.00	2963.30	7.69	12.12	13.88	33.69	0.025
3.	*Persea macrantha*	0.20	1.00	20.00	4582.30	3.85	6.06	21.46	31.37	0.050
4.	*Knema attenuata*	0.80	2.00	40.00	258.47	15.38	12.12	1.21	28.71	0.050
5.	*Myristica malabarica*	0.50	2.50	20.00	1604.10	9.62	6.06	7.51	23.19	0.125
6.	*Myristica fatua*	0.30	1.00	30.00	1742.60	5.77	9.09	8.16	23.02	0.033
7.	*Vateria indica*	0.20	2.00	10.00	2606.30	3.85	3.03	12.21	19.09	0.200
8.	*Mesua nagasarium*	0.10	1.00	10.00	2577.60	1.92	3.03	12.07	17.02	0.100
9.	*Holigarna arnottiana*	0.40	2.00	20.00	534.92	7.69	6.06	2.51	16.26	0.100
10.	*Calophyllum apetalum*	0.30	1.50	20.00	336.12	5.77	6.06	1.57	13.40	0.075
11.	*Glochidion zeylanicum*	0.10	1.00	10.00	1559.30	1.92	3.03	7.30	12.25	0.100
12.	*Ficus tsjahela*	0.10	1.00	10.00	843.99	1.92	3.03	3.95	8.90	0.100
13.	*Scolopia crenata*	0.10	1.00	10.00	389.82	1.92	3.03	1.83	6.78	0.100
14.	*Mastixia arborea subsp.meziana*	0.10	1.00	10.00	378.76	1.92	3.03	1.77	6.72	0.100
15.	*Agrostistachys borneensis*	0.10	1.00	10.00	121.00	1.92	3.03	0.57	5.52	0.100
16.	*Syzygium mundagam*	0.10	1.00	10.00	114.88	1.92	3.03	0.54	5.49	0.100
17.	*Palaquium elliptium*	0.10	1.00	10.00	91.96	1.92	3.03	0.43	5.38	0.100
18.	*Dimocarpus longan*	0.10	1.00	10.00	17.90	1.92	3.03	0.08	5.03	0.100

Maturity-18.33.Continuum-1800.85.Diversity-2.5098,Dominance-0.11

Appendix 19. Vegetation analysis

SUB MONTANE HILLVALLEY SWAMP FOREST

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Symplocos cochinchinensis*	1.20	2.00	60.00	86.63	17.39	13.04	0.81	31.24	0.033
2.	*Pandanus thwattesii*	1.40	4.67	30.00	42.08	20.29	6.52	0.39	27.20	0.155
3.	*Gymnacranthera farguhariana*	0.50	1.25	40.00	910.82	7.25	8.70	8.50	24.45	0.031
4.	*Holigarna arnottiana*	0.50	1.25	40.00	658.79	7.25	8.70	6.15	22.10	0.031
5.	*Myristica dactyloides*	0.10	1.00	10.00	1790.0	1.45	2.17	16.70	20.32	0.100
6.	*Mastixia arborea subsp.meziana*	0.20	1.00	20.00	1344.5	2.90	4.35	12.54	19.79	0.000
7.	*Persea macrantha*	0.30	1.00	30.00	843.99	4.35	6.52	7.87	18.74	0.033
8.	*Hopea parviflora*	0.30	1.00	30.00	509.15	4.35	6.52	4.75	15.62	0.033
9.	*Glochidion zeylanicum*	0.30	1.50	20.00	357.12	4.35	4.35	3.33	12.03	0.075
10.	*Myristica malabarica*	0.10	1.00	10.00	843.99	1.45	2.17	7.87	11.49	0.100
11.	*Vateria indica*	0.10	1.00	10.00	795.54	1.45	2.17	7.42	11.04	0.100
12.	*Artocarpus hirsutus*	0.10	1.00	10.00	630.15	1.45	2.17	5.88	9.50	0.100
13.	*Symplocos macrophylla subsp.zeylanicus*	0.30	1.50	20.00	76.45	4.35	4.35	0.71	9.41	0.075
14.	*Dimocarpus longan*	0.20	1.00	20.00	198.89	2.90	4.35	1.86	9.11	0.050
15.	*Leea indica*	0.30	1.50	20.00	22.99	4.35	4.35	0.21	8.91	0.075
16.	*Carallia brachiata*	0.10	1.00	10.00	509.15	1.45	2.17	4.75	8.37	0.100
17.	*Pajanelia longifolia*	0.20	1.00	20.00	38.50	2.90	4.35	0.36	7.61	0.050
18.	*Macaranga peltata*	0.10	1.00	10.00	378.76	1.45	2.17	3.53	7.15	0.100
19.	*Sterculia urens*	0.10	1.00	10.00	286.40	1.45	2.17	2.67	6.29	0.100
20.	*Aporusa lindleyana*	0.20	2.00	10.00	81.46	2.90	2.17	0.76	5.83	0.200
21.	*Lannea coromandelica*	0.10	1.00	10.00	127.29	1.45	2.17	1.19	4.81	0.100
22.	*Olea dioica*	0.10	1.00	10.00	114.88	1.45	2.17	1.07	4.69	0.100
23.	*Alstonia scholaris*	0.10	1.00	10.00	71.60	1.45	2.17	0.67	4.29	0.100

Maturity-20.00, Continuum-1588.41, Diversity-2.7140, Dominance- 0.10

Appendix 20. Vegetation analysis

RIPARIAN FRINGING FOREST - BONOCCORD- LOCALITY

NO	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Madhuca nertifolia*	1.30	1.63	80.00	910.82	22.41	17.02	2.68	42.11	0.020
2.	*Vateria indica*	0.10	1.00	10.00	5799.50	1.72	2.13	17.07	20.92	0.100
3.	*Hopea parviflora*	0.40	1.00	40.00	1813.90	6.90	8.51	5.34	20.75	0.025
4.	*Aporusa lindleyana*	0.60	1.50	40.00	509.15	10.34	8.51	1.50	20.35	0.037
5.	*Ixora arborea*	0.50	1.00	50.00	305.81	8.62	10.64	0.90	20.16	0.020
6.	*Calophyllum apetalum*	0.10	1.00	10.00	4972.20	1.72	2.13	14.64	18.49	0.100
7.	*Ficus hispida*	0.10	1.00	10.00	4582.30	1.72	2.13	13.49	17.34	0.100
8.	*Holigarna arnottiana*	0.40	1.33	30.00	561.34	6.90	6.38	1.65	14.93	0.044
9.	*Artocarpus hirsutus*	0.30	1.00	30.00	1126.60	5.17	6.38	3.32	14.87	0.033
10.	*Persea macrantha*	0.30	1.50	20.00	1283.10	5.17	4.26	3.78	13.21	0.075
11.	*Antiaris toxicaria*	0.20	2.00	10.00	2272.20	3.45	2.13	6.69	12.27	0.200
12.	*Lannea coromandelica*	0.20	1.00	20.00	1052.10	3.45	4.26	3.10	10.81	0.050
13.	*Olea dioica*	0.20	1.00	20.00	910.82	3.45	4.26	2.68	10.39	0.050
14.	*Terminalia paniculata*	0.20	1.00	20.00	893.87	3.45	4.26	2.63	10.34	0.050
15.	*Alstonia scholaris*	0.10	1.00	10.00	2036.60	1.72	2.13	6.00	9.85	0.100
16.	*Scleropyrum pentandrum*	0.20	1.00	20.00	484.01	3.45	4.26	1.42	9.13	0.050
17.	*Carallia brachiata*	0.10	1.00	10.00	1695.80	1.72	2.13	4.99	8.84	0.100
18.	*Garcinia gummi-gutta*	0.10	1.00	10.00	1164.80	1.72	2.13	3.43	7.28	0.100
19.	*Knema attenuata*	0.20	2.00	10.00	521.96	3.45	2.13	1.54	7.12	0.200
20.	*Hydnocarpus alpina*	0.10	1.00	10.00	534.92	1.72	2.13	1.57	5.42	0.100
21.	*Vitex altissima*	0.10	1.00	10.00	534.92	1.72	2.13	1.57	5.42	0.100

