CHAPTER 3

PHYSICAL FEATURES OF KERALA

3.1 LOCATION

Kerala is a narrow strip of land on the southwestern corner of the Indian Union. It extends between the latitudes 8°18'N and 12°48'N and longitudes 74°52'E and 77°22'E. The State has a total geographical area of 38863 Sq.kms which is 1.18% of the total area of India. It has a long coastline of 590 kms. The width of the State varies from 30 kms. to 130 kms. It is narrower in the North and South, and broader in the central portion. The State is bounded by the Lakshadweep sea on the West and the Sahyadris in the East. North and North-East of the State is bordered by Karnataka State and South and South-East by the State of Tamil Nadu (Fig.3.1).

3.1.1 ADMINISTRATIVE DIVISIONS.

Consequent to the reorganisation of the States, Kerala was formed on 1st November 1956 by merging the erstwhile princely States of Travancore, Cochin and Malabar. Various reorganisations within the State resulted in the formation of 9 districts by 1958. They were Thiruvananthapuram, Kollam, Alappuzha, Kottayam, Ernakulam, Thrissur, Palakkad, Kozhikode and Kannur. Subsequently 5 more districts viz. Malappuram, Idukki, Wayanad, Pathanamthitta and Kasargode were formed during the period from 1969 to 1984. Thus the State now has 14 revenue districts, 61 taluks and 1452 villages. This also includes 990 panchayats, 59 municipalities, 3 corporations and 1 township.

