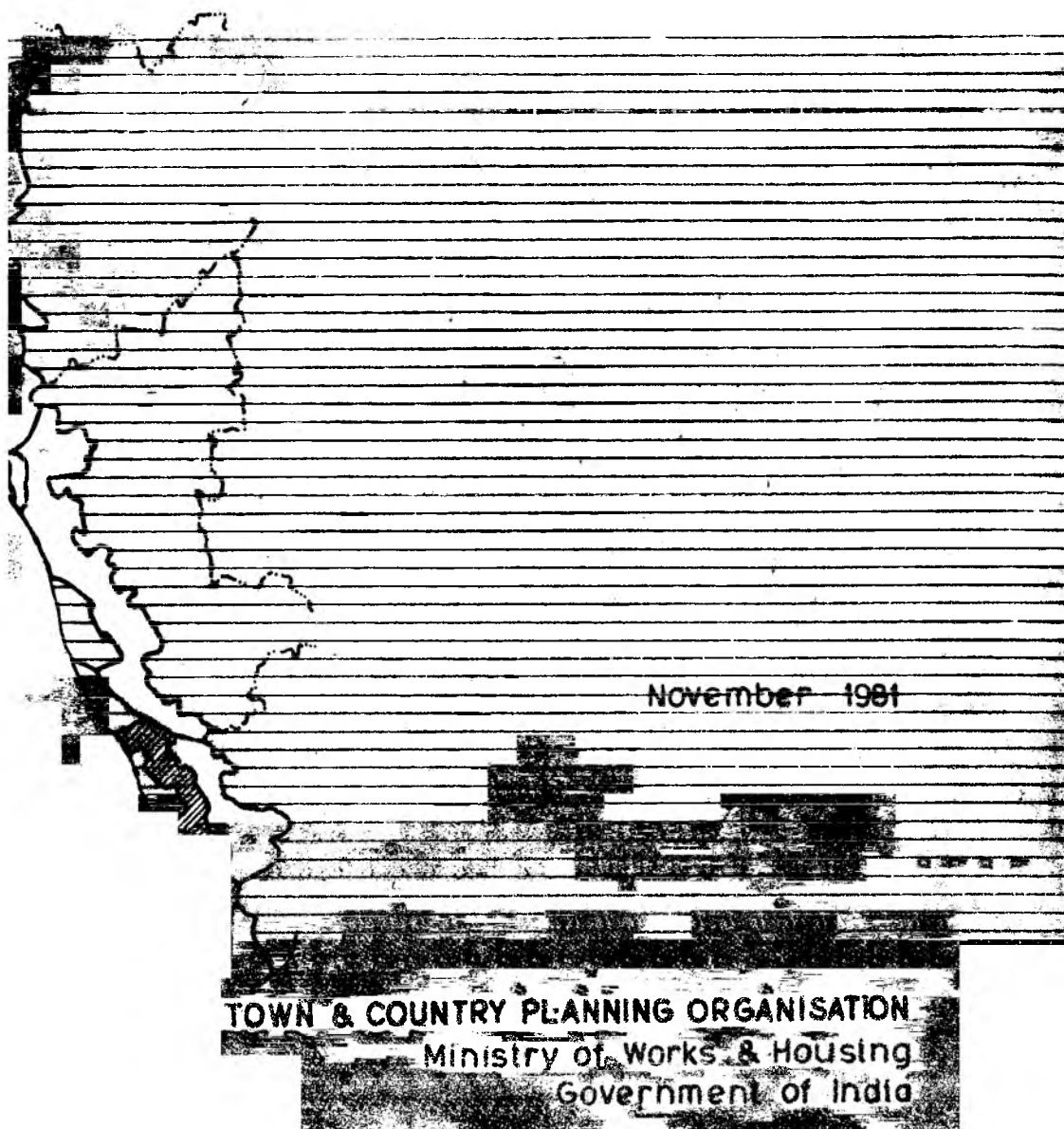


WESTERN GHATS REGIONAL PLAN

KERALA SUB-REGION

Volume : Two
SECTORAL STUDIES



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SECTORAL STUDIES

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Government of India, Ministry of Works and Housing

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SECTION - 1 : PHYSICAL PROFILE :

The Kerala Sub-region is one of the five Sub-regions of the Western Ghats Region, a macro region delineated for the purpose of preparation of a comprehensive plan under the Hill Area Development Programme of the Planning Commission (Fig. 1.1). It comprises of 21 taluks falling in 9 districts of Kerala State (Fig.1.2) and has an area of 21,856 sq. km. and a total population of 6,881,115 persons in 1971, of which 92% were rural. It is interesting to note that although the Sub-region accounts for 56.25% of the area of the State but accounts for only 32.25% of its population. The Sub-region is thus relatively sparsely populated with a density of 315 persons per sq. km. against 549 in the State (Table 1.1). The total scheduled population (Scheduled Tribe and Scheduled Caste) in the Sub-region was 7,53,570 persons; constituting about 11% of the total population in 1971.

The Western Ghats stand out as the principal geographic features in the Sub-region running from north to south east (Fig. 1.3). The Sub-region is separated from the sea by low land sea coast. It is composed of laterite platforms, erosional surfaces of hard basement rock or the residual hills. The south sahyadris rising in elevation between 760m. and 1220m. runs almost continuously parallel and present their steep face to the low lands. Its continuity is interrupted by the presence of a few ghats or gaps, like the Pal ghats which have been used by the railways to connect the Malabar coast with the Tamil Nadu. Other gaps of lesser importance have been used by motorable roads to link the western coast region with the interior of the Peninsula.

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TABLE - 1.1 : Area and Population of the constituent taluks of Kerala Sub-region.

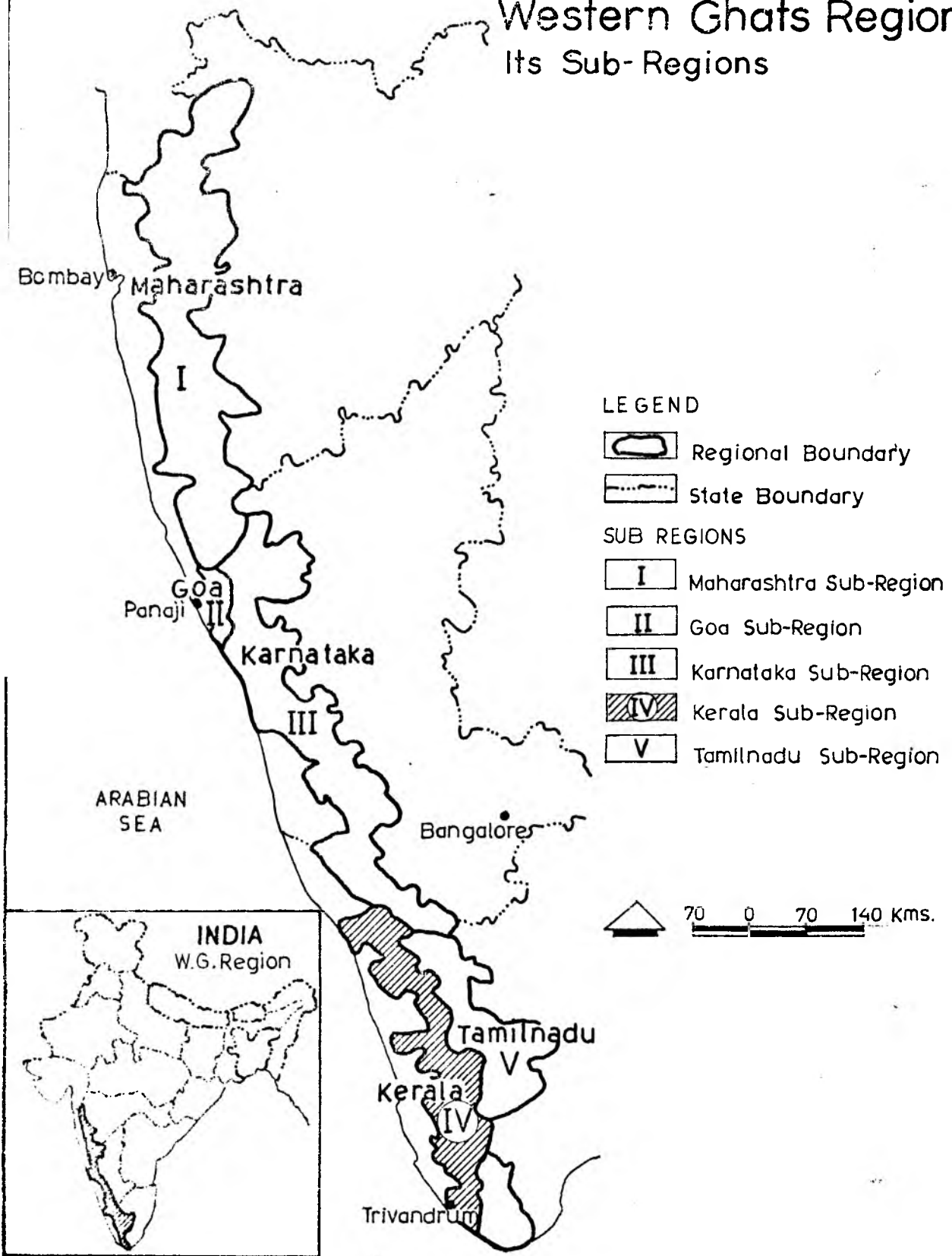
District/Taluk	Area (Sq.km.)	Population (1971)	Density per Sq.Km.
1	2	3	4
I. KOZHIKODE			
1. North Wynad *	747.4	129,335	173
2. South Wynad	1,378.2	284,515	206
3. Quilandy	756.9	468,714	619
4. Badagara	549.8	409,771	745
II. MALAPURAM			
5. Ernad	2,261.9	715,496	316
III. PALGHAT			
6. Mannarghat	1,199.6	184,579	168
7. Palghat	720.3	369,001	513
8. Chittur	1,155.1	313,973	272
IV. TRICHUR			
9. Mukandapuram	1,316.0	590,317	449
V. ERNAKULAM			
10. Kunnathunad	677.7	292,113	431
11. Kothamangalam	285.0	142,378	494
VI. IDUKKI			
12. Thodupuzha	973.7	219,504	225
13. Devicolam	1,774.1	134,350	76
14. Udambanchola	1,071.4	364,913	247
15. Peermade	1,307.8	146,841	112
VII. KOTTAYAM			
16. Meenachil	722.7	315,879	487
17. Kanjirappally	351.3	172,360	491
VIII. QUILON			
18. Pathanamthitta	1,975.6	390,150	197
19. Pathanapuram	1,233.7	310,659	252
IX. TRIVANDRUM			
20. Neyyattinkara	571.0	559,488	979
21. Nedumangad	926.8	430,779	464
<hr/>			
Kerala Sub-region	21,856.0	6,881,115	315
<hr/>			
Kerala State	38,864.0	21,347,375	549
<hr/>			

* North Wynad Taluk has been named as Mananthavadi since November 1980.

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Fig. 1.1

Western Ghats Region: Its Sub-Regions



WESTERN GHATS : SURVEY & PLAN

Town & Country planning Orgn., Min. of Works & Housing, Government of India

Fig. 1.2

Kerala Sub-Region: Its Taluks

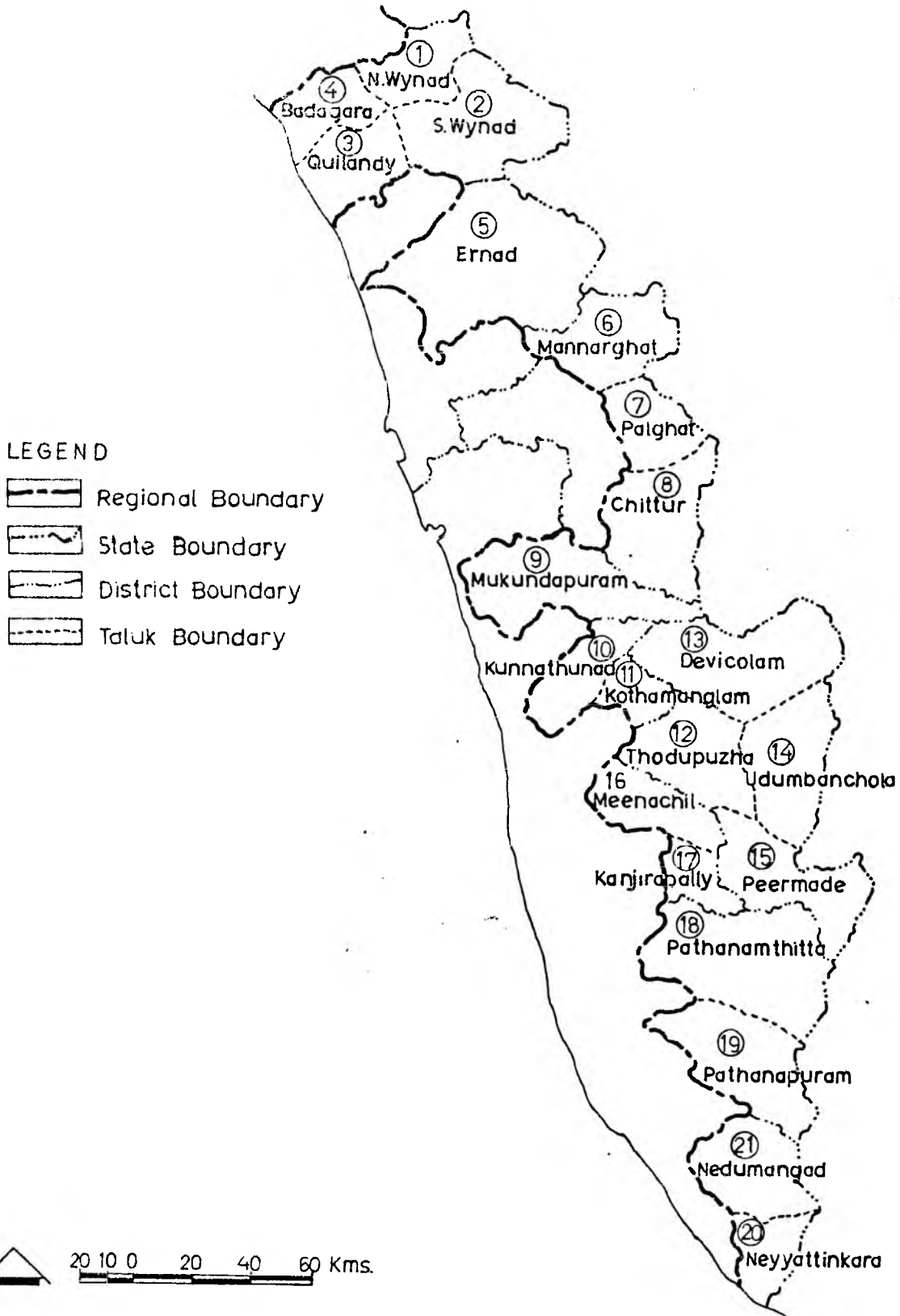












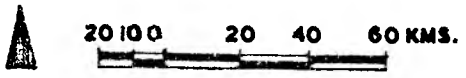
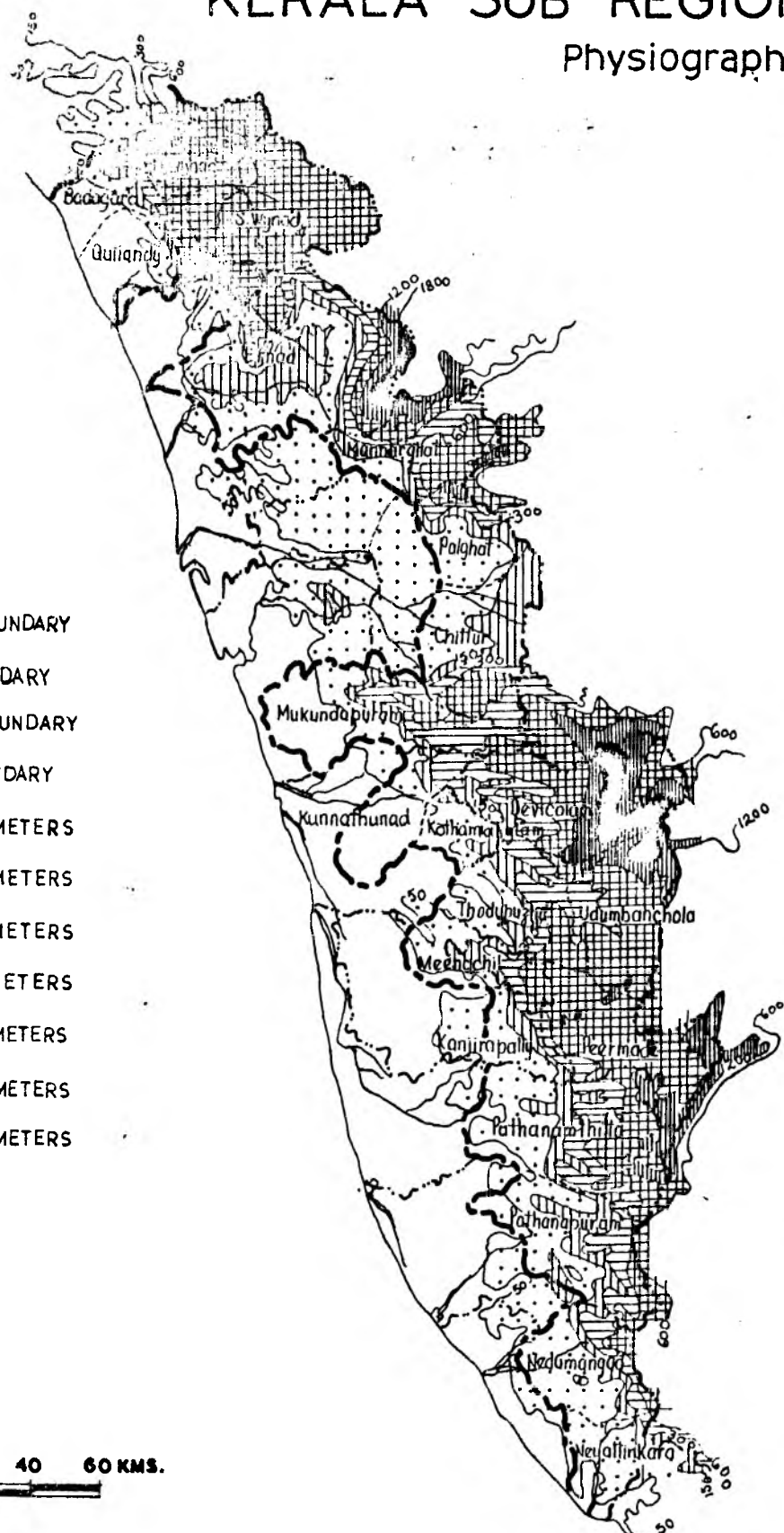


Fig. I.3

KERALA SUB-REGION Physiography

Legend

-  REGIONAL BOUNDARY
-  STATE BOUNDARY
-  DISTRICT BOUNDARY
-  TALUK BOUNDARY
-  BELOW 50 METERS
-  50 TO 150 METERS
-  150 TO 300 METERS
-  300 TO 600 METERS
-  600 TO 1200 METERS
-  1200 TO 1800 METERS
-  ABOVE 1800 METERS
-  RIVERS



The Western Ghats are mainly of residual laterite. The laterites are associated with warkalli beds of Pliocene period. Occurrences of laterite cliffs have been also noted at 40-46m. in Kozhikode district. Crystalline rocks of the Archaean age which included Charnokite and Schist rocks are also found in the Sub-region. The gneissic hill country lies farther inland.

Drainage:

This Sub-region has numerous short swift streams which have carved deep valleys on the west facing slope of the hills. They generally run parallel to one another and flow in a westerly direction. Bharatpuzha (251 Km.) is the longest river. Besides this, Periyar, Beypore and Pambax are important rivers. They serve as important arteries of inland communication and provide potential for hydro-electric generation and irrigation.

Climate:

The Sub-region enjoys an equable climate with high temperature throughout the year. The mean monthly temperature ranges between 24°C and 31°C. April and May are the hottest months of the year. High humidity and refreshing breeze particularly in the evening is typical in the Sub-region. The climate is generally very humid.

The Sub-region receives high rainfall which is well distributed throughout the year. It comes under the influence of south-west monsoon from June to September and of north east monsoon from September to November. Nearly two-thirds of the total annual rainfall is received through the south west monsoon and the contribution of

/...

north-east monsoon is often uncertain. The average annual rainfall decreases from 300 cm. in the north to 150 cm. in the south. The average rainfall in the districts of the Sub-region varies from 2001 mm. to 3577mm.(Table 1.2).

Soil :

The soil is generally low in organic content and deficient in nitrogen, phosphorus, potash and calcium in Kerala State and are, therefore, of poor fertility. Only in river beds alluvial soil is found but most of the area is covered by laterite or red soils with narrow strip of forest soil on the slopes of the ghats (Table 1.3). The main soil types found in the Sub-region are laterite soil, forest loam, brown hydro-morphic, riverine alluvium coastal alluvial, black soil and red loam. The characteristics of each of them are given in the following paragraphs.

Laterite Soil:

The laterite soil is a product of weathering of gneissic and granitic rocks under humid tropical conditions. It is often gravelly and sandy containing only a very low proportion of clay and is generally poor in nitrogen, phosphorus and potash. It is mostly reddish brown to yellowish in colour. The surface texture ranges from gravelly loam to gravelly clay loam. It is found in almost all the taluks of the Sub-region.

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TABLE: 1.2 Distribution of normal Rainfall in Kerala Sub-region

District	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
CANNANORE	5.3	4.8	11.2	58.6	200.6	923.0	1063.5	584.7	239.4	218.0	106.0	22.8	3437.9
KOZHIKODE	9.0	6.8	18.4	84.0	233.5	853.9	1005.9	530.5	239.2	286.6	160.1	33.4	3461.3
PALGHAT	9.1	9.3	26.6	80.0	175.2	532.2	657.1	361.9	175.7	257.4	144.3	30.4	2459.2
TRICHUR	10.1	9.2	28.4	91.1	283.5	800.3	747.6	441.7	245.5	305.7	163.5	32.8	3159.4
ERNAKULAM	18.0	23.6	54.4	136.1	310.1	792.1	785.9	523.5	296.6	365.7	216.9	54.6	3577.5
KOTTAYAM	31.2	27.0	59.5	133.1	237.4	585.8	628.0	412.4	263.5	330.8	213.6	72.2	2994.5
ALLEPPEY	27.6	31.6	59.7	134.1	293.7	666.1	548.1	371.3	272.3	328.1	224.0	64.0	3020.9
QUILON	24.1	32.1	83.6	166.3	260.3	547.4	449.6	318.1	226.2	344.9	242.9	64.8	2760.2
TRIVANDRUM	21.2	18.0	48.0	118.1	213.9	391.1	257.4	204.5	168.9	280.2	210.2	70.1	2001.6

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TABLE - 1.3: Classification of Soil (Talukwise)
in Kerala Sub-region.

Sl. No.	Name of Taluk	Name of District	Type of Soil
1	2	3	4
1.	North Wynad	Kozhikode	Forest Loams, Laterites.
2.	South Wynad	Kozhikode	Forest Loams, Laterites.
3.	Quilandy	Kozhikode	Laterites, Brown Hydromorphic, Riverine Alluvium, Coastal Alluvium.
4.	Badagara	-do-	-do-
5.	Ernad	Malapuram	Forest loams, laterites, brown hydromorphic, riverine alluvium.
6.	Mannarghat	Palghat	Forest Loams, laterites, brown hydromorphic.
7.	Palghat	-do-	-do-
8.	Chittur	-do-	Forest loams, laterites, brown hydro-morphic, Riverine alluvium, black soil.
9.	Mukandapuram	Trichur	-do-except black soil.
10.	Kunnathunad	Ernakulam	Laterites, brown hydromorphic, Riverine alluvium.
11.	Thodupuzha	Idukki	-do-
12.	Devicolam	-do-	Forest loams, laterites.
13.	Udumbanchola	-do-	-do-
14.	Peermade	-do-	-do-
15.	Meenachil	Kottayam	Laterites, Brown hydromorphic.
16.	Kanjirappally	-do-	-do-
17.	Pathanamthitta	Quilon	Forest loams, laterites.
18.	Pathanapuram	-do-	Forest loams, laterites, brown hydromorphic.
			<u>Riverine alluvium</u>
19.	Neyyattinkara	Trivandrum	Forest loams, laterites, brown hydromorphic, Riverine alluvium, Coastal alluvium, Red Loams.
20.	Nedumangad	-do-	Forest loams, laterites, Brown hydromorphic, Riverine Alluvium.

Forest Loam:

This is a product of weathering of crystalline rocks under forest cover. The soil profile is immature with shallow soil followed by gneissic parent material. It is dark redish brown to black in colour with loam to silty loam in texture. It is mostly found in North Wynad, Mannarghat, Palghat, Chittur, Mukandapuram, Devicolam, Pathanamthitta, Pathanapuram, Neyyattinkara and Nedumangad taluks of the Sub-region.

Brown Hydromorphic :

It is mostly found in valleys as a result of transportation and sedimentation of material from adjoining hill slopes and also through river deposits. Generally, it is very deep and brownish in colour and has sandy loam to clay texture. It is also found in almost all the taluks of the Sub-region.

Riverine Alluvium:

It mostly occurs on river banks. Normally very deep and show wide variation in their physio-chemical properties. The surface texture of this soil ranges from sandy loam to clay loam. It is found only in 9 taluks of the Sub-region.

/...

Coastal Alluvial:

It is of recent marine deposits and occurs in the coastal tracts along with western parts of the Sub-region. It is poor in nutrients, and found only in Quilandy, Badagara and Neyyattinkara taluks of the Sub-region.

Black Soil:

It is found in Chittur taluk of the Sub-region and considered to be the extension of the black cotton soil of the adjoining Coimbatore district of Tamil Nadu State. This is dark in colour, low in organic matter, calcareous, moderately alkaline, high in clay content and very sticky and pasty. It is a very fertile soil with high moisture retaining capacity.

Red Loam:

It is mostly found in the Neyyattinkara taluk of the Sub-region with laterite and/or mainly as deposits by colluviation in foot hills and small hillocks. Due to presence of haematite, its colour is red. Like laterite soils, it is highly acidic, rich in iron, aluminium, titanium and manganese oxides but poor in lime, organic content and plant nutrients.

SECTION II - DEMOGRAPHIC AND ECONOMIC PROFILE

1. DEMOGRAPHIC ASPECTS

Kerala State is one of the densely populated states in India, having a density figure of as high as 549 persons per sq. km. in 1971*. And, the Kerala Sub-region of the Western Ghats, though completely hilly, is also a very densely populated Sub-region. Having an area of 21856 sq. kms. it had a population of 68.81 lakh in 1971. The population density of 315 persons per sq. km. for the Sub-region was even higher than the density recorded for the State of UP - noted for high population concentration (304 persons for sq. km.). The all India Average density in 1971 was only 177 persons per sq. km.

1.1 Density of Population

It is worth mentioning that the Sub-region accounted for nearly 27% of the Western Ghat's population though having only 16% of its area. A discerning feature is that the pressure of population in its 21 Taluks was quite uneven. Taluks like Devicolam, Peermade, Mannarghat, North Wynad had density as low as 76, 112, 168 and 173 persons per sq. km. respectively. Whereas Neyyattinkara Taluk had

* The density for Kerala State in 1981 is put at 654 persons per sq. km. For Kerala Sub-region the density is estimated at 400 person per sq. km. (See Appendix-I). Data at Taluk Level is not yet available for the 1981 Census.

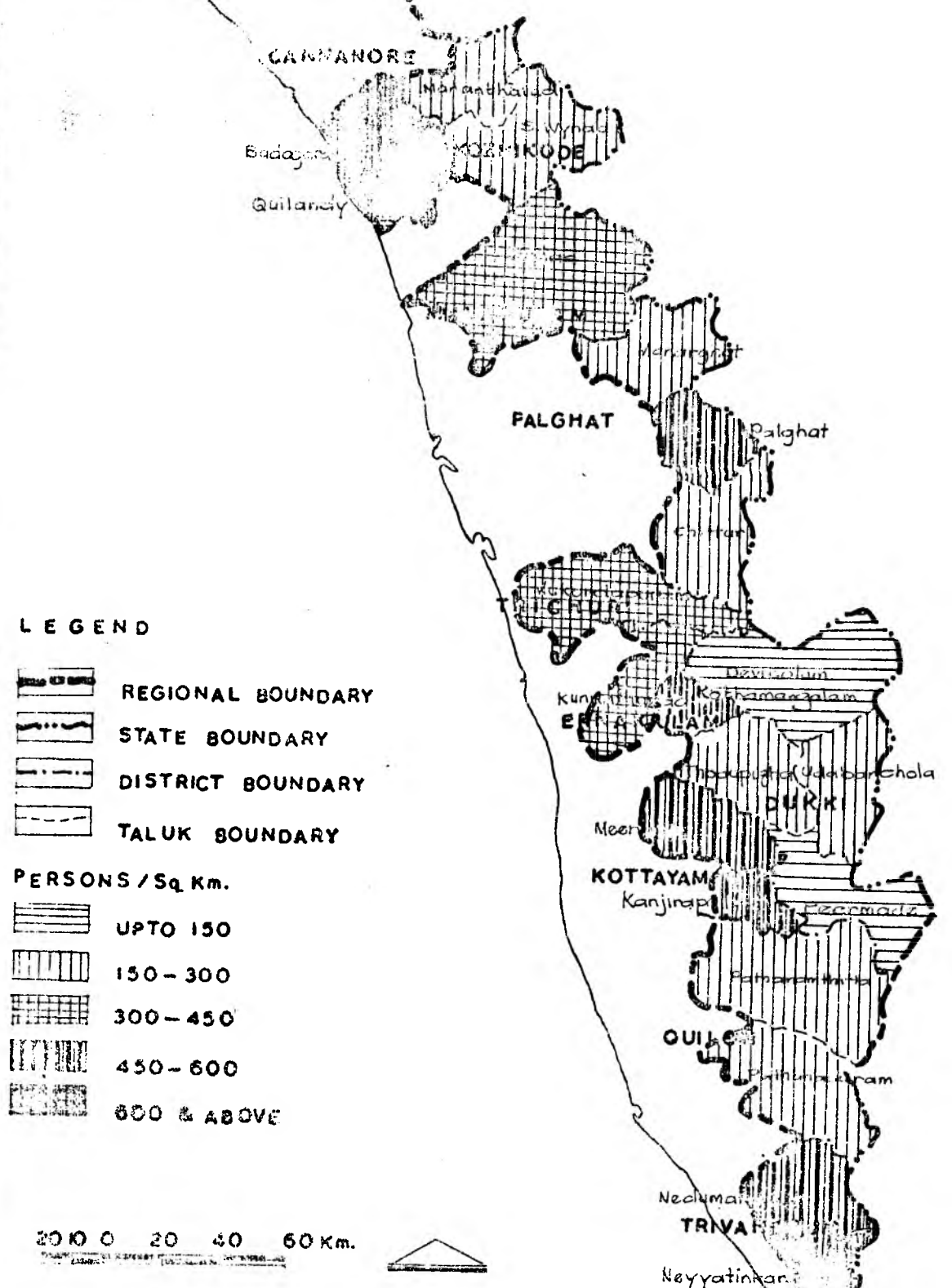
density figure of 979 persons per sq. km. (Refer Table 2.1 and Fig.2.1) one can visualise the stark contrasts in population pressure in different Taluks of the Sub-region and it is rather quite staggering to note that in hilly tracts (in fact whole of Western Ghats is 600 metres and above) the population pressure could be so high. Kerala State is known for the high population pressure but the pressure in hilly Taluks (barring few) point to the problems that this high population pressure must be posing.

1.2 Growth Rate

Another important demographic fact about the Sub-region's population is its high growth rate. Between 1961 and 1971 the Sub-region's growth rate of population was 27.04%. The only redeeming feature of the population growth between 1961 and 1971 was that it was generally higher in Taluks like Udumbanchola (70.27%), South Wynad (53.75%) which were having comparatively low population pressure. This reflects that there was out-migration of population from the high density areas (may be from outside the Sub-region) to the low density areas, a welcome sign under the circumstances. But, all Taluks, without exception, recorded positive growth rate of population, though in two taluks, viz. Devicolam and Peermade, the population growth rate was less than 10%. It gives the indication that population pressure in all the Taluks is mounting and would mount in the ensuing decades. (Table 2.1)

FIG:2.1

KERALA SUB-REGION DEMOGRAPHY & ECONOMIC PROFILE POPULATION DENSITY-1971



WESTERN GHATS : SURVEY & PLAN

TOWN & COUNTRY PLANNING ORGN., MIN. OF WORKS & HOUSING, GOVT. OF INDIA.