Maturity-22.38. Continuum-1264.00. Diversity-2.7132. Dominance- 0.09

Appendix 21. Vegetation analysis

RIPARIAN FRINGING FOREST KARAMANA LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1	*Calophyllum apetalum*	1.10	2.75	40.00	447.49	117.46	9.76	2.23	29.45	0.068
2.	*Gymnacranthera farquhariana*	0.10	1.00	10.00	458230	1.59	2.44	122.84	26.87	0.100
3.	*Hopea parviflora*	0.70	1.75	40.00	357.12	11.11	9.76	1.78	22.65	0.043
4.	*Vateria indica*	0.40	2.00	20.00	1672.60	6.35	4.88	8.34	19.57	0.100
5.	*Knema attenuata*	0.40	1.00	40.00	658.79	6.35	9.76	3.28	19.39	0.025
6.	*Lophopetalum wightianum*	0.70	3.50	20.00	423.95	11.11	4.88	2.11	18.10	0.175
7.	*Gluta travancorica*	0.30	1.00	30.00	588.39	4.76	7.32	2.93	15.01	0.033
8.	*Persea macrantha*	0.20	2.00	10.00	1559.30	3.17	2.44	7.77	13.38	0.200
9.	*Holigarna arnottiana*	0.30	1.50	20.00	748.53	4.76	4.88	3.73	13.37	0.075
10.	*Lannea coromandelica*	0.10	1.00	10.00	1790.00	1.59	2.44	8.92	12.95	0.100
11.	*Syzygium cuminii*	0.10	1.00	10.00	1790.00	1.59	2.44	8.92	12.95	0.100
12.	*Mesua nagasarium*	0.20	1.00	20.00	860.46	3.17	4.88	4.29	12.34	0.050
13.	*Murraya paniculata*	0.20	1.00	20.00	346.54	3.17	4.88	1.73	9.78	0.050
14.	*Wendlandia bicuspidata*	0.20	1.00	20.00	215.12	3.17	4.88	1.07	9.12	0.050
15.	*Dimocarpus longan*	0.30	3.00	10.00	215.12	4.76	2.44	1.07	8.27	0.300
16.	*Lagerstroemia microcarpa*	0.10	1.00	10.00	795.54	1.59	2.44	3.97	8.00	0.100
17.	*Diospyros candolleana*	0.10	1.00	10.00	644.39	1.59	2.44	3.21	7.24	0.100
18.	*Garcinia morella*	0.10	1.00	10.00	644.39	1.59	2.44	3.21	7.24	0.100
19.	*Terminalia paniculata*	0.10	1.00	10.00	484.01	1.59	2.44	2.41	6.44	0.100
20.	*Mangifera indica*	0.10	1.00	10.00	389.82	1.59	2.44	1.94	5.97	0.100
21.	*Allophylus serrulatus*	0.20	2.00	10.00	66.91	3.17	2.44	0.33	5.94	0.200
22.	*Artocarpus hirsutus*	0.10	1.00	10.00	367.86	1.59	2.44	1.83	5.86	0.100
23.	*Canarium strictum*	0.10	1.00	10.00	357.12	1.59	2.44	1.78	5.81	0.100
24.	*Actinodaphne bourdillonii*	0.10	1.00	10.00	58.00	1.59	2.44	0.29	4.32	0.100

Maturity-17.08. Continuum-1557.89.Diversity-2.8490. Dominance- 0.08

Appendix 22. Vegetation analysis

RIPARIAN FRINGING FOREST - PODIUM LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Vateria indica*	0.60	1.50	40.00	2664.20	9.23	7.69	8.38	25.30	0.037
2.	*Gluta travancorica*	0.70	2.33	30.00	1015.80	10.77	5.77	3.19	19.73	0.077
3.	*Calophyllum apetalum*	0.40	1.00	40.00	1813.90	6.15	7.69	5.70	19.54	0.025
4.	*Hopea parviflora*	0.50	1.25	40.00	1107.70	7.69	7.69	3.48	18.86	0.030
5.	*Dipterocarpus bourdillonii*	0.20	1.00	20.00	3310.70	3.08	3.85	10.41	17.34	0.050
6.	*Artocarpus hirsutus*	0.30	1.00	30.00	1344.50	4.62	5.77	4.23	14.62	0.030
7.	*Madhuca neriifolia*	0.50	1.67	30.00	325.86	7.69	5.77	1.02	14.48	0.055
8.	*Syzygium cumini*	0.40	2.00	20.00	733.17	6.15	3.85	2.31	12.31	0.100
9.	*Olea dioica*	0.30	1.00	30.00	459.51	4.62	5.77	1.45	11.84	0.030
10.	*Vitex altissima*	0.10	1.00	10.00	2664.20	1.54	1.92	8.38	11.84	0.100
11.	*Lophopetalum wightianum*	0.10	1.00	10.00	2381.00	1.54	1.92	7.49	10.95	0.100
12.	*Xanthophyllum arnottianum*	0.30	1.50	20.00	81.46	4.62	3.85	0.26	8.73	0.070
13.	*Holigarna arnottiana*	0.10	1.00	10.00	1649.60	1.54	1.92	5.19	8.65	0.100
14.	*Gymnacranthera farquhariana*	0.20	1.00	**20.00**	**459.51**	**3.08**	3.85	**1.45**	8.38	*0.050*
15.	*Toona ciliata*	0.10	1.00	10.00	1493.20	1.54	1.92	4.70	8.17	0.100
16.	*Humboldtia vahliana*	0.20	1.00	20.00	357.12	3.08	3.85	1.12	8.05	0.050
17.	*Terminalia paniculata*	0.10	1.00	10.00	1407.20	1.54	1.92	4.43	7.89	0.100
18.	*Carallia brachiata*	0.20	2.00	10.00	827.68	3.08	1.92	2.60	7.60	0.200
19.	*Hydnocarpus macrocarpa*	0.10	1.00	10.00	1243.00	1.54	1.92	3.91	7.37	0.100
20.	*Clananthus courtallensis*	0.10	1.00	10.00	927.92	1.54	1.92	2.92	6.38	0.100
21.	*Anthocephalus chinensis*	0.10	1.00	10.00	910.82	1.54	1.92	2.86	6.32	0.100
22.	*Mesua nagasarium*	0.10	1.00	10.00	795.54	1.54	1.92	2.50	5.96	0.100
23.	*Aporusa lindleyana*	0.10	1.00	10.00	795.54	1.54	1.92	2.50	5.96	0.100
24.	*Dimocarpus longan*	0.10	1.00	10.00	702.94	1.54	1.92	2.21	5.67	0.100
25.	*Symplocos macrophylla subsp.zeylanicus*	0.10	1.00	10.00	616.07	1.54	1.92	1.94	5.40	0.100
26.	*Glochidion zeylanicum*	0.10	1.00	10.00	496.50	1.54	1.92	1.56	5.02	0.100
27.	*Actinodaphne malabarica*	0.10	1.00	10.00	496.50	1.54	1.92	1.56	5.02	0.100
28.	*Vitex trifolia*	0.10	1.00	10.00	484.01	1.54	1.92	1.52	4.98	0.100
29.	*Spondias indica*	0.10	1.00	10.00	133.73	1.54	1.92	0.42	3.88	0.100
31.	*Lannea coromandelica*	0.10	1.00	10.00	97.15	1.54	1.92	0.31	3.77	0.100