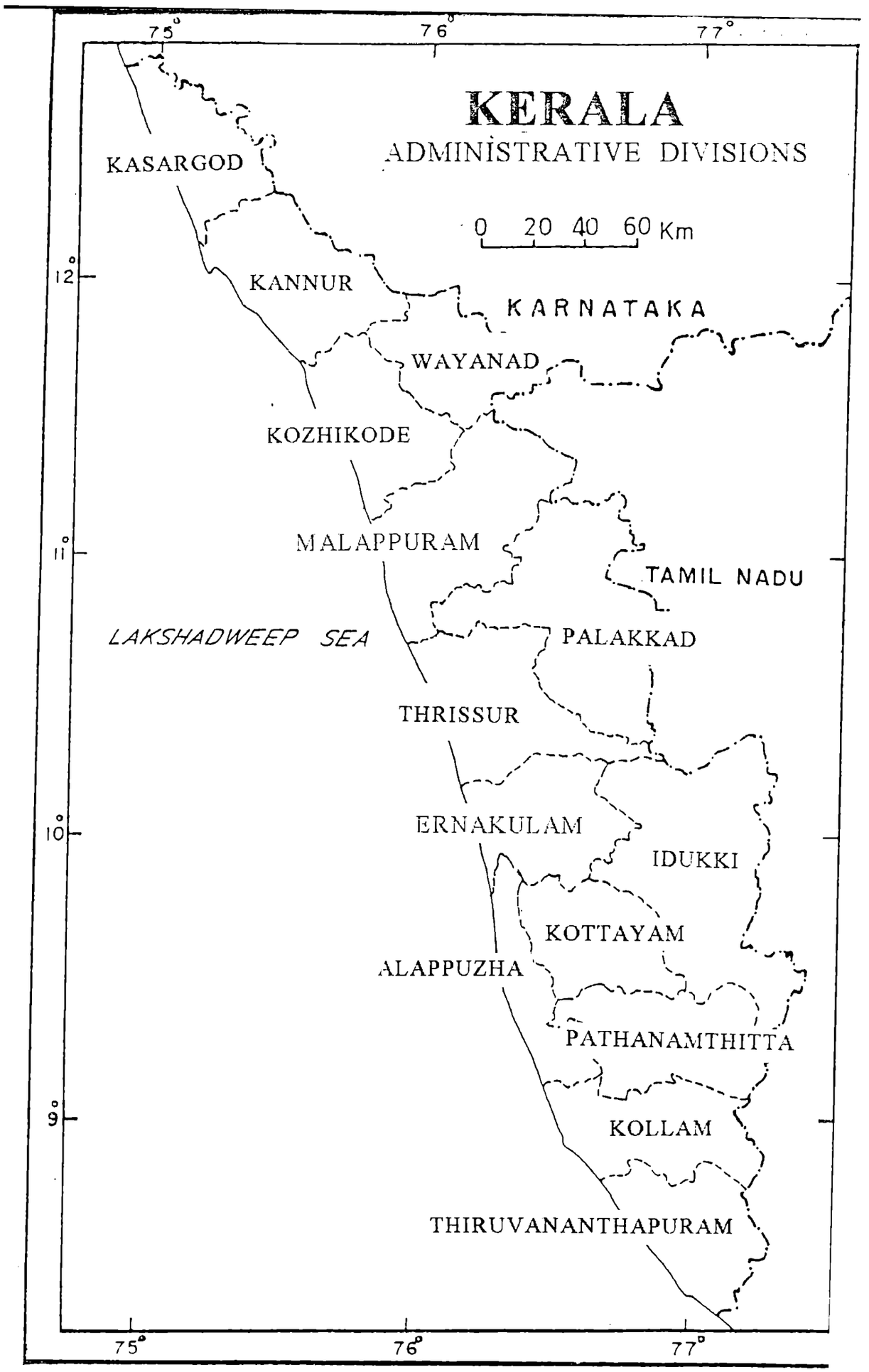

Fig. 3.1. KERALA ADMINISRATIVE DIVISIONS

3.2. PHYSIOGRAPHY :

Kerala has varied physiographic features that are the result of complex geological processes. The Public Works Department of Kerala divides the State into 3 major physiographic divisions, according to their elevation from the mean sea level (MSL). They are (i).Highlands with altitude above 75m of MSL, (ii). Midlands with altitude of 7.5m to 75m above MSL and (iii). Lowlands with altitude of less than 7.5m above MSL.(Fig.3.2)

3.2.1. HIGHLANDS

Highlands are the most conspicuous feature of Kerala and has an area of 18654 sq.km which is 48% of the total geographical area of the State. They are known as Sahyadris and are part of the Western Ghats. The Sahyadris include the Nilgiris, Anamalai, Palani and Vershanad. Andipatti ranges with arching projections into Tamilnadu. Innumerable rivers dissect these ranges resulting in varied landforms. These mountains are mostly the remnants of old plateaus with three distinctive planation surfaces at 1800m, 1200m, and 600m. They are the result of periodic upliftment of the Western Ghats. Wayanad Plateau in Wayanad district, Kunda hills in Malappuram district, Nelliampathy Plateau in Palakkad district, Periyar Plateau in Idukki district and Agasthyamalai in Thiruvananthapuram district are all parts of this extensive range. The highest peak of the Western Ghats, Anamudi (2694m) which is also the highest peak, south of Himalayas is located in Idukki district.

The continuous and extensive upland terrains of the Sahyadris have a major break in the Palakkad area known as the PALAKKAD GAP. This gap has a width of about 30km.It is