TABLE- 2.1: TALUKAWISE DEMOGRAPHIC CHARACTERISTICS IN KERALA SUB-REGION:- 1971.

District	Taluk	Area (Sq. Kms.)	Population			Population Growth Rate 1961-71	Density (Per Sq. Km.)	Sex Ratio
			Total	Male	Female			
Kannanore:	1. North Wynad	747.4	129,335	66,611	62,714	43.39	173	942
Kozhikode:	2. South Wynad	1373.2	284,515	148,727	135,788	53.75	206	913
	3. Quilandy	756.9	468,714	232,939	235,775	28.71	619	1012
	4. Badagara	549.8	409,771	201,291	208,480	28.09	745	1036
	5. Ernad	2261.9	715,496	356,253	359,243	36.47	316	1008
Palghat	6. Mannarghat	1099.6	184,579	91,897	92,682	39.79	168	1009
	7. Palghat	720.3	369,001	181,171	187,830	24.57	513	1037
	8. Chittur	1155.1	313,973	154,376	159,577	15.32	272	1034
Trichur:	9. Mukundapuram	1316.0	590,317	287,881	302,436	26.42	449	1051
Ernakulam:	10. Kunathunad	677.7	292,113	146,968	145,145	27.40	431	988
	11. Kothamangalam	285.0	142,378	71,698	70,680	29.71	494	986
Kottayam:	12. Meenachil	722.7	315,879	176,856	175,023	13.57	487	990
	13. Kanjirapally	351.3	172,360	87,808	84,552	15.34	491	963
Idukki	14. Thodupuzha	973.7	219,504	113,514	105,990	30.77	225	934
	15. Devicoolam	1774.1	134,350	69,581	64,769	9.05	76	931
	16. Udubanothola	1071.4	364,913	137,488	127,425	70.27	247	927
	17. Peermade	1307.8	146,841	74,714	72,127	9.88	112	965
Quilon	18. Pathanamthitta	1975.6	390,150	195,048	195,102	17.05	197	1000
	19. Pathanapuram	1233.7	310,659	155,997	154,662	25.40	252	991
Trivendrum	20. Neyyattikkara	571.0	539,488	281,380	278,108	22.39	979	988
	21. Nedumangad	926.8	430,779	215,380	215,399	24.96	464	1000
Total Sub-Region		21,856.0	6,881,115	3,447,578	3,433,537	27.04	315	996

1.3 Sex-Ratio

Sex-Ratio for the Sub-region in 1971 was 996 females for every thousand males. The Sub-region's characteristics in this regard stood in line with the State's figure (Refer Table 2.1). The Sex-Ratio was adverse in Taluks like Quilandy, Badagara, Chittur and Mukandpuram which point to the fact that from these Taluks there had been an outmigration of males. It is, in a way, a disquieting feature as it indirectly refers to the near static conditions of the economy in Taluks like Mukundpuram, Palghat, Chittur etc. as outmigration of males reflect the non-availability of employment avenues.

1.4 Age-Structure

Age-Structure of the population of an area also gives some insight into its demographic aspects. This in turn gives an idea about the changes or actions needed to meet the future needs of the society. The higher proportion of children and the old people point to the higher burden that the Society has to bear as its working population size gets reduced. On the other hand, higher component of working population (15-59) point towards the possibility that the area must have higher job potentials and there is marked tendency of immigration to these Taluks because of the better job opportunities. Looking at the age-composition of population in Kerala Sub-region, it is noticed that Taluks like Neyyattinkara, Nedumangad and Pathanamthitta are having comparatively higher working age group and all these Taluks, as noted

earlier, had higher population density (see Table 2.2). It is proved, though indirectly, that the above mentioned Taluks, vis-a-vis the other Taluks in the Sub-region have better economic position.

1.5 Urban Population

Urbanisation level gives a fair idea of the level of development attained in an area. The Kerala Sub-region of the Western Ghats was characterised by a very low level of urbanisation. Out of the total population of 68.81 lakhs in 1971 only 5.11 lakh or 8.0% were living in urban areas compared to 18.2% for the Kerala State (Refer Table 2.3).

There was no class I city in the whole of Kerala Sub-region and the size distribution of urban settlements amply demonstrates that the smaller size of urban settlements were the characteristics of these hilly Taluks. Of the total 24 urban settlements in 1971, 2 were class II, 10 were class III, 9 were class IV and the rest of 3 settlement were having population less than 5,000. In 1961, the position was still worse. The level of urbanisation was to the extent of 6.7% only and the total number of settlements for an area of nearly 22,000 sq. kms. were 14, with smaller sized settlements out-numbering the bigger sized settlements.

At taluk level, out of the 21 Taluks in the Sub-region, 5 Taluks were devoid of any urban population in 1971. 11 Taluks had a urban population component of less than 10%. Only 2 Taluks viz. Palghat

TABLE- 2.2: DISTRIBUTION OF POPULATION BY BROAD AGE GROUPS 1971

District	S.No. Taluk	0-14	15-39	40-59	60+	Age Not stated	Total Population
CANNANORE	1. North Wynad	56,033 (43.32)	49,501 (38.27)	17,828 (13.78)	5,969 (4.62)	4	12,9335
KOZIKHODE	2. South Wynad	121,419 (42.68)	112,452 (39.52)	38,932 (13.68)	11,697 (4.11)	15	284,515
	3. Quilandy	189,146 (40.35)	176,749 (37.71)	70,854 (15.12)	31,951 (6.82)	14	468,714
	4. Badagara	167,668 (40.92)	153,608 (37.49)	61,377 (14.98)	27,085 (6.61)	33	409,771
	5. Ernad	312,504 (43.68)	268,777 (37.57)	96,703 (13.52)	37,477 (5.24)	35	715,496
PALGHAT	6. Mannarghat	77,571 (42.08)	68,709 (37.22)	27,907 (15.12)	10,370 (5.62)	22	184,579
	7. Palghat	142,490 (38.62)	141,589 (38.37)	52,838 (16.22)	25,671 (6.79)	13	369,001
	8. Chittur	120,644 (38.42)	215,758 (38.05)	52,526 (16.73)	21,331 (6.79)	16	313,973
TRICHUR	9. Mukundapuram	241,335 (40.88)	217,762 (36.89)	91,345 (15.47)	39,859 (6.75)	16	590,317
ERNAKULAM	10. Kunnathunad	116,948 (40.04)	110,442 (37.81)	44,287 (15.16)	20,412 (6.99)	13	292,113
	11. Kothamangalam	NA	NA	NA	NA	NA	NA
IDIKKI	12. Thodupuzha	89,441 (40.75)	87,141 (39.70)	30,092 (13.71)	12,817 (5.84)	13	219,504
	13. Devicolam	57,481 (42.78)	52,996 (39.45)	19,280 (14.35)	4,579 (3.41)	14	134,350
	14. Udumbanchola	116,275 (43.89)	104,343 (39.39)	34,562 (13.05)	9,723 (3.67)	10	264,913
	15. Peermade	59,721 (40.67)	60,507 (41.21)	21,375 (14.50)	5,230 (3.56)	3	146,841
KOTTAYAM	16. Meenachil	141,399 (40.18)	135,358 (38.48)	50,295 (14.29)	24,823 (7.05)	4	351,879
	17. Kanjirapally	71,044 (41.22)	67,883 (39.38)	24,154 (14.01)	9,274 (5.38)	5	172,360
QUILON	18. Pathanamthitta	151,654 (39.38)	148,317 (38.02)	61,749 (15.83)	26,430 (6.77)	-	390,150
	19. Pathanapuram	199,879 (41.81)	119,489 (38.46)	44,658 (14.38)	16,597 (5.34)	36	310,659
TRIVANDRUM	20. Nayyattinkara	221,584 (39.60)	225,645 (40.33)	82,150 (14.68)	30,104 (5.38)	5	559,488
	21. Nedumanad	175,382 (40.71)	174,649 (40.54)	59,832 (13.89)	20,911 (4.85)	5	430,779
Total Western Ghats		27,60,618 (40.98)	25,95,373 (38.51)	9,89,744 (14.69)	3,91,716 (5.82)	266	67,38,737

TABLE- 2.3: TALUKAWISE URBAN POPULATION IN KERALA SUB REGION (1961 & 1971)

District	Taluk	Urban Population		Urban Population	
		1961	1971	1961	1971
		Population	Percentage to total population	Population	Percentage to total population
Cannanore	1. North Wynad	-	-	-	-
	2. South Wynad	-	-	-	-
	3. Quilandy	17356	4.74	28530	6.09
	4. Badagara	43908	13.72	53938	13.16
Malapuram	5. Ernad	12276	2.34	47736	6.67
Palghat	6. Mannarghat	-	-	-	-
	7. Palghat	77620	26.20	102820	27.56
	8. Chittur	38395	14.10	41407	13.19
Trichur	9. Mukundapuram	39199	8.39	62967	10.67
Ernakulam	10. Kunnathunad	16147	7.04	20888	7.15
	11. Kothamanglam	-	-	6534	4.59
Kottayam	12. Meenachil	15457	4.99	20273	5.76
	13. Kanjirapally	24644	16.56	44501	25.82
Idukki	14. Thodupuzha	-	-	20880	9.90
	15. Devicolam	-	-	4382	3.26
	16. Udumbanchola	-	-	-	-
	17. Peermade	-	-	-	-
Quilon	18. Pathanamthitta	-	-	-	-
	19. Pathanapuram	-	-	13562	4.37
Trivendrum	20. Neyyatinkara	58028	12.69	55366	9.90
	21. Nedumangad	-	-	14643	3.40
Total Sub-Region		343030	6.61	551007	8.01

and Kanjirapally were conspicuous for having urban population of above 25%. In 1961 the position was even worse; in 8 Taluks there was no urban population and even in the rest of the Taluks proportion of urban population was less than 10%. It is obvious that the Sub-region was having a very low urban population component and over the years the position has not shown any perceptible improvement. At Sub-regional level the position in regard to urban population is rather confusing. It is a known fact that there are a number of big sized settlements which have not been classified as urban. Further the Sub-region is not a viable entity and its close linkages with the adjoining cities, particularly with Trivandrum, Quilon, Calicut, Cochin etc. point to the fallacy of studying the Sub-region in isolation.

Better urban component always bespeak of better economic conditions with better infrastructure facilities and higher secondary and tertiary employment. The settlement pattern of only two taluks has a better hierarchical pattern starting with village followed by service village, service town and reaching the highest layer with first order settlement. On the other hand, taluks which are retarded economically and socially, (this holds good for nearby all the taluks in the Sub-region) have a number of missing links in their hierarchy of settlements and are completely devoid of higher order settlements. As such the urban component of their population, is either completely missing or negligible. This immediately brings home the fact that to bring

change and prosperity to the area/taluk Sub-region it is rather essential to regroup and re-arrange the settlement system in an hierarchical manner - with proper amenities. A deliberate and timely action in this regard becomes all the more necessary in the Sub-region as the population pressure is mounting quite alarmingly and further delay would make the situation quite difficult. This aspect has been dealt in detail in Chapter on Urbanisation and Settlements.

1.6 Scheduled Population

Another worth mentioning and important demographic feature of an area is its population juxtaposition. The Sub-region had a significant share of Scheduled Castes and Scheduled Tribes population (Refer Table 2.4). Scheduled Castes were to the extent 8.4% of the Sub-region's population and were present in all the Taluks without exception. The scheduled tribes in the Sub-region, in terms of numbers were not conspicuous (174,058 and 2.6% of the Sub-region's population) still they accounted for as high as 60% of the State's total Scheduled Tribes population. A further note-worthy feature of the Scheduled Tribes population was that of the total of 1.74 lakh Scheduled Tribes in the Sub-region, as high as 60% was accounted for by 3 Taluks only viz. North Wynad, South Wynad and Quilandy. In these Taluks also though comparatively higher concentration was noted in terms of the total population, their proportions were 22%, 16.5% and 6.4% respectively. Another fact worth mentioning is that the tribal population of the Sub-region was not only scattered

TABLE-2.4: ETHNOLOGICAL COMPOSITION OF POPULATION TALUKWISE-Kerala Sub Region-1971.

District	Sl.No.	Taluk	Total Population 1971	Scheduled Castes		Scheduled Tribes	
				1961	1971	1961	1971
CANNANORE	1.	North Wynad	129335	917 (1.0)	1693 (1.3)	21346 (23.6)	26397 (22.0)
KOZHIKODE	2.	South Wynad	284515	3228 (2.8)	7343 (2.6)	37606 (20.3)	47082 (16.5)
	3.	Quilandy	463714	11905 (3.3)	10709 (2.3)	20881 (8.2)	30023 (6.4)
	4.	Badagara	409771	882 (0.3)	909 (0.2)	3274 (1.0)	3966 (0.9)
	5.	Ernad	715496	50404 (9.6)	65634 (9.2)	5627 (1.1)	7445 (1.0)
MALAPURAM	6.	Maimarghat	184579	-	16426 (8.9)	-	16623 (8.9)
	7.	Palghat	369001	36557 (12.3)	42994 (11.7)	765 (0.3)	2025 (0.6)
	8.	Chittur	313973	32291 (11.8)	38356 (12.2)	3672 (1.3)	4032 (1.3)
	9.	Mukundapuram	590317	55038 (11.8)	69916 (12.0)	887 (0.2)	1289 (0.2)
ERNAKULAM	10.	Kunnathunad	292113	26216 (11.4)	33408 (11.4)	7 (Neg.)	40 (Neg.)
	11.	Kothamangalam	142378	NA	10793 (7.6)	NA	14 (Neg.)
IDIKKI	12.	Thodupuzha	219504	7532 (4.0)	10276 (4.7)	9296 (5.0)	11068 (5.0)
	13.	Devicolam	134350	40384 (22.8)	39055 (29.0)	5268 (4.6)	6691 (4.9)
	14.	Udumbanchola	254913	9973 (6.4)	15761 (5.9)	3112 (2.0)	5633 (2.1)
	15.	Peermade	146841	34325 (25.7)	32727 (22.3)	1882 (1.4)	1789 (1.2)
KOTTAYAM	16.	Meenachil	351879	10905 (3.5)	13630 (3.9)	6243 (2.0)	6350 (1.8)
	17.	Kanjirapally	172360	11178 (7.5)	14857 (8.6)	3512 (2.4)	4383 (2.5)
Quilon	18.	Pathanamthitta	390150	29517 (8.8)	35874 (9.2)	2372 (0.7)	1733 (0.4)
	19.	Pathanampuram	310659	30499 (12.3)	37622 (12.1)	1083 (0.4)	1809 (0.6)
TRIVANDRUM	20.	Nayyantinkara	559488	31287 (6.8)	43202 (7.7)	1773 (0.4)	1697 (0.3)
	21.	Nedumangad	430779	29506 (7.5)	38327 (8.8)	7518 (1.9)	8929 (2.1)
Total Kerala Sub-Region			6881115	454539 (8.6)	579512 (8.4)	136484 (2.6)	74058 (2.6)

Note: Figures in brackets show percentages to total population
Source : Census of Kerala Part II-A-1971.

but also very heterogeneous. There were as many as 32 tribes in whole of the Sub-region with only 2 tribes viz. Pulayan, Paniyan were having sizeable population. The other tribal groups were very small in size and also scattered all over the Sub-region.

Unlike the tribals in Bastar and Koraput (noted for tribal concentration in India) the tribal population in the Kerala Sub-region was not completely isolated. In fact the tribes like Kanikars and Kurchians were practising settled agriculture and are in no way were lagging behind in the use of better if not modern techniques of agriculture etc. There are, no doubt, quite a few tribes viz. Kurumbas, Cholananichary etc. which are economically and socially quite retarded. The State has already identified the 'Kurumbas' of Attappady and 'Cholanai-chans' of 'Nilambur' as primitive tribal communities. In addition to the above mentioned two communities, the 'Koragas' of Kasaragod, 'Kadars' of Parambikkulam and 'Leliampathy' of Palghat District possess all the characteristics of primitive tribal communities. An important fact about the tribal community is that they, by and large, are having agriculture as their main source of livelihood and due to the onslaught of the vested interests, their main source of livelihood i.e. agricultural lands and forests, have unscrupulously been usurped. This has made their lot quite miserable and instead of helping the tribals, the economic and social development initiated in wake of planning efforts has in fact brought untold miseries to these people.

Tribal Sub-plan has since been prepared (1976) for the tribal areas in the State of Kerala. The Sub-Plan areas, more or less, coincide with the tribal areas in the Kerala Sub-region. The major thrust of the tribal uplift, as such, is in the tribal belt of the Kerala Sub-region. It is a welcome sign and since the integrated area development approach is said to be the hall mark of this scheme, the tribal areas in particular are expected to receive substantiated help. But at the same time, not to be very critical, it may be pointed out that the Sub-plan approach is not strictly an area approach scheme. It, in fact, is an aggregation of the sectoral schemes for a defined area. Its main merit is that all the sectoral schemes are brought under one umbrella (Refer Table 2.5). But what has to be conceived is to chalk out schemes which have physical connotations. In such schemes of things, the areas/people's maladies get the top billing and then the schemes from various sectors have to be fitted. Another important aspect has to be the phasing of the schemes, and as the funds being limited, the most important maladies remedies shall have to be attended first. The perusal of the Tribal Sub-plan on the other hand, point to the fact that it has all possible sectoral schemes, with many allocations under all the heads. Not only each scheme gets a very meagre share but no scheme has the backward area or the backward people development strategy as its thrust.

Another fact which should merit attention is that the benefits accruing to the population and area would be minimal

TABLE-2.5: COMPARATIVE BREAKUP OF TRIBAL SUB PLAN ALLOCATIONS KERALA SUB-REGION 1979-80.

Sector	State/Centre	(Rs. in lakhs)					Tot. l Rs.
		Manan-toddy Rs.	Nilambur Rs.	Attappady Rs.	Idukki Rs.	Punalur Rs.	
I Agriculture	State	18.85	10.35	14.35	10.60	10.35	64.50
	Centre	1.35	0.50	3.89	1.30	0.45	7.25
II Co-operation	State	1.60	1.60	1.60	1.60	1.60	8.00
	Centre	0.85	0.55	3.00	0.55	0.55	5.50
III Irrigation	State	1.00	1.00	1.00	1.00	1.00	5.00
	Centre	0.30	0.20	0.60	0.20	0.20	1.50
IV Industries	State	0.15	0.15	0.65	0.15	0.15	1.25
	Centre	0.20	0.10	0.90	0.10	0.20	1.50
V Education	State	2.36	2.36	2.36	2.36	2.36	11.80
	Centre	1.40	1.40	1.65	1.40	1.40	7.25
VI Health & Nutrition	State	1.05	1.05	2.80	1.05	1.05	7.00
	Centre	0.02	0.52	0.52	0.02	0.02	1.10
VII Drinking Water Facilities	State	4.00	4.00	4.00	4.00	4.00	20.00
	Centre	0.40	0.40	0.40	0.40	0.40	2.00
VIII Housing	State	2.00	2.00	1.00	2.00	1.00	8.00
	Centre	0.50	0.50	1.90	0.50	0.50	3.90
IX Communication	State	4.50	4.50	4.50	4.50	4.00	22.00
	Centre	-	-	1.00	-	-	1.00
X Cost of Staff and Contingency	State	-	-	-	-	-	-
	Centre	0.50	0.50	2.00	0.50	0.50	4.00
XI Rural Electrification	State	2.00	2.00	2.00	2.00	2.00	10.00
	Centre	-	-	-	-	-	-
XII Labour & Labour Welfare	State	0.20	0.20	0.20	0.20	0.20	1.00
	Centre	-	-	-	-	-	-
XIII Information & Publicity	State	0.04	0.04	0.04	0.04	0.04	0.20
	Centre	-	-	-	-	-	-
Total Sub-Region	State	43.27	33.82	50.12	34.47	32.07	193.75
	Centre	5.52	4.6	15.62	4.97	4.22	35.00

Source: Sub plan for scheduled caste & scheduled tribes-1979-80, Govt. of Kerala-1979.

as most of the funds in fact get absorbed for administrative staff alone.

2. ECONOMIC PROFILE

2.1 Participation Ratio

As noticed earlier, Kerala Sub-region has a sizeable population. And, because of the physical and social conf of the Sub-region, the population concentration in the Sub-region is very high. Consequently the working population as a ratio to the total population is somewhat lower. The participation ratio in the Kerala Sub-region was 30.23% in 1971 which was lower than the participation ratio recorded for the whole of Western Ghats Region (34%) (Refer Table 2.6). Implicitly the non-working population was to the extent of 69.77% which brings home the fact that unemployment must be quite rife in the Sub-region. Though unemployment figures are not available to corroborate this fact but lower participation ratio, is an indirect evidence. Further, the Sub-region having agriculture as its main or rather only source of livelihood, the lower participation ratio becomes all the more a disquieting fact.

At taluk level, the variation in participation ratio is again in tune with the physical profile of Taluks. Taluks, which have less physical odds, and have higher population component, have lower participation ratios. The taluks in this category are Neyyattinkara, Pathanamthitta, Meenachil, Kanjirapally and Pathanapuram and since these Taluks have higher literacy standards, the

fact of unemployment and that too for educated people becomes an open question. On the other hand, Taluks like Chittur, North Wynad, Devicolam, Thodupuzha - to mention a few-have higher participation ratio because their density of population is low (isolated areas because of physical terrain), their literacy rate is comparatively low and also there is complete sway of vocations like agriculture/forestry. Evidently, the physical handicap in shape of higher altitude, subservient economy because of the ecological considerations, virtual isolation and then centuries old neglect, has made these Taluks and their people quite backward - both socially and economically.

2.2 Broad Economic Activity

As regard the primary focus of livelihood, as stated earlier, primary sector is in an over-whelming position. As high as 68.34% of the total working force is absorbed in this sector and the shares or the roles of secondary and tertiary sectors in a hilly area has to be minimal but their proportionate shares at 11.27% and 20.39% respectively is quite dismal. Even the tertiary sector, at the Sub-regional level, with a share of 20.39% is quite out of proportion.

At taluk level, the distortions or differences in the role of different sectors, as noticed earlier, have a familiar pattern. Primary Sector has sway in taluks with higher altitude, where the population density is low, and so on. These taluks are, Devicolam, Peermade, North Wynad & Kothamanglam. On the other hand, Taluks where population pressure is heavy, literacy

Table-2.6: Classification of Workers by Broad Economic Activity-Kerala Sub-Region-1971.

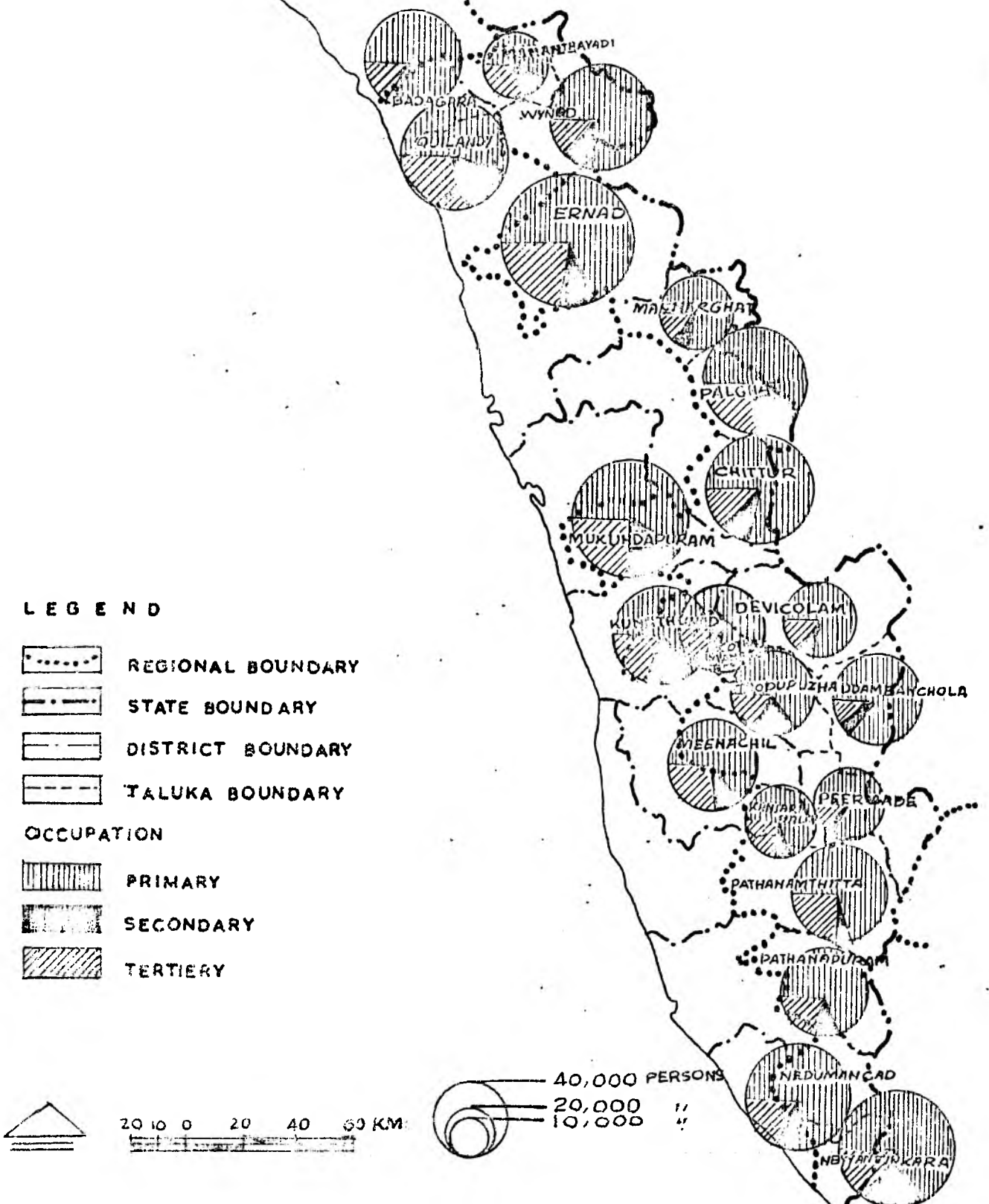
District	Taluk	Population	Total Workers	Primary Sector	Secondary Sector	Tertiary Sector
Cannanore	1. North Wynad	129335	46433 (35.90)	37336 (8.40)	2083 (4.49)	7014 (15.11)
Kozhikode	2. South Wynad	284515	106041 (37.27)	88528 (83.48)	4852 (4.58)	12661 (11.94)
	3. Quilandy	468714	121341 (25.89)	65781 (54.21)	18617 (15.34)	36943 (30.45)
	4. Badagara	409771	103250 (25.20)	55845 (54.09)	14006 (13.57)	33399 (32.34)
Malapuram	5. Ernad	715496	198819 (27.79)	135025 (67.91)	20867 (10.50)	42927 (21.59)
	6. Mannarghat	184579	65013 (35.22)	50203 (77.22)	5081 (7.82)	9729 (14.96)
	7. Palghat	369001	132461 (35.90)	76231 (57.55)	20174 (15.23)	36056 (27.22)
Trichur	8. Chittur	313973	131883 (42.00)	94740 (71.84)	15609 (11.84)	21534 (16.32)
	9. Mukundapuram	590317	166086 (28.14)	97670 (58.81)	31236 (18.81)	37180 (22.38)
Ernakulam	10. Kunnathunad	292113	91358 (31.27)	57687 (63.14)	16148 (17.68)	17523 (19.18)
	11. Kothamangalam	142378	43741 (30.72)	31963 (73.07)	3762 (8.60)	8016 (18.33)
Idukki	12. Thodupuzha	215504	66136 (30.13)	44841 (64.78)	10339 (15.63)	12956 (19.59)
	13. Devicoolam	134350	51778 (38.54)	40683 (78.57)	4143 (8.00)	6952 (13.43)
	14. Udumbanchola	264913	39769 (33.89)	78863 (87.85)	3103 (3.46)	7803 (8.69)
	15. Pocrnado	146841	57407 (39.09)	47407 (82.58)	2774 (4.83)	7226 (12.59)
Kottayam	16. Moonachil	351879	95351 (27.10)	66179 (69.41)	8306 (8.71)	20866 (21.88)
	17. Kanjirapally	172360	47206 (27.39)	32493 (68.83)	3914 (8.29)	10799 (22.88)
Quilon	18. Pathanamthitta	390150	100582 (25.78)	71223 (70.81)	6796 (6.76)	22563 (22.43)
	19. Pathanapuram	310659	37196 (28.07)	59637 (68.39)	11017 (12.64)	16542 (18.97)
Trivandrum	20. Noyyatinkara	559488	156060 (27.89)	101923 (65.31)	20199 (12.94)	33938 (21.75)
	21. Nedumangad	430779	122388 (28.41)	89427 (73.07)	11346 (9.27)	21615 (17.66)
Total Kerala Sub-Region		6881115	2080299 (30.23)	1421685 (68.34)	234372 (11.27)	424242 (20.39)

Note: (i) Figures in brackets in column 4 show workers participation ratio
(ii) Figures in brackets in other columns show percentage to total workers

Source: Census of Kerala, Part II-A-1971.

FIG: 2.2

KERALA SUB-REGION DEMOGRAPHY & ECONOMIC PROFILE OCCUPATIONAL STRUCTURE



ratio is significant and tribal population is conspicuous by its absence, have more diversified economy with higher share in tertiary and secondary sectors employment. The Taluks, as recounted earlier, and which fall in this category are Neyyattinkara, Pathanamathitta, Nedumangad, and Pathanapuram.

2.3 Detailed Occupational Pattern

A redeeming feature about the employment pattern in the Kerala Sub-region is in regard to the differences noticed in respect of detailed occupational structure (Refer Table 2.7). The hegemony of primary sector is noticed in most of the Taluks, but within the primary sector, it is not the agriculture (Agriculturists + agricultural labourers) which is completely dominating. Plantations and Forestry as a source of livelihood is somewhat significant (10.79%) and it is a welcome sign. Plantations in particular have an important role in the Kerala Sub-region's economy and since these vocations are comparatively lucrative, the economic and social implications are evident. Not only these vocations bring higher income but have built in advantage of bringing other benefits in shape of processing industry, providing checks on soil erosion and at the same time diversifying the economy with better tertiary component. The Taluks which abound in such a situation are, Peermade, North Wynad, South Wynad and Quilandy.

As regard the secondary sector the terrain and physical setting pose a direct constraint to the

development of such a sector. Since ecology constraints further hamper the transformation, the role of secondary sector, has to be somewhat lower and mostly in spheres of small sector/collage industries with processing industry having an edge.

The development of tertiary sector is no doubt on the lower side and here like any backward economy, the other services are prominent (10.86%). As stressed earlier, the role of settlement planning with a proper hierarchy of settlements with necessary wherewithals of facilities and amenities can bring the change in a more systematic and accelerated manner.

3. FUTURE RECOURSE

In the foregoing paragraphs an attempt has been made to bring out, as far as possible, the constraints that hamper the speedy and orderly growth of the economy and the people in the Kerala Sub-region. The analysis reveals that the Sub-region's economy (being somewhat sub-servient to other parts of the state/Country because of the toonatural endownments) has to have a different strategy for development. Some of the areas in the Sub-region, because of the ecology consideration alone, have to be earmarked exclusively for reserved forestry. This puts a big constraint, as the area being hilly, but population pressure being heavy and likely to get accentuated, the land available for cultivation becomes a critical factor. The man-land ratio is already adverse and with mounting population (10.573 lakh in 1991)(Ref.App.I) & other avenues of production very negligible, because

Table-2.7: Talukwise Percentage Distribution of Workers-Kerala Sub-Region-1971.