Maturity-17.33, Continuum-1433.66, Diversity-3.1433, Dominance-0.05

Appendix 23. Vegetation analysis

RIPARIAN FRINGING FOREST-MEAN

No.	Species	D	AB	PF	BA	IVI	PIVI
1.	*Calophyllum apetalum*	0.20	1.58	30.00	2411.19	22.49	7.60
2.	*Vateria indica*	0.03	0.66	23.33	3378.76	21.93	7.41
3.	*Hopea parviflora*	0.53	1.00	40.00	1092.90	20.75	7.01
4.	*Madhuca neriifolia*	0.60	0.33	36.66	412.22	18.86	6.37
5.	*Holigarna arnottiana*	0.26	1.27	20.00	986.49	12.32	4.16
6.	*Gymnacranthera farquhariana*	0.10	0.66	10.00	1680.60	11.74	3.97
7.	*Artocarpus hirsutus*	0.23	1.00	23.33	946.32	11.70	3.95
8.	*Gluta travancorica*	0.03	1.11	20.00	534.73	11.58	3.91
9.	*Lophopetatum wightianum*	0.26	1.10	10.00	934.98	9.68	3.27
10.	*Lannea coromandelica*	0.13	1.50	13.33	979.85	9.18	3.10
11.	*Persea macrantha*	0.16	0.33	10.00	947.46	8.86	0.99
12.	*Knema attenuata*	0.02	1.00	16.66	393.58	8.84	2.98
13.	*Syzygium cumini*	0.16	1.00	10.00	841.05	8.42	2.84
14.	*Terminalia paniculata*	0.13	0.33	13.33	928.30	8.22	2.78
15.	*Aporusa lindleyana*	0.23	0.83	16.66	434.89	8.00	2.70
16.	*Ixora arborea*	0.16	0.33	16.66	101.93	6.72	2.27
17.	*Mesua nagasarium*	0.10	0.33	10.00	552.00	6.10	2.06
18.	*Dipterocarpus bourdillonii*	0.06	0.33	6.66	1103.56	5.78	1.95
19.	*Ficus hispida*	0.03	0.33	3.33	1527.43	5.78	1.95
20.	*Vitex altissima*	0.06	0.33	6.66	1066.37	5.75	1.94
21.	*Cordia brachyclada*	0.10	1.00	6.66	841.16	5.48	1.85
22.	*Dimocarpus longan*	0.13	1.33	6.66	806.02	4.65	1.57
23.	*Antiaris toxicaria*	0.06	0.66	3.33	675.40	4.09	1.38
24.	*Olea dioica*	0.16	1.66	16.66	456.77	3.95	1.33
25.	*Alstonia scholaris*	0.03	0.33	3.33	678.86	3.28	1.10
26.	*Murraya paniculata*	0.06	0.33	6.66	115.51	3.26	1.10
27.	*Scleropyrum pentandrum*	0.06	0.33	6.66	161.33	3.04	1.02
28.	*Wendlandia bicuspidata*	0.06	0.33	6.66	71.70	3.04	1.02
29.	*Xanthophyllum arnottianum*	0.10	1.00	6.66	27.15	2.91	0.98
30.	*Toona ciliata*	0.03	1.50	3.33	497.73	2.72	0.91
31.	*Humboldtia vahliana*	0.06	0.33	6.66	119.04	2.68	0.90
32.	*Lagerstroemia microcarpa*	0.03	0.33	3.33	265.18	2.67	0.90
33.	*Hydnocarpus macrocarpa*	0.03	0.33	3.33	414.33	2.46	0.83
34.	*Garcinia gummi-gutta*	0.03	0.33	3.33	388.26	2.43	0.82
35.	*Garcinia morella*	0.03	0.33	3.33	214.79	2.41	0.81
36.	*Diospyros candolleana*	0.03	0.33	3.33	214.79	2.41	0.81
37.	*Chionanthus courtallensis*	0.03	0.66	3.33	309.30	2.13	0.72
38.	*Anthocephalus chinensis*	0.03	0.33	3.33	303.60	2.11	0.71
39.	*Mangifera indica*	0.03	0.66	3.33	129.94	1.99	0.67
40.	*Allophylus serrulatus*	0.06	0.66	3.33	22.30	1.98	0.66
41.	*Canarium strictum*	0.03	0.33	3.33	119.04	1.94	0.65
42.	*Hydnocarpus alpina*	0.03	0.33	3.33	178.30	1.81	0.61
43.	*Symplocos macrophylla subsp.zeylanicus*	0.03	1.00	3.33	205.35	1.80	0.60
44.	*Actinodaphne malabarica*	0.03	0.33	3.33	165.55	1.67	0.56
45.	*Glochidion zeylanicum*	0.03	0.33	3.33	165.50	1.67	0.56
46.	*Vitex trifolia*	0.03	0.50	3.33	161.33	1.66	0.56
47.	*Actinodaphne bourdillonii*	0.03	0.33	3.33	19.33	1.44	0.48
48.	*Sponias indica*	0.03	0.33	3.33	44.52	1.29	0.43

Appendix 24. Vegetation analysis

SOUTHERN SUB-TROPICAL HILL FOREST- KAALIMALAIPARAMBU LOCALITY

No	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Syzygium cumini*	2.70	4.50	60.00	140.33	17.09	9.68	2.64	29.41	0.075
2.	*Atalantia racemosa*	3.00	6.00	50.00	103.10	18.99	8.06	1.94	28.99	0.120
3.	*Hopea parviflora*	0.40	1.33	30.00	910.82	2.53	4.84	17.13	24.50	0.044
4.	*Mesua nagasarium*	1.00	3.33	30.00	459.51	6.33	4.84	8.64	19.81	0.111
5.	*Schrebera swietenioides*	1.10	2.20	50.00	191.01	6.96	8.06	3.59	18.61	0.044
6.	*Vateria indica*	0.30	1.50	20.00	561.34	1.90	3.23	10.56	15.69	0.075
7.	*Cullenia exarillata*	1.00	2.50	40.00	127.29	6.33	6.45	2.39	15.17	0.062
8.	*Xanthophyllum arnottianum*	0.90	2.25	40.00	147.10	5.70	6.45	2.77	14.92	0.056
9.	*Carallia brachiata*	1.50	7.50	20.00	103.10	9.49	3.23	1.94	14.66	0.375
10.	*Elaeocarpus tuberculata*	0.10	1.00	10.00	574.78	0.63	1.61	10.81	13.05	0.100
11.	*Elaeocarpus munronii*	0.50	1.67	30.00	133.73	3.16	4.84	2.51	10.51	0.055
12.	*Wendlandia bicuspidata*	0.50	1.67	30.00	108.91	3.16	4.84	2.05	10.05	0.055
13.	*Ficus tsjahela*	0.10	1.00	10.00	378.76	0.63	1.61	7.12	9.36	0.100
14.	*Holigarna arnottiana*	0.30	1.50	20.00	175.74	1.90	3.23	3.30	8.43	0.075
15.	*Actinodaphne companulata var. obtusa*	0.40	2.00	20.00	140.33	2.53	3.23	2.64	8.40	0.100
16.	*Cinnamomum verum*	0.30	1.50	20.00	147.10	1.90	3.23	2.77	7.90	0.075
17.	*Artocarpus heterophyllus*	0.20	1.00	20.00	108.91	1.27	3.23	2.05	6.55	0.050
18.	*Dimocarpus longan*	0.20	1.00	20.00	49.72	1.27	3.23	0.94	5.44	0.050
19.	*Vernonia travancorica*	0.10	1.00	10.00	161.10	0.63	1.61	3.03	5.27	0.100
20.	*Diospyros candolleana*	0.20	1.00	20.00	38.50	1.27	3.23	0.72	5.22	0.050
21.	*Ixora arborea*	0.30	3.00	10.00	76.45	1.90	1.61	1.44	4.95	0.300
22.	*Ailanthus triphysa*	0.10	1.00	10.00	108.91	0.63	1.61	2.05	4.29	0.100
23.	*Tarenna alpestris*	0.10	1.00	10.00	103.10	0.63	1.61	1.94	4.18	0.100
24.	*Ixora nigricans*	0.20	2.00	10.00	62.37	1.27	1.61	1.17	4.05	0.200
25.	*Trichilia connaroides*	0.10	1.00	10.00	71.60	0.63	1.61	1.35	3.59	0.100
26.	*Ternstroemia japonica*	0.10	1.00	10.00	71.60	0.63	1.61	1.35	3.59	0.100
27.	*Symplocos macrophylla subsp. zeylanicus*	0.10	1.00	10.00	62.37	0.63	1.61	1.17	3.41	0.100

Maturity-22.96, Continuum-1580.97, Diversity-2.7223, Dominance- 0.10

Appendix 25. Vegetation analysis

SOUTHERN SUB-TROPICAL HILL FOREST-CHEMMUNJIMOTTAI - LOCALITY

NO	SPECIES	D	AB	PF	BA	RD	RF	RBA	IVI	ABF
1.	*Cinnamomum verum*	3.60	6.00	60.00	103.10	18.65	7.41	1.42	27.48	0.100
2.	*Syzygium cuminii*	1.90	2.71	70.00	231.98	9.84	8.64	3.19	21.67	0.038
3.	*Xanthophyllum arnottianum*	2.50	6.25	40.00	103.10	12.95	4.94	1.42	19.31	0.156
4.	*Cullenia exarillata*	1.10	2.20	50.00	534.92	5.70	6.17	7.36	19.23	0.040
5.	*Actinodaphne bourdillonii*	1.00	1.43	70.00	215.12	5.18	8.64	2.96	16.78	0.020
6.	*Hydnocarpus macrocarpa*	0.10	1.00	10.00	962.61	0.52	1.23	13.25	15.00	0.100
7.	*Elaeocarpus munronii*	1.40	2.80	50.00	108.91	7.25	6.17	1.50	14.92	0.056
8.	*Poeciloneuron indicum*	0.10	1.00	10.00	945.19	0.52	1.23	13.01	14.76	0.100
9.	*Mastixia arborea subsp.meziana*	1.50	3.75	40.00	76.45	7.77	4.94	1.05	13.76	0.093
10.	*Vateria indica*	0.60	1.50	40.00	378.76	3.11	4.94	5.21	13.26	0.037
11.	*Atalantia racemosa*	1.00	2.00	50.00	127.29	5.18	6.17	1.75	13.10	0.040
12.	*Anthocephalus chinensis*	0.20	1.00	20.00	658.79	1.04	2.47	9.07	12.58	0.050
13.	*Mesua nagasarium*	0.60	2.00	30.00	315.75	3.11	3.70	4.35	11.16	0.066
14.	*Antidesma menasu*	0.60	3.00	20.00	168.34	3.11	2.47	2.32	7.90	0.150
15.	*Ficus tsjahela*	0.20	1.00	20.00	231.98	1.04	2.47	3.19	6.70	0.050
16.	*Dimocarpus longan*	0.50	2.50	20.00	103.10	2.59	2.47	1.42	6.48	0.125
17.	*Agrostistachys borneensis*	0.20	1.00	20.00	191.01	1.04	2.47	2.63	6.14	0.050
18.	*Calophyllum apetalum*	0.10	1.00	10.00	315.75	0.52	1.23	4.35	6.10	0.100
19.	*Vitex altissima*	0.10	1.00	10.00	296.02	0.52	1.23	4.07	5.82	0.100
20.	*Gomphandra coreacea*	0.20	1.00	20.00	86.63	1.04	2.47	1.19	4.70	0.050
21.	*Cinnamomum travancoricum*	0.20	1.00	20.00	71.60	1.04	2.47	0.99	4.50	0.050
22.	*Elaeocarpus tuberculata*	0.10	1.00	10.00	198.89	0.52	1.23	2.74	4.49	0.100
23.	*Wendlandia bicuspidata*	0.20	1.00	20.00	58.00	1.04	2.47	0.80	4.31	0.050
24.	*Ternstroemia japonica*	0.20	1.00	20.00	49.72	1.04	2.47	0.68	4.19	0.050
25.	*Carallia brachiata*	0.30	3.00	10.00	66.91	1.55	1.23	0.92	3.70	0.300
26.	*Aglaia minutiflora*	0.10	1.00	10.00	127.29	0.52	1.23	1.75	3.50	0.100
27.	*Diospyros ferrea var.angustifolia*	0.10	1.00	10.00	127.29	0.52	1.23	1.75	3.50	0.100
28.	*Actinodaphne companulata var.obtusa*	0.10	1.00	10.00	114.88	0.52	1.23	1.58	3.33	0.100
29.	*Dipterocarpus bourdillonii*	0.10	1.00	10.00	103.10	0.52	1.23	1.42	3.17	0.100
30.	*Aporusa lindleyana*	0.20	2.00	10.00	58.00	1.04	1.23	0.80	3.07	0.200
31.	*Bischofia javanica*	0.10	1.00	10.00	86.63	0.52	1.23	1.19	2.94	0.100
32.	*Syzygium mundagam*	0.10	1.00	10.00	49.72	0.52	1.23	0.68	2.43	0.100