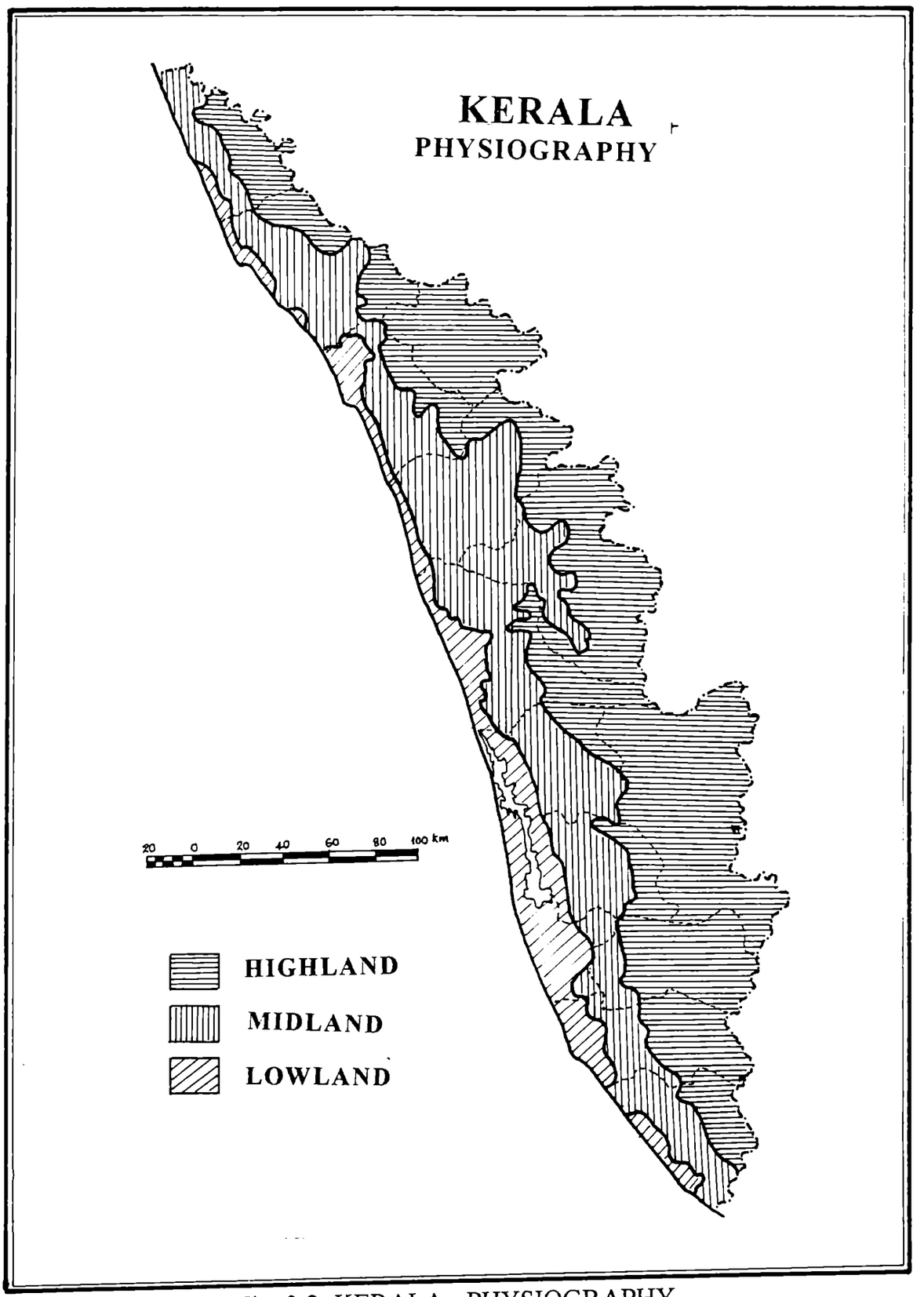

Fig. 3.2. KERALA - PHYSIOGRAPHY

bounded in the north and south by lofty hills with altitude of 1100 to 2000m. The Sahyadris also have some minor gaps south of Palakkad gap. They are the Aryankavu or Chenkotta gap in Kollam district; Kumily gap, Kombanmedu pass and Munnar pass in Idukki district. All these gaps connect Kerala and Tamilnadu and are major trade routes.

3.2.2 MIDLANDS

Midlands have an area of 16231 sq.kms, which is 41.8% of the total geographical area.They have rocky spurs protruding towards the west from the Sahyadris. In most places it extends eastwards right upto a few metres to the seashore. In the southern districts, these secondary ridges produce undulating topography with wide valleys. North of Cardamom Hills, excepting the Palakkad Gap , long spurs and extensive ravines of ghat mountains are seen to merge westward into gentler slopes, rolling down and gradually widening valleys which end themselves abruptly in cliffs giving way to lowlands.(Kerala State Gazetteer.1986).

3.2.3. LOWLANDS

Lowlands ranging in width from 20km to 100km consist of peneplains, flood plains, rock cut terraces, colluvium and coastal plains. Coastal plains are low in relief ranging from 4 to 6 m. It is characterised by the presence of numerous beach dune ridges which run parallel to the present shoreline. There are about 34 lagoons or estuaries, locally known as Kayals, in this zone. These kayals have been created in depressions formed in between the old beach dune ridges. The lowlands occupy 10.2% of the geographical area (3979 sq.km) of the State.

3.3. DRAINAGE

Kerala is blessed with 44 short and swift flowing rivers. Of these 41 are west flowing and 3 are east flowing.(Fig.3.3). Unlike other peninsular rivers, the rivers of Kerala do not form deltas because of their short distances from their sources to the mouth. The general drainage patterns of the State is dendritic. In some places it is sub parallel and radial. Most of these rivers are structurally controlled and follow the general direction of NW-SE and NE-SW of prominent lineaments. Table 3.1 gives details of the drainage systems of the State.