District	Taluk	Total Workers	Primary Sector					Secondary Sector				Tertiary Sector			
			I	II	III	IV	Total	V(a)	V(b)	VI	Total	VII	VIII	IX	Total
<u>Cannanore</u>	1. North Waynad	46433	27.89	36.98	15.42	0.12	80.40	1.24	2.66	0.58	4.49	5.47	0.89	8.75	15.11
<u>Kozhikode</u>	2. S.Waynad	106041	24.07	37.10	22.20	0.11	83.48	1.11	2.78	0.69	4.58	4.42	0.93	6.59	11.94
	3. Quilandy	121341	12.03	28.42	12.90	0.86	54.21	4.83	7.97	2.54	15.34	2.05	5.83	12.57	30.45
	4. Badagara	103250	12.92	32.55	7.87	0.74	54.08	4.66	7.14	1.77	13.57	4.86	4.64	12.85	32.35
<u>Malapuram</u>	5. Ernad	198819	20.14	42.77	4.47	0.53	67.91	2.71	6.33	1.45	10.50	6.58	2.95	12.07	21.59
	6. Mannarghat	65013	27.80	42.19	6.89	0.34	77.22	2.41	3.96	1.45	7.82	4.74	1.72	8.50	14.96
	7. Palghat	132461	11.33	44.21	1.90	0.11	57.55	4.58	9.27	1.38	15.23	9.73	5.12	12.37	27.22
	8. Chittur	131883	11.29	53.54	6.92	0.09	71.84	3.77	6.74	1.33	11.84	6.92	1.64	7.76	16.32
<u>Trichur</u>	9. Mukundapuram	166086	18.90	34.58	4.62	0.71	58.81	3.75	13.52	1.53	18.80	7.63	3.17	11.59	22.39
<u>Ernakulam</u>	10. Kunnathunad	91358	23.12	37.00	1.89	1.13	63.14	4.90	10.60	2.18	17.68	5.92	2.71	10.55	19.18
	11. Kothamangalam	43741	24.19	42.27	6.22	0.39	73.07	1.82	5.29	1.49	8.60	6.15	2.46	9.72	18.33
<u>Idukki</u>	12. Thodupuzha	66136	31.47	24.97	8.14	0.20	64.78	1.20	4.60	9.83	15.63	6.36	2.25	10.98	19.59
	13. Devicoolam	51778	13.96	19.06	45.48	0.07	78.57	0.78	6.62	0.60	8.00	3.34	0.90	9.18	13.43
	14. Udumbanchola	89769	37.87	30.34	19.58	0.06	87.85	0.82	1.92	0.72	3.46	2.92	0.58	5.19	8.69
	15. Peermed	57407	9.97	10.33	62.03	0.25	82.58	0.86	2.85	1.12	4.83	4.28	1.17	7.14	12.59
<u>Kottayam</u>	16. Meenachil	95351	35.16	21.37	12.67	0.21	69.41	1.94	5.12	1.65	8.71	6.75	2.31	12.82	21.88
	17. Kanjirapally	47206	27.21	22.81	18.66	0.15	68.83	1.43	5.51	1.35	8.29	7.71	2.94	12.23	22.88
<u>Quilon</u>	18. Pathananthitta	100582	42.99	21.22	6.36	0.24	70.81	1.80	3.86	1.10	6.76	5.21	1.90	15.32	22.43
	19. Pathanapuram	87196	29.81	29.20	9.21	0.17	68.39	2.13	9.33	1.18	12.64	5.66	2.35	10.96	18.97
	20. Neyyatinkara	156060	17.71	41.50	5.96	0.14	65.31	6.13	5.82	0.99	12.94	6.02	2.45	13.28	21.75
	21. Ncdumangad	122338	23.21	44.56	4.98	0.32	73.07	3.30	4.98	0.99	9.27	5.57	1.77	10.32	17.66
Kerala Sub-Region		2080299	21.97	35.22	10.79	0.36	68.34	3.09	6.56	1.62	11.27	6.90	2.63	10.86	20.39

Source : Census of Kerala, Part II-A-1971.

No.PC(P)19/TCPO/81-MLP
Government of India
Planning Commission
.....

Yojana Bhawan
Parliament Street
New Delhi, the 5th Feb. 1982.

To

Prof. Moonis Raza
Director
National Institute of Educational
Planning & Administration
17-B Arbindo Marg
New Delhi


Sub: Western Ghats Regional Plan -
Kerala Sub-Region.

Sir,

I am directed to forward herewith a copy of the draft Report on Kerala Sub-Region of the Western Ghat Regional Plan prepared by the TCPO. This will be considered in the next meeting of the Technical Advisory Committee.

You are kindly requested to send your comments early.

Yours faithfully,


(K. Narasimha Iyer)
Consultant (WG)
6/2/82

of the hilly terrain, the choice or choices open to development get squeezed. It is amply clear that agriculture, plantation, forestry and vocations dependent upon these sectors (Animal husbandry, processing industries mostly small scale forestry occupations) have to play a very significant role in the Sub-region's economy. Only the mix shall vary from Taluk to Taluk depending upon their physical profile, soil condition, rainfall pattern, demographic characteristics and the social overheads available and that would be made available in proper locations/setting.

The funds being limited and problems manifold, it becomes all the more necessary to match immediate needs with possible and achievable targets in a proper time schedule. A host of studies and references are available to chalk out a workable and practical timetable, keeping the needs and aspirations of the people in view. For this, it becomes necessary to catalogue the developmental efforts that are being undertaken in the different Taluks of the Sub-region. Once the targets/achievements are known the shortfalls can be spotted. But, unfortunately no information at taluk level is available to make such a recourse possible.

No matter how the data is interpreted, the post independence period has induced change and development all around. The drawback has been the absence of a well conceived plan of action, having both the people and space in perspective. The end result is that within a small number of Taluks (21 to be precise), the levels of development have distorted look. The study has also revealed that, more or less, all the

Taluks are comparatively backward. But amongst them, some are better placed vis-a-vis the others. Three distinct groups of Taluks are visible. Taluks with low density, are generally forest based and their development has been the tardy. Next comes Taluks where comparative population growth has been better and these Taluks have plantation as an emerging typology.

APPENDIX - I PROJECTED POPULATION FOR 1981-91 -
KERALA SUB-REGION

Estimates of the population for 1981 and 1991 have been made for the Kerala Sub-region and its various talukas by taking into consideration the proportion of population for 1941-71 in relation to the population of Sub-region and the State. It was observed that the decadal growth of population during 1941-71 in various talukas was quite uneven, showing wide variation from decade to decade. Due to this it was difficult to find a trend by using known methods of projections. To minimise these variations it was decided to find the decadal proportion of population of every taluka to the Sub-regional population, and that of Sub-regional population to the State's population for 1941-71. After finding these decadal proportions of population for various talukas, they were plotted on the graph and their fluctuations were studied and it was decided to fit straight line curve by using the formula $y = a + b x$ to project proportion for 1981 and 1991 for various talukas as well as the Sub-region. For the State of Kerala the projected population for 1981 and 1991 **has** been taken from the estimates made by the Office of the Registrar General of India. To find out the Sub-region's population for 1981-91 the projected proportion were applied to the State's population and then from the Sub-region's population, taluka population was calculated. In case of talukas like Badagara, Palghat, Chittur, Kothamanglam, Kunnathunad, Meenachil and Udamancholla marginal adjustments have been made in the projected proportion to correct the statistical error in course of projections.

Accordingly the population of the Sub-region for 1981 and 1991 has been estimated at 87.4 and 105.7 l&hs respectively showing the growth of 27% and 20.9% during 1971-81 and 1981-91.

Table - 2.8 Projected Population in Kerala Sub-region Western Ghats
(1981-1991)

District	Taluks	1941	1951	1961	1971	1981	1991
Cannanore	1.North Wynad	37431	59580 (59.17)	90200 (51.39)	129335 (43.39)	188857 (46.02)	253759 (34.37)
Kozhikode	2.South Wynad	68919	109700 (59.17)	185055 (68.69)	284515 (53.75)	422304 (48.43)	579414 (37.20)
	3.Quilandy	233447	290019 (24.23)	364173 (25.57)	468714 (28.71)	570941 (21.81)	671402 (17.60)
	4.Badagara	211061	262208 (24.23)	319913 (22.01)	409771 (28.09)	529602 (28.02)	634395 (20.93)
Malapuram	5.Ernad	339743	404571 (19.08)	524294 (29.59)	715496 (36.47)	869964 (21.59)	1043580 (19.96)
Palghat	6.Mannarghat	88211	103782 (17.65)	132040 (27.23)	184579 (39.79)	221207 (19.84)	264331 (19.49)
	7.Palghat	231453	273489 (18.16)	296217 (8.31)	369001 (24.57)	437168 (18.47)	518090 (18.51)
	8.Chittur	199511	242308 (21.45)	272272 (12.37)	313973 (15.32)	363724 (15.85)	422930 (16.28)
Trichur	9.Mukundpuram	300899	375110 (24.66)	466957 (24.49)	590317 (26.42)	719579 (21.90)	839517 (16.67)
Ernakulam	10.Kunnathunad	157861	182908 (15.87)	229282 (25.35)	292113 (27.40)	371593 (27.21)	444077 (19.51)
	11.Kothamangalam	-	-	114171	142378 (24.71)	192354 (35.10)	256930 (33.57)
Kottayam	12.Meenachil	244302	279097 (14.24)	309830 (11.02)	351879 (13.57)	437168 (24.24)	475797 (8.84)
	13.Kanjirapally	90894	115957 (27.57)	148786 (28.31)	172360 (15.84)	215087 (24.79)	248472 (15.52)

District	Taluka	1941	1951	1961	1971	1981	1991
Quilon	14. Pathanamthitta	198223	251779 (27.02)	333310 (32.38)	390150 (17.05)	496623 (27.29)	584702 (17.74)
	15. Pathanapuram	124510	177141 (42.27)	247737 (39.85)	310659 (25.40)	427550 (37.63)	540293 (26.37)
Trivendrum	16. Neyyattinkara	269753	349125 (29.42)	457132 (30.94)	559488 (22.39)	714333 (27.68)	854319 (19.60)
	17. Nedumangad	176673	251446 (42.19)	344725 (37.32)	430779 (24.96)	563947 (30.91)	708408 (25.62)
Iddiki	18. Thodapuzha	109027	142113 (30.35)	167861 (18.12)	219504 (30.77)	266672 (21.49)	311912 (16.96)
	19. Devicolam	62872	83002 (32.02)	123155 (48.38)	134350 (9.09)	183611 (36.67)	224154 (22.08)
	20. Udambanchola	14264	20056 (40.61)	155584 (675.75)	264913 (70.27)	340991 (28.72)	422931 (24.03)
	21. Peermade	58255	86432 (48.37)	133635 (54.61)	146841 (9.88)	215087 (46.48)	273848 (27.32)
Total Sub-region		3217309	4059413 (26.17)	5416329 (33.43)	6881115 (27.04)	8743362 (27.06)	10573259 (20.93)
Kerala State		11031541	13549118 (22.82)	16903715 (24.76)	21347375 (26.29)	25960100 (21.61)	30374200 (17.00)

Note: Figures in brackets show decadal percentage growth of population

SECTION - III : LAND USE, AGRICULTURE, LIVESTOCK
AND FORESTRY DEVELOPMENT :

The Sub-region is predominantly covered by forests all along the eastern portion which is relatively higher whereas the western portion which is relatively lower flat land is dominated by agricultural land. The reason for this pattern of land use is primarily the physical nature of the ground which is marked by large tracts of undulating terrain interspread with hills and valleys. Agriculture and forests predominate the overall land-use pattern of the Sub-region and cover 45.20% and 42.57% respectively of the total area during 1974-75 (Table 3.1 and Fig. 3.1 and 3.2).

1. LANDUSE CATEGORIES:

1.1. Land Use Pattern:

The total area of the Sub-region is 2177280 hectares which is 56.43% of the total area of the Kerala State. With a population of 6,881,115 persons in 1971, the per capita land in the Sub-region is 0.32 hectare compared with 0.18 hectare for the state and 0.53 hectare for India (Table 3.2). The higher per capita land in relation to state indicates the dominance of forests and agriculture and lesser urbanisation growth, in the Sub-region.

The net area sown in the Sub-region was 45.20% of the total area compared to 57.24% in the State. This indicates that comparatively lower percentage of land is sown in the Sub-region in comparison to Kerala State which is mainly because of undulating nature of terrain and relatively poor soil resulting in almost equal percentage of forests.

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TABLE - 3.1: Landuse Pattern in Kerala Sub-region and Kerala State during 1974-75 :

Sl. No.	Landuse Category	Kerala Sub-Region		Kerala State	
		Area in 000' hectare	% to total area	Area in 000' hectare	% to total area
1	2	3	4	5	6
1.	Net area sown	984.07	45.20	2208.45	57.24
2.	Fallow land	21.89	1.00	45.36	1.18
3.	Culturable Waste Land	55.86	2.57	71.95	1.86
4.	Permanent Pasture	33.35	1.53	125.48	3.25
A.	Total Arable Lands	1095.17	50.30	2451.24	63.53
5.	Area not available for cultivation.	155.30	7.13	360.00	9.33
6.	Area under forest.	926.81	42.57	1047.28	27.14
B.	Total non-agri-cultural land.	1082.11	49.70	1407.28	36.47
Total: Geographical Area (A+B)		2177.28	100.00	3858.28	100.00

Source: Compiled from the data collected from the Bureau of Economics & Statistics, Kerala, Trivendrum.

TABLE - 3.2 Per Capita availability of Land in the Sub-region compared with Kerala State & India:

Sl. No.	Population 1971	Total area in 000 hectares	Per capita land (hectares)	
1	2	3	4	
1.	Kerala Sub-region.	6881,115	2177.27	0.32
2.	Kerala State	21,347,375	3858.52	0.18
3.	India	547,949,809	2130000.00	0.53

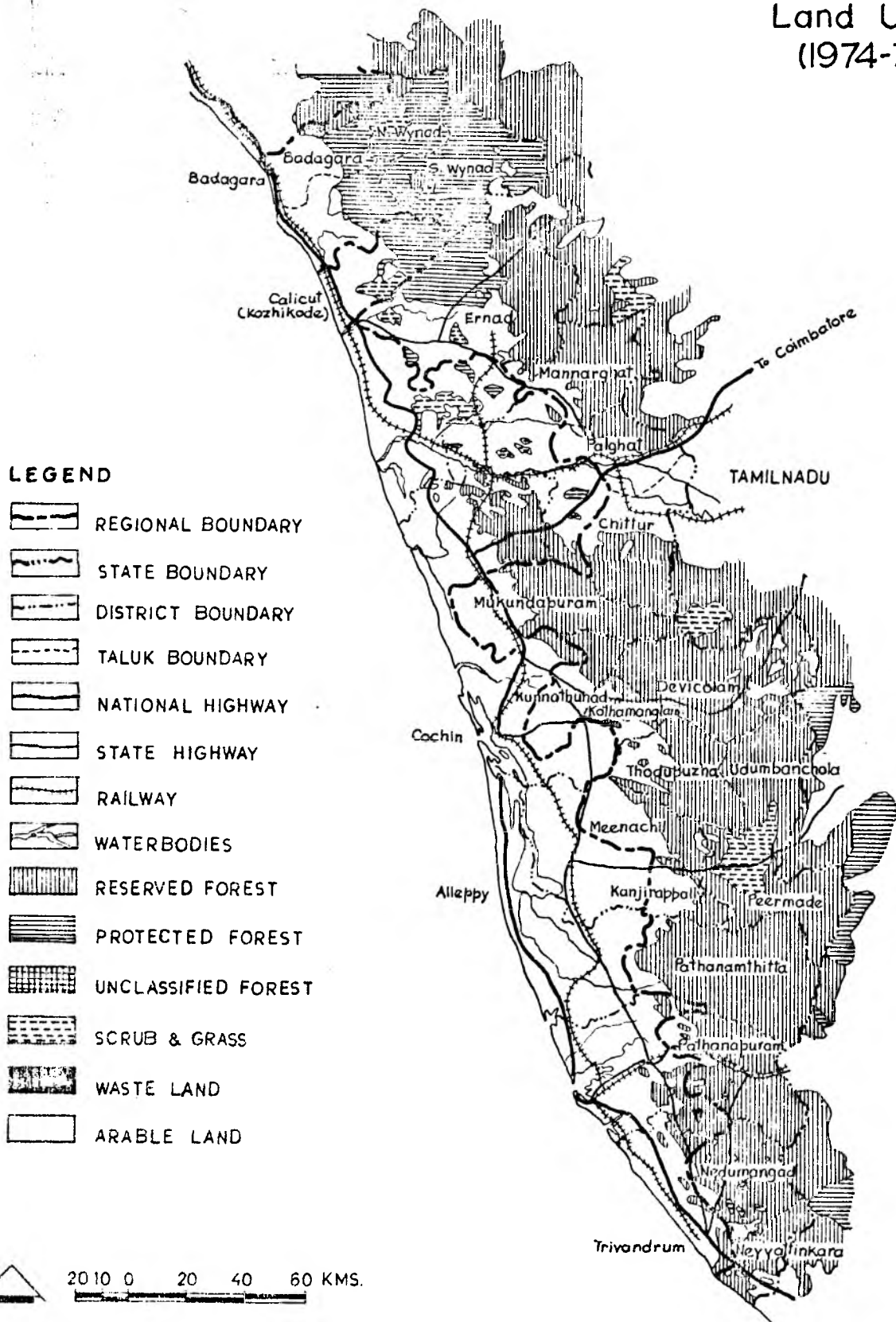
The quantum of land left fallow, which includes current fallow and other fallow lands, in the Sub-region is 21.89 thousand hectares or 1.00 per cent of the total area compared to 45.36 thousand hectares or 1.18% of the

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Fig. 3.1

KERALA SUB-REGION

Land Use
(1974-75)














WESTERN GHATS : SURVEY & PLAN

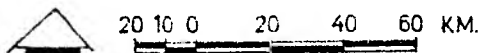
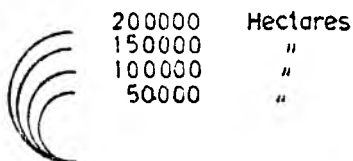
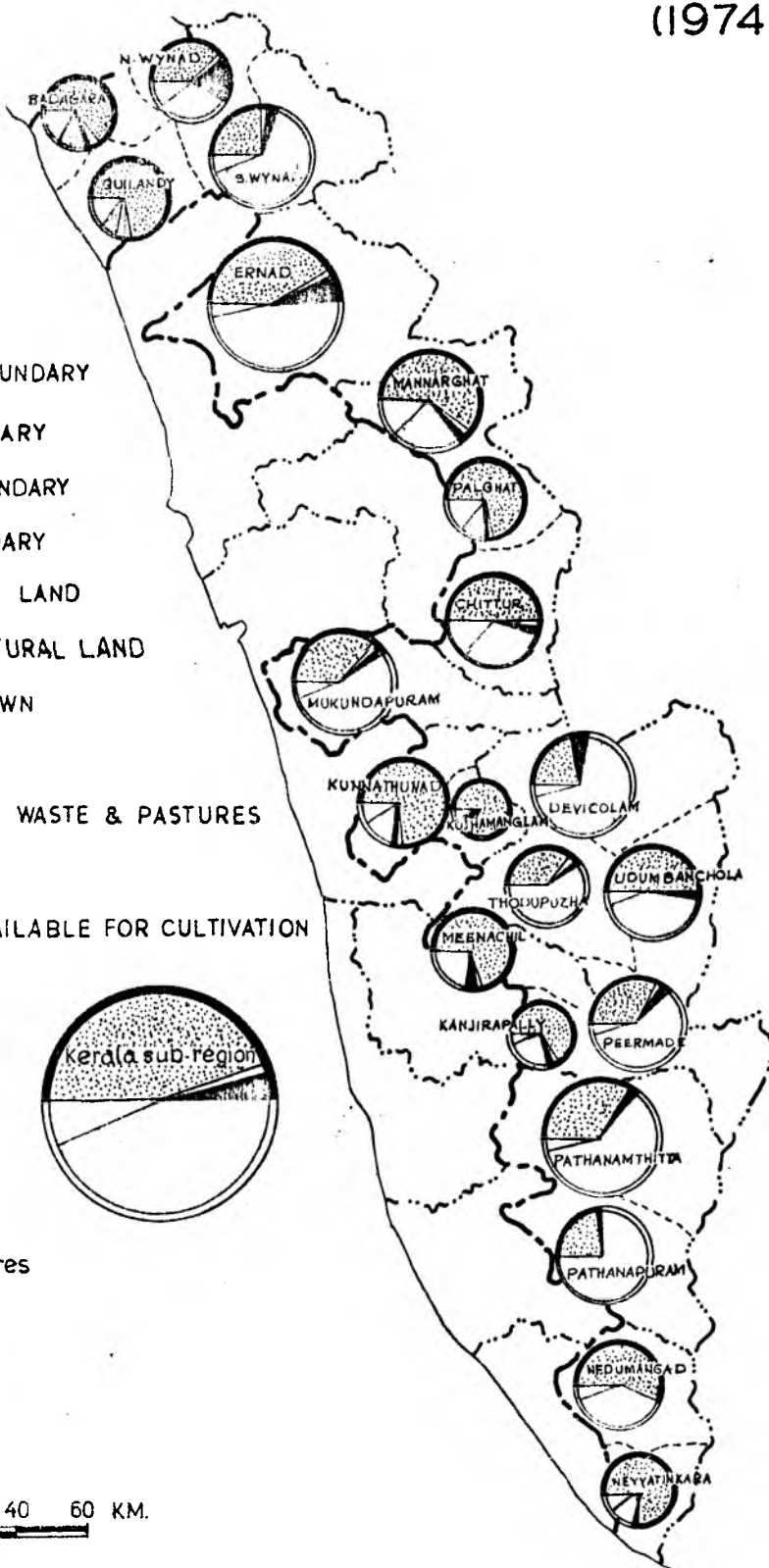
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KERALA SUB-REGION

Land Use Categories
(1974-75)

LEGEND

-  REGIONAL BOUNDARY
-  STATE BOUNDARY
-  DISTRICT BOUNDARY
-  TALUK BOUNDARY
-  TOTAL ARABLE LAND
-  NON AGRICULTURAL LAND
-  NET AREA SOWN
-  FALLOW LAND
-  CULTURABLE WASTE & PASTURES
-  FOREST
-  AREA NOT AVAILABLE FOR CULTIVATION



WESTERN GHATS SURVEY & PLAN

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total area in the State. The reason for the slightly lower percentage in the Sub-region may perhaps be attributed to the more land under shifting cultivation, the areas under which are not included under fallow lands. Otherwise, the proportion of land under fallow land should normally be higher in the hilly areas which comprises most of the parts of the Sub-region, because the soil over large areas is relatively poor and cannot bear the strain of annual cropping.

The other uncultivated land excluding fallow land includes mainly the culturable waste land and land under pastures, tree crops and green etc. The other unculturable lands represent 4.10% of the total area against 5.11% of the State.

The culturable waste lands represents 2.57% of the total area against 1.86% in the Kerala State. Since the culturable waste is the main promising sector of land which can be reclaimed for agricultural purposes by soil conservation and other techniques, the Sub-region has slightly better score.

The area under pastures, tree crops and groves etc. not included in the net area sown is 1.53% in the Sub-region against 3.25% in the State. This Sub-category contrary to the culturable waste is not promising enough to be developed as cultivated area but by proper development may be turned into a rich grazing land for the rearing of cattle. It may be noted that substantial portion of area under tree crops and groves is occupied by casurina trees, thatching grass, bamboo bushes and other groves for fuel. In fact they are not included in net area sown mainly because these ^{vegetations} do not come under the category of crops. A sizable portion of the area under

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this category may be promising enough for cultivation if detailed study is conducted.

The area not available for cultivation includes the land under settlements, roads and railways and completely barren lands. The area under this category is 7.13% in the Sub-region against 9.33% in the State. The comparatively lower percentage appears to be mainly because of the Sub-region being hilly, forested, backward and less urbanised. Consequently the area under settlement and transportation is lower.

The area under forests is 926.81 thousand hectares i.e. 42.57% in the Sub-region compared to 1047.28 thousand hectares or 27.14% in the State. This high percentage is mainly because of the undulating nature of the terrain and poor soil.

1.2 Landuse Change during 1970-71 and 1974-75* in the Sub-region :

The change in the overall landuse pattern between 1970-71 and 1974-75 is negligible at the sub-regional level. However, some of the features appear to be noteworthy. The net area sown has increased from 44.13% in 1970-71 to 44.62% in 1974-75 whereas the culturable waste has decreased from 2.63% in 1970-71 to 2.59% in 1974-75 and the forest land from 43.35% to 43.03% during the same period. Similarly, the fallow lands have also declined from 1.10% in 1970-71 to 1.00% in 1974-75. A perusal of Table 3.3 indicates that the increase in the net area sown during the period 1970-71 to 1974-75 has

* To make the figures comparable for assessing the changes in the landuse pattern, the landuse figures for 1970-71 & 1974-75 in this section of the report do not include figures for Kothamangalam Taluk, as it was formed in 1974.

been mainly at the expense of forest area and to a lesser extent at the expense of culturable waste and fallow lands. The landuse changes at the Sub-regional level is detailed out in Table 3.3. Some of the taluks have, however, recorded significant changes in the landuse pattern. In the North Wynad Taluk, the net area sown increased from 29.83% in 1970-71 to 35.50% in 1974-75 whereas the area under forests has declined from 34.12% to 28.03% during this period. Likewise the increase in net area sown was also recorded from 71.87% to 74.10% in Kunnathunad taluk from 55.03% to 56.79% in Nedumangad taluk whereas the area under forests has decreased from 13.12% to 12.10% in Kunnathunad taluk and from 39.50% to 37.63% in Nedumangad taluk. The changes in other taluks, however, appears to be negligible (Table 3.4).

TABLE - 3.3 : Landuse changes in Kerala Sub-region
between 1970-71 and 1974-75:

(Area in hectares)

Sl. No.	Category	1970-71		1974-75		% change
		Area	%	Area	%	
1.	Net area sown	948,222	44.13	958,864	44.62	+0.49
2.	Fallow land	23,792	1.10	21,567	1.00	-0.10
3.	Culturable waste	56,391	2.63	55,866	2.59	-0.04
4.	Permanent pastures, trees etc.	33,697	1.57	32,794	1.53	-0.04
5.	Forest	931,570	43.35	924,593	43.08	-0.32
6.	Area not available for cultivation.	155,099	7.22	155,298	7.23	-0.01
TOTAL:		21,48,771	100.00	21,48,771	100.00	

Source : Bureau of Economics and Statistics, Trivendrum.

* Excludes figure for Kothamangalam Taluk.

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1.3 Regional Variation in Landuse:

The agriculture and forest predominate the landuse pattern of the Sub-region and cover roughly 45% and 42.5% of the total area. The land covered under culturable waste and other waste land is also over 4%. Relatively higher percentage of land given to forest and waste land signifies the rocky and undulating nature of the area which has affected socio-economic life of the people as well. The heterogeneity in relief, structure, climate and soil types has given rise to a considerable variation in the landuse pattern as evident from Table 3.5.

The culturable land which includes net area sown and fallow land, is taken as the real index of the present development of agricultural activities in the area. The total cultivated area, reported as 10,05,960 hectares or 46.20% of total area in the Sub-region during 1974-75, shows a significant variation from 21.83% in Devicolan taluk in Idikki district to 89.55% in Kothamangalam Taluk in Ernakulam district. Twelve taluks in the Sub-region have reported higher percentage of cultivated land than the Sub-regional average figure of 46.20%. The six taluks, namely Kothamangalam (89.55%), Laysattinkara (81.28%), Quilandy (76.95%), Kunnathunad (76.27%), Meenachil (74.58%) and Palghat (73.91%) have as high as three-fourth of their total area under cultivation. On the other hand, in the remaining nine taluks with lower percentage of cultivated land than the Sub-regional average, three taluks - South Wynaad (25.78%), Devicolan (21.83%), Pathanamuram (22.82%) and have a very low percentage of cultivated land (Table 3.6).

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TABLE - 3.4 : Changes in the Land Use Pattern in Kerala Sub-region between 1970-71 and 1974-75 :

Sl. No.	Taluk	Total area (in Hectares)	Percentage to Total Area											
			N.A.S.		Fallow Lands		Culturable Waste		Permanent Pastures Trees, etc.		Forest		Area not available for cultivation.	
			1970-71	1974-75	1970-71	1974-75	1970-71	1974-75	1970-71	1974-75	1970-71	1974-75	1970-71	1974-75
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	N. Wynad	74772	29.83	35.50	2.09	2.21	11.20	11.20	11.95	11.9	34.12	28.03	10.82	11.09
2.	S. Wynad	137820	24.90	24.90	0.89	0.89	3.23	3.23	1.14	1.1	62.73	62.73	7.12	7.12
3.	Quilandy	75693	75.22	75.23	1.72	1.72	1.88	1.88	3.53	3.5	4.14	4.14	13.51	13.50
4.	Badamara	54982	66.96	67.42	2.64	2.02	1.72	1.73	0.62	0.6	12.77	12.77	15.30	15.44
5.	Ernad	226198	40.44	40.66	1.50	1.35	8.23	8.09	2.45	2.4	42.89	42.89	4.49	4.56
6.	Mannerghat	109964	63.31	63.96	1.62	1.57	1.16	1.16	1.05	1.0	18.99	18.99	13.37	13.30
7.	Palghat	72033	72.69	72.79	1.16	1.12	0.94	0.89	0.96	0.9	10.15	10.15	14.10	14.11
8.	Chittur	115509	50.25	50.70	1.79	1.75	1.99	1.04	0.60	0.6	33.25	33.25	13.02	12.66
9.	Mukundapuram	131604	35.73	35.78	0.67	0.66	0.52	0.50	1.33	1.3	54.80	54.80	6.94	6.98
10.	Kunnathunad	67772	71.87	74.10	3.38	2.17	1.30	1.30	1.57	1.5	13.12	12.10	8.26	9.11
11.	Kothamangalam*													
12.	Thodupuzha	91437	36.74	36.74	2.07	2.07	0.15	0.15	0.38	0.38	57.63	57.62	3.04	3.03
13.	Devicollam	177416	21.65	21.65	0.17	0.17	4.89	4.89	0.45	0.45	68.00	68.00	4.84	4.84
14.	Peerade	130782	31.65	31.65	1.26	1.26	1.76	1.76	1.29	1.29	61.08	61.08	2.96	2.97
15.	Udumbachola	107140	49.39	49.89	0.15	0.15	2.28	2.28	0.20	0.20	41.46	41.46	6.03	6.03
16.	Meenachil	72273	71.83	73.43	1.17	1.15	3.59	3.20	1.17	1.17	0.07	0.07	22.18	21.03
17.	Kanjirappally	35133	67.48	67.55	1.63	1.53	0.37	0.34	0.53	0.53	22.92	22.92	7.08	7.14
18.	Lathanshitte	197574	32.61	32.82	0.13	0.13	0.45	0.45	2.05	2.05	62.22	62.22	2.43	2.48
19.	Pathanapuram	123285	22.63	22.67	0.33	0.15	0.30	0.30	0.17	0.17	76.11	76.12	0.40	0.62
20.	Neyyattinkara	54739	80.78	80.95	0.49	0.33	0.22	0.22	0.74	0.74	10.46	10.47	7.20	7.30
21.	Nedumengad	92675	55.03	56.79	0.36	0.38	0.15	0.15	0.44	0.44	39.50	37.63	4.56	4.65
Kerala Sub-Region		2148771	44.13	44.62	1.10	1.00	2.63	2.59	1.57	1.57	43.35	43.03	7.22	7.23

* Figures for 1970-71 are not available.