Maturity-25.31, Continuum-1498.42, Diversity-2.8269, Dominance- 0.09

Appendix 26. Vegetation analysis

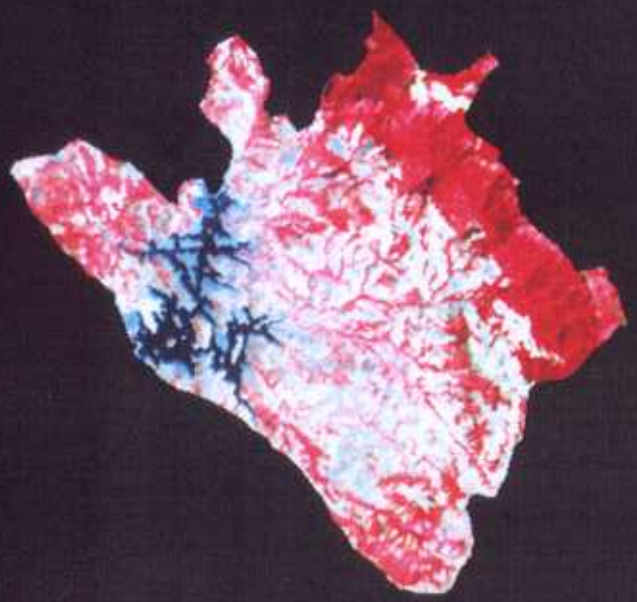
SOUTHERN SUB-TROPICAL HILL FOREST- MEAN

No	SPECIES	D	AB	PF	BA	IVI	PIVI
1.	*Syzygium cumini*	2.30	3.60	65.00	186.15	40.24	12.48
2.	*Atalantia racemosa*	2.00	4.00	50.00	115.19	21.04	6.65
3.	*Cinnamomum verum*	1.95	3.75	40.00	125.10	17.69	5.59
4.	*Cullenia exarillata*	1.05	2.35	45.00	331.10	17.20	5.60
5.	*Xanthophyllum arnottianum*	1.70	4.25	40.00	125.10	17.11	5.40
6.	*Mesua nagasarium*	0.80	2.66	30.00	387.63	15.48	4.89
7.	*Vateria indica*	0.45	1.50	30.00	470.05	14.47	4.57
8.	*Elaeocarpus munronii*	0.95	2.23	20.00	121.32	12.71	4.01
9.	*Hopea parviflora*	0.20	0.60	15.00	455.41	12.25	3.87
10.	*Schrebera swietenioides*	0.55	1.10	25.00	95.50	9.30	2.93
11.	*Carallia brachiata*	0.90	5.25	15.00	85.00	9.18	2.90
12.	*Elaeocarpus tuberculata*	0.10	1.00	10.00	386.83	8.77	2.77
13.	*Actinodaphne bourdillonii*	0.50	0.71	35.00	107.56	8.39	2.65
14.	*Ficus tsjahela*	0.15	1.00	15.00	305.37	8.03	2.53
15.	*Hydnocarpus macrocarpa*	0.05	0.50	5.00	481.30	7.50	2.37
16.	*Poeciloneuron indicum*	0.05	0.50	5.00	472.59	7.38	2.33
17.	*Wendlandia bicuspidata*	0.35	1.33	25.00	83.45	7.18	2.26
18.	*Mastixia arborea subsp.meziana*	0.75	1.87	20.00	38.22	6.88	2.17
19.	*Anthocephalus chinensis*	0.10	0.50	10.00	329.39	6.29	1.98
20.	*Dimocarpus longan*	0.35	1.75	20.00	76.41	5.96	1.88
21.	*Actinodaphne companulata var.obtusa*	0.25	1.50	15.00	127.60	5.86	1.85
22.	*Ternstroemia japonica*	0.15	1.00	10.00	60.66	5.68	1.79
23.	*Holigarna arnottiana*	0.15	0.75	10.00	87.87	4.21	1.33
24.	*Antidesma menasu*	0.30	1.50	10.00	84.17	3.95	1.24
25.	*Artocarpus heterophyllus*	0.10	0.50	10.00	54.45	3.27	1.03
26.	*Agrostistachys borneensis*	0.10	0.50	10.00	95.50	3.07	0.97
27.	*Calophyllum apetalum*	0.05	0.50	5.00	157.87	3.05	0.96
28.	*Vitex altissima*	0.05	0.50	5.00	148.01	2.91	0.91
29.	*Vernonia travancorica*	0.05	0.50	5.00	80.55	2.63	0.83
30.	*Diospyros candolleana*	0.10	0.50	10.00	19.25	2.61	0.82
31.	*Ixora arborea*	0.15	1.50	5.00	38.22	2.47	0.78
32.	*Gomphandra coreacea*	0.10	0.50	10.00	43.31	2.35	0.74
33.	*Cinnamomum travancoricum*	0.10	0.50	10.00	35.80	2.25	0.71
34.	*Allanthus triphysa*	0.05	0.50	10.00	54.45	2.14	0.67
35.	*Tarenna alpestris*	0.05	0.50	5.00	51.55	2.09	6.98
36.	*Ixora nigricans*	0.10	1.00	5.00	31.18	2.02	0.63
37.	*Trichilia connaroides*	0.05	0.50	5.00	35.80	1.79	0.56
38.	*Aglaia minutiflora*	0.05	0.50	5.00	63.64	1.75	0.55
39.	*Diospyros ferrea var.angustifolia*	0.05	0.50	5.00	63.64	1.75	0.55
40.	*Symplocos macrophylla subsp.zeylanicus*	0.05	0.50	5.00	31.18	1.70	0.53
41.	*Dipterocarpus bourdillonii*	0.05	0.50	5.00	51.55	1.58	0.49
42.	*Aporusa lindleyana*	0.10	1.00	5.00	29.00	1.53	0.48
43.	*Bischofia javanica*	0.05	0.50	5.00	43.31	1.47	0.46
44.	*Syzygium mundagam*	0.05	0.50	5.00	24.86	1.21	0.38

Plate 1

PEPPARA WILDLIFE SANCTUARY

KERALA STATE



FALSE COLOUR COMPOSITE

CLASSIFIED IMAGE

LEGEND

- W.C. EVERGREEN
- SUB TROP. HILL
- H.T. EVERGREEN
- W.C. SEMI-EVERGREEN
- S.S. MOIST DECIDUOUS
- RIPARIAN FRINGING
- DEGRADED S.TROP.HILL
- REED BRAKE
- GRASS LAND
- SCRUB LAND
- EXPOSED ROCK
- RESERVOIR