NAME OF RIVER	LENGTH IN KM.	CATCHMENT AREA IN SQ.KM. (IN KERALA)
WEST FLOWING		
1. MANJESWAR	16	90
2. UPPALA	50	76
3. SHIRIYA	67	290
4. MORYAL	34	132
5. CHANDRAGIRI	25	145
6. CHITTARI	25	570
7. NILESWAR	46	190
8. KARINGOTE	64	429
9. KAVVAI	31	143
10. PERUVEMBA	51	300
11. RAMAPURAM	19	52
12. KUPPAM	82	469
13. VALAPATANAM	110	1321
14. ANJARAKKANDY	48	412
15. TELLICHERY	28	132
16. MAHE	54	394
17. KUTTYADI	74	583
18. KORAPUZHA	40	624
19. KALLAI	22	96

20. CHALIYAR	169	1735
21. KADALUNDI	130	1122
22. TIRUR	48	117
23.BHARATHAPUZHA	209	4400
24. KEECHERI	51	401
25. PUZHIKKAL	29	234
26. KARUVANNUR	48	1054
27. CHALAKKUDY	130	1404
28. PERIYAR	244	5284
29. MUVATTUPUZHA	121	1554
30. MEENACHIL	78	1272
31. MANIMALA	90	847
32. PAMBA	176	2235
33. ACHENKOVIL	128	1484
34. PALLIKKAL	42	220
35. KALLADA	121	1699
36. ITHIKKARA	56	642
37. AYOOR	17	66
38. VAMANAPURAM	88	687
39. MAMOM	27	114
40. KARAMANA	68	702
41. NEYYAR	56	497
EAST FLOWING		
42. KABANI	-	1920
43. BHAVANI	-	562
44. PAMBAR	-	384

Table.3.1. RIVERS OF KERALA

3.4. GEOLOGY

Kerala is part of the Indian Peninsular shield and is composed of four major rock types.