TABLE - 3.5 : Landuse in the Kerala Sub-Region 1974-75 :

Sl. No.	Taluk	Net Area sown	Fallow lands		Other uncultivated land excluding fallow land		Forest Area	Area not available for cultivation	Total Area
			Current fallow	Other fallows	culturable waste	Pastures, tree crops etc.			
1	2	3	4	5	6	7	8	9	10
1.	N. Wynađ	26549 (35.52)	620 (0.83)	1033 (1.38)	8374 (11.20)	8929 (11.95)	20950 (28.03)	82871 (11.09)	74742
2.	E. Wynađ	34312 (24.90)	1013 (0.74)	209 (0.15)	4446 (3.23)	1566 (1.14)	86457 (62.73)	9817 (7.12)	137820
3.	Quilandy	56937 (75.23)	487 (0.65)	814 (1.07)	1425 (1.88)	2674 (3.53)	3132 (4.14)	10224 (13.50)	75693
4.	Badagara	37071 (67.42)	233 (0.42)	882 (1.60)	944 (1.73)	339 (0.62)	7020 (12.77)	8493 (15.44)	54982
5.	Ernad	91975 (40.66)	2729 (1.21)	321 (0.14)	18301 (8.09)	5544 (2.45)	97014 (42.89)	10314 (4.56)	226198
6.	Mannarghat	70318 (63.96)	986 (0.90)	744 (0.67)	1280 (1.16)	1118 (1.02)	20886 (18.99)	14632 (13.30)	109964
7.	Chittur	58564 (50.70)	515 (0.45)	1501 (1.30)	1195 (1.04)	697 (0.60)	38410 (33.25)	14627 (12.66)	115509
8.	Palghat	52431 (72.79)	325 (0.44)	488 (0.68)	643 (0.89)	679 (0.94)	7311 (10.15)	10156 (14.11)	72033
9.	Mukundapuram	47082 (35.78)	679 (0.52)	181 (0.14)	657 (0.50)	1683 (1.28)	72123 (54.80)	9199 (6.98)	131604
10.	Kannethunad	50221 (74.10)	860 (1.27)	613 (0.90)	880 (1.30)	828 (1.22)	8198 (12.10)	6172 (9.11)	67772
11.	Kothamangalam*	25213 (88.44)	249 (0.87)	68 (0.24)	211 (0.74)	554 (1.94)	2214 (7.77)	Nil	28509
12.	Thodupuzha	33595 (36.74)	1710 (1.87)	180 (0.20)	136 (0.15)	348 (0.38)	52695 (57.63)	2773 (3.03)	91437
13.	Devicolar	38417 (21.65)	310 (0.17)	-	8676 (4.89)	790 (0.45)	120639 (68.00)	8584 (4.84)	177416
14.	Udumbanchola	53456 (49.89)	158 (0.15)	-	2440 (2.28)	212 (0.20)	44416 (41.46)	6458 (6.03)	107140

Contd..

Table - 3.5 Contd...

	2	4	5	6	7	8	9	10
Peermade	41393 (31.65)	1533 (1.17)	122 (0.09)	2304 (1.76)	1684 (1.29)	79876 (61.08)	3870 (2.96)	130782
Meenacnil	53074 (73.43)	566 (0.79)	259 (0.36)	2309 (3.20)	808 (1.12)	47 (0.07)	15210 (21.03)	72273
Lanjirappally	23733 (67.55)	374 (1.06)	164 (0.47)	119 (0.34)	180 (0.51)	8054 (22.92)	2509 (7.14)	35133
Patharamthitta	64851 (32.82)	108 (0.06)	128 (0.07)	895 (0.45)	3750 (1.90)	122940 (62.22)	4902 (2.48)	197574
Pathanapuram	27943 (22.67)	146 (0.11)	46 (0.04)	371 (0.30)	186 (0.15)	93827 (76.11)	766 (0.62)	123285
Neyyattinkara	44314 (80.95)	55 (0.11)	123 (0.22)	120 (0.22)	405 (0.73)	5726 (10.47)	3996 (7.30)	54739
Nedumangad	52628 (56.79)	124 (0.13)	228 (0.25)	140 (0.15)	374 (0.40)	34872 (37.63)	4309 (4.65)	92675
ala Sub-Region :	984077 (45.20)	13780 (0.63)	8104 (0.37)	55866 (2.57)	33348 (1.53)	926807 (42.57)	155298 (7.13)	2177280

*Information supplied by the State Government under the category "area not available for cultivation" for Kothamangalam taluk indicates nil and therefore appears to be doubtful.

Source: Bureau of Economics and Statistics Trivendrum, Kerala.

Note : Figures in brackets indicate percentage to total area.

TABLE - 3.6 : Cultivated land as Percentage to total area in Kerala Sub-region 1974-75

(000 Hectares).

Sl. No.	Taluk	Total area	Cultivated land	Percentage to total area
1.	N. Wynad	74.74	28.20	37.73
2.	S. Wynad	137.82	35.53	25.78
3.	Quilandy	75.69	58.24	76.95
4.	Badagara	54.98	38.18	69.44
5.	Ernad	226.20	95.03	42.01
6.	Mannarghat	109.96	72.05	65.52
7.	Palghat	72.03	53.24	73.91
8.	Chittur	115.51	60.58	52.45
9.	Mukundapuram	131.60	47.94	36.43
10.	Kunnathuned	67.77	51.69	76.27
11.	Kothamangalam	28.51	25.53	89.55
12.	Thodupuzha	91.44	35.49	38.81
13.	Devicolan	177.42	36.73	21.83
14.	Udumbanchola	107.14	53.61	50.04
15.	Peermade	130.78	43.05	32.92
16.	Meenachil	72.27	53.90	74.58
17.	Kanjirappally	35.13	24.27	69.09
18.	Pathanamthitta	197.58	65.09	32.95
19.	Pathanapuram	123.29	28.14	22.82
20.	Neyyattinkara	54.74	44.49	81.28
21.	Nedumangad	92.68	52.98	57.16
Kerala Sub-region		2177.28	1005.96	46.20

Source: Compiled from the data collected from the Bureau of Economics & Statistics, Kerala, Trivendrum.

1.4. Concentration of Cultivated Land and Forests:

Pattern of concentration of the cultivated land and forest area in the Sub-region has been worked out in details. The index of concentration of the cultivated land and forest area for each taluk has been calculated for the year 1974-75. The degree of concentration has been classified into three groups, i.e., high degree of concentration, medium and low as given in Table 3.7 and Fig. 3.3 and 3.4.

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The regional variation in the degree of concentration of the cultivated land and forest area among the various taluks of the sub-region reveals some important facts. The result shows that usually the taluks with high concentration of cultivated land have low degree of forest area. Out of 10 taluks with high degree of concentration of cultivated land, 9 taluks have low forest cover and the remaining one is very near to low but covered in medium group. Similarly, in 7 taluks with low concentration of cultivated land, 5 taluks have high concentration of forest cover and one as the medium and the remaining one with low forest cover. The taluks with low concentration of cultivated land are dominated by undulating terrain, poor soil, high level of dissection and are consequently densely forested except small peasants and so a high percentage of land is under forests. In the medium groups, agriculture and forests share roughly equal percentage of land.

The percentage ^{of} net area sown to total area in the sub-region varies from 21.65% in Devicolan Taluk to 88.44% in Kothananglan Taluk (Table 3.5). There are 12 taluks in the Sub-region which have higher percentage of net area sown than the Sub-regional average figure (45.20%).

The percentage of fallow land in the Sub-region varies from 2.21% in N. Wynad taluk to 0.13% in Pathanthitta taluk against 1.00% the Sub-regional average. Within the cultivated land also, the amount of net area sown and fallow land varies considerably.

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Fig. 3.3

KERALA SUB-REGION

Concentration of Cultivated Land (1974 - 75)

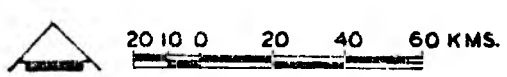
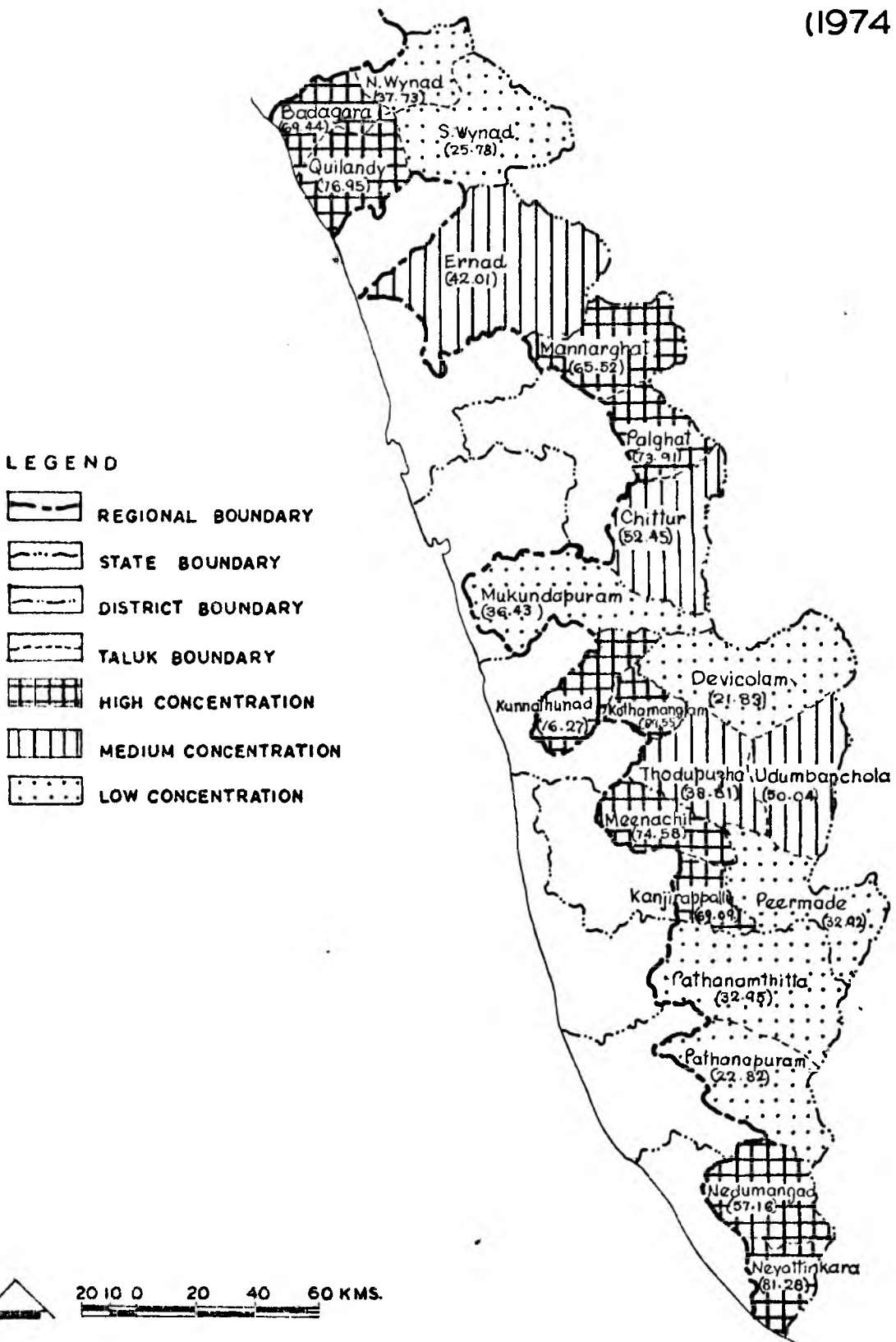
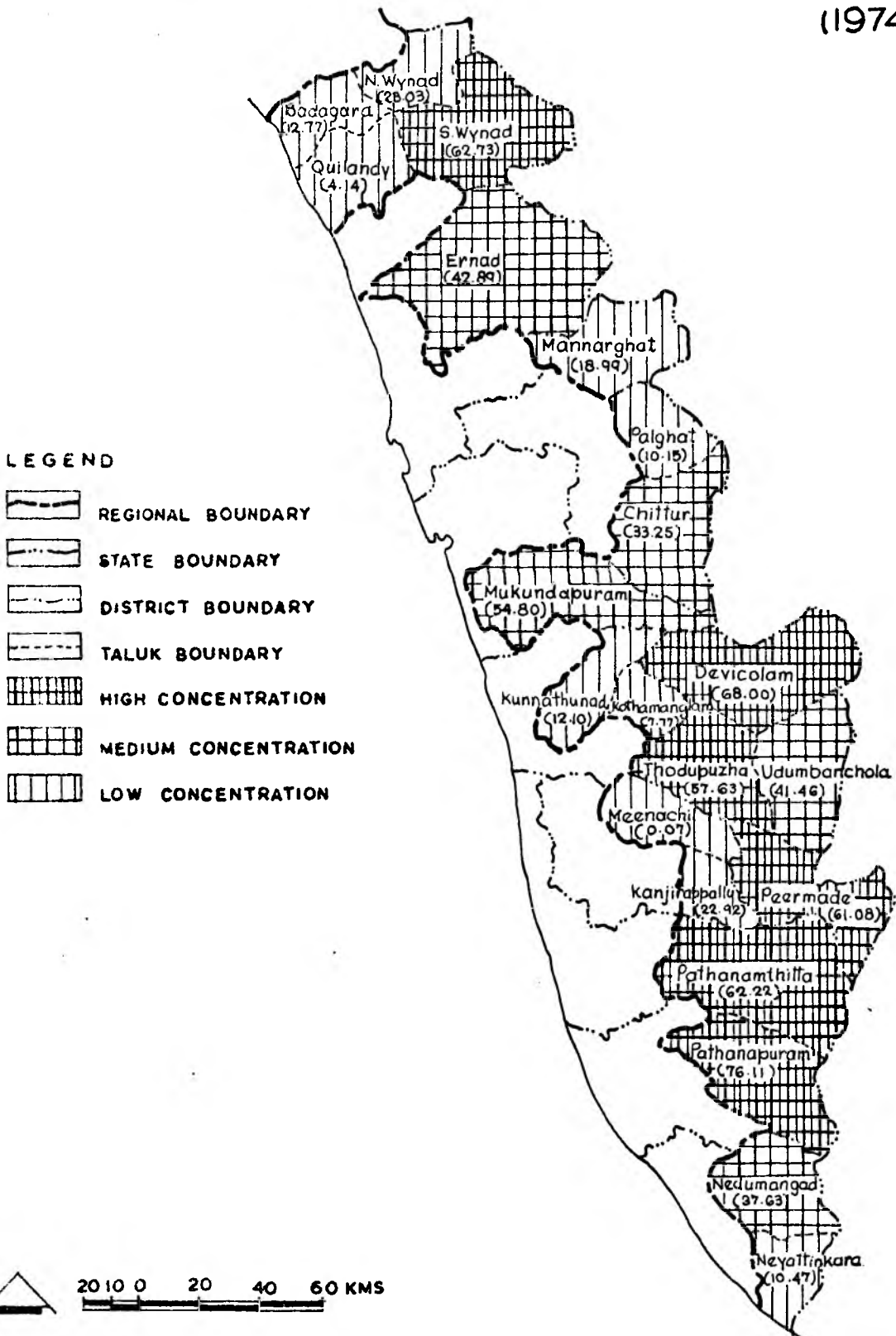


Fig. 3.4

KERALA SUB-REGION

Concentration of Forest
(1974-75)



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TABLE - 3.7 : Pattern of concentration (Taluk Level) of Cultivated Land and Forests in the Kerala Sub-Region 1974-75

Degree of Concentration Group	Cultivated Land		Forest Area	
	% to the total area	Index*	% to the total area	Index **
1	2	3	4	5
1. High	55.00 & above	1.15-1.94	55.00 & above	1.31-1.76
2. Medium	38.00-54.99	0.83-1.14	35.00-54.99	0.81-1.31
3. Low	21.00-37.99	0.48-0.82	0.07-34.99	Neg.-0.80
Kerala Sub-region.	46.20	1.00	42.57	1.00

*Index of concentration of cultivated land

$$= \frac{\text{Cultivated land in a Taluk}}{\text{Total area in a Taluk}} \div \frac{\text{Cultivated land in the Sub-region}}{\text{Total area in the Sub-region}}$$

**Index of concentration of Forest Area.

$$= \frac{\text{Forest area in a Taluk}}{\text{Total area in a Taluk}} \div \frac{\text{Forest area in the Sub-region}}{\text{Total area in the Sub-region}}$$

The percentage of fallow lands to cultivated land within Sub-region varies from 5.85% in North Wynad taluk to 0.30% in Udumbanchola taluk compared with the Sub-regional average figure of 2.18% (Table 3.8). Eleven taluks having higher percentage of fallow lands than the Sub-regional average are North Wynad (5.85%), Thodupuzha (5.33%), S. Wynad (3.43%), Chittur (3.33%), Peernade (3.86%), Ernad (3.21%), Badagara (2.91%), Kunnathunad (2.84%), Mannarghat (2.40%)

Quilandy (2.23%) and Kanjirapally (2.22%). The comparatively high percentage of fallow lands in these taluks is mainly because of inadequate water supply, soil erosion, fragmentation of land holdings, lack of young cultivators and apathy to modern innovations and problem of terracing particularly on the uplands.

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TABLE - 3.8 : Fallow Lands as percent to cultivated land
in Kerala Sub-Region 1974-75 :

(000 Hectares)

Sl. No.	District/Taluk	Cultivated Land	Fallow Land	Percentage to cultivated land
1	2	3	4	5
1.	N. Wynad	28.20	1.65	5.85
2.	S. Wynad	35.53	1.22	3.43
3.	Quilandy	58.24	1.30	2.23
4.	Badagara	38.18	1.11	2.91
5.	Ernad	95.03	3.05	3.21
6.	Mannarghat	72.05	1.73	2.40
7.	Palghat	53.24	0.81	1.52
8.	Chittur	60.58	2.02	3.33
9.	Mukundapuram	47.94	0.86	1.79
10.	Kunnathunad	51.69	1.47	2.84
11.	Kothamangalam	25.53	0.32	1.25
12.	Thodupuzha	35.49	1.89	5.33
13.	Devicollam	38.73	0.31	0.80
14.	Udumbanchola	53.61	0.16	0.30
15.	Peermade	43.05	1.66	3.86
16.	Meenachil	53.90	0.83	1.54
17.	Kanjirappally	24.27	0.54	2.22
18.	Pathanamthitta	65.09	0.24	0.37
19.	Pathanapuram	28.14	0.19	0.68
20.	Nedumangad	52.98	0.35	0.66
21.	Neyyattinkara	44.49	0.18	0.40
Kerala Sub-region:		1005.96	21.89	2.18

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Besides fallow lands, culturable waste lands are another promising sector where extension of agriculture is possible. The percentage of culturable waste to total area varies from 11.20% in N. Wynad taluk to 0.15% in Thodupuzha and Nedumangad taluks compared to 2.57% Sub-regional average. The culturable waste lands are mostly rocky and full of thorny bushes and can be brought under the plough only after extensive terracing.

The percentage of land covered by forest is slightly less (42.57%) than the net area sown (45.20%) in the Sub-region. The percentage variation of land covered by forests within the Sub-region is quite significant. The percentage of land under forests varies from 76.11% in Pathanapuram taluk to 0.07% in Meenachil taluk compared to 42.57% the Sub-regional average. Seven taluks viz. Pathanapuram (76.11%), Devicolum (68%), S. Wynad (62.73%), Pathanamthitta (62.22%), Peermade (61.08%), Thodupuzha (57.63%) and Mukundapuram (54.80%) have more than half of their total area covered under forests. The analysis of the forest area reveals that the forest occupies a dominant position in steep and rugged area of the region.

The areas not available for cultivation include both productive and unproductive sectors of the economy. It is therefore difficult to explain their distribution pattern from the combined data. The percentage of land under this category varies from 21.03% in Meenachil taluk to 0.62% in Pathanapuram taluk and nil in Kothamangalam taluk, compared to 7.13% of the Sub-regional average. The taluks with relatively high percentages in this category are predominantly agricultural and mainly plain developed areas. A correct assessment of the wide disparity in the distribution pattern under this category cannot be given at this stage but it may be very tentatively assumed that most of the areas under this category are waste lands.

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2. ARABLE LAND AND ITS CROPPING PATTERN:

The concept of arable land or agricultural land is a rather poor basis for comparison since it includes also land that has at present little or no agricultural function. However, since no other refined classification is available, we have indicated in Table - 3.9 the "Mix" of various types of farm lands within the Sub-region which in contrast to the great intra-sub regional variations in overall land use reveals that it does not vary much among the taluks of the Sub-region (Fig. 3.5).

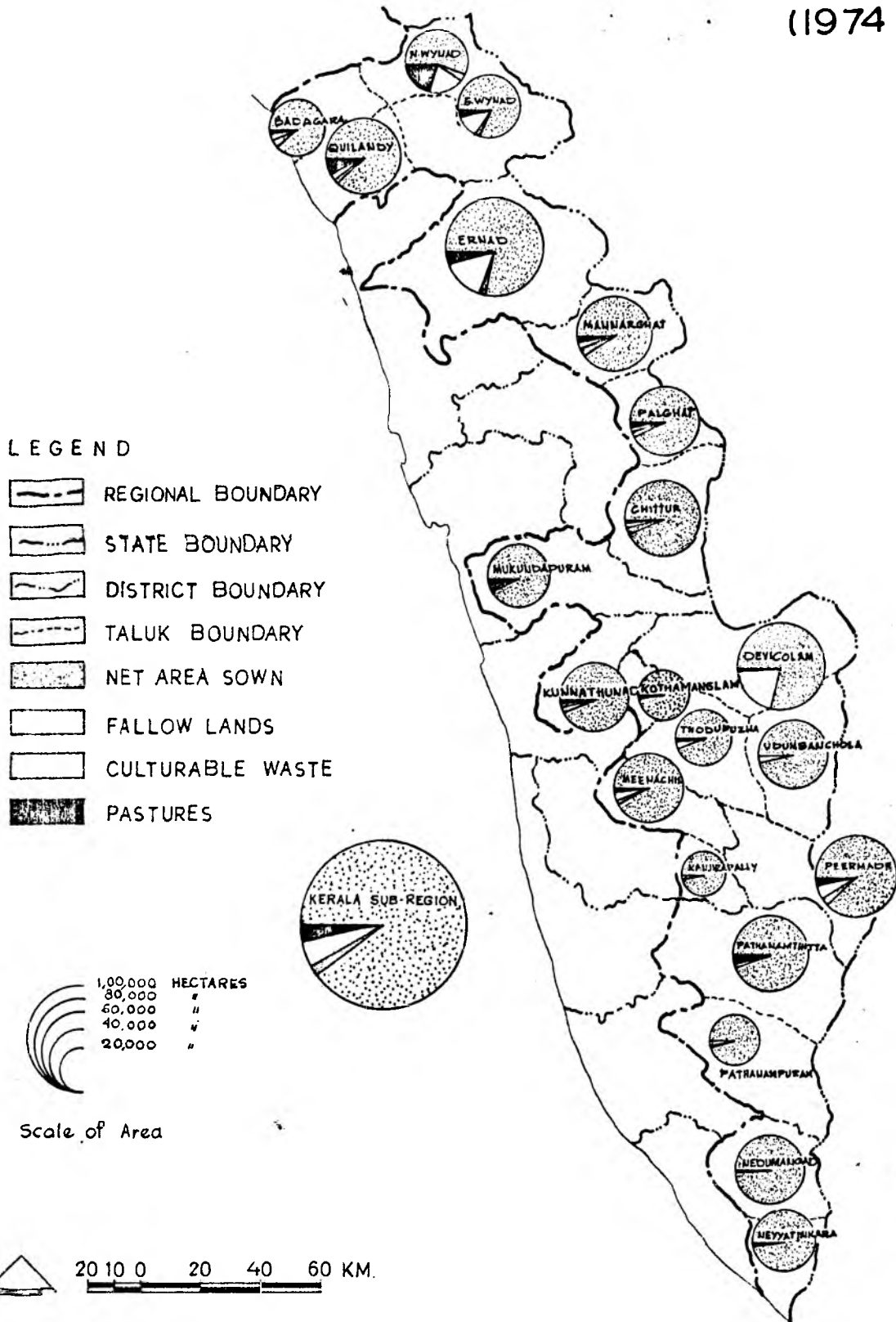
A perusal of table - 3.9 reveals that the net area sown accounts for 89.86% of total arable land¹ in the Sub-region against the Kerala State percentage of 90.09. This is especially significant if we keep in view that the percentage of arable land to total area in the Sub-region is less (49.74%) in comparison to the State (63.53%). Nearly 96.96% of the total arable land in Sub-region is potentially arable land, since the rest (3.04%) is under pastures and tree crops, which may be turned into rich grazing land for the rearing of cattle after proper development and will supply protective food to the people but need not be brought under cultivation.

¹Total arable land includes net area sown, fallow lands, culturable waste and areas under pasture, tree crops etc., whereas "potential arable land" includes only net area sown, fallow lands and culturable wastes.

Fig.3.5

KERALA SUB-REGION

Arable Land & Its Components (1974 - 75)



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TABLE - 3.9 : Arable land in the Kerala Sub-Region 1974-75
(Area in 000' Hectares)

Sl. No.	Taluk	Net area sown	Fallow Lands	Other uncultivated land excluding fallow lands	Cultural Waste	Pastures, tree crops etc.	Total arable (agricultural land & its percentage to total area)
1	2	3	4	5	6	7	
1.	North Wynad	26.55 (58.35)	1.65 (3.63)	8.37 (18.40)	8.93 (19.63)	45.50 (60.88%)	
2.	South Wynad	34.31 (82.61)	1.22 (2.94)	4.44 (10.69)	1.56 (3.76)	41.53 (30.13%)	
3.	Quilandy	56.94 (91.35)	1.30 (2.09)	1.42 (2.28)	2.67 (4.28)	62.33 (82.35%)	
4.	Badagara	37.07 (93.95)	1.11 (2.81)	0.94 (2.38)	0.34 (0.86)	39.46 (71.77%)	
5.	Ernad	91.98 (77.38)	3.05 (2.57)	18.30 (15.40)	5.54 (4.65)	118.86 (52.55%)	
6.	Mannarghat	70.32 (94.47)	1.73 (2.32)	1.28 (1.72)	1.11 (1.49)	74.44 (67.69%)	
7.	Palghat	52.43 (96.10)	0.81 (1.48)	0.64 (1.17)	0.68 (1.25)	54.56 (75.74%)	
8.	Chittur	58.56 (93.76)	2.02 (3.23)	1.19 (1.91)	0.69 (1.10)	62.46 (54.07%)	
9.	Mukundapuram	47.08 (93.64)	0.86 (1.71)	0.66 (1.31)	1.68 (3.34)	50.28 (38.21%)	
10.	Kunnathunad	50.22 (94.05)	1.47 (2.75)	0.88 (1.65)	0.83 (1.55)	53.40 (78.79%)	
11.	Kothamangalam	25.21 (95.89)	0.32 (1.22)	0.21 (0.80)	0.55 (2.09)	26.69 (22.21%)	
12.	Thodupuzha	33.60 (93.38)	1.89 (5.25)	0.14 (0.39)	0.35 (0.98)	35.97 (39.34%)	
13.	Devicolam	38.42 (79.71)	0.31 (0.64)	0.68 (18.01)	0.79 (1.64)	48.20 (27.17%)	
14.	Udumbanchola	53.46 (95.01)	0.16 (0.28)	2.44 (4.34)	0.21 (0.37)	56.27 (52.52%)	
15.	Peermade	41.39 (88.03)	1.66 (3.51)	2.30 (4.89)	1.68 (3.57)	47.02 (35.95%)	

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TABLE - 3.9 Contd...

1	2	3	4	5	6	7
16. Meenachil		53.07 (93.07)	0.83 (1.46)	2.31 (4.05)	0.81 (1.42)	57.02 (78.90%)
17. Kanjirapally		23.73 (96.62)	0.54 (2.16)	0.12 (0.49)	0.18 (0.73)	24.56 (69.91%)
18. Rathanamthitta		64.85 (93.00)	0.24 (0.34)	0.89 (1.28)	3.75 (5.38)	69.73 (35.29%)
19. Pathanapuram		27.94 (97.42)	0.19 (0.66)	0.37 (1.29)	0.18 (0.63)	28.68 (23.26%)
20. Neyyathinkara		44.31 (98.44)	0.18 (0.40)	0.12 (0.27)	0.40 (0.89)	45.01 (82.23%)
21. Nedumangad		52.63 (98.39)	0.35 (0.65)	0.14 (0.26)	0.37 (0.69)	53.49 (57.72%)
Kerala Sub-region:		984.07 (89.86)	21.89 (2.00)	55.86 (5.10)	33.35 (3.04)	1095.17 (50.29%)
Kerala State		2208.45 (90.09)	45.36 (1.85)	71.95 (2.94)	125.48 (5.12)	2451.24 (63.53%)

Figures in the parenthesis indicate percentage to total arable land.

The analysis of the table reveals that a substantial portion of available land is not put to productive use and is either left fallow or culturable waste. The probable reason for comparatively high percentage of land under these categories in the Sub-region than the state appears to be the non-availability of irrigation, fragmentation of holdings, poor economic condition of the cultivators, fear of wild animals and undulating nature of the terrain. Any attempt to increase the area under agriculture, therefore, should come from these categories.

2.1. Agricultural Land Vis-a-Vis Population Distribution:

While the Sub-region is marked by relatively lower population density (315 persons per sq. km. against 549 persons per sq. km. in Kerala State in 1971), are marked by

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variation in the taluks density of population. The density is the highest in Neyyattinkara taluk with 979 persons per sq. km. followed by Badagara (745), Quilandy (619), Palghat (513), Kothamanglam (494), Kanjirapally (491), Meenachil (487), Nedumangad (464). All these taluks are marked by the predominance of low level plain land and are located nearer to the coastal plain. Other taluks, however, have the density between 112 and 449, with a density as low as 76 persons per sq. km. in Devicolam taluk. A comparison of the maps on density of population and per capita availability of cultivated land (Figs. 3.6 and 3.7) reveals that there exist a significant relationship in their distribution i.e., the taluk having higher density is marked by low per capita cultivated land and vice versa.

Though productivity of land varies a good deal in the different parts of the Sub-region, man land ratio is generally taken as an indication of pressure of population on land. An attempt has been made to study the per capita availability of various categories of agricultural land in (Table 3.10 and Figures 3.6 to 7) in order to bring out the inter-taluks disparities in their distribution in the Sub-region. In the Sub-region per capita cultivated land works out to be 0.15 hectare as against the corresponding figure of 0.10 hectare in Kerala State. The per capita cultivated land in the Sub-region is more than the State figure mainly because of the low population density but its supporting capacity is relatively lower because of the hilly nature of the terrain and relatively poor soil. It should, therefore, be kept in mind that slightly higher acreage per capita does not mean low pressure, as land available is relatively less productive. Within the Sub-region, the per capita cultivated land varies from 0.08 hectare to 0.39 hectare. The per capita

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cultivated land is the lowest in Mukundapuram and Neyyattinkara taluks and the highest in Mannarghat. Both these taluks are marked by high density of population whereas Mannarghat, where land is poor and population density is low, the per capita share goes up to 0.39 hectare.