KFRI / RRSSC -B

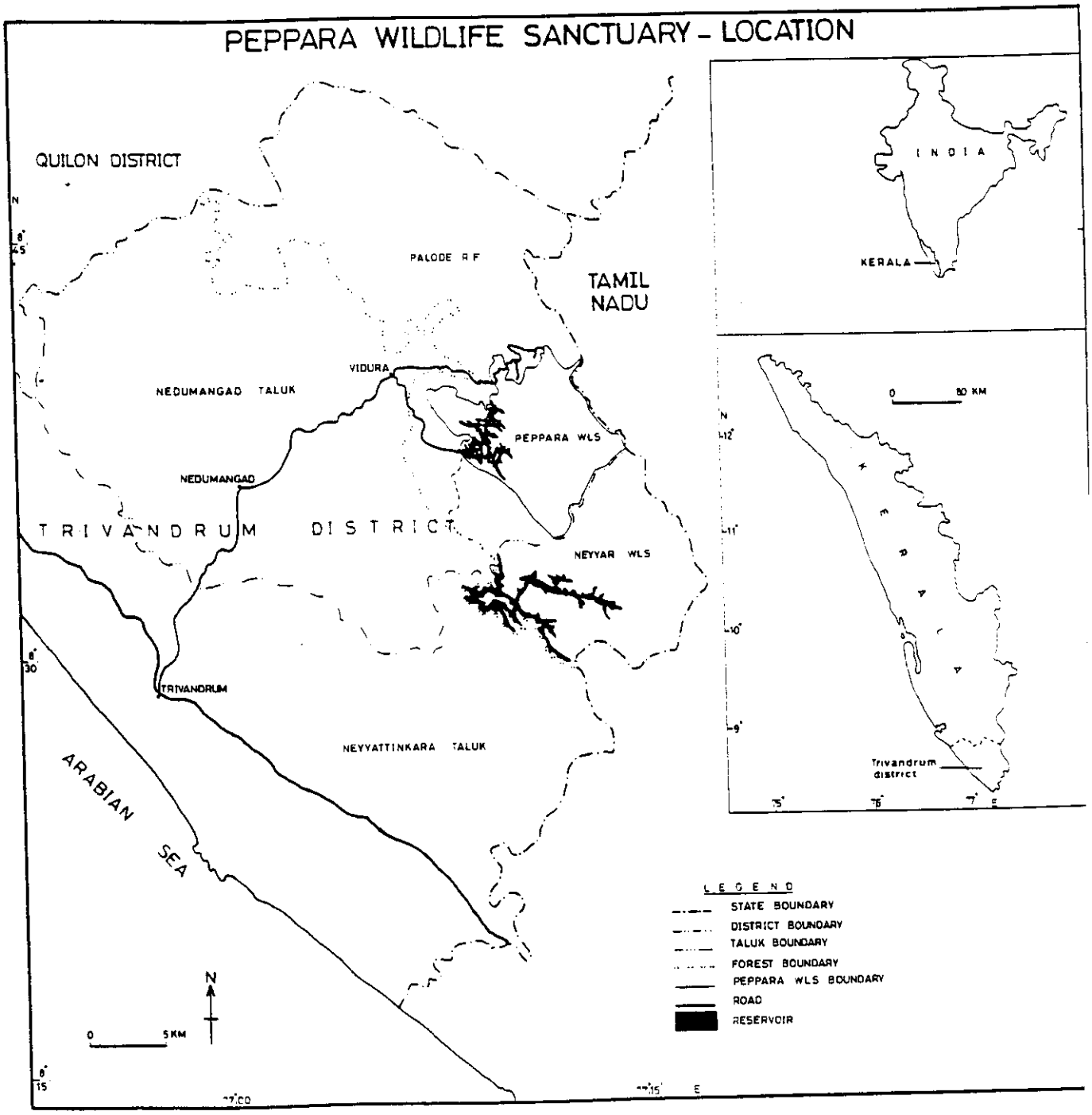

PEPPARA WILDLIFE SANCTUARY - LOCATION
QUILON DISTRICT
PALODE R F
TAMIL NADU
VIDURA
NEDUMANGAD TALUK
PEPPARA WLS
NEDUMANGAD
TRIVANDRUM DISTRICT
NEYYAR WLS
TRIVANDRUM
NEYYATTINKARA TALUK
ARABIAN SEA
0 5KM
INDIA
KERALA
0 80 KM
Trivandrum district
LEGEND
STATE BOUNDARY
DISTRICT BOUNDARY
TALUK BOUNDARY
FOREST BOUNDARY
PEPPARA WLS BOUNDARY
ROAD
RESERVOIR

Fig. 1

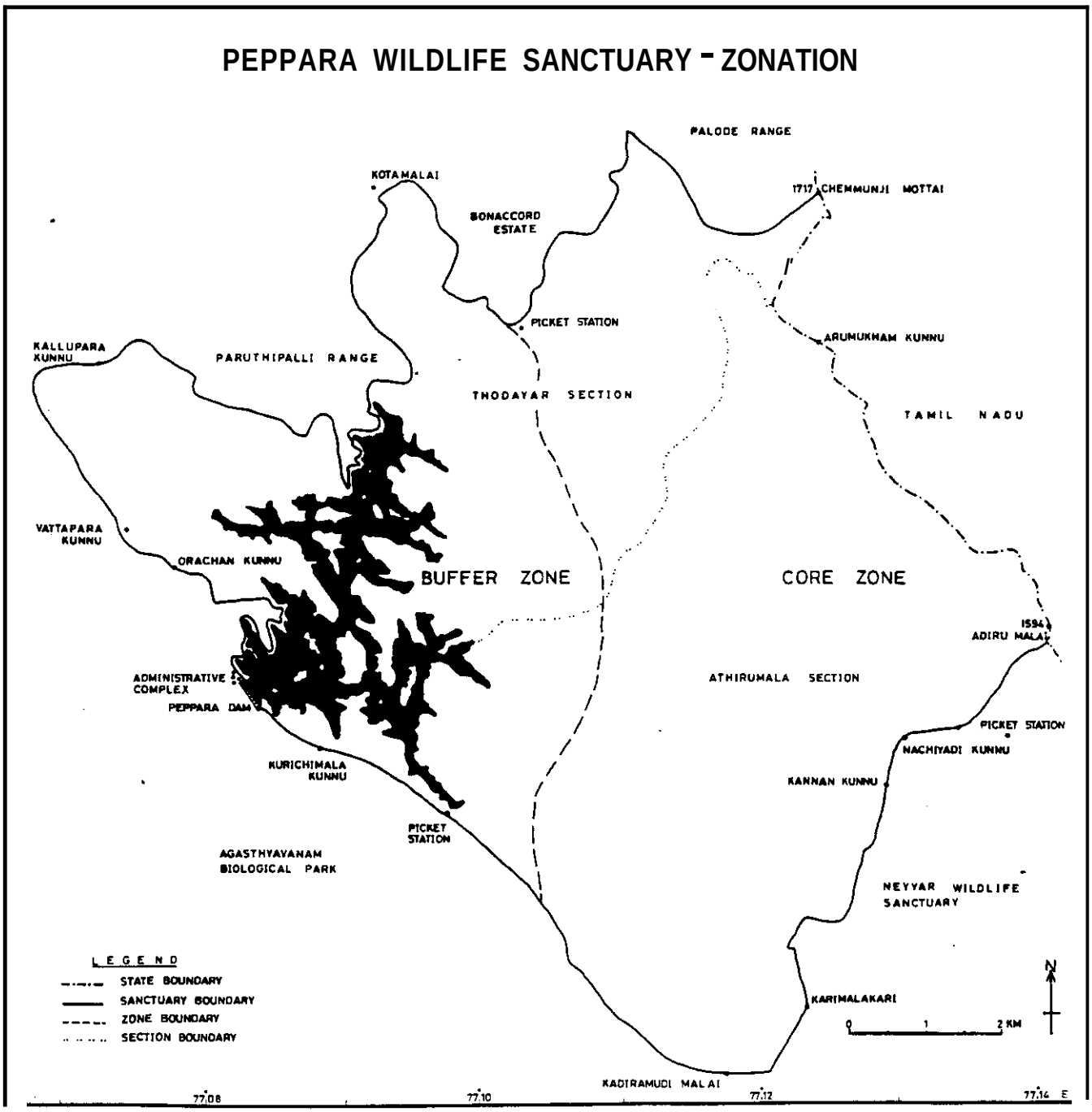

PEPPARA WILDLIFE SANCTUARY - ZONATION
PALODE RANGE
KOTAMALAI
1717 CHEMMUNJI MOTTAI
BONACCORD ESTATE
PICKET STATION
KALLUPARA KUNNU
PARUTHIPALLI RANGE
ARUMUKHAM KUNNU
THODAYAR SECTION
TAMIL NADU
VATTAPARA KUNNU
ORACHAN KUNNU
BUFFER ZONE
CORE ZONE
1594 ADIRU MALAI
ADMINISTRATIVE COMPLEX
PEPPARA DAM
ATHIRUMALA SECTION
PICKET STATION
NACHIYADI KUNNU
KURICHIMALA KUNNU
KANNAN KUNNU
PICKET STATION
AGASTHYAVANAM BIOLOGICAL PARK
NEYYAR WILDLIFE SANCTUARY
LEGEND
STATE BOUNDARY
SANCTUARY BOUNDARY
ZONE BOUNDARY
SECTION BOUNDARY
KARIMALAKARI
0 1 2 KM
N
KADIRAMUDI MALAI
77°08
77°10
77°12
77°14 E