1. Crystalline rocks of the Precambrian which are 600 to 3800 million years old

2. Sedimentary rocks of Tertiary (Cenozoic) which are younger than 65 million years.

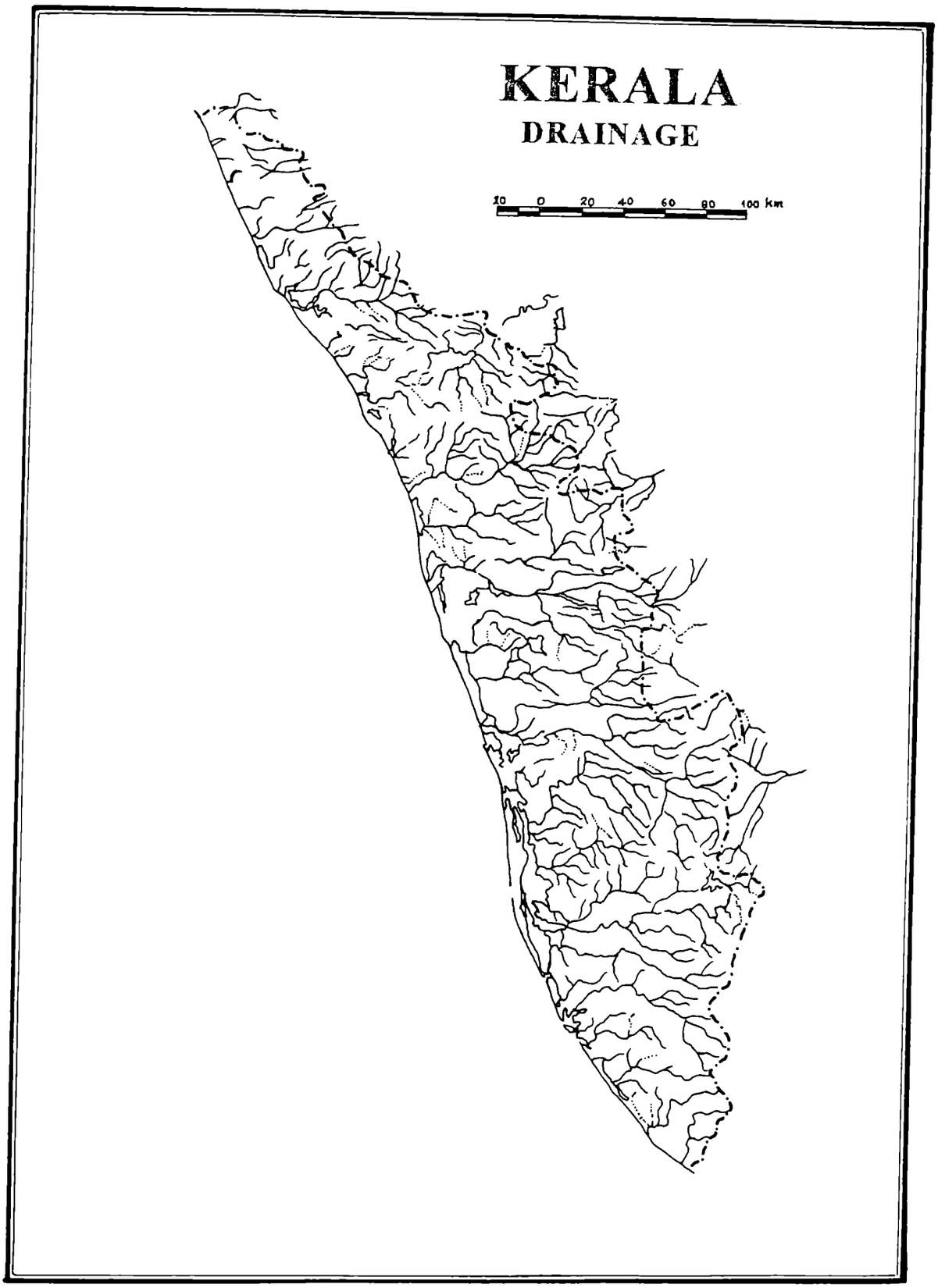

Fig. 3.3. KERALA - DRAINAGE

3.Laterite developed due to chemical weathering mostly during the Pleistocene occur over crystalline and sedimentary rocks.

4.Recent to sub recent rocks, 10,000 yrs old occupy low-lying areas of river valleys.

The crystalline rocks are mainly igneous and metamorphic igneous. They are mostly exposed in the Sahyadris and their foothills and to a lesser extent in the midlands. They mainly consist of Charnokite,
Khondalities, Granite gneisses, Dharwar Schists and Granites traversed by Pegmatities and basic dykes.

The Khondalitic group includes fine to medium grained and light coloured granite-sillimanite biotic gneiss and garnet-biotic gneiss. There are seen extensively in the Southern districts of Kerala. They are also found in Idukki and Palakkad districts.

The Charnokite group consists of Pyroxene granulite, Charnokite, Gneissic Charnokite Magnetite quartz etc. They are seen in almost all the districts of the State.

Granitic gneisses are found mainly in Wayanad and Kannur districts.

Dharwar Schist containing the quartz mica schist, quartz schist and tremotite chlorite talc schist is seen as a narrow belt in parts of Kasargod , Kannur and Wayanad districts.

Sedimentary rocks of Miocene age (Tertiary Sediments) known as Warkalli beds and Quilon beds are seen as a discontinuous cut crop along the Kerala Coast.

Laterite occurs as capping over crystalline and sedimentary rocks. They are seen extensively in the midland regions. They are the result of deep chemical weathering of

rocks occurred during prolonged exposure of these rocks to tropical climate.

Recent to subrecent sediments are mainly coastal sands, silty alluvium, lagoonal alluvium and black clays. They are found in the low lying areas of Alappuzha and Kottayam districts.

3.5 SOILS

Soils of Kerala are mostly fertile and cultivable. It is dominated by lateritic and forest loam. The depth of the soil is considered to be moderately shallow when it ranges between 50cm to 75cm, moderately deep when it is 75 - 100cm. Soils are deep when the depth is between 100-150 cm, and it is very deep when the depth is over 150cm. 89% of the soils of Kerala are deep to very deep

The textures of surface layer of soils of Kerala vary from sandy to clayey. Nearly 59% of the soils are loamy in texture, 30 percent are clayey and about 4% sandy.

The capacity of the soil to hold moisture depends on the soil texture and depth. On the basis of the water holding capacity, expressed in mm.of water in 100cms.of soil or the entire soil column, if it is shallow,soils of Kerala can be grouped into the following categories.

About 72 % of the soils of Kerala are well drained. The soil survey unit of the Dept of Agriculture, Govt of Kerala classified the soils of Kerala into 10 broad categories based on the physio-chemical characteristics and morphological features.