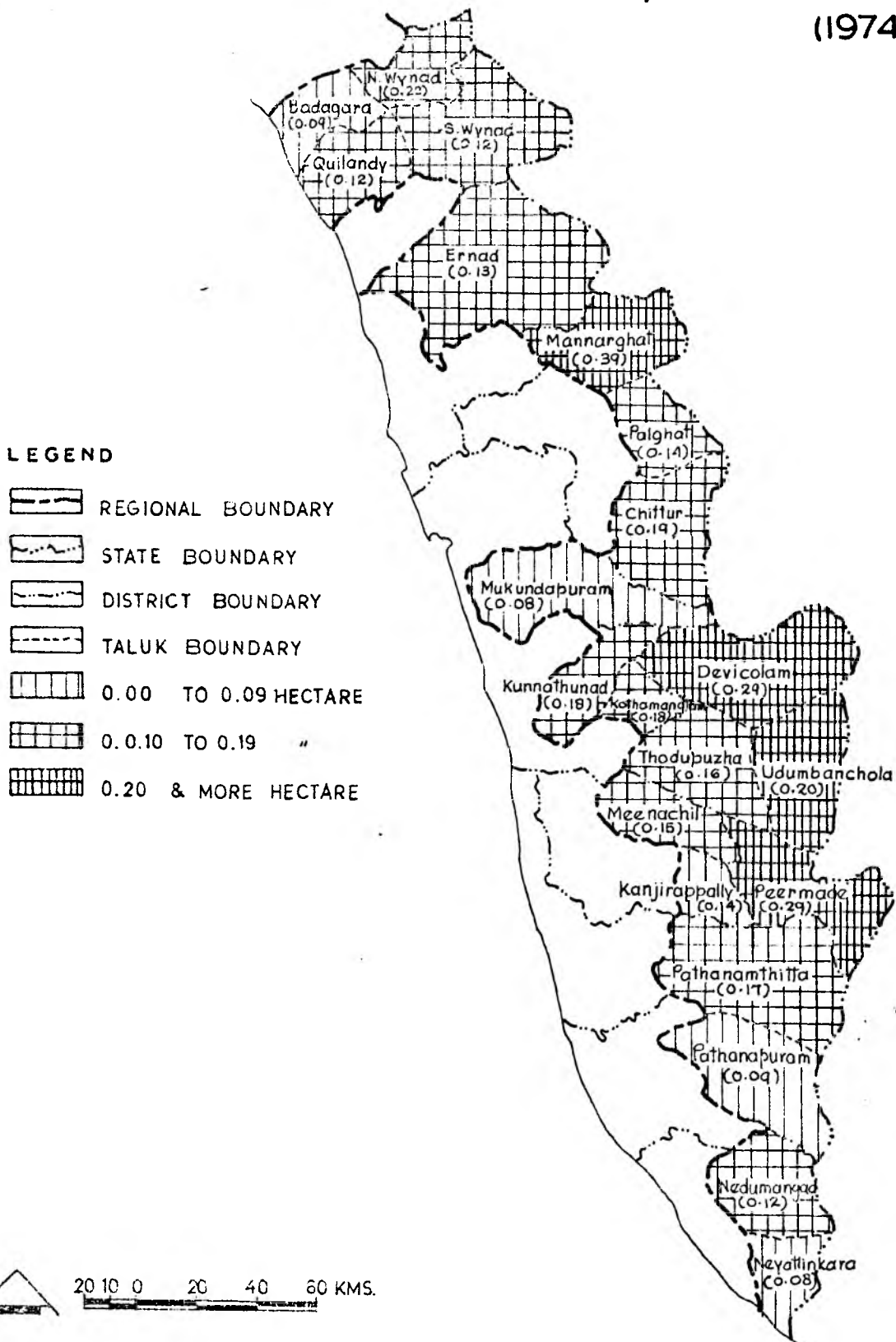
TABLE - 3.10: Per Capita availability of cultivated land, net area sown, total sown area, and culturable waste land in the Kerala Sub-region 1974-75:

(Area in Hectares)						
Sl. No.	Taluk	Population (1971)	Per Capita cultivated land	Per capita net area sown	Per capita total sown area	Per capita culturable waste land.
1.	North Wynad	129335	0.22	0.17	0.28	0.06
2.	South Wynad	284515	0.12	0.12	0.27	0.02
3.	Quilandy	468714	0.12	0.12	0.16	-
4.	Badagara	409771	0.09	0.09	0.15	-
5.	Ernad	715496	0.13	0.13	0.15	0.03
6.	Mannarghat	184579	0.39	0.38	0.40	0.01
7.	Palghat	369001	0.14	0.14	0.20	-
8.	Chittur	313973	0.19	0.18	0.23	-
9.	Mukandapuram	590317	0.08	0.08	0.11	-
10.	Kunnathunad	292113	0.18	0.17	0.20	-
11.	Kothamangalam	142378	0.18	0.18	0.13	Neg.
12.	Thodupuzha	219504	0.16	0.15	0.16	0.06
13.	Devicoolam	134350	0.29	0.29	0.29	0.01
14.	Udumbanchola	264913	0.20	0.20	0.20	0.02
15.	Peermade	146841	0.29	0.28	0.28	0.01
16.	Meenachil	351879	0.15	0.15	0.19	-
17.	Kanjirappally	172360	0.14	0.14	0.19	-
18.	Pathanamthitta	390150	0.17	0.17	0.17	-
19.	Pathanam-puram	310659	0.09	0.09	0.14	-
20.	Neyyattinkara	559488	0.08	0.08	0.09	-
21.	Nedumangad	430779	0.12	0.12	0.14	-
Kerala Sub-region: 6881115			0.15	0.14	0.18	0.01

Fig. 3.6

KERALA SUB-REGION

Per Capita Cultivated Land (1974-75)



20 10 0 20 40 60 KMS.

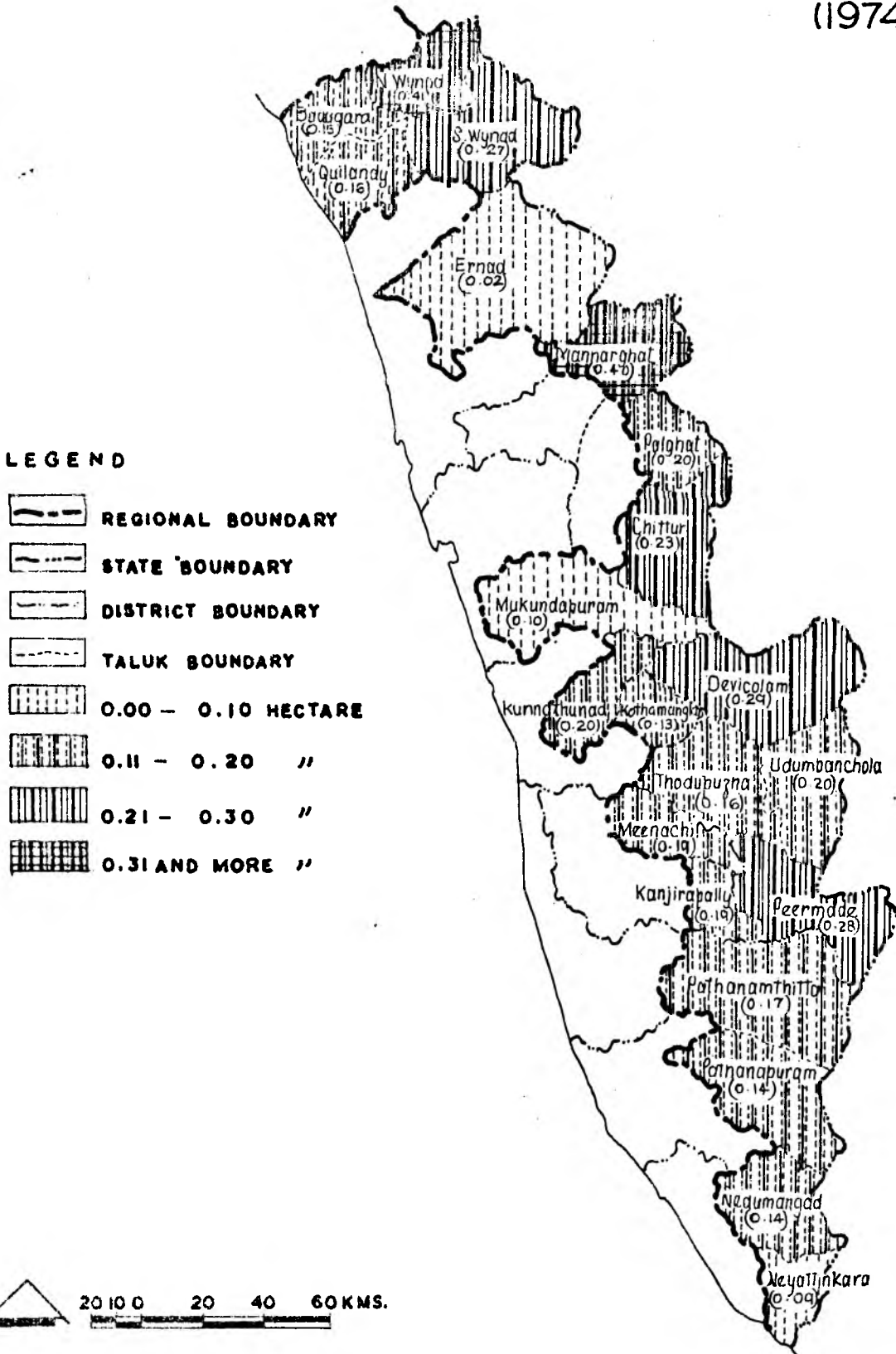
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






Fig.3.7

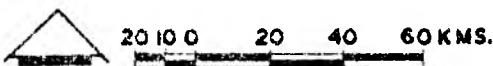
KERALA SUB-REGION

Per Capita Total Sown Area
(1974-75)



LEGEND

-  REGIONAL BOUNDARY
-  STATE BOUNDARY
-  DISTRICT BOUNDARY
-  TALUK BOUNDARY
-  0.00 - 0.10 HECTARE
-  0.11 - 0.20 "
-  0.21 - 0.30 "
-  0.31 AND MORE "



No doubt, some consolation can be had from the availability of fallow lands and culturable wastes (3.57% of the total area) which together provide a scope of extension of crop area. The net area sown has increased from 44.13% in 1970-71 to 44.62% in 1974-75, a net increase of 10642 hectares. However, a greater scope exists for intensive rather than extensive cultivation. Since the Sub-region comes within the high rainfall zone and receives rainfall twice in a year, double cropping is practised relatively on a larger scale i.e., on 22.26% of the net area sown (Table 3.11, Fig. 3.8). With higher irrigation and better seeds, there is a possibility to increase this figure. Since it is relatively easier as well as cheaper to increase the area sown more than once, it would be advisable to give much more emphasis on intensive cultivation.

2.2 Ranking of Crops and their Distribution:

A Study of ranking of crops is necessary for an understanding of their relative importance (in terms of acreage) in the areas they are grown. For this purpose, proportions of areas covered by various crops to total cropped area in each taluks of the Sub-region are arranged in order and the four top ranking crops thus obtained (Table - 3.12) are plotted on the three separate maps, each map bringing out the spatial pattern of crops of particular rank (Figs. 3.9 to 3.11). A perusal of these maps reveals that the spatial pattern of the first ranking crops and second ranking crops in the taluks located in the northern portion of the Sub-region but has become complex in the taluks located in the southern half of the Sub-region. It is interesting to note that rice or coconut rank first or second in almost all the Taluks of the Sub-region whereas the number of crops in the Southern taluks are much more. The predominance of

TABLE - 3.11 ⁺Intensity of Cultivation in the Kerala
Sub-region 1974-75:
(Area in Hectares)

Sl. No.	Name of the Taluka	Net area sown	Total sown area	Percentage of total sown area to Net Area Sown.
1.	N. Wynad	26549	36499	137.48
2.	S. Wynad	34312	76773	223.75
3.	Quilandy	56937	72970	128.16
4.	Badagara	37071	62690	169.11
5.	Ernad	91975	110505	120.15
6.	Mannarghat	70318	74120	105.41
7.	Palghat	52431	72464	138.21
8.	Chittur	58564	73651	125.76
9.	Mukandapuram	47082	65327	138.95
10.	Kunnathunad	50221	57211	113.92
11.	Kothamangalam	25213	18804*	
12.	Thodupuzha	33595	36210	107.78
13.	Devicolam	38417	38652	100.61
14.	Udumbanchola	53456	53517	100.11
15.	Peermade	41393	41537	100.34
16.	Meenachil	53074	66139	124.62
17.	Kanjirappally	23733	31966	134.69
18.	Pathanamthitta	64851	66683	102.82
19.	Pathanapuram	27943	43594	156.01
20.	Neyyattinkara	44314	51177	115.49
21.	Nedumangad	52628	58548	111.25
Kerala Sub-region:		984077	1209037	122.86

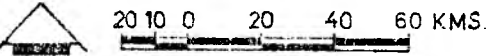
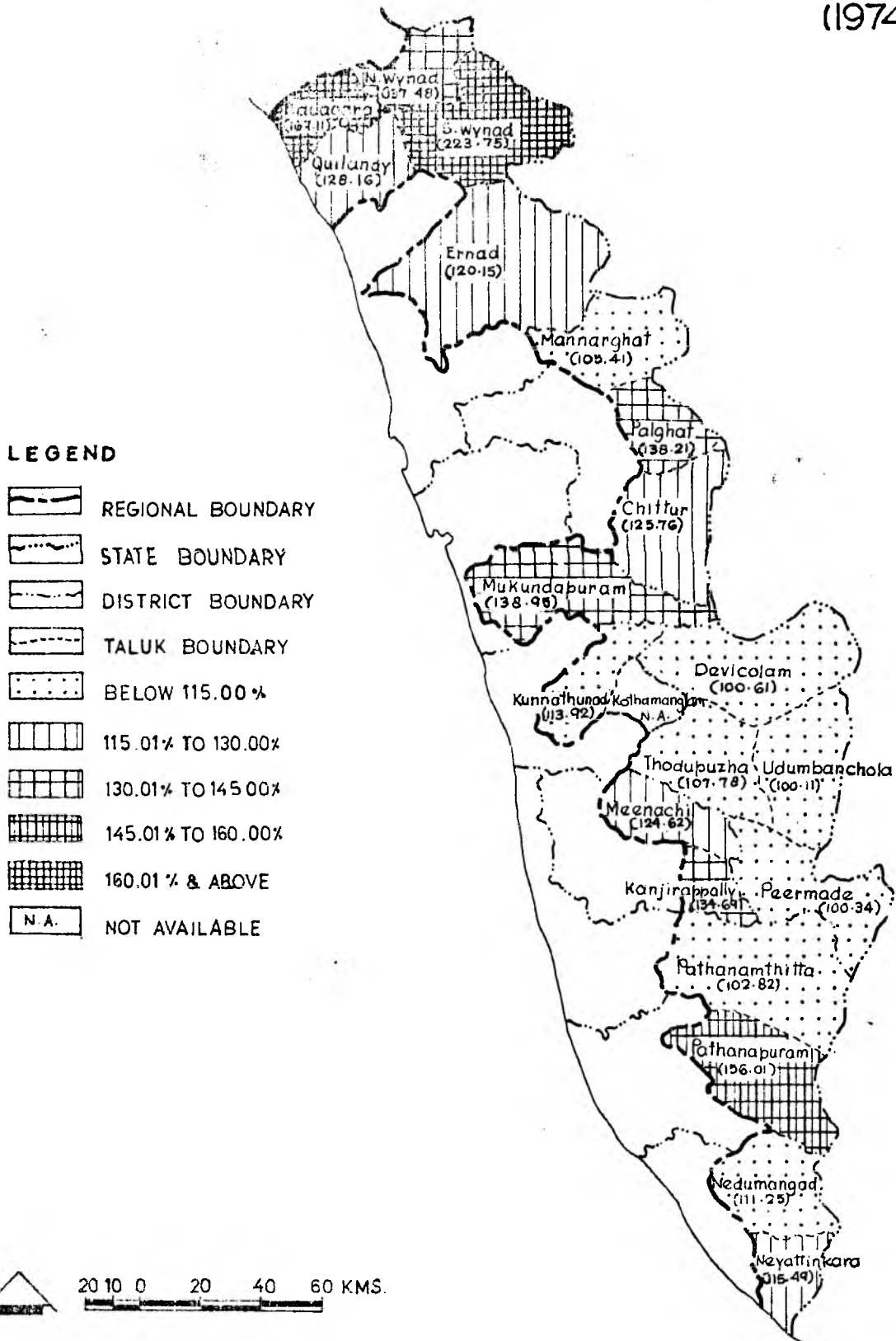
* Information regarding total cropped area appears to be not correct.

⁺ Intensity of cultivation = ratio of total sown area to net area sown expressed in percentage.

Fig.3.8

KERALA SUB-REGION

Intensity of Cultivation (1974-75)



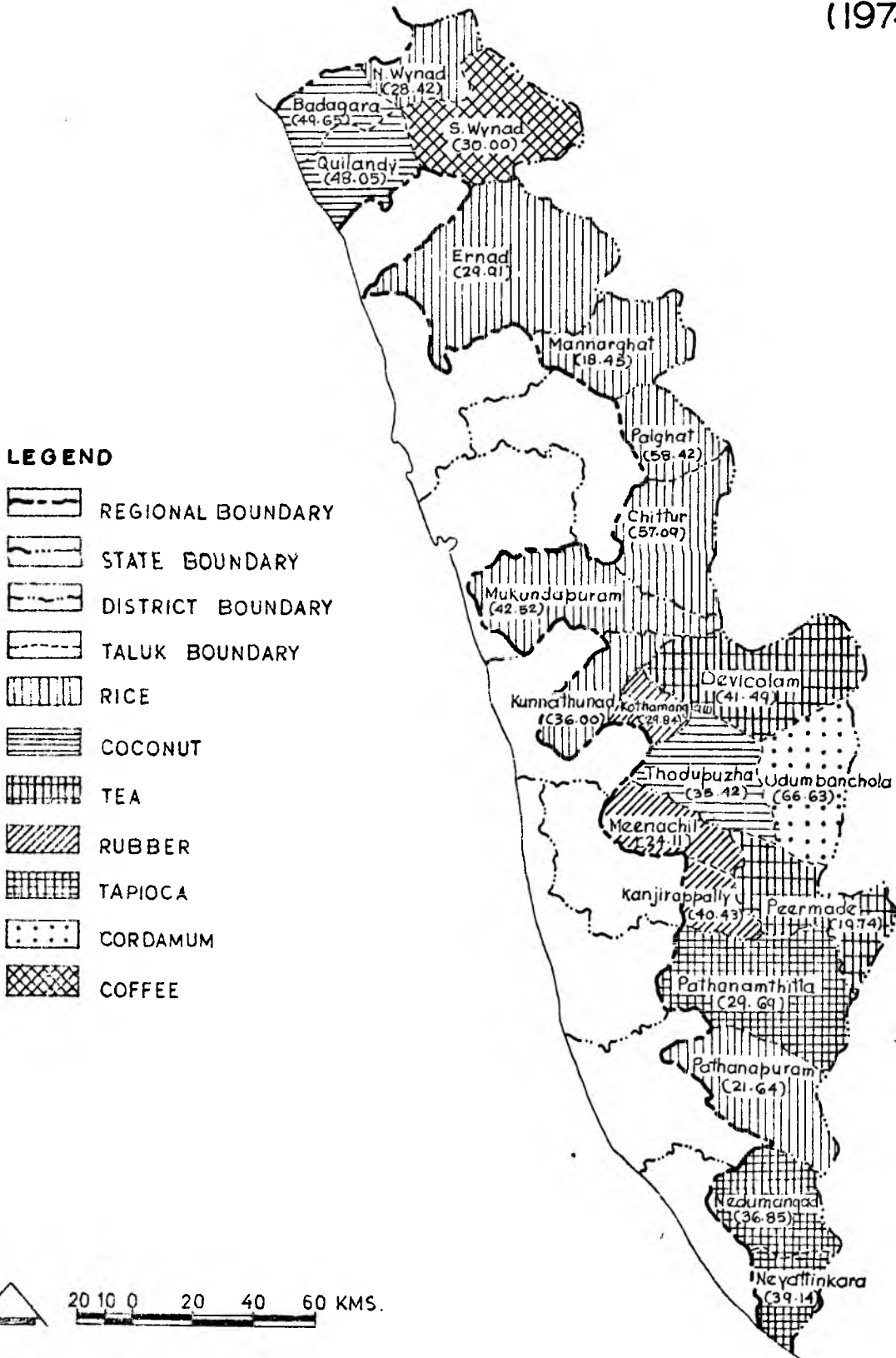
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Fig. 3.9

KERALA SUB-REGION

1st. Rank Crops
(1974-75)



20 10 0 20 40 60 KMS.

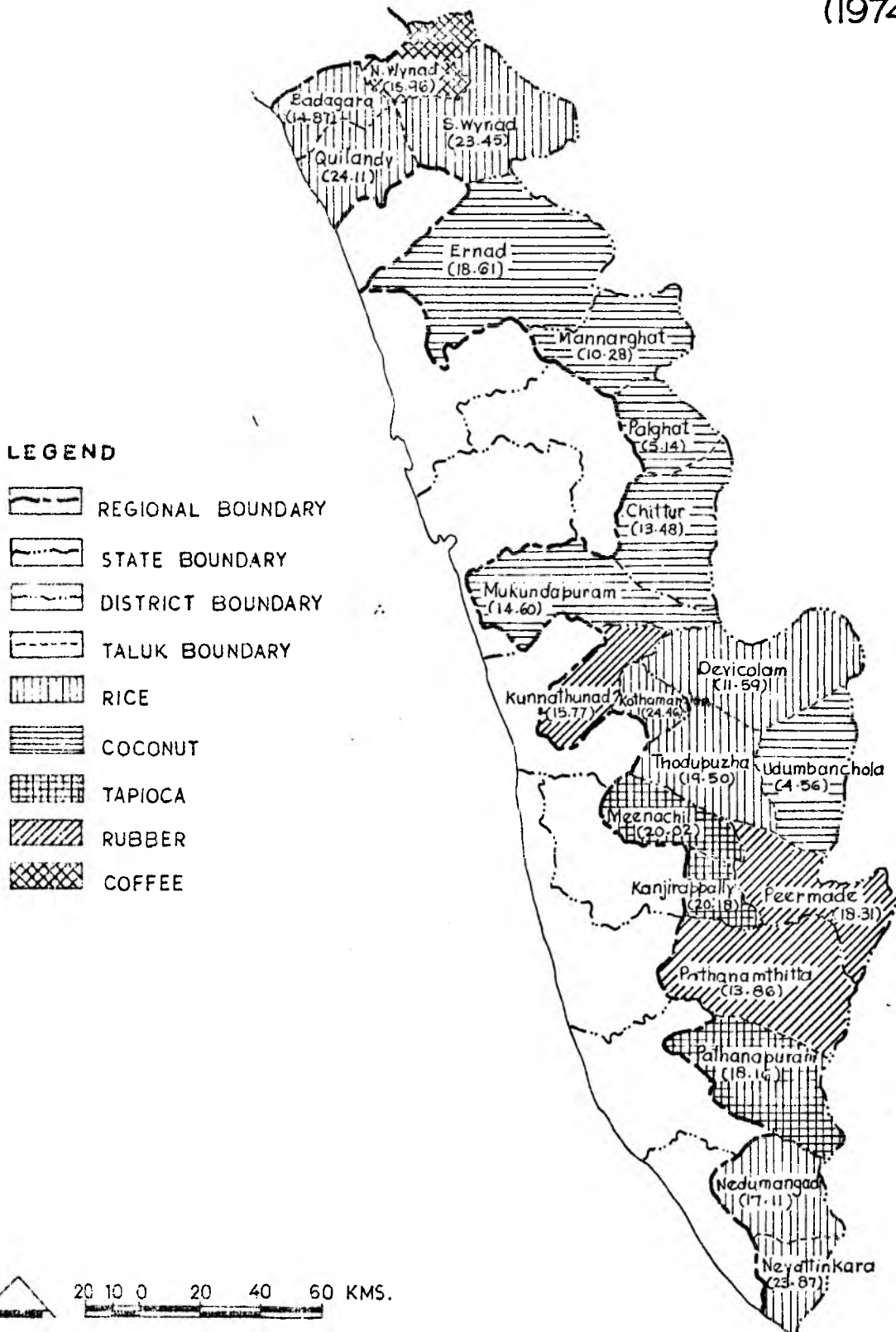
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Fig. 3.10

KERALA SUB-REGION

2nd. Rank Crops
(1974-75)



20 10 0 20 40 60 KMS.










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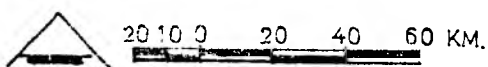
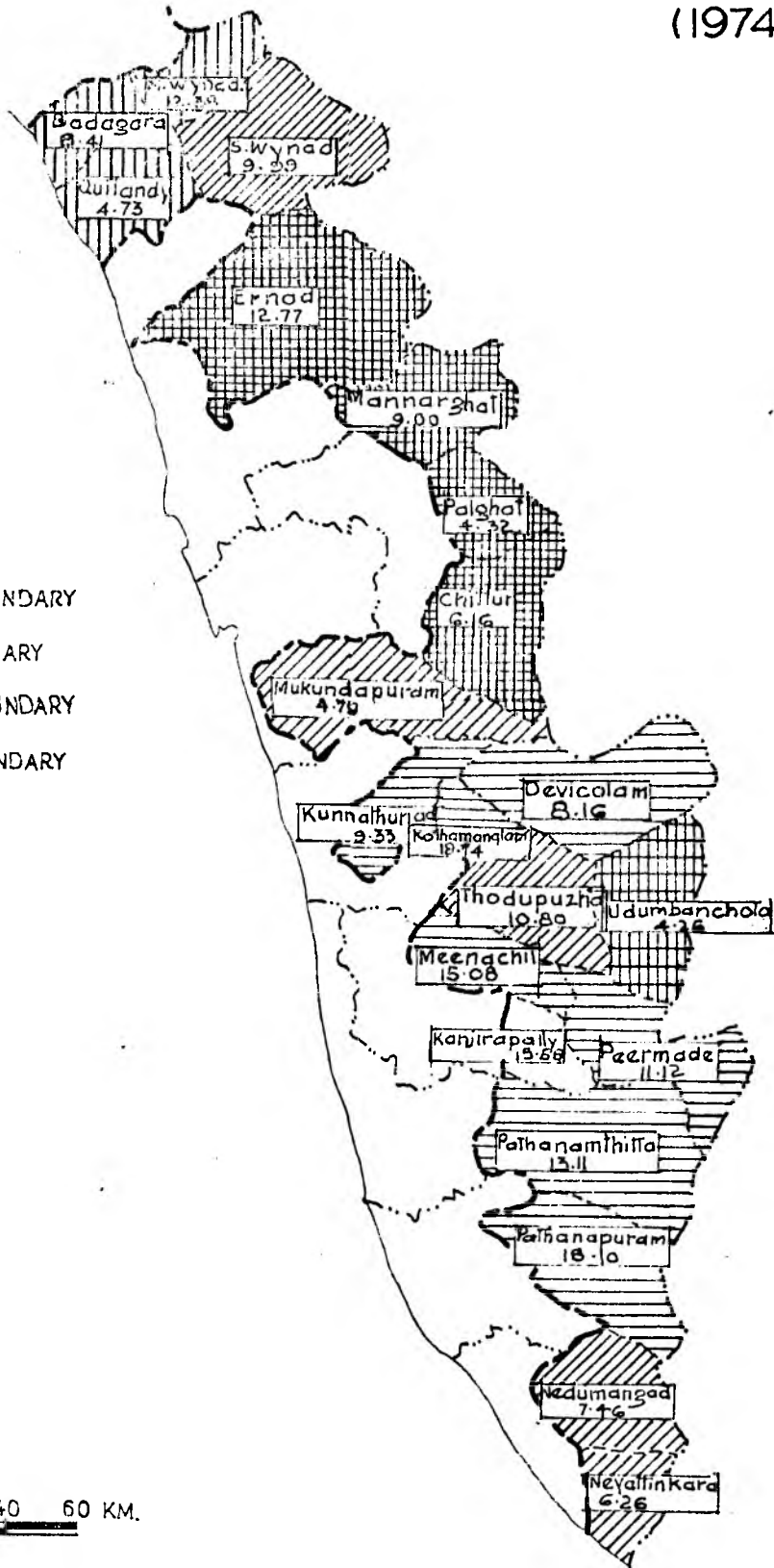
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KERALA SUB-REGION

3rd. Rank Crops
(1974-75)

LEGEND

-  REGIONAL BOUNDARY
-  STATE BOUNDARY
-  DISTRICT BOUNDARY
-  TALUKA BOUNDARY
-  PEPPER
-  RUBBER
-  TAPIOCA
-  COCONUT
-  TEA



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TABLE - 3.12: List of the first four crops in the Taluks of Kerala Sub-region 1974-75:

Sl. No.	Taluk /Sub-Region	1st Rank	2nd Rank	3rd Rank	4th Rank
1.	N.Wynad	Rice (28.42)	Coffee (15.96)	Pepper (12.38)	Rubber (11.83)
2.	S.Wynad	Coffee (30.00)	Rice (23.45)	Rubber (9.99)	Pepper (5.81)
3.	Quilandy	Coconut (48.05)	Rice (24.11)	Pepper (4.73)	Rubber (4.55)
4.	Badagara	Coconut (49.65)	Rice (14.87)	Pepper (8.41)	Rubber (5.98)
5.	Ernad	Rice (29.91)	Coconut (18.61)	Tapioca (12.77)	Areca nut (7.56)
6.	Mannarghat	Rice (18.45)	Coconut (10.28)	Tapioca (9.00)	Rubber (4.11)
7.	Palghat	Rice (58.42)	Coconut (5.14)	Tapioca (4.32)	Rubber (2.79)
8.	Chittur	Rice (57.09)	Coconut (13.48)	Tapioca (6.16)	Rubber (3.29)
9.	Mukandapuram	Rice (42.52)	Coconut (14.60)	Rubber (4.79)	Areca nut (4.63)
10.	Kunnathunad	Rice (36.00)	Rubber (15.77)	Coconut (9.33)	Jowar (7.67)
11.	Kothamangalam	Rubber (29.04)	Rice (24.46)	Coconut (18.74)	Tapioca (7.71)
12.	Thodupuzha	Coconut (35.42)	Rice (19.50)	Rubber (10.80)	Pepper (9.05)
13.	Devicoolam	Tea (41.49)	Rice (11.59)	Coconut (8.16)	Rubber (5.96)
14.	Udumbanchola	Cardamom (66.63)	Coconut (4.56)	Tea (4.26)	Rice (2.97)
15.	Peermade	Tea (19.74)	Rubber (18.31)	Coconut (11.12)	Cardamom (10.42)
16.	Meenachil	Rubber (24.11)	Tapioca (20.02)	Coconut (15.08)	Pepper (11.30)
17.	Kanjirappally	Rubber (40.43)	Tapioca (20.18)	Pepper (15.58)	Coconut (11.41)
18.	Pathanamthitta	Tapioca (29.69)	Rubber (13.86)	Coconut (13.11)	Rice (5.36)
19.	Pathanapuram	Rice (21.64)	Tapioca (18.16)	Coconut (18.10)	Rubber (15.56)
20.	Neyyattinkara	Tapioca (39.14)	Rice (23.87)	Rubber (6.26)	Coconut (3.81)
21.	Nedumangad	Tapioca (36.85)	Rice (17.11)	Rubber (7.46)	Areca nut (4.06)
Kerala Sub-region:		Rice (24.28)	Coconut (15.45)	Tapioca (10.64)	Rubber (9.88)

Note: Figures in Parenthesis indicate percentage to total cropped area under each crop.

rice in the Sub-region is thus evident. The preponderance of rice in the cropping pattern is the natural consequence of the favourable agro-climatic conditions for its cultivation as well as the demand for local consumption. Other food crops such as Jowar and Tapioca are grown in areas unsuitable for rice cultivation. The plantation crops also occupy areas worthy of mention as first and second rank crops. There is, however, extraordinary predominance of plantation crops as third and fourth ranking crops. Area under plantation crops at present is limited because of lack of irrigation facilities and inadequate extension work but is gaining ground.








Concentration of Rice, Coconut and Rubber: In order to determine the regional concentration of crops, an index (the location quotient) has been worked out. If the index value is greater than unity, the component areal unit accounts for a share larger than it would have had if the distribution were uniform in the entire Sub-region and, therefore, the component areal unit has a concentration of the agricultural distribution under study. The pattern of the rice concentration has been analysed. The percentage of the rice area to total cropped area and their index for each taluk of the Sub-region has been calculated. Their values were arranged and divided to distinguish three degrees of concentration as shown in the Table 3.13.