Fig. 2

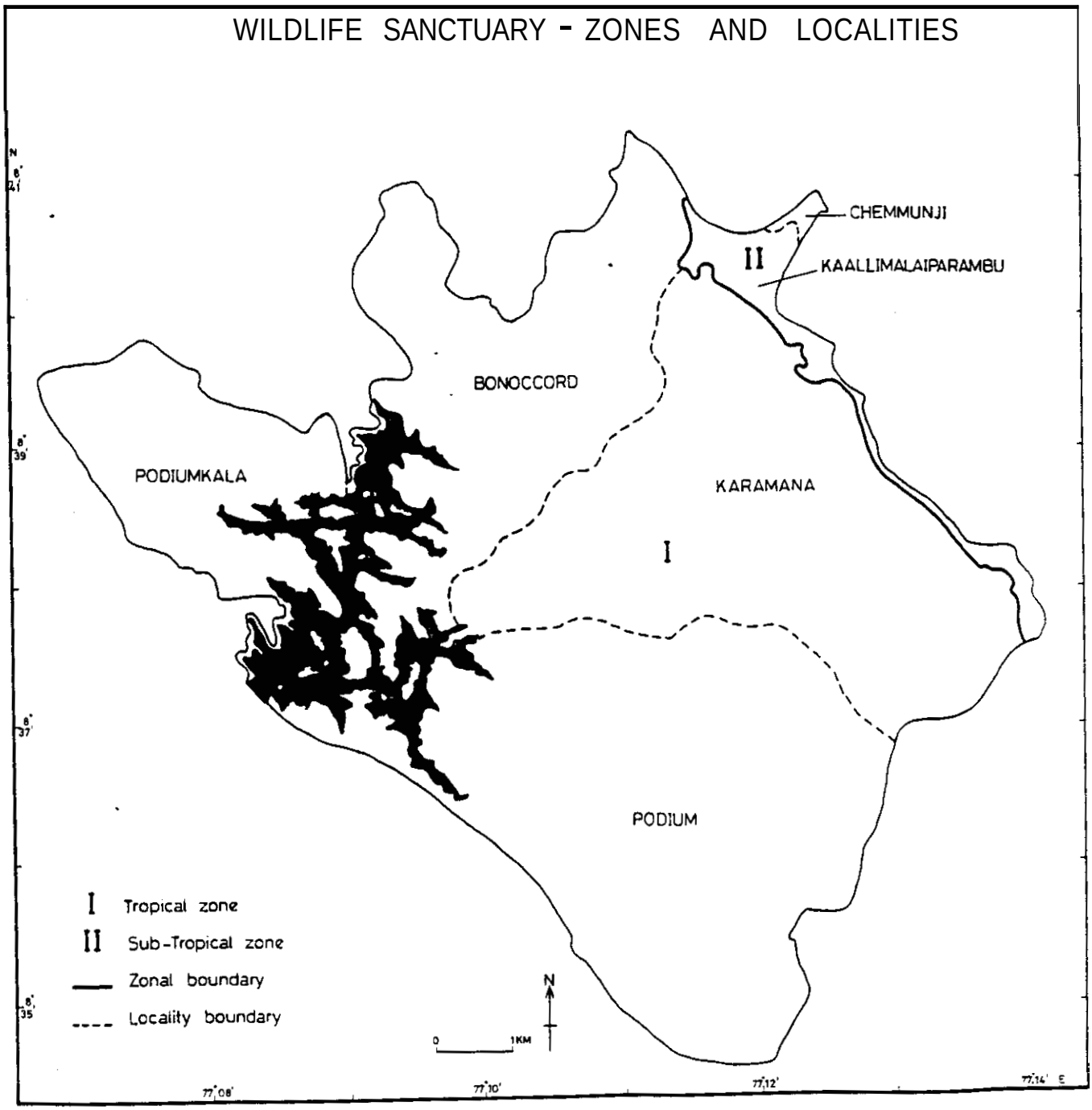

WILDLIFE SANCTUARY - ZONES AND LOCALITIES
CHEMMUNJI
KAALLIMALAIPARAMBU
II
BONOCCORD
PODIUMKALA
KARAMANA
I
PODIUM
I Tropical zone
II Sub-Tropical zone
Zonal boundary
Locality boundary
N
0 1KM
77°08'
77°10'
77°12'
77°14' E
8°41'
8°39'
8°37'
8°35'