WATER HOLDING CAPACITY	DEPTH IN mm.	AREA IN PERCENTAGE
1. VERY LOW	< 50	6
2. LOW	50-100	38
3. MEDIUM	100-150	14
4. HIGH	150-200	35

Table. 3.2 WATER HOLDING CAPACITY OF SOILS

1. COASTAL ALLUVIUM (Tropopsammonth -Tropofluvents)

This soil is predominantly marine in origin with some fluvial deposits and is found along the coastline. This soil is high in sand content and hence low in water holding capacity.

2.RIVERINEALLUVIUM(Tropofluvents-Eutropepts-Dystripepts)

This soil is developed along the river valleys and cut across the extensive laterites. The texture varies from sandy loam to clay and is usually very deep. This soil is highly fertile and has very good water holding capacity and hence supports wide variety of crops.

3. RED LOAM(Tropudalfs-Eutropepys)

Red loam occurs in isolated patches, in the foothills and hill locks associated with laterite as colluvial deposits. Its colour appears red because of the presence of high ferric oxide content. It is highly porous and friable and hence is not fertile.

4. LATERITE SOIL (Eutrorthox-Haplorthox-Dystropepts)

This is a major group of soil foind extensively throughout Kerala. Laterite show the development of deep to very deep AB(c) profile in some parts of the State.In most of the places, the B horizon is well developed.This soil is generally poor in potash, nitrogen, phospherous and organic matters. It is well drained and hence suitable for many crops such as coconut, arecanut, pepper, tapioca, rubber,etc.

5. GREYISH ONATTUKARA (Troporthents)

This soil is usually found in Kollam and Alappuzha diatricts.It has got the characteristic greyish colour.The texture is coarse and its water holding capacity is low.Highly deficient in plant nutrients and acidic in character,this soil is not suitable for cultivation

6. BROWN HYDROMORPHIC (Tropaquepts)

Usually found in wet lands, brown hydromorphic soil is rich in organic matter,nitrogen and potash. Lime and phosphate are deficit in this soil.

7. ACIDIC SALINE (Tropaquepts-Fluvaquepts)

Acidic Saline soil is found in the lowlying areas of Kuttanad regions. It is developed under hydromorphic conditions. This includes (i). Kari soil, which is black in colour with high organic content developed in the water logged areas (ii) Kayal soil, which is developed in the reclaimed areas and is high in clay content and (iii) Karappadam soil, which is developed along river courses. This soil is high In silt content and salinity is a major problem in many areas.

8. HYDROMORPHIC SALINE (Tropoqualfs)

This soil is found along the coastal strip, where inundation by sea causes high salinity.

9. BLACK SOIL (Chronuderts)

The black colour soil which is characterised by high clay content, is found in the North-eastern part of Palakkad district. It is low in organic content. Since the soil is highly suitable for cotton cultivation. It is also known as the Black Cotton soil.

10. FOREST LOAM (Hapludolts - Tropodalfs - Tropeptic - Eutrorthox)

This soil is highly enriched in humus content which gives it a dark reddish brown to black colour. It is developed in the forested areas of the eastern parts of the State. Highly rich in nitrogen and low in bases, this soil promote prolific undergrowth.

3.6. VEGETATION

The tropical humid climate of Kerala favours prolific growth of natural vegetation. Variations in climate from the coast to the highland within a short distance, results in various types of forests. The State has 11,223 sq.km of total forest area of which 9,400 sq.km are effective forest area. Forest plantations occupy about 1538 sq.km. The following table (Table 3.3) gives the classification of forest area of Kerala by Type and Legal status.

FOREST TYPES	AREA IN SQ.KM.	AREA IN %
1.TROPICAL WET EVERGREEN AND SEMI-EVERGREEN.	3480	37
2. TROPICAN MOIST DECIDUOUS	4100	44
3. TROPICAL DRY DECIDUOUS	94	1
4. MONTANE SUB-TROPICAL	188	2
5. FOREST PLANTATIONS	1538	16
TOTAL	**9400**	**100**
FOREDT BY LEGAL STATUS		
1. RESERVED FORESTS	9335	83
2. VARIED FORESTS	1888	17
TOTAL	**11223**	**100**

Table.3.3. CLASSIFICATION OF FORESTS OF KERALA