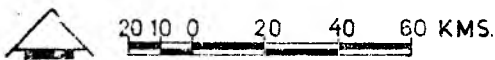
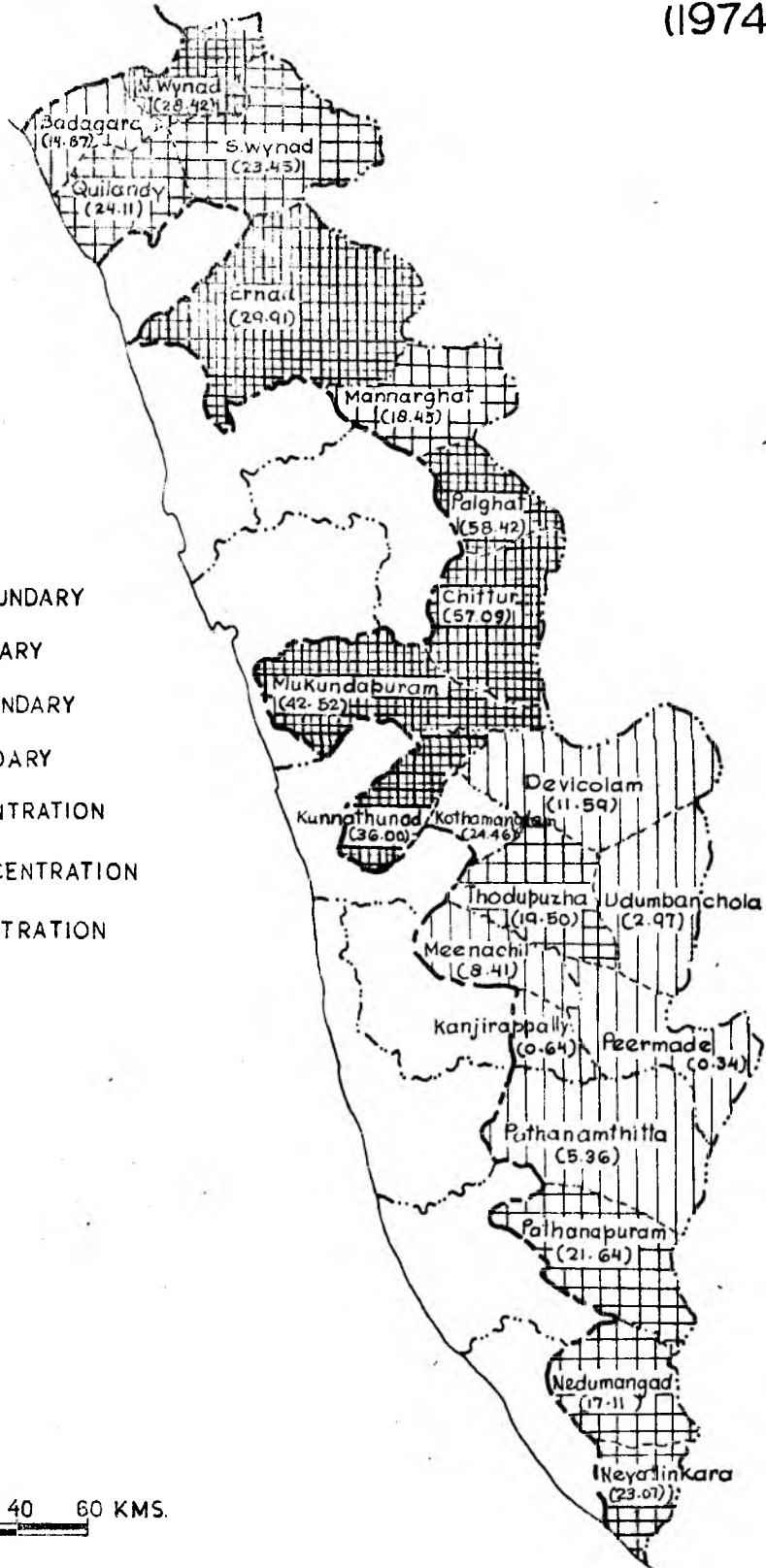
The regional variation in the degree of rice concentration according to the Table 3.13 are shown in Fig.3.12 which reveals interesting points. The high and medium concentration of rice is marked in the northern and southern portions of the Sub-region whereas low concentration of rice is prevalent in the central portion of the Sub-region. The heavy concentration of rice in the northern and

KERALA SUB-REGION

Concentration of Rice
(1974-75)

LEGEND

-  REGIONAL BOUNDARY
-  STATE BOUNDARY
-  DISTRICT BOUNDARY
-  TALUK BOUNDARY
-  HIGH CONCENTRATION
-  MEDIUM CONCENTRATION
-  LOW CONCENTRATION



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TABLE - 3.13: Percentage of Rice, Coconut and Tapioca to total cropped area and Index corresponding to their degree of concentration :

Degree of concentration		Percentage		Index*	
High Concentration	Rice	More than	28.40	More than	1.14
	Coconut	More than	16.00	More than	1.00
	Tapioca	More than	25.00	More than	2.00
Medium Concentration,	Rice	More than	18.40	More than	0.72
	Coconut	More than	9.30	More than	0.55
	Tapioca	More than	10.00	More than	1.00
Low Concentration	Rice	Less than	18.40	Less than	0.72
	Coconut	Less than	9.30	Less than	0.55
	Tapioca	Less than	10.00	Less than	1.00

*Index for Concentration: $\frac{\text{Area under x crop in a taluk}}{\text{Total cropped area in a taluk}} \times \frac{\text{Area under x crop in the Region}}{\text{Total cropped area in the region}}$.

and southern taluks of the Sub-region as mentioned above, is largely because of the favourable physical conditions, such as, heavy rainfall, relatively low and flat land, fertile soil suitable for paddy cultivation; the superiority of rice as a food crop the traditional emphasis on the food crops in the agricultural land-use of the entire sub-region. The regional variations in the degree of concentration of coconut and Tapioca according to Table 3.13 are shown in Fig. 3.13 and 3.14 which reveals interesting points.

2.3 Pattern and Prospects of Crop Diversification in the Sub-region:

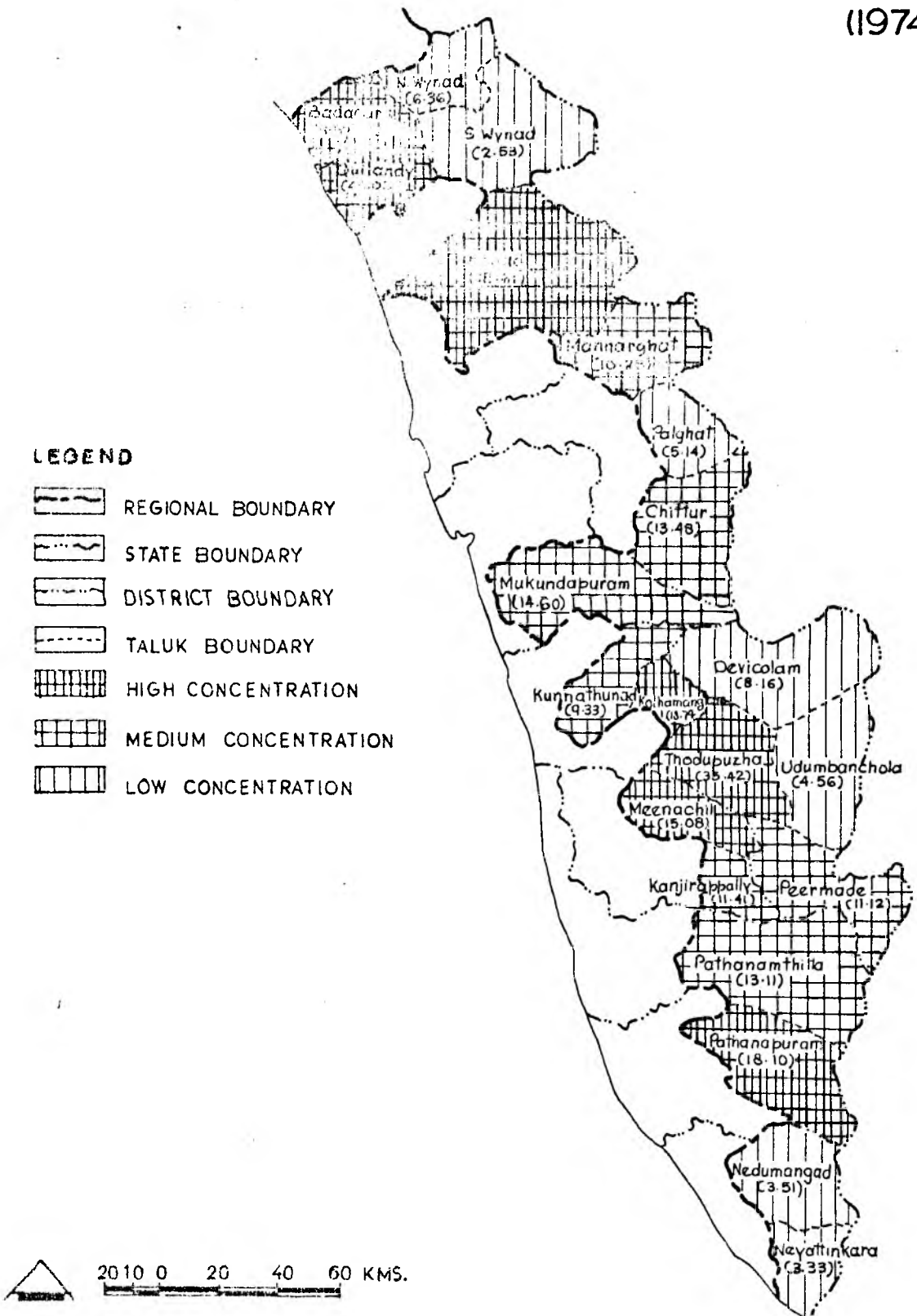
Cropping pattern mainly depends on relief climate and richness of the soil. Based on these physical factors, farmers are growing rice as a major crop. This creates serious problems in case of crop failures. In the year 1974-75, 24.28% of the total cropped area in the Sub-region was under rice cultivation. The percentage of rice area varies from 2.97% in Udumbanchola Taluk to 58.42% in Palghat Taluk. Over a large part of the Sub-region, which is between these two extremes, there is possibility of crop diversification, which if properly encouraged and developed may result in the balanced cropping pattern and greater economic stability. Thus, a specific measure of the degree of crop diversification may be evolved by relating the number of crops grown in a taluk to the area occupied by each crop in the same unit.

From the examination of the crop statistics, it is observed that the number of crops that occupy 10% and more of total cropped area in a taluk varies from one to four in the Sub-region (Please see Table 3.12). The degree of crop diversification that results from the occurrence of crops, each of which occupy 10% of the

Fig. 3.13

KERALA SUB-REGION

Concentration of Coconut (1974-75)

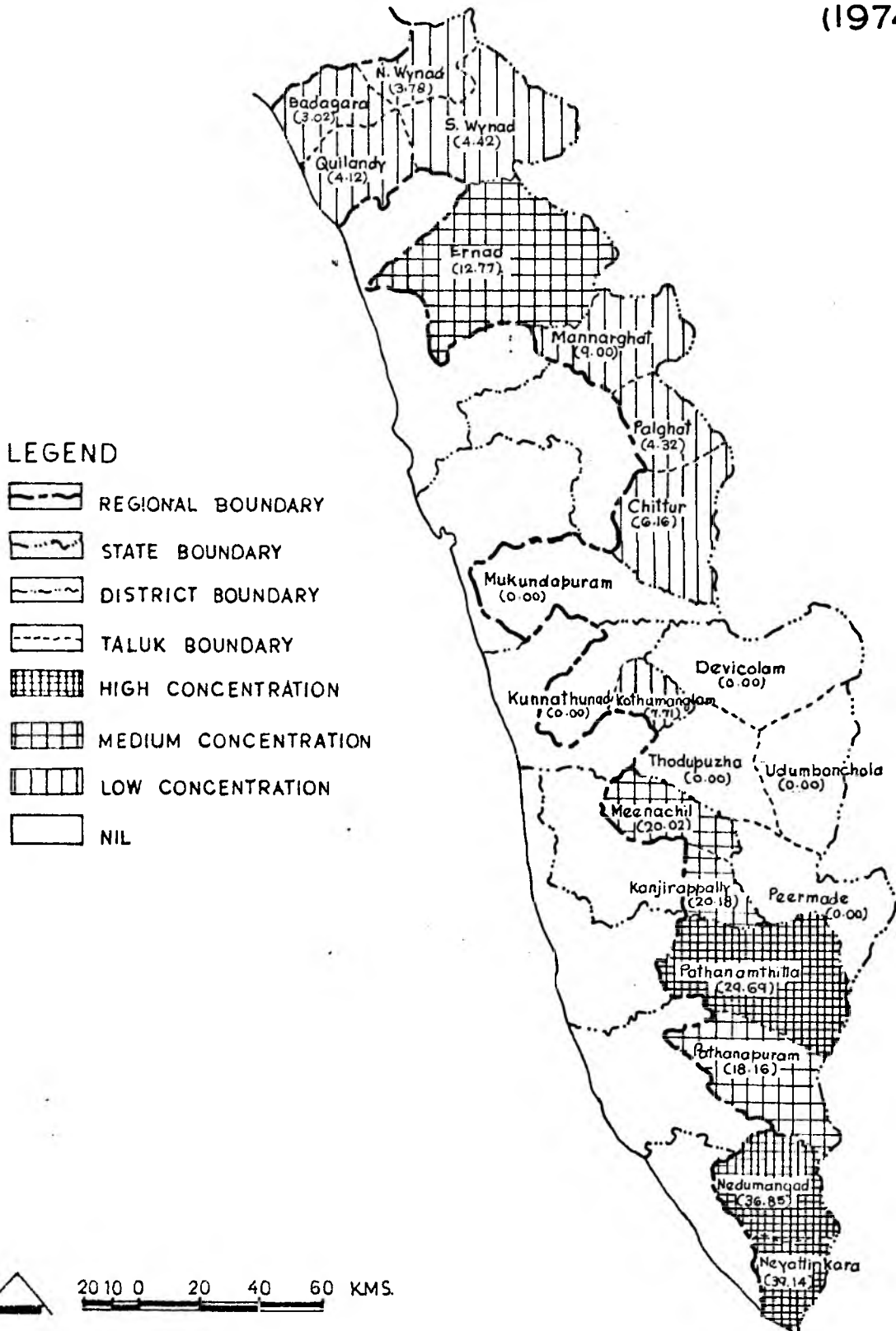


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Concentration of Tapioca
(1974-75)



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cropped area may be taken as a standard against which crop diversification of the districts can be measured. As such, all crops that individually occupy 10% and more of the cropped area are considered for measuring the degree of crop diversification, if existing farm practices continue.

The index¹ of crop diversification was calculated for each taluk of the Sub-region taking Sub-region as a unit of comparison. Table 3.14 and their regional variation has been shown on Map which shows that the possibility of the crop diversification is either high or very high in the Northern and southern taluks of the Sub-region (Fig. 3.15). This is largely because these taluks are relatively higher and have steeper slopes which are relatively less suitable for rice cultivation. However, in the rest of the taluks of the Sub-region where physical conditions are favourable for rice cultivation there exists either little or no possibility of crop diversification.

TABLE - 3.14: Degree of crop diversification in the Kerala Sub-region :

Degree of Diversification	Index Value
Very High	Less than 20
High	Between 20-35
Little	Between 35-50
Very little	50 and above.

$$^1 \text{Index of crop diversification} = \frac{\% \text{ of sown area under X Crops}}{\text{Number of X crops}}$$

Where X crops are those crops that individually occupy 10% or more of the total sown area in a Taluk.

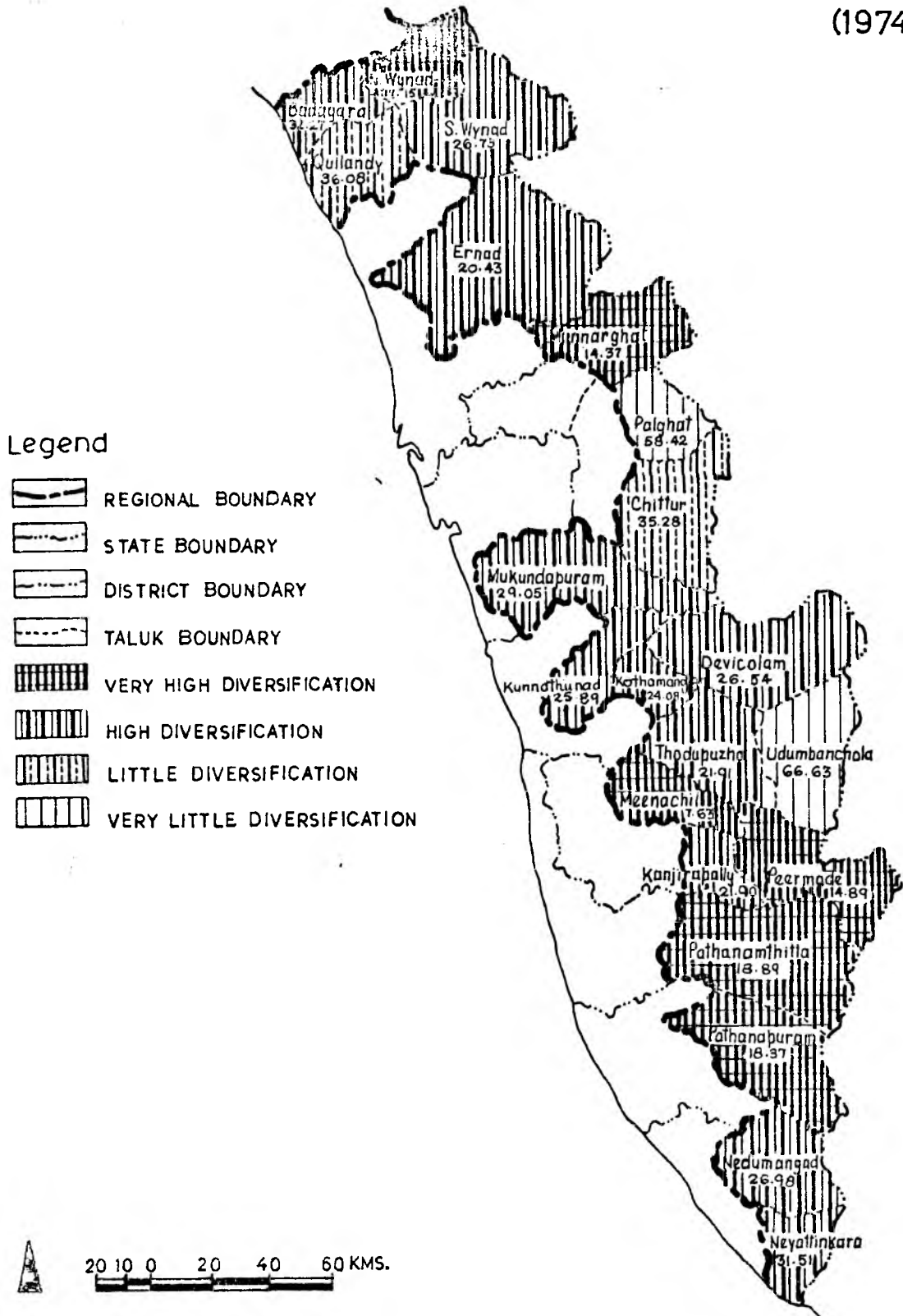
Apart from the increase in the net sown area, the major addition to the cultivated area should come through intensive cultivation, by providing irrigation facilities and crop diversification on dry land. Intensive cultivation of seasonal crops on a large scale on the wet lands cannot be thought of unless irrigation facilities are provided during the summer months. In the dry lands, where a number of crops are grown as rainfed crops, there is a scope for increasing the intensity further provided soil and moisture conservation measures are adopted and ground water resources are tapped properly. As stated earlier, according to the current farming practices in the Sub-region, the cultivation is confined to the rainy season. However, if the economy of the Sub-region is to improve, it is imperative that every effort should be made to introduce second crop and diversify the cropping pattern as far as possible. Taking into consideration the soil, the climate the physical features, it is possible to grow several crops as second crop if the improved methods of farming is applied in the Sub-region. Moreover, prospects of crop diversification has to be viewed from the point of view of increase in the yield. Yield estimates of different crops from different parts of the Sub-region is essential since given the same inputs the agricultural growth rate, which also depends on social, climatic and physical factors, differs from one area to other. However, the yield estimates available, besides being unscientific, are based on inadequate samples. In this context, a reference may be made to crop cutting estimates done "by the Patwari" which cannot serve as a basis to evolve a production strategy. Realising the importance of yield figures in the strategy for agricultural development, there is need for complete enumeration by specialised agencies. Even in the absence of

Fig. 3.15

KERALA SUB-REGION

Index of Crop Diversification

(1974-75)



reliable yield figures, prospects of crop diversification in certain parts of the Sub-region can only be attempted based on local experiences.

2.4 Employment in Agriculture:

Agriculture is the greatest user of land (46.20% of the total reporting area in 1974-75). It employed 57.18% of the total workers against the corresponding figure of 48.50% in Kerala State (Table 3.15). Within the Sub-region, there is significant variation, the percentage of workers engaged in agriculture varies from 20.31% in Peermade taluk to 69.99% in Mannarghat taluk (Fig. 3.16). Out of the 21 taluks of the Sub-region, in 12 taluks more than 57.18% (average for the sub-region) of the workers are engaged in agriculture for their livelihood. The maximum dependence on agriculture is in hilly taluks or in taluks where the proportion of cultivated land is higher and also rice is an important crop, such as in Mannarghat (69.99%), Nedumangad (67.77%) and Uduanchola (68.21%) whereas it is relatively less in taluks such as Peermade (20.31%), Devicolan (32.02%) and Quilandy (40.46%) where there is a predominance of perennial and annual crops such as coconut, tea and rubber.

Within the agricultural classes there is a great difference in the pattern of distribution of cultivators and agricultural labourers in various taluks of the Sub-region. The percentage of cultivator-owners of land in the Sub-region is only 38.41% of the total workers engaged in agriculture against 61.59% for agricultural labourers (Table 3.16). The percentage of agricultural labourers is particularly high in Taluks which are growing mainly food grains. Such taluks are Chittur (82.58%), Palghat (79.60%), Mukandapuram (64.65%), Quilandy (70.25%) and Neyyattinkara (70.09%) (Fig. 3.17). The

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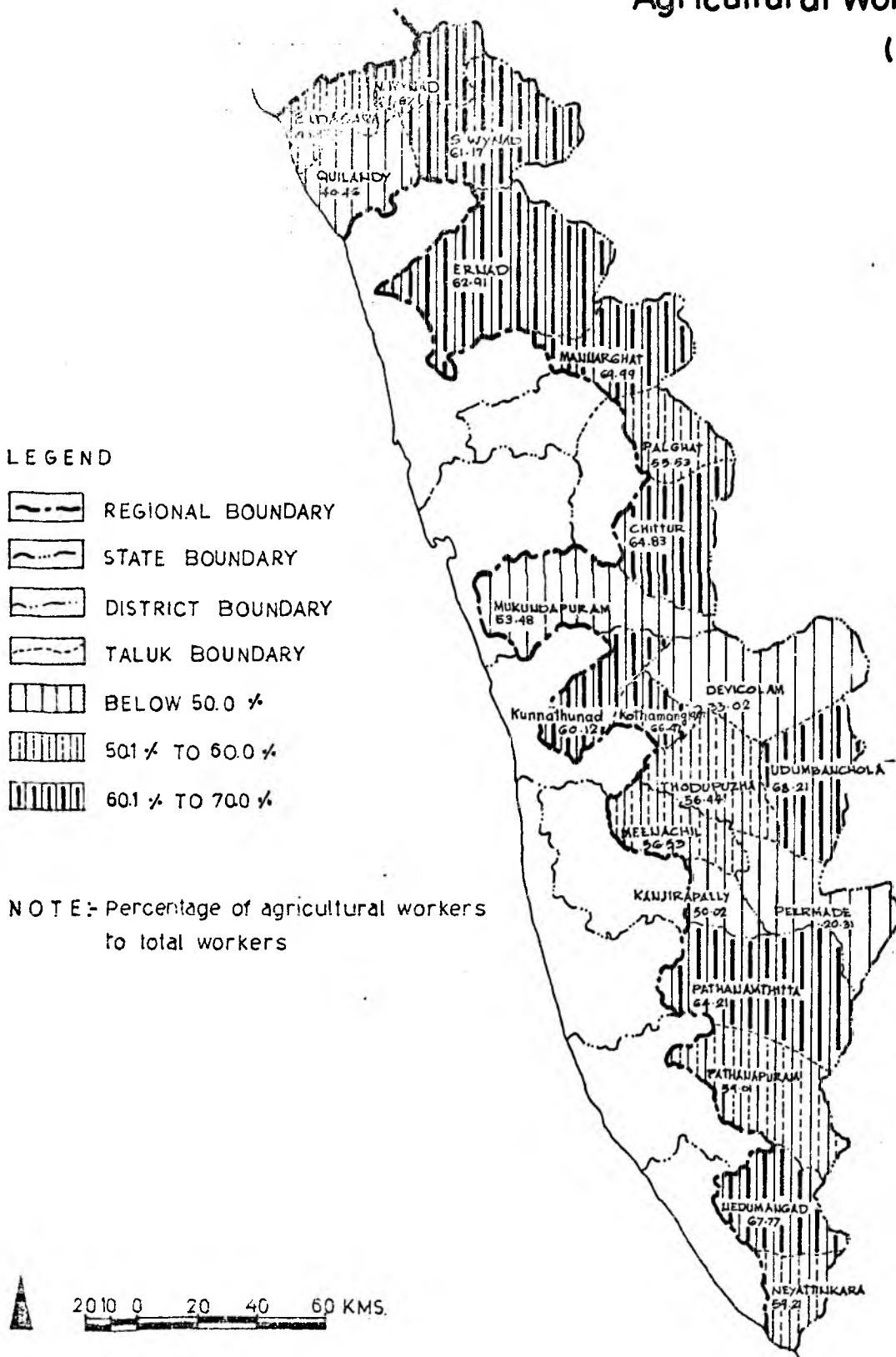
TABLE - 3.15: Number and Percentage of workers engaged in agriculture 1971

Sl. No.	Taluk	Total Workers	Workers in agriculture	Percentage to total workers.
1	2	3	4	5
1.	N. Wynad	46433	30119	64.87
2.	S. Wynad	106041	64867	61.17
3.	Quilandy	121341	49092	40.46
4.	Badagara	103250	46948	45.47
5.	Ernad	198819	125074	62.91
6.	Mannarghat	65013	45500	69.99
7.	Chittur	131883	85502	64.83
8.	Palghat	132461	73562	55.53
9.	Mukundapuram	166086	88829	53.48
10.	Kothamangalam	43741	29073	66.47
11.	Kunnathunad	91358	54920	60.12
12.	Thodupuzha	66136	37326	56.44
13.	Devicolan	51778	17096	33.02
14.	Udumbanchola	89769	61228	68.21
15.	Peermade	57407	11658	20.31
16.	Meenachil	95351	53901	56.53
17.	Kanjirappally	47206	23612	50.02
18.	Pathanamthitta	100582	64587	64.21
19.	Pathanam-puram	87196	51458	59.01
20.	Neyyattinkara	156060	92403	59.21
21.	Nedumangad	122388	82947	67.77
Kerala Sub-region:		2080299	1189702	57.18
Kerala State:		6216459	3014777	48.50

Fig. 3.16

KERALA SUB-REGION

Agricultural Workers (1971)

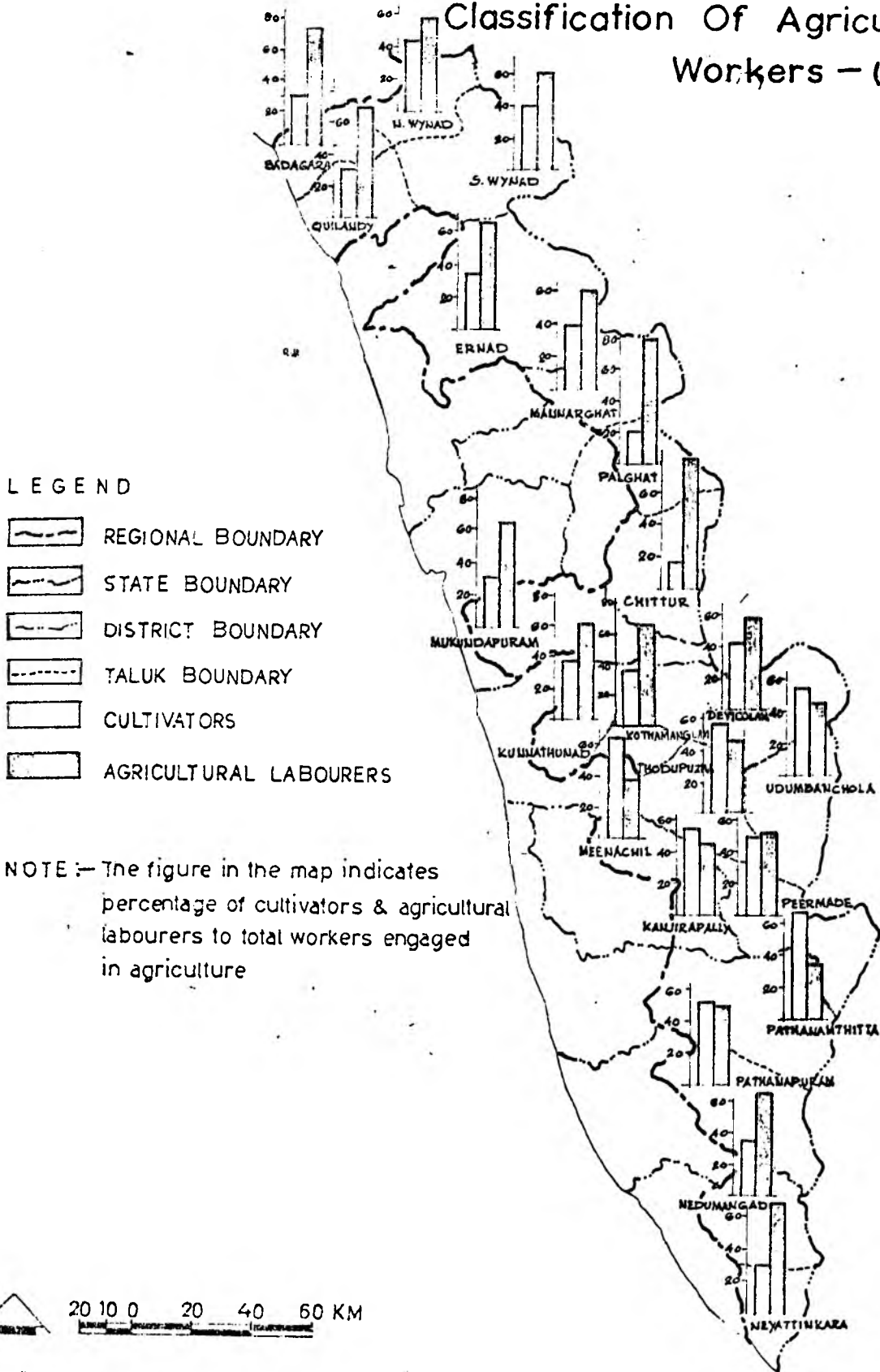


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KERALA SUB-REGION

Classification Of Agricultural Workers - (1971)



comparatively higher percentage of agricultural labourers in these taluks indicates that the crops grown, which is mainly rice, is labour-intensive whose demand are not met mainly from members of the cultivators families as also relatively higher income sustain employment of additional labourers to a sizeable extent. Recent experience has, however, shown that with the growing intensity of agricultural development there is a scope for increasing further the employment potential in agriculture in these taluks.

At present agricultural operations are limited to 1005960 hectares of total cultivated land with a crop intensity of 122.86% in the Sub-region. The lower intensity of cultivation and traditional agricultural practices have created a situation of unemployment and lower productivity. The census figures do not throw light directly on the real unemployment. As per the 1971 Census, about 30.23% of the total population are workers whereas 53.20% are in the working age-group. Thus, 23% of the working force is unemployed. Besides this, it is estimated that 18% of the employed workers, work either for less than 100 days in a year and or earn less than Rs.240/- annually and may be treated as under-employed¹. Counting them as gainfully employed as one-third, the unemployment rate in the Sub-region is estimated at 26.63% (23+3.63) out of 53.20% of the working force.

According to N.S. Survey² only 84% to 90% workers have got the gainful employment and the remaining say roughly 13% are only partly employed. If we presume

¹Based on the findings of the comprehensive survey conducted by the Association of Voluntary Agencies for Rural Development for the Integrated Development Programme of Balpur Block in West Bengal, 1978 (P. 67).

²Based on National Sample Survey's 27th round (No.2228) report for Karnataka State. /...