Fig. 3

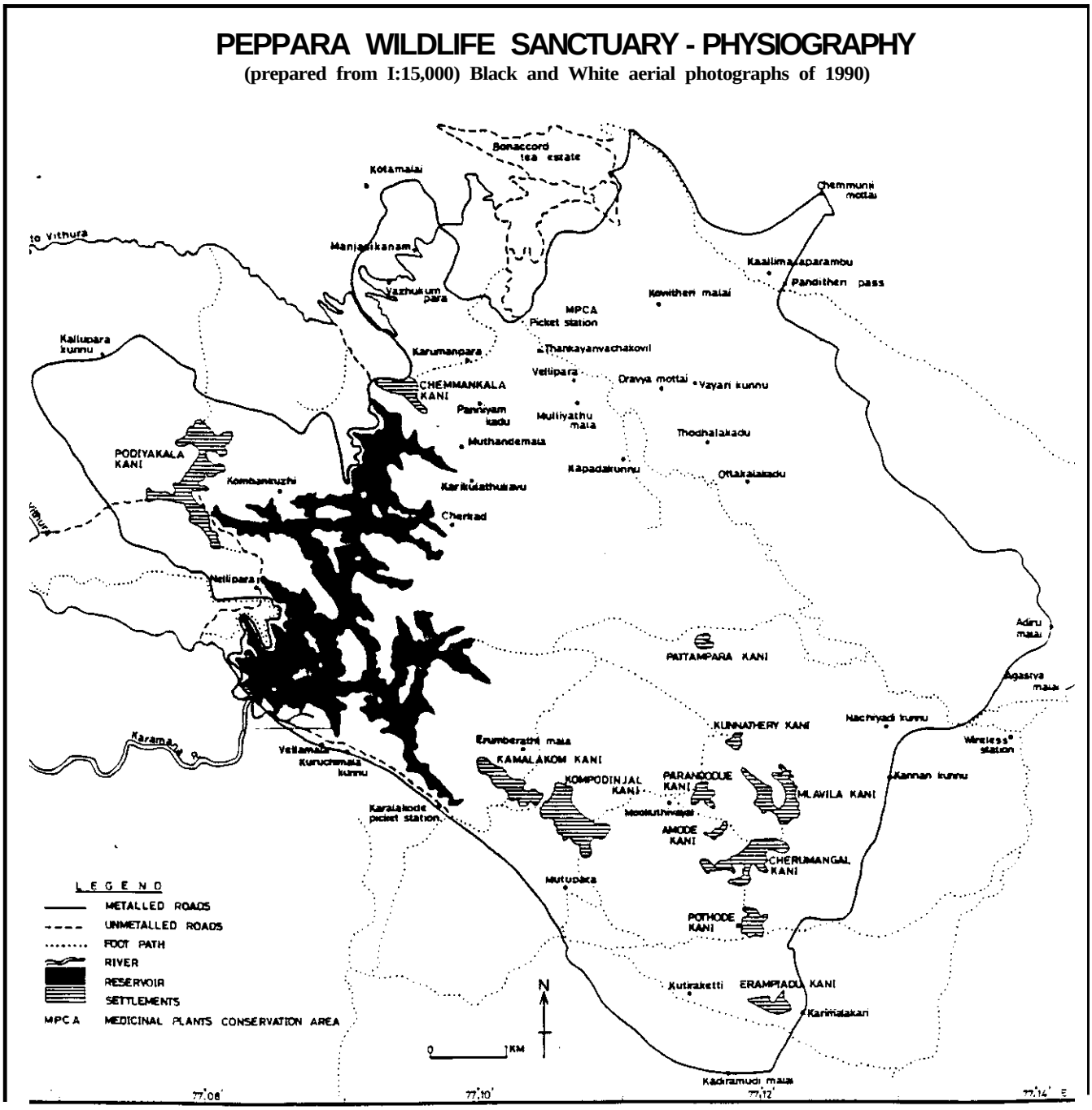

PEPPARA WILDLIFE SANCTUARY - PHYSIOGRAPHY
(prepared from I:15,000) Black and White aerial photographs of 1990)
Bonaccord tea estate
Kotamalai
Chemmunni mottai
to Vithura
Manjanikanam
Vazhukum para
Kaalima Saparambu
Pandithen pass
Kowithen malai
MPCA Picket station
Kallupara kunnu
Karumanpara
Thankayanvachakovil
Vellipara
Dravya mottai
Vayari kunnu
CHEMMANKALA KANI
Panniyam kadu
Muliyathu mala
Thodhalakadu
Muthandemala
PODIYAKALA KANI
Kapadakunnu
Ottakalakadu
Kombanmuzhi
Karikulathukavu
Chenkad
Vithura
Nellipara
Adiru malai
PATTAMPARA KANI
Agasrya mala
Nachiyadi kunnu
KUNNATHERY KANI
Ezhumerathi mala
Wireless station
Karamana
Vellamala
Kuruchimala kunnu
KAMALAKOM KANI
KOMPODINJAL KANI
PARANGODUE KANI
MLAVILA KANI
Kannan kunnu
Karalakode picket station
AMODE KANI
CHERUMANGAL KANI
Mutupaka
POTHODE KANI
LEGEND
METALLED ROADS
UNMETALLED ROADS
FOOT PATH
RIVER
RESERVOIR
SETTLEMENTS
MPCA MEDICINAL PLANTS CONSERVATION AREA
Kutiraketti
ERAMPADU KANI
Karimalakan
N
0
1 KM
Kadramudi mala
77°08'
77°10'
77°12'
77°14' E

Fig. 4

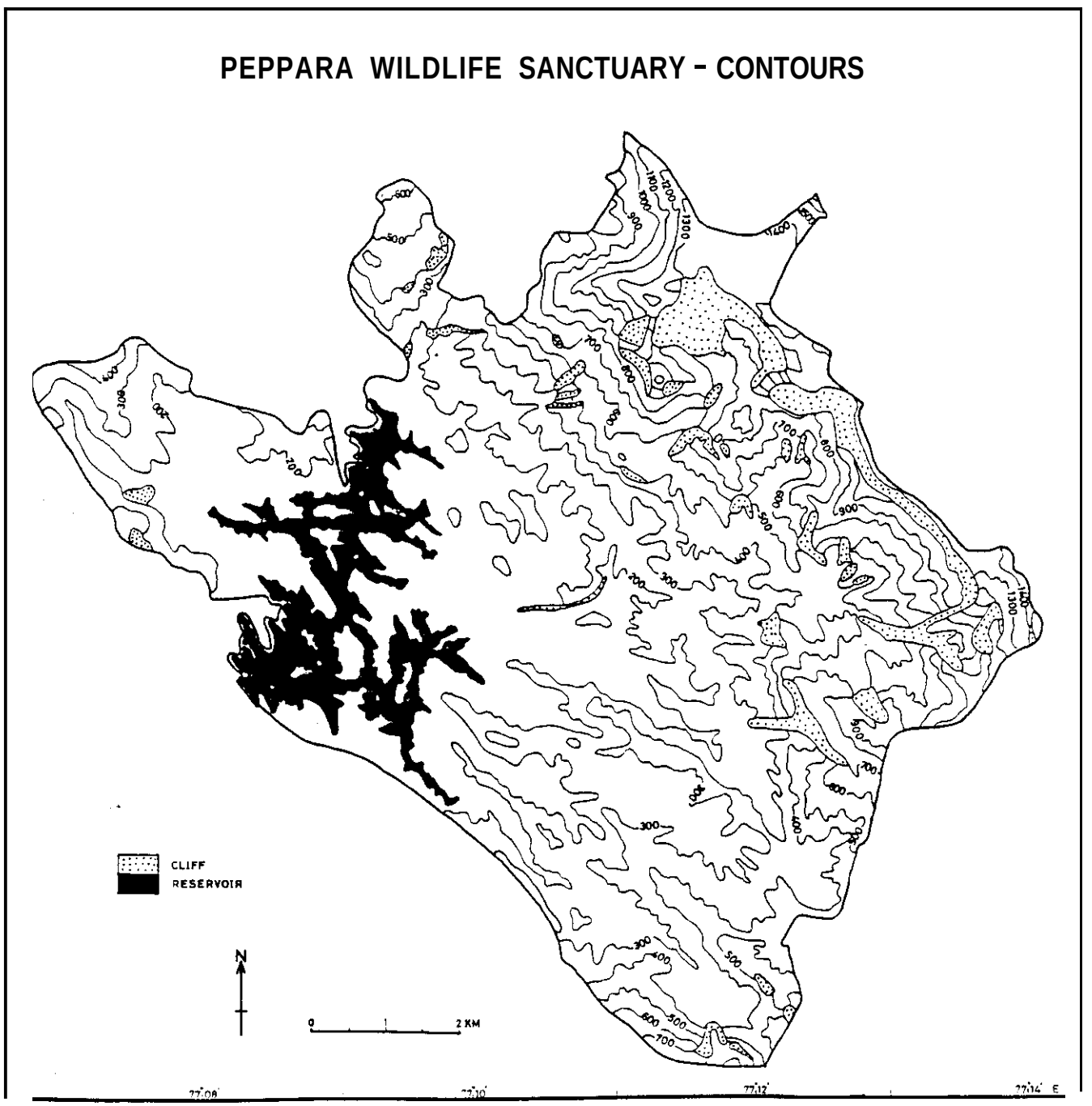

PEPPARA WILDLIFE SANCTUARY - CONTOURS
CLIFF
RESERVOIR
N
0
1
2 KM
77°08'
77°10'
77°12'
77°14' E

Fig. 5

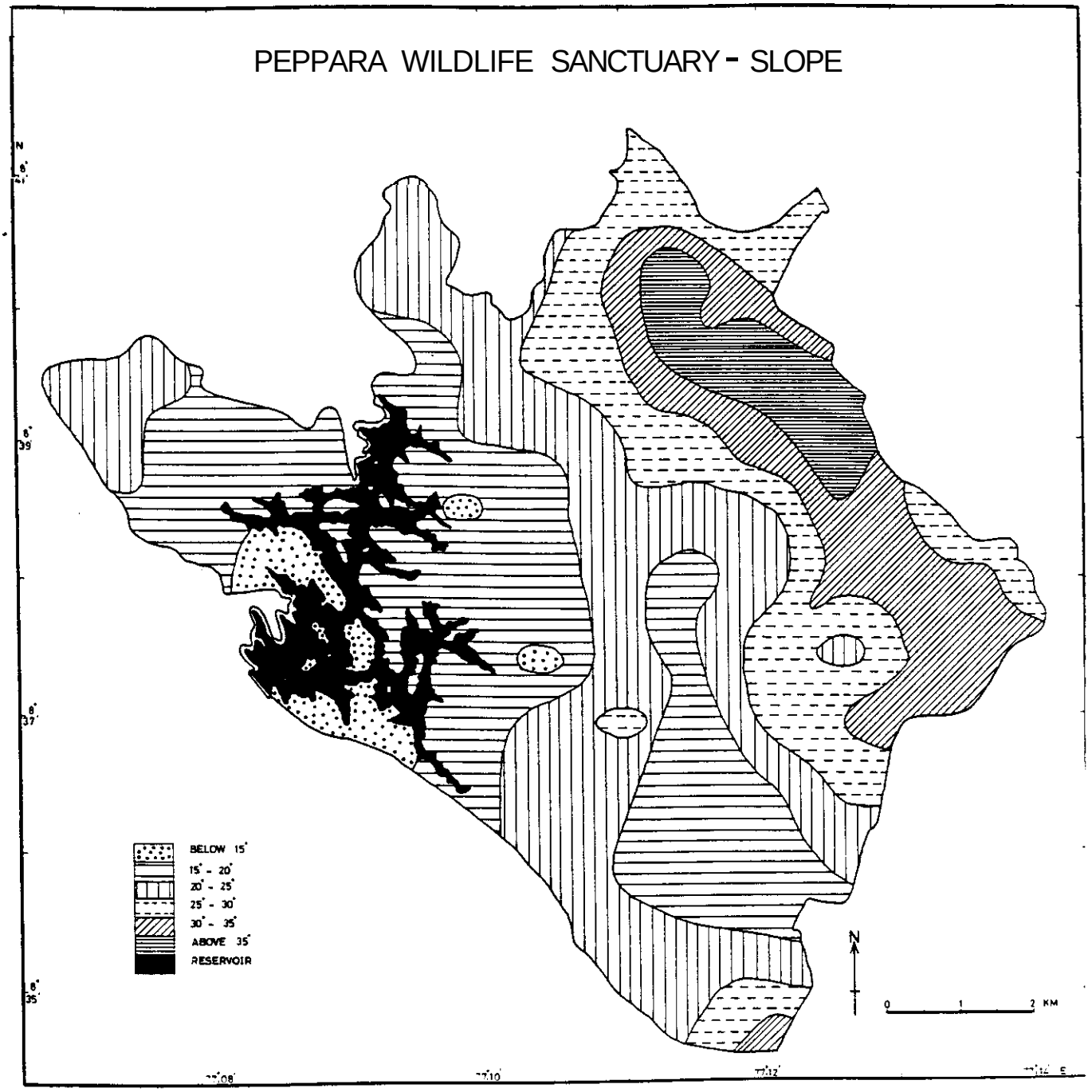

PEPPARA WILDLIFE SANCTUARY - SLOPE
N
8°
39'
8°
37'
8°
35'
77°08'
77°10'
77°12'
BELOW 15°
15° - 20°
20° - 25°
25° - 30°
30° - 35°
ABOVE 35°
RESERVOIR
N
0
1
2 KM