TABLE - 3.16 : Number and Percentage of Cultivators and Agricultural labourers to total workers engaged in agriculture (1971):

Sl. No.	Taluk	Cultivators	Agricultural labourers	Total agricultural workers
1	2	3	4	5
1.	North Wynad	12951 (43.00%)	17168 (57.00%)	30119
2.	South Wynad	25525 (39.39%)	39342 (60.65%)	64867
3.	Quilandy	14604 (29.75%)	34488 (70.25%)	49092
4.	Badagara	13337 (28.41%)	33611 (71.59%)	46948
5.	Ernad	40033 (32.01%)	85041 (67.99%)	125074
6.	Mannarghat	18074 (39.72%)	27426 (60.28%)	45500
7.	Chittur	14895 (17.42%)	70607 (82.58%)	85502
8.	Palghat	15004 (20.40%)	58556 (79.60%)	73562
9.	Mukundapuram	31398 (35.35%)	57431 (64.65%)	88829
10.	Kunnathunad	21121 (38.46%)	33799 (61.54%)	54920
11.	Kothamangalam	10582 (36.40%)	18491 (63.60%)	29073
12.	Thodupuzha	20814 (55.76%)	16512 (44.24%)	37326
13.	Devicolan	7229 (42.28%)	9867 (57.72%)	17096
14.	Udumbanchola	33997 (55.53%)	27231 (44.47%)	61228
15.	Peermade	5725 (49.11%)	5933 (50.89%)	11658
16.	Meenachil	33528 (62.20%)	20373 (37.80%)	53901
17.	Kanjirappally	12844 (54.40%)	10768 (45.60%)	23612
18.	Pathanamthitta	43245 (66.96%)	21342 (33.04%)	64587
19.	Pathanapuram	25996 (50.52%)	25462 (49.48%)	51458
20.	Neyyattinkara	27635 (29.91%)	64768 (70.09%)	92403
21.	Nedumangad	28406 (34.25%)	54541 (65.75%)	82947
Kerala Sub-Region		456943 (38.41%)	732759 (61.59%)	1189702

half i.e. 6.5% as gainfully employed and 6.5% as unemployed the percentage of unemployed works out to be 25.0% (23+2.0) out of 53.20% of the working force. Taking average, the unemployment rate is 25.8% out of working force 53.20% or approximately 48.5% of the working force (assuming working force as 100). If we take care of the workers in minor age-group (i.e. below 15 years) and retired age group (over 59 years) who are also working and counted as workers but in fact not included in the work force, the problem of unemployment will be much higher than 48.5% as indicated above. The magnitude of unemployment in the labour force thus appears to be very high and needs to be taken care of in the economic development of the Sub-region.

The growth rate of agricultural output will, have a considerable influence on the overall growth rate of the Sub-regional economy, creation of employment opportunity and on the productivity of a large part of the work force. Further, a rapid increase in agricultural output is essential to meet the increasing demand for food and other agricultural products which result from the rapid population growth and from the rise in per capita consumption. This is particularly important since the Sub-region has a relatively low level of per capita consumption of food grains and is likely to experience substantial increase in population. Agriculture, therefore, must become a major productive sector in the Sub-region, if development in the other sectors is to go on smoothly and if the problem of employment is to be solved.

The Sub-region, however, exhibits agricultural backwardness in a very acute form. Even the planned

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efforts made in the post-independence era have not have much impact. Consequently, the economy has remained stagnant over the years and bulk of the population has had to depend on poorly developed agricultural activities. The output from the land has remained low as most of the agricultural land is cultivated only during the monsoon season. The development of agriculture has been handicapped not only on account of hilly nature of the terrain and relatively poor soils but also to a great extent due to lack of irrigation facilities which if made available could enable better utilisation of land. Irrigation, however, constitutes only one element in a long integrated chain which must include land development, soil conservation, water management, provision of fertilizer, pesticides and other inputs, a whole range of extension advisory services, better implements, appropriate farm machines, improved post harvest technology including such facilities as marketing, processing, storage fair pricing, agricultural credit and finally the development of human resources to adopt these practices. The object must be to stabilise, diversify and commercialise agriculture and to extend "green revolution" to cash-crops, vegetables, horticulture and develop dairy, poultry and animal husbandry. With multiple cropping, the intensity of cultivation and the demand for labour (or labour saving devices) and productivity per hectare of land is bound to rise.

2.5 Agricultural Land Holdings:

The size of the farm is a matter of great importance for the success of agricultural development and for devising the economic cropping pattern. In theory, the

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standard is fixed by economic conditions in accordance with the nature of farming attempted. In practice, however, the standard varies enormously depending on the pressure on cultivated land and the law of inheritance. Even in homogenous physical conditions, it is clear that variation in resources and ambitions of the farmers will create pressures on farms of corresponding size. These result in the Sub-division of a large proportion of cultivated holdings into small often widely separated fragments which fail to form to any reasonable economic standard.

The size of the operational land holdings in the Sub-region, on the whole, is small. The distribution of operational land holdings in the taluks of the Sub-region has been indicated in Table 3.17 which reveals that more than 84 per cent of the operational land holdings are of the size of less than 1 hectare and more than 93 per cent of the land holdings are upto the size of 2 hectares in the Sub-region. There is, however, a great disparity in the distribution of operational land holdings among the taluks of the Sub-region (Fig. 3.18). A perusal of Table 3.17 reveals that the land holdings are larger in the taluks of Edikki and Palgnat districts.

The data on average size of male cultivators holdings at taluk level is derived by relating the number of male cultivators to the cultivated area. The average cultivated area per male cultivator for 1971 works out to 2.30 hectares against the average of 2.17 hectares in

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the Kerala State (Table 3.18). There is a general downfall slight from the higher runs of the ladder chiefly due to sub-division of the farm lands because of the increase of the number of heirs to take a share in the paternal property. The average male cultivators holdings for the Sub-region as a whole is of minimum size with a tenancy towards small size but what is more striking, it is becoming a smaller and smaller every day due to the increase in the number of individual cultivators. There is no sign of the number of cultivators decreasing. There is not much possibility of either shifting large numbers from agricultural to non-agricultural occupations or of increasing the area under agriculture to a considerable extent.

Another aspect of great significance is the intra-Sub-regional disparity in the average size of holdings which must be taken note of while undertaking planning of agricultural development and the differential production capability of land in each taluk. These offer great difficulties to effective cultivation even with the existing techniques and comes in the way of introduction of improved technique or economic organisation to increase the quantity and value of the produce and to reduce the production cost. In brief small size of holdings appears to be one of the most important factors affecting agricultural production efficiencies. It is equally important to understand the serial patterns of the small size of holdings and suggest measures for the maintenance of small holdings with improved technical equipments and

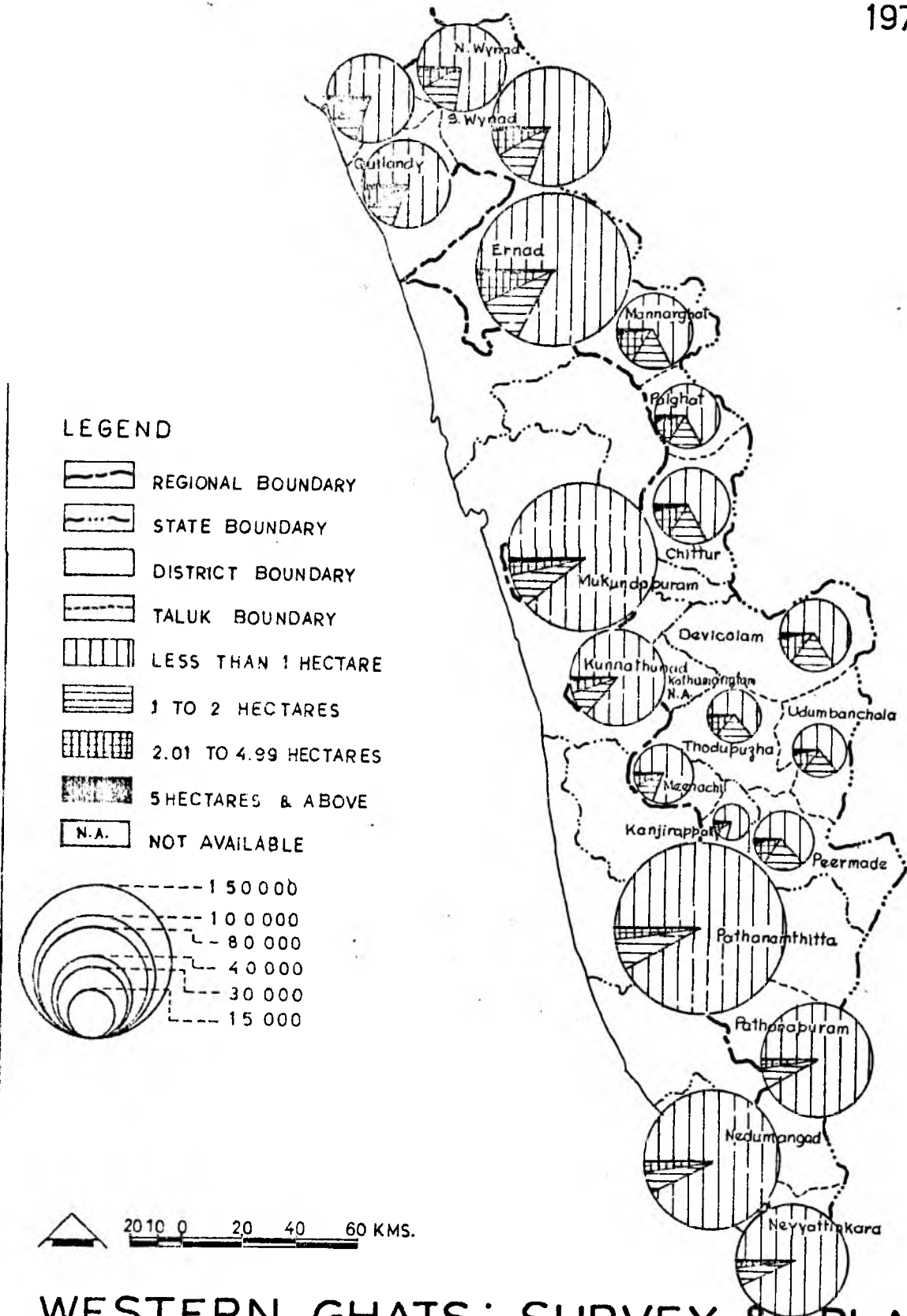
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Fig. 3.18

KERALA SUB-REGION

Land Holdings by size

1970-71



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TABLE - 3.17: Number and percentage Distribution of Agricultural Land Holdings by size in the Kerala Sub-Region (1971)

Sl. No.	Taluk	Geographical Area (In Hects.) 1971	*Number of Holdings				Total
			Less than 1 Hectare	1 to 2 Hectare	2 to 5 Hectare	5 Hectares and above	
1.	North Wynad	74742	35372 (75.96%)	627 (14.51%)	2975 (7.07%)	445 (1.06%)	42063
2.	South Wynad	137820	7626 (80.47%)	10783 (11.8%)	7167 (7.43%)	892 (0.92%)	96468
3.	Quilandy	75693	42636 (80.47%)	5922 (11.8%)	3936 (7.43%)	489 (0.92%)	52983
4.	Badagara	54982	30958 (80.74%)	4300 (11.18%)	2858 (7.43%)	356 (0.92%)	38472
5.	Emad	226198	117922 (82.82%)	14880 (10.45%)	8217 (5.77%)	1365 (0.17%)	142384
6.	Mannarghat	109964	26811 (67.39%)	6447 (16.20%)	5558 (13.97%)	970 (2.44%)	39782
7.	Chittur	115509	28163 (67.39%)	6766 (16.20%)	5839 (13.97%)	1020 (2.44%)	41790
8.	Palghat	72033	17563 (67.39%)	4221 (16.20%)	3641 (13.97%)	635 (2.44%)	26060
9.	Mukandapuram	131604	119262 (89.50%)	9403 (7.05%)	4081 (3.06%)	512 (0.38%)	133225
10.	Gunnathunad	61112	48262 (86.68%)	4740 (8.51%)	2320 (4.17%)	355 (0.64%)	55677
11.	Kothamangalam**						
12.	Thodupuzha	91437	9294 (63.58%)	3272 (22.38%)	1836 (12.56%)	216 (1.47%)	14618
13.	Devicollam	177416	18037 (63.58%)	6349 (22.38%)	3502 (12.56%)	421 (1.47%)	28369
14.	Udumbanchola	107140	10891 (63.58%)	3633 (22.38%)	2152 (12.56%)	254 (1.47%)	17130
15.	Peermede	130782	13298 (63.58%)	4680 (22.38%)	2626 (12.56%)	310 (1.47%)	20914
16.	Meenachil	72273	18978 (80.96%)	2883 (12.30%)	1440 (6.14%)	141 (0.60%)	23442
17.	Kanjirappally	35133	2229 (80.96%)	1402 (12.30%)	700 (6.14%)	69 (0.60%)	11400
18.	Palmananthitta	197574	144544 (92.12%)	9498 (6.05%)	2596 (1.65%)	277 (0.18%)	156915
19.	Pathanapuram	123285	90197 (92.12%)	5927 (6.05%)	1620 (1.65%)	172 (0.18%)	97916
20.	Neyyattinkara	54739	69745 (93.74%)	3433 (4.61%)	1104 (1.48%)	123 (0.17%)	74405
21.	Nedumangad	92675	118095 (93.74%)	583 (4.61%)	1869 (1.48%)	209 (0.17%)	125986
<u>Kerala Sub-Region:</u>		2148771	1043883 (84.18%)	12818 (5.74%)	66097 (5.33%)	9231 (0.74%)	1240029

* In absence of Taluk level information, number of holdings in Taluks have been worked out from the district level information on prorata basis and assuming the percentage distribution of holdings in each size being the same as in the district.

** Figures for Kothamangalam Taluk are not available.

TABLE - 3.18: Average Male Cultivators Holding in the Taluks of Kerala Sub-Region and Kerala State in the year (1974-75)

Sl. No.	Taluk/Sub-Region/ Kerala State	Nos. of Male cultivators (1971)	Cultivated land in Hectares (1974-75)	Average Male culti- vators Hold- ing(Hectares)
1	2	3	4	5
1.	North Wynad	12178	28202	2.32
2.	South Wynad	24287	35534	1.46
3.	Quilandy	13700	58238	4.25
4.	Badagara	12164	38186	3.14
5.	Ernad	38095	95025	2.49
6.	Mannarghat	15403	72048	4.68
7.	Chittur	12780	60580	4.74
8.	Palghat	12166	53244	4.38
9.	Mukandapuram	29288	47942	1.64
10.	Kunnathunad	19709	51694	2.62
11.	Kothamangalam*			
12.	Thodupuzha	22473	35485	1.58
13.	D. vicolan	6864	38727	5.64
14.	Udumbanchola	32973	53614	1.63
15.	Peernade	5595	43048	7.69
16.	Meenachil	33082	53899	1.63
17.	Kanjirappally	12619	24271	1.92
18.	Pathanamthitta	43734	65087	1.52
19.	Pathanapuram	25544	28135	1.10
20.	Neyyattinkara	26965	44492	1.65
21.	Nedunangad	27648	52980	1.92
Kerala Sub-region:		426267	980431	2.30
Kerala State:		1039331	2253810	2.17

* Figures for Kothamangalam taluk are not available.

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economic assistance to save the small farmers from the competition of the big farmers in order to maintain the family needs.

The problem of fragmentation of holdings is so acute that the cultivation of smaller holdings, located far off, are un-economical and, therefore, invariably left fallow. According to the land legislation passed recently by Kerala Government, the cultivating tenants have become the owner of the land and the cultivators of the larger holdings have also acquired more land either from the big landlords or from the small farmers. This has also resulted in the abolition of tenancy as a result of which the households, for whom rent was the main source of income have suffered most. On the other hand, the potential beneficiaries of this tenancy legislation were the households who had no land of their own but have become the owners and the rest who were already owners have leased in additional land to increase the area of farming than what they had earlier. Though the area of land transferred to the landless appears to be limited, there is no reason to doubt that the land reforms as a whole have helped to reduce inequalities despite the limitations of the legislation and the impediments to its effective implementation.

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3 : AGRICULTURAL INPUTS AND SUPPORTING SERVICES

The Sub-region is quite backward and traditional in agricultural technology. About three fourths of the total cropped area is still confined to traditional practices and the technology used is labour intensive. Locally produced low yielding seeds are commonly used. Green and farm-manures are used in place of rich fertilizers. Water management which contribute to a great extent for the development of agriculture and new economic practices is also not well developed.

3.1 Irrigation.

The rainfall though heavy, is erratic, and irrigation is required as an insurance against rainfailure or for multiple cropping. The irrigated area in the Sub-region is only 10.34% of the net area sown in the year 1974-75. The percentage of irrigated area to net area sown varies from 0.08% in Kanjirapally Taluk to 38.36% in Mukandapuram Taluk. Out of 20 Taluks, only 15 Taluks are provided with irrigation facilities in even less than 10% of the net area sown. The availability of irrigation facility is more in those Taluks which are relatively plain, through which the rivers are flowing. (Table 3.19 & Fig. 3.19).

The main source of irrigation is canal which irrigates about 82.1% of the total irrigated area in the Sub-region. Bunds and tanks together irrigate only 13.1% of the total irrigated area. Remaining 4.8% of the total irrigated area is irrigated by lift irrigation schemes. There are 9 completed major and medium irrigation schemes in the

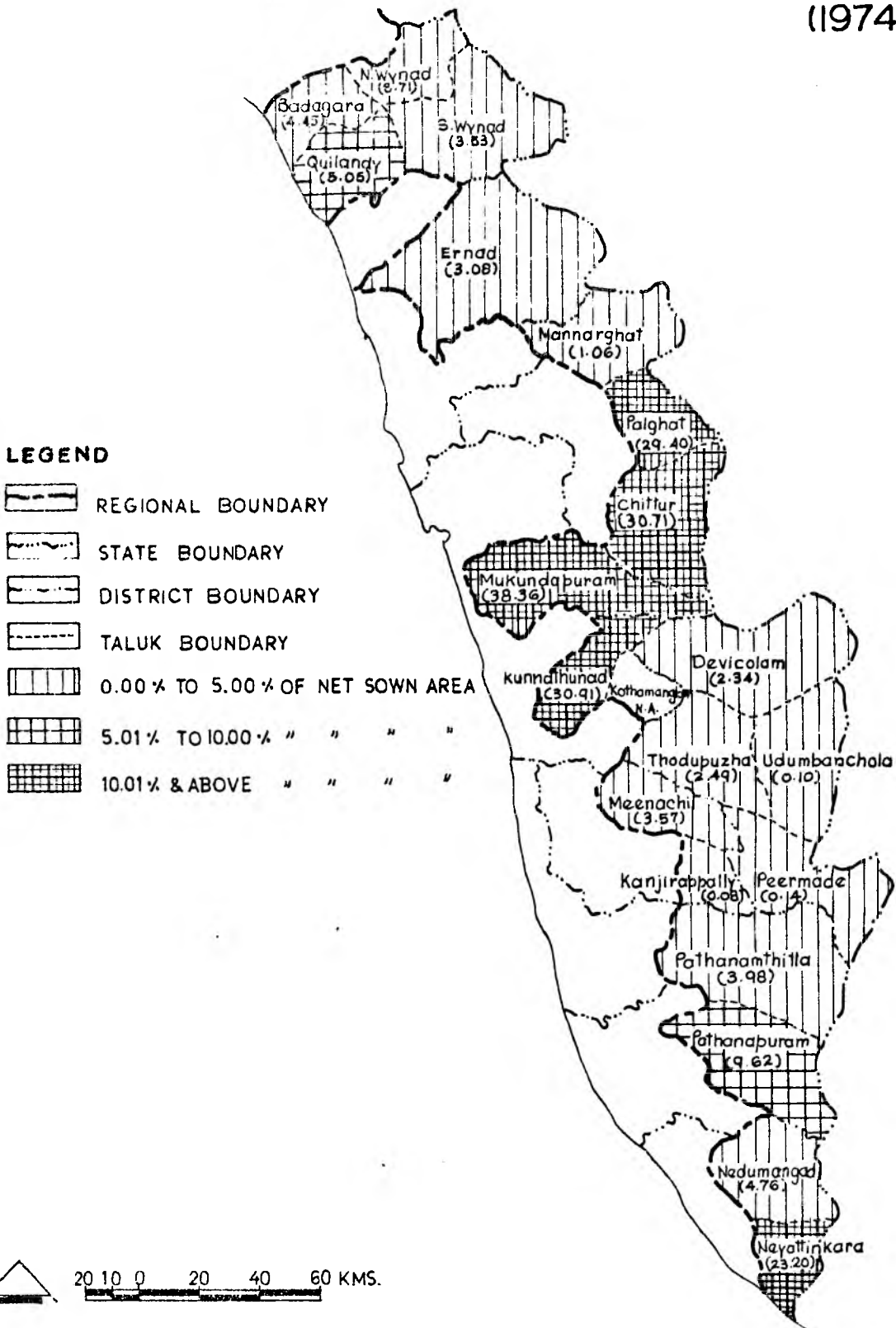
Sub-region which are irrigating 57,373 hectares of land. Besides these schemes there are another 9 continuing schemes (under construction) which are designed to provide irrigation to 54,124 hectares of land. Twenty five more schemes have been proposed by the State Government in Mannarghar, Chittur, Ernad, Devicolam, Pathanamthitta, Nedumangrad, Neyyattinkara, North Wynad and south Wynad taluks of the Sub-region which are likely to benefit another 176,873 hectares of land. Besides these major and medium irrigation schemes, there are other minor irrigation schemes which together irrigate 34,414 hectares of land. In addition, there are minor irrigation schemes which have been proposed in North Wynad, Ernad Mannarghat and Devicolam taluks of the Sub-region and will benefit another 91,46 hectares of land when completed. The details of the proportion of the area under irrigation and to be brought under irrigation by the existing and proposed irrigation schemes in each taluk have been shown in figure 3.20. Thus when all these schemes will be functioning, a total area of 331,930 hectares will be under irrigation coverage with 288,370 hectares under major and medium schemes and 43,560 hectares under minor schemes. Assuming the net sown area remaining the same, the coverage of irrigation will increase from existing 10.34% to 34.62% of the net area sown (Table 3.19).

All the continuing major and medium schemes and proposed minor schemes are expected to be completed by 1985. This will provide irrigation in about 155,000 hectares against the estimated irrigation potential of 332,000 hectares by 1985.

Fig. 3.19

KERALA SUB-REGION

Net Irrigated Area
(1974-75)



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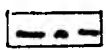
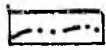
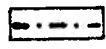
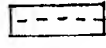



Fig. 3.20

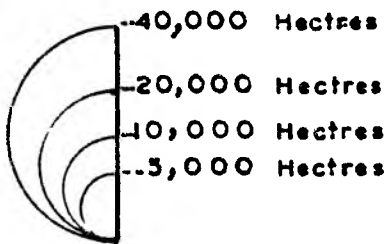
KERALA SUB-REGION

IRRIGATION SCHEMES: Existing & Proposed

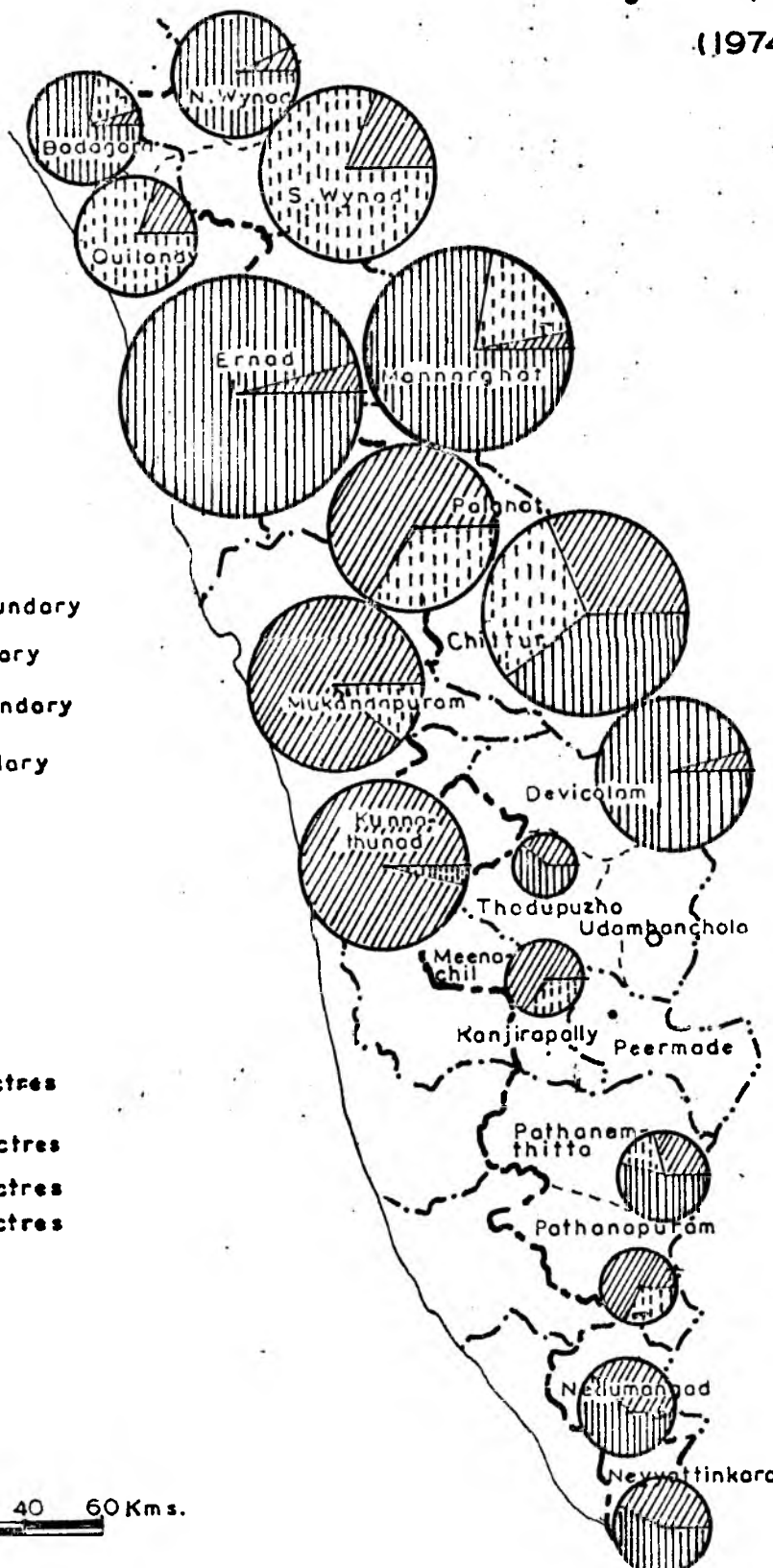
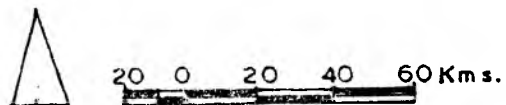
(1974-75)

LEGEND

-  Regional boundary
-  State boundary
-  District boundary
-  Toluk boundary
-  Completed
-  Continuing
-  Proposed



SCALE OF AREA



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TABLE 3.19: Present and proposed Irrigation Potentials in Kerala Sub-Region 1974-75.

Sl. No.	Taluks	Net sown Area (000 Hectares)	Net irrigated Area as per N.S.A.	Designed Benefits from Major and Medium irrigation Schemes (Hectares)			Designed benefits from minor irrigation Schemes (Hectares)		Total benefits from Major, Medium and Minor irrigation schemes. (Hectares)			Total
				Completed	Continuing	Proposed	Completed	Proposed	Completed	Continuing	Proposed	
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	N. Wyznad	26.55	3.71	-	-	7900	983	4403	983	-	12303	15286
2.	S. Wyznad	34.31	3.53	-	4650	18990	1210	-	1210	4650	18990	25850
3.	Quilandy	56.94	5.05	-	8213	-	2095	-	2095	8213	-	10308
4.	Badagara	37.07	4.45	-	6940	-	1665	-	1665	6940	-	8605
5.	Ernad	91.98	3.00	-	-	74358	3133	950	3133	-	75308	78441
6.	Mannarghat	70.32	1.06	-	7280	25040	747	2656	747	7280	27696	35723
7.	Palghat	52.43	29.40	11996	6486	-	238	-	12234	6486	-	18720
8.	Chittur	58.56	30.71	10266	10287	14085	731	-	10997	10287	14085	35369
9.	Mukudapuram	47.08	38.36	13878	2000	-	4182	-	18060	2000	-	20060
10.	Kunnathunad	50.22	30.91	19330	900	-	4829	-	24159	900	-	25059
11.	Kothamanglam	-	NA	NA	2000	-	NA	-	NA	2000	-	2000
12.	Thodupuzha	33.60	2.49	-	1320	-	835	-	835	1320	-	2155
13.	Devicollam	38.42	2.34	-	-	20200	900	1137	900	-	21337	22237
14.	Udumbanchola	53.46	0.10	-	-	-	55	-	55	-	-	55
15.	Permade	41.39	0.14	-	-	-	60	-	60	-	-	60
16.	Meenachil	53.07	3.57	-	965	-	1892	-	1892	965	-	2857
17.	Kanjirappally	23.73	0.08	-	-	-	19	-	19	-	-	19
18.	Pathanamthitta	64.85	3.98	-	1738	5000	2580	-	2580	1738	5000	9318
19.	Pathanapuram	27.94	9.62	-	1345	-	2790	-	2790	1345	-	4135
20.	Neyyattinkara	44.31	23.20	1093	-	5300	3006	-	4099	-	5300	9399
21.	Nedumangad	52.63	4.76	810	-	6000	2464	-	3274	-	6000	9274
Kerala Sub-region:		958.86	10.34**	57373	54124	176873	34414	9146	91787	54124	186019	331930

** Net irrigated area for Kothamanglam taluk has been reported. not

TABLE -3.24: Distribution of Fertilizer and Pesticides (Talukwise) in Kerala Sub-region in the year 1974-75.

Sl. No.	Taluk	Total cropped area (Hectares)	Fertilizers			Pesticides	
			Distribution Centres	Total quantity distributed (Metric tonnes)	Per hectare of cropped area. (Kg.)	Area covered under plant protection Schemes. (in Hectares)	Percent to total cropped area.
1.	North Wynad	36499	41	1394	38.19	6315	17.30
2.	South Wynad	76773	44	2065	26.90	NA	NA
3.	Quilandy	72970	34	658	9.02	NA	NA
4.	Badagara	62690	51	897	14.31	NA	NA
5.	Ernad	110505	119	3299	29.85	NA	NA
6.	Mannarghat	74120	34	1037	13.99	3608	4.87
7.	Chittur	73651	58	4264	57.89	8660	9.96
8.	Palghat	72464	82	2943	40.61	7215	11.76
9.	Mukundapuram	63527	128	2812	44.26	131582*	207.10
10.	Kunnathunad	57211	120	835	14.60	22602	39.51
11.	Kothamanglam	NA	NA	NA	NA	NA	NA
12.	Thodupuzha	36210	67	1509	41.67	11000	30.38
13.	Devicoolam	38652	25	300	7.76	15973	41.33
14.	Udumalanchola	53517	22	197	3.68	Nil	Nil
15.	Peermade	41537	28	475	11.4	17365	41.81
16.	Meenachil	65339	59	1449	22.18	15060	23.05
17.	Kanjirappally	31966	33	1830	57.25	14870	46.52
18.	Pathanamthitta	66683	134	16141	242.06	550	0.82
19.	Pathanapuram	43594	89	1539	35.30	3195	7.33
20.	Neyyattinkara	51177	90	7909	154.54	6154	12.02
21.	Nedumangad	58548	46	3955	67.55	3077	5.26
Kerala Sub-region		1187633	1304	55508	46.74	267226	22.50

* Plant Protection measures are undertaken twice and thrice in most of the areas of the Taluk.

** Figures for Kothamanglam taluka are not available.

3.2 Fertilizers and Pesticides

According to National Commission on Agriculture, "New lands for agricultural use being limited the solution lies in increasing the per unit area productivity by modernising agriculture with the help of technology by taking recourse to multiple cropping programme utilizing H.Y.V. seeds and necessary inputs including fertilizers".

There were 1304 fertilizer distribution centres in the Sub-region, which distributed 55,508 metric tonnes of fertilizers among the farmers during 1974-75. The use of fertilizers works out to 46.74 kg. per hectare in the taluks of the Sub-region which is much below the requirements of the soil. The use of fertilizers among taluks varies from 3.68 kgs. per hectare in Udumbanchola taluk to 242.06 kgs. per hectare in Pathanamthitta taluk (Table 3.20).