Fig. 6

PEPPARA WILDLIFE SANCTUARY - DRAINAGE

(prepared from 1:15,000 Black and While aerial photographs of 1990)

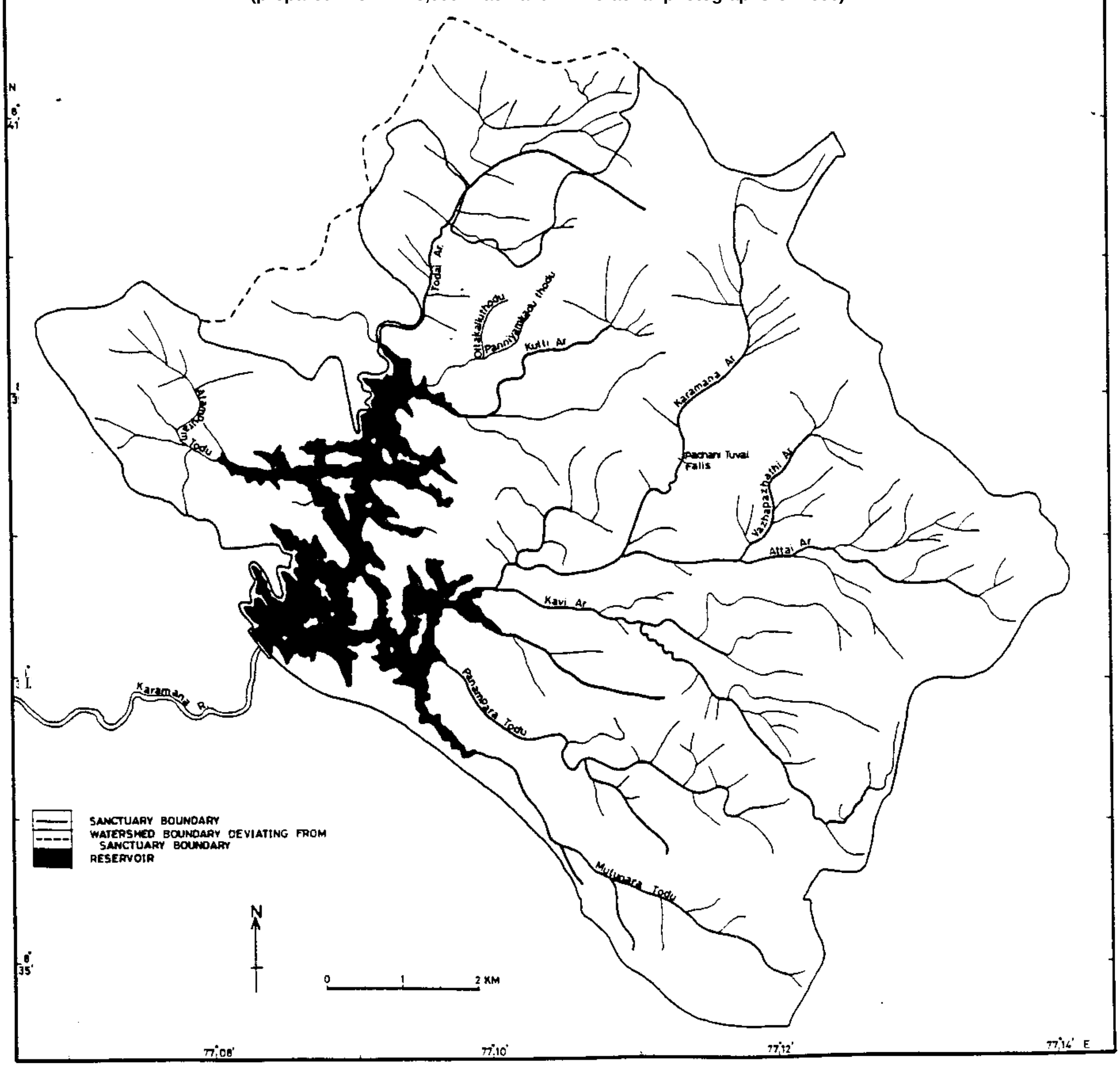


Fig. 7

PEPPARA WILDLIFE SANCTUARY AND SURROUNDINGS-VEGETATION

(prepared from 1:2,50,000 IRS 1A LISS 1 imagery of April 1989)

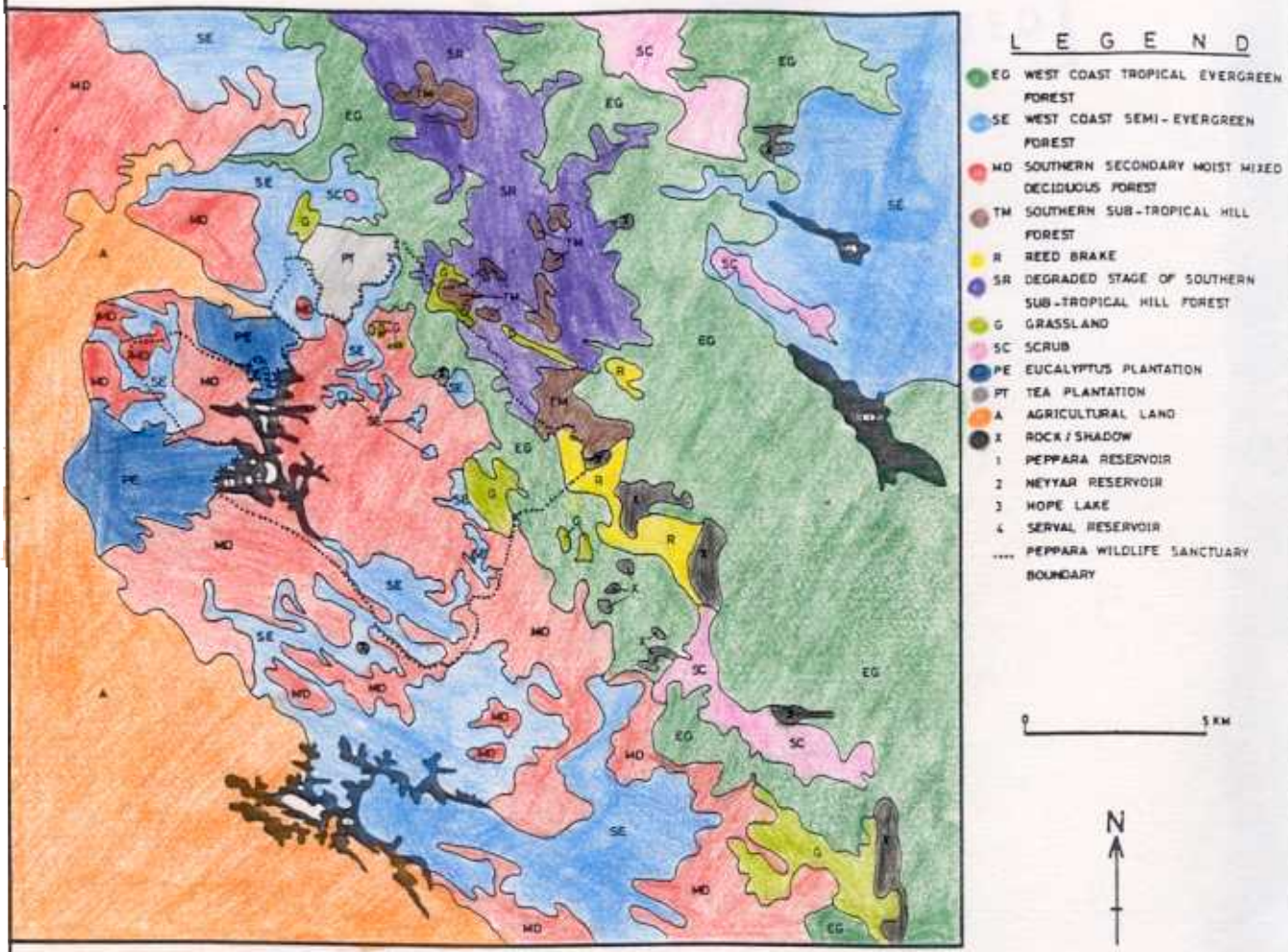


Fig. 8