Pesticides are used for plant protection against insects Pathogens and weeds rodents etc. Normally all the cropped area should be covered through appropriate plant protection schemes to get the full out-put of the crop cultivation. In the Sub-region only 22.50% of the total cropped area is covered under plant protection. Within the Sub-region, the coverage under plant protection varies greatly among taluks. Mukundapuram taluk is exceptionally developed in plant protection measures as more than 207% of the total cropped area is covered by these schemes. The high percentage of area indicates that the protection measures are under taken twice or thrice in the major portion of the taluk. In all other

taluks, the area covered under plant protection schemes is less than 50% of the total cropped area. Out of the 16 taluks* for which figures are available, 7 taluks have less than 12% of the total cropped area under plant protection schemes. (Table 3.20).

3.3 Seeds

The area covered under High yielding variety seeds was only 33,125 hectares or 2.8% of the total cropped area in the Sub-region during 1974-75. The area covered under H.Y.V. seeds varies from 36.1% in Kunnathunad taluk to 0.04% in Pathanamthitta taluk. In seven taluks area is even less than one percent. In the remaining nine taluks the coverage is only upto 3% of the total cropped area. The low coverage of H.Y.V. seeds results into low yield of crop production. A comprehensive programme to introduce H.Y.V. seeds appears to be a necessity to increase the yield in the Sub-region (Table 3.21).

3.4 Agricultural Implements

Due to poor economic conditions, the farmers are using traditional farming implements which are outdated. Use of modern and motorised implements need to be promoted in the Sub-region to get higher yield.

* Figures for South Wynad, Quilandy, Badagara, Kothamangalam and Ernad taluks are not available.

TABLE-3.21: Area covered under High Yield variety seeds as percentage to the total cropped area 1974-75.

Sl. No.	Taluk	No. of distribution centre HYV Seeds.	Total cropped area (in Hect.)	Area covered under H.Y.V. Seeds (Hects.)	Percentage.
1.	North Wynad	12	36499	450	1.2
2.	South Wynad	NA	76773	NA	NA
3.	Quilandy	NA	72970	NA	NA
4.	Badagara	NA	62690	NA	NA
5.	Ernad	4	110505	2850	2.6
6.	Mannarghat	20	74120	525	0.7
7.	Palghat	23	72464	1075	1.5
8.	Chittur	43	73651	1300	1.8
9.	Mul gadaपुरam	62	63527	900	1.4
10.	Kunnathunad	9	57211	20625	36.1
11.	Kothamangalam *	NA	NA	NA	NA
12.	Thodupusha	4	36210	900	2.5
13.	Devicoolam	1	38652	100	0.3
14.	Udumbanchola	Nil	53517	Nil	Nil
15.	Pocrmade	1	41537	275	0.7
16.	Meenachil	3	65339	275	0.4
17.	Kanjirappally	1	31966	150	0.5
18.	Pathanamthitta	5	66683	25	0.04
19.	Pathanapuram	29	43594	1050	2.4
20.	Neyyattinkara	10	51177	875	1.7
21.	Neelumangal	5	58548	1750	3.0
Sub-Region		232	1187633	33125	2.8

* Figures for Kothamangalam taluk, are not available

3.5 Marketing Facilities

For the marketing of inputs and farm produce, market facility is very much essential. Regulated market is available only in Pathanapuram taluk and therefore, the main marketing need is met by 276 unregulated markets in the Sub-region. These unregulated markets are unevenly distributed in the Sub-region for example only 3 unregulated markets exist in Mukandapuram taluk while 67 in Badagara taluk. Out of 20 taluks for which figures are available 9 taluks do not have daily marketing facility and have to depend on weekly markets. Three taluks viz. Ernad, Palghat and Peermade have only one daily market each to serve the need of the entire taluk. The Sub-region, thus, is very much deficient in marketing facilities for agricultural activities. Co-operative marketing societies are operating only in 12 taluks (Table 3.25). Mainly tree crops viz. arecanut, pepper, coconut, banana and vegetables are sold in these markets.

3.6 Storage Facilities

Except Peermade, all other taluks have warehousing godown facilities of varying capacities and sizes. There are 40 warehouses/godowns with total storage capacity of 79,821 Metric tonnes which is very much inadequate in view of the marketable surplus specially the plantation crops in the Sub-region. There are only 8 cold storage plants in the Sub-region, 4 of which are located in Quilandy 3 in Badagara and one in Neyyattinkara taluk. (Table 3.26).

TABLE-3.22: Distribution of Agricultural Markets 1974-75.

Sl. No.	Name of the Taluk	No. of Markets					
		Regu- lated	Unregu- lated	Daily	Weekly	Fort- night- ly.	Cooperative Marketing Society.
1	2	3	4	5	6	7	8
1.	North Wynad	-	5	-	5	-	1
2.	South Wynad	-	11	7	4	-	-
3.	Quilandy	-	16	8	8	-	-
4.	Badagara	-	67	65	2	-	-
5.	Ernad	-	9	1	8	-	-
6.	Mannarghat	-	6	-	6	-	1
7.	Palghat	-	6	1	5	-	2
8.	Chittur	-	16	-	16	-	1
9.	Mukandapuram	-	3	-	3	-	1
10.	Kunnathunad	-	7	-	7	-	2
11.	Kothamangalam *	NA	NA	NA	NA	NA	NA
12.	Thodupuzha	-	8	2	6	-	-
13.	Devicollam	-	4	-	4	-	-
14.	Udumbanchola	-	7	-	7	-	-
15.	Peermado	-	7	1	6	-	-
16.	Moonaichil	-	12	-	12	-	4
17.	Kanzirappally	-	6	-	5	1	2
18.	Pathanamthitta	-	24	4	19	1	3
19.	Pathanapuram	17	17	9	9	1	1
20.	Noyyattikara	-	36	29	6	1	2
21.	Nodumangad	-	19	12	6	1	2
Sub-region		17	276	139	144	5	22

* Figures for Kothamangalam taluk, are not available.

TABLE-3.23: Number of Warehouses/Godown/Cold Storage in the Kerala Sub-region 1974-75.

Sl. No.	Taluk	Warehouses/Godown		Cold Storage	
		No.	Capacity in M.T.	No. of Ice Plants	Ice storage capacity (tonnes)
1.	North Wynad	2	540	-	-
2.	South Wynad	2	966	-	-
3.	Quilandy	2	2490	4	25
4.	Badagara	2	2425	3	45
5.	Ernad	3	2564	-	-
6.	Mannarghat	1	70	-	-
7.	Palghat	2	39940	-	-
8.	Chittur	3	3630	-	-
9.	Mukandapuram	3	7732	-	-
10.	Kunnathunad	2	770	-	-
11.	Kothamangalam *	NA	NA	NA	NA
12.	Thodupuzha	2	1303	-	-
13.	Devicolum	1	90	-	-
14.	Udumbanchola	2	330	-	-
15.	Poormade	Nil	Nil	-	-
16.	Moonaichil	2	4640	-	-
17.	Kanjirappally	2	1509	-	-
18.	Pathanamthitta	2	2131	-	-
19.	Pathanapuram	3	7715	-	-
20.	Noyyattinkara	1	150	1	-
21.	Nodumanad	2	826	-	-
Kerala Sub-region		40	79821	8	70

* Figures for Kothamangalam taluk are not available.

TABLE-3.24: Loan Advanced by different Financial Institution 1974-75 in Kerala Sub-region.

(Loans in thousand Rupees)

Sl. No.	Name of the Taluk	Commercial Banks			Cooperative Banks			Land Mortgage Bank			Cooperative Societies			Kerala Financial Corpn. Loan advanced	Total
		No.	Loan advanced	Average loan advanced per unit.	No.	Loan advanced	Average loan advanced per unit.	No.	Loan advanced	Average loan advanced per unit.	No.	Loan advanced	Average loan advanced per unit.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	North Wynad	3	7720	2573	1	5531	5531	1	6196	6196	11	5588	508	-	25035
2.	South Wynad	11	24219	2202	-	-	-	-	-	-	16	14174	886	-	38393
3.	Quilandy	9	18359	2040	4	8687	2172	-	-	-	29	3396	117	-	30442
4.	Badagara	12	99546	8296	1	557	557	1	1577	1577	32	7688	240	203	109571
5.	Ernad	27	50867	1884	5	19113	3823	-	-	-	43	7020	163	131	77131
6.	Mannarghat	6	5707	951	1	8140	8140	-	-	-	10	8548	855	-	22395
7.	Palghat	29	247621	8539	2	14898	7449	1	1037	1037	17	4940	291	65	268561
8.	Chittur	23	34838	1515	1	4359	4359	-	-	-	21	16857	803	-	56054
9.	Mukandapuram	45	294668	6548	4	14385	3595	1	-	-	54	15050	279	245	324348
10.	Kunnathunad	11	65335	5940	1	5589	5589	-	-	-	27	7244	268	1599	79767
11.	Kothamanglam *		NA	NA		NA	NA		NA	NA		NA	NA	NA	NA
12.	Thodupuzha	15	20732	1382	2	7934	3967	-	-	-	25	10079	403	-	38745
13.	Devicoolam	9	14773	1641	2	6417	3209	-	-	-	8	1320	165	70	22580
14.	Udumbanchola	2	2739	1370	2	73347	36674	1	313	313	23	6918	301	-	83317
15.	Peermade	4	3604	901	-	-	-	-	-	-	-	-	-	-	3604
16.	Meenachil	22	36796	1673	1	10651	10651	1	566	566	36	31128	865	281	79422
17.	Kanjirappally	8	17228	2154	1	4029	4029	-	-	-	24	16316	680	66	37639
18.	Pathanamthitta	20	33006	1650	3	4471	1490	1	1169	1169	1	5059	5059	66	43771
19.	Pathanapuram	12	87544	7295	2	44014	22007	-	-	-	30	4508	150	227	136292
20.	Neyyattinkara	23	55630	2419	2	3794	1895	-	-	-	39	4948	127	268	64640
21.	Nedumangad	14	34707	2479	1	178	178	-	-	-	23	6410	279	285	219284
Kerala Sub-region		305	1155639	3788.98	36	413798	11494.30	7	10858	1551.14	469	177186	377.80	3506.	1760991

* Figures for Kothamanglam taluk are not available.

3.7 Credit Facilities

The requirements of the farm credits are met by institutional and non-institutional agencies in the rural areas. There are 305 commercial banks, 36 Co-operative banks, 469 cooperative societies and 7 land mortgage banks located in the Sub-region. Besides these banks and societies, Kerala Financial Corporation is also providing financial assistance to the farmers. During 1974-75, these banks together with societies etc. have advanced loans to the tune of about Rs.1.76 crores in the Sub-region. Commercial banks, Cooperative banks land mortgage banks and cooperative societies have advanced on an average about Rs.37.89, Rs.114.94, Rs.15.51, Rs.3.78 lakhs respectively. Considering the loan requirements of the farmers the loan advanced appears to be quite low in the Sub-region, (Table 3.24).

4. LIVESTOCK AND ANIMAL HUSBANDARY:

The term livestock includes all animals kept on the farm or raised by farmers. Besides agriculture, livestock and animal husbandary have very important place in the rural economy. The animals are the part of the farmer's wealth and are kept for milk, meat, motive power, manures, hides and other livestock products.

In the Kerala Sub-region, the livestock population has been classified under eleven categories viz., bulls, bullocks, cows, she-buffaloes, ha-buffaloes, sheep, goats, pigs, poultry, horses, donkeys and ponies. In the year 1972, the total livestock population has been recorded as 5,504,051 in the Sub-region.

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The poultry is the most important category of the livestock and constitutes about three-fourths (74.19%) of the total cattle population in the Sub-region. The next highest categories are goats and cows which constitute about 9.83 and 8.31 per cent respectively of the total. Other categories of the livestock population are below 5% each of the total cattle population (Table 3.25).

In the Sub-region sheep (+33.45%) goats (+29.92%) and poultry (+20.94%), she-buffalows (+16.53%) cows (+12.12%), and he-buffaloes (3.54%), have registered an increase during 1966-72 whereas other cattles viz. bulls (-29.02%), bullocks (-20.61%), Ponies (-19.91%) and pigs (-6.17%) have declined sharply during this period. The rise in the number of he-buffaloes in the Sub-region is perhaps due to its use in agricultural activities and also for meat. Similarly, the increase in the number of sheep and goats is probably due to their use for meat, household wool industry and leather requirement. Poultry is another up coming occupation. It has registered substantial increase in all the taluks of the Sub-region leading to an overall increase of 20.94% during 1966-72 in the Sub-region. Talukwise variation in the livestock has been detailed out in Table 3.26. However, there appears to be a vast scope for its growth and may be developed as one of the most important supporting activities to the farmers. Because of the reluctance to adopt it by the upper castes and farmers, this activity is at present mainly prevalent in muslims and tribal communities.

The organised dairy farms which have increased from 109 in 1970-71 to 149 in 1974-75 have produced milk worth Rs.1,77,64,063 in 1974-75 against Rs.1,13,72,976 in 1970-71.

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TABLE - 3.25 : Livestock and poultry in Kerala Sub-region 1972 :

<u>Categories</u>	<u>Number</u>	<u>Percentage</u>
1. Bulls	2,209	0.04
2. He-Buffaloes	88,260	1.60
3. Cows	457,245	8.31
4. Bullocks	178,079	3.24
5. She-buffalows	71,420	1.30
6. Sheep	7,269	0.13
7. Goats	540,848	9.83
8. Horse/Ponnies	181	Neg.
9. Donkeys	638	0.01
10. Pigs	74,430	1.35
11. Poultry	4,083,472	74.19
Total:	5,504,051	100.00

Source: Livestock Census- 1972.

South Wynad, Ernad, Palghat, Chittur, Nawayyattinkara, taluks are the main milk producing taluks in the Sub-region (Table 3.27). There is still a vast scope for the development of dairy farms in all the taluks, if the problem of stall feeding and grazing could be solved (Fig. 3.20).

The development of livestock, poultry and piggery, however require a good network of veterinary services to check epidemics and to improve the breed. The Sub-region is adequately served by veterinary services and is having 28 veterinary hospitals, 115 veterinary dispensaries and 40 veterinary aid centres, (Table 3.28). Considering the topographical conditions and accessibility of rural areas, there is need for more mobile veterinary dispensaries. The Sub-region has four main artificial

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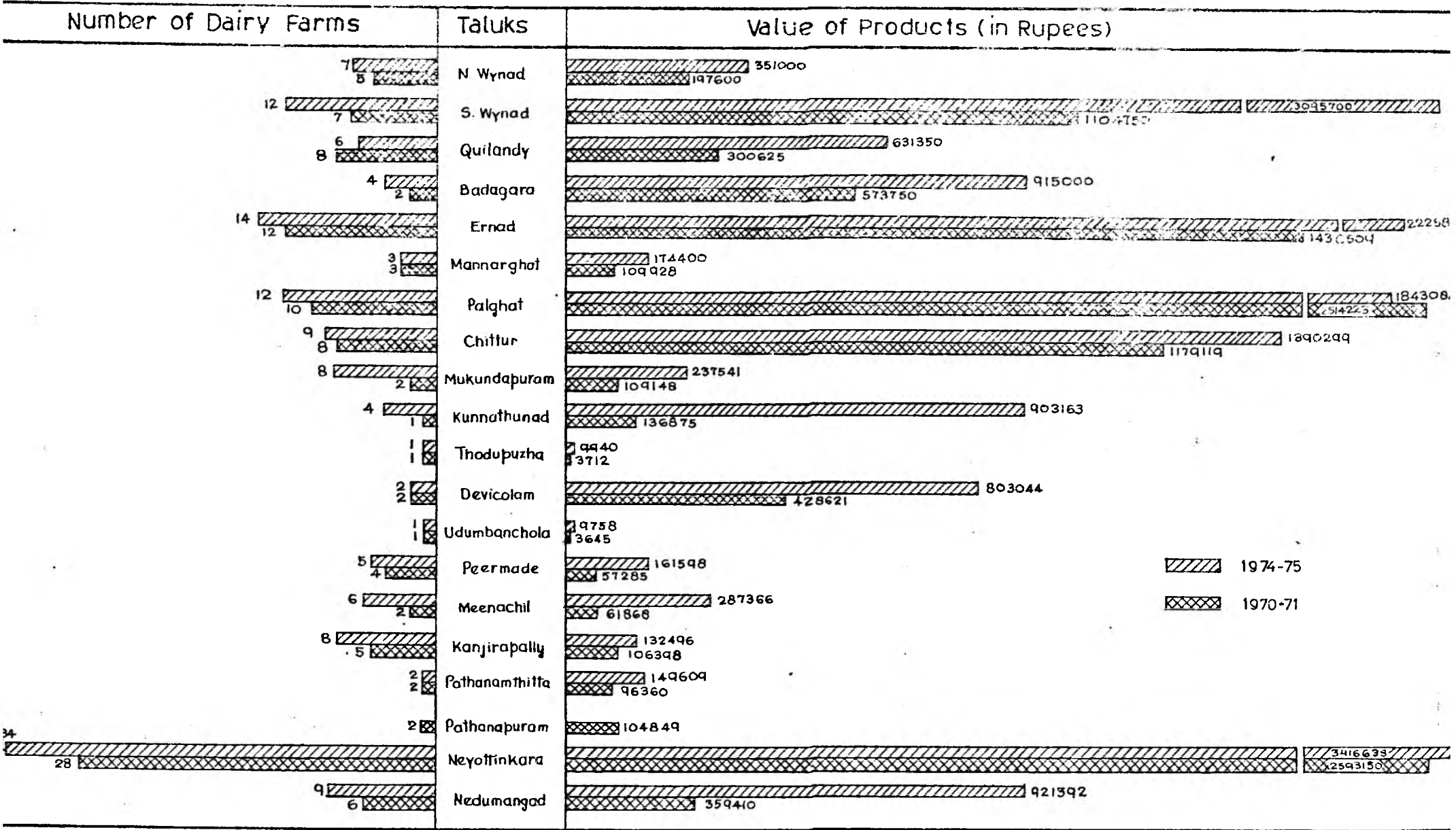
insemination centres at Palghat, Chittur, Mukandapuram and Kanjirapally Taluks and 47 Sub-centres located in Chittur (16), Meenachil (11), Palghat (10), Kanjirapally (7), Quilandy (1), Kannathunad (1) and Peermade (1) Taluk. Other Taluks have no artificial insemination centre. Recently, one cross-breeding scheme has been started in Neyyattinkara Taluk. Besides these services, two rinder posts in South Wynad and Chittur Taluks, one dispensary in Palghat Taluk, one nobile veterinary dispensary in Udumbanchola Taluk are also functioning in the Sub-region.

Table - 3.28: Veterinary Services in Kerala Sub-Region (1954)

Sl. No.	Taluk/Sub-region	Veterinary Services						
		Hospital	Dispensaries	Aid Centres	Key Vill. Centres	Sub-Main Centres	Main Centres	A.I. Units
1.	North Wynad	1	1	1	1	10	-	-
2.	South Wynad	1	5	2	1	10	-	-
3.	Quilandy	1	4	4	-	1	-	1
4.	Badagara	1	4	7	-	-	-	-
5.	Ernad	2	7	7	2	14	-	-
6.	Mannarghat	-	3	4	-	-	-	-
7.	Palghat	1	5	3	-	-	1	10
8.	Chittur	2	5	3	-	-	1	16
9.	Mukandapuram	3	14	4	-	-	1	-
10.	Kannathunad	1	7	-	-	-	-	1
11.	Kothamangalam	Nil	4	1	Nil	Nil	Nil	Nil
12.	Thodupuzha	1	3	-	-	-	-	-
13.	Devicolan	1	3	-	-	-	-	-
14.	Udumbanchola	2	5	-	-	-	-	-
15.	Peermade	2	3	1	-	-	-	1
16.	Meenachil	2	7	-	-	-	-	11
17.	Kanjirappally	-	2	-	-	-	4	7
18.	Pathanathitta	3	9	2	-	-	-	-
19.	Pathanamangalam	1	6	-	-	2	-	-
20.	Neyyattinkara	1	11	-	1	7	-	-
21.	Nedumangad	2	7	1	-	4	-	-
Kerala Sub-region:		28	115	40	5	48	4	47

Source: Department of Animal Husbandry, Kerala.

ORGANISED DAIRY FARMS & THEIR PRODUCTS (1970-71 & 1974-75)





 1974-75
 1970-71

TABLE - 3.26 : Livestock and poultry in 1972 and its variation from 1966 in Kerala Sub-region:

Sl. No.	Taluk	Bulls		He-buffaloes		Bullocks		Cows		She-buffaloes		Donkeys	
		No. 1972	Variation No. (%)	No. 1972	Variation No. (%)	No. 1972	Variation No. (%)	No. 1972	Variation No. (%)	No. 1972	Variation No. (%)	No. 1972	Variation No. (%)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	North Wynaad	69	- 26 (-27.37)	4900	-684 (-12.25)	8982	- 389 (-4.15)	9973	-1323 (-11.71)	1672	- 484 (-22.45)	-	-
2.	South Wynaad	102	+ 93 (+47.69)	10713	+129 (+1.22)	15913	-2855 (-20.54)	25468	+4391 (+20.83)	5165	-1762 (-25.44)	6	+6 (-)
3.	Coilandy	74	-25 (-25.25)	158	-103 (-39.46)	6882	-2406 (-25.00)	31800	+3038 (+10.56)	1176	+124 (+11.79)	-	-
4.	Badagara	77	- 47 (-37.90)	38	- 46 (-54.76)	4707	- 974 (-17.14)	24837	+ 976 (+4.09)	464	+ 198 (+74.44)	-	-
5.	Ernad	70	-164 (-70.09)	7410	-1250 (-14.43)	26678	-11389 (-42.69)	32450	+ 839 (+2.65)	9313	+1335 (+16.59)	10	+10 (-)
6.	Mannarghat	129	+129 (-)	10174	+10174 (-)	9855	+ 9855 (-)	19769	+19769 (-)	2025	+2025 (-)	156	+156 (-)
7.	Palghat	49	- 12 (-19.67)	15940	- 1439 (-2.84)	11439	- 1470 (-11.39)	22542	+ 5063 (+28.97)	7851	+1741 (+28.49)	88	+ 35 (+66.04)
8.	Chittur	90	-957 (-38.78)	15344	- 785 (-4.87)	17318	- 3208 (-15.63)	23332	+4835 (+26.14)	7783	+ 52 (+0.67)	144	+ 37 (+34.58)
9.	Mulanapuram	221	+97 (+78.23)	5304	- 275 (-4.93)	24338	- 3624 (-12.96)	26662	+2760 (+11.55)	5826	+ 82 (+1.43)	-	-
10.	Kannathunad	102	+16 (+18.60)	3162	+ 314 (+11.03)	17772	- 5823 (-24.68)	19698	+2274 (+13.05)	2153	+435 (+25.32)	31	+31 (-)
11.	Kothamangalam	57	-28 (-32.94)	541	- 673 (-55.44)	3825	- 5243 (-57.82)	5660	-5534 (-49.44)	536	-158 (+22.77)	35	+35 (-)
12.	Thedupuzha	211	-94 (-30.82)	216	- 258 (-54.43)	5314	- 4696 (-46.91)	19033	-316 (-1.63)	986	+427 (+76.39)	-	-
13.	Devicolan	152	+ 4 (+2.70)	602	- 245 (-28.93)	2335	- 926 (-28.22)	10662	+1635 (+18.11)	878	+ 95 (+12.13)	40	+40 (-)
14.	Udumbenchola	296	+61 (+25.96)	888	- 254 (-22.24)	3158	- 1614 (-33.82)	18453	+ 239 (+1.31)	3335	+395 (+13.44)	44	-32 (-42.11)
15.	Peermade	62	-90 (-5.21)	172	- 34 (-16.50)	575	- 584 (-50.60)	17417	+ 677 (+4.04)	1564	+149 (+10.53)	73	+31 (+73.81)
16.	Meenachil	95	-87 (-4.80)	112	- 91 (-44.83)	5610	- 3601 (-39.09)	32918	+ 222 (+0.68)	1437	+730 (+103.25)	-	-
17.	Kanjirappally	45	-32 (-41.56)	18	- 21 (53.35)	316	- 243 (43.47)	12718	-3810 (-23.05)	777	+250 (+47.44)	-	-
18.	Pathananthitta	135	-139 (-50.73)	300	- 31 (-9.37)	2637	- 2231 (-45.83)	44317	+2980 (+7.21)	2807	+618 (+28.23)	2	+ 2 (-)
19.	Pathanapuram	97	- 56 (-41.48)	3132	- 437 (-12.24)	5484	- 3042 (-35.68)	23162	+3186 (+15.89)	3039	+1277 (+72.47)	-	-
20.	Neyyattinkara	44	-114 (-72.15)	5098	+ 554 (+12.19)	2392	- 1057 (-30.65)	18003	+3872 (+27.40)	8470	+1207 (+16.62)	-	-
21.	Nedumangad	32	-116 (-78.38)	4938	- 1521 (-23.55)	2549	- 708 (-21.74)	18371	+3684 (+25.00)	4163	+1406 (+51.00)	9	+9 (-)
Kerala Sub-region		2209	-903 (-29.02)	88260	+ 3020 (+3.54)	178079	-46133 (-20.51)	457245	+49437 (+12.12)	71420	+10132 (+16.53)	678	+360 (129.50)

TABLE - 3.20: (Contd....)

Sl. No.	Taluk	Sheep		Goats		Pigs		Poultry		Horses/Ponies	
		No. 1972	Variation No. (%)	No. 1972	Variation No. (%)	No. 1972	Variation No. (%)	No. 1972	Variation No. (%)	No. 1972	Variation No. (%)
		15	16	17	18	19	20	21	22	23	24
1.	North Wynad	22	+ 12 (+120.00)	8639	+ 2397 (+38.40)	637	+ 210 (+49.18)	64805	+ 1216 (+45.24)	2	- 2 (-50.00)
2.	South Wynad	58	+ 43 (+286.87)	18434	+ 7923 (+75.38)	1901	+ 808 (+82.26)	184332	+ 13995 (+8.22)	41	+34 (+485.71)
3.	Milandy	-	- 5 (-)	34038	+ 9936 (+41.22)	518	+ 452 (+684.85)	188833	+68099 (+56.40)	-	- 2 (-)
4.	Badagara	-	-	34540	+ 8860 (+34.50)	438	+ 434 (+10850.00)	128082	+37812 (+41.09)	2	- 2 (-50.00)
5.	Ernad	20	+ 14 (+233.33)	48268	+13523 (+38.92)	79	+ 76 (+2533.00)	604993	+10395 (+20.75)	28	+26 (+1300.00)
6.	Mannarghat	1463	+1463 (-)	24877	+24877 (-)	23	+ 23 (-)	142295	- (-)	-	- (-)
7.	Palghat	2099	+1240 (+144.35)	17130	- 2804 (-14.07)	111	+ 42 (+6.87)	160187	+41758 (+35.26)	46	-26 (-34.14)
8.	Chittur	2166	- 365 (-14.42)	26130	+ 3115 (+13.54)	243	- 12 (-4.71)	39093	+39308 (+39.39)	46	-6 (-11.54)
9.	Mukaidouran	19	+ 16 (+533.33)	41974	+12530 (+42.56)	912	+ 81 (+9.75)	440927	+94867 (+27.41)	1	+1 (+100.00)
10.	Kunnathunad	-	-	25666	+ 6726 (+35.51)	2002	+ 111 (+5.87)	229798	+32913 (+16.72)	1	-
11.	Kothamangalam	-	-	8750	+ 3237	5055	+1953	79833	-21891	3	-
12.	Thodupuzha	-	- 18 (-100.00)	18663	- 4129 (-18.12)	14152	-5731 (-28.82)	142233	-19262 (-11.93)	-	-1 (-100.00)
13.	Devicolan	102	-470 (-82.70)	5687	+ 1491 (+35.53)	623	+ 40 (+6.86)	76845	+ 6818 (+93.05)	-	-47 (-100.00)
14.	Ldumbanchola	30	- 16 (-34.78)	28887	+11526 (+66.39)	8995	- 655 (-6.79)	162142	+32481 (+25.05)	-	-
15.	Peermade	72	+ 27 (+60.00)	8005	+ 468 (+6.21)	1896	+ 376 (+24.74)	83313	-22303 (-26.76)	2	-29 (-93.55)
16.	Meenacil	-	-	41681	+ 7185 (+20.83)	28584	-5032 (-14.97)	254898	+18824 (+7.37)	-	-
17.	Hanjirappally	169	+157 (+1308.33)	13341	-1626 (-10.86)	3193	- 411 (-11.40)	79297	-28656 (-26.54)	-	-
18.	Pathanamthitta	551	-199 (-26.53)	26939	+5004 (+22.81)	519	+ 143 (+38.03)	232846	+26795 (+13.00)	2	+2 (-)
19.	Patharapuram	203	+ 76 (+59.53)	25426	+6009 (+30.95)	9	+ 2 (+28.57)	14997	+15425 (+12.00)	2	+2 (-)
20.	Meyyattinkara	165	+ 8 (+5.10)	39178	+3314 (+9.24)	4216	+2009 (+91.03)	340085	+67160 (+24.61)	2	+2 (-)
21.	Nedumangad	130	-161 (-55.33)	44586	+4354 (+10.82)	324	- 189 (-140.00)	204533	+55357 (+37.80)	3	+3 (-)
Kerala Sub-region:		7269	+1822 (+33.45)	540848	+123926 (+29.92)	74450	-4892 (-6.17)	4083472	+706969 (+20.94)	181	-45 (-19.91)

Source: Livestock Census 1966 and 1972.

TABLE - 3.27 : Organised Dairy Farms in Kerala Sub-region 1970-71 and 1974-75 :

Sl. No.	Taluk	Public Sector				Private Sector				Cooperative Societies				Total Dairy Farms			
		No.		Value (in Rs.)		No.		Value (in Rs.)		No.		Value (in Rs.)		No.		Value (in Rs.)	
		1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	North Wyzad	-	-	-	-	4	4	46400	81000	1	3	151200	270000	5	7	197600	351000
2.	South Wyzad	-	-	-	-	-	1	-	50700	7	11	1104750	3045000	7	12	1104750	3095700
3.	Nilandy	-	-	-	-	4	4	218600	256350	4	2	82025	375000	8	6	300625	631350
4.	Balagara	-	-	-	-	-	-	-	-	2	4	573750	915000	2	4	573750	915000
5.	Ernad	-	-	-	-	4	1	8250	18780	11	13	1428259	2207056	12	14	1436509	2225836
6.	Kannurghat	1	1	78611	71385	1	1	16564	30726	1	1	14753	72289	3	3	109928	174400
7.	Palghat	-	-	-	-	2	3	42668	30050	8	9	2471555	1813034	10	12	2514223	1843084
8.	Chittur	-	-	-	-	-	-	-	-	8	9	1179119	1390299	8	9	1179119	1390299
9.	Mukrandapuram	1	1	15949	60831	-	-	-	-	1	7	43200	176710	2	8	109148	237541
10.	Kannatnur ad	-	-	-	-	-	1	-	34493	1	3	136875	868670	1	4	136875	903163
11.	Kothaangalam	-	-	-	-	-	-	Nil	-	-	-	-	-	-	-	-	-
12.	Thodupuzha	-	-	-	-	1	1	3712	9940	-	-	-	-	1	1	3712	9940
13.	Devicolan	1	1	247374	295527	-	-	-	-	1	1	181247	507517	2	2	428621	803044
14.	Udumbanchola	-	-	-	-	1	1	3645	9758	-	-	-	-	1	1	3645	9758
15.	Peenuade	1	1	47685	136048	3	4	9600	25550	-	-	-	-	4	5	57285	161598
16.	Meenachil	-	-	-	-	-	1	-	50261	2	5	61868	237105	2	6	61868	287366
17.	Pathanamthitta	-	-	-	-	2	2	96360	149609	-	-	-	-	2	2	96360	149609
18.	Kanjirappally	-	-	-	-	4	7	36135	64058	1	1	70263	68438	5	8	106398	132496
19.	Pathanapuram	-	-	-	-	-	-	-	-	-	2	-	104849	-	2	-	104849
20.	Neyyattinkara	-	-	-	-	5	6	311540	452750	23	28	2281610	2963888	28	34	2593150	3416638
21.	Jedumangad	-	-	-	-	-	5	-	142715	6	4	359410	778677	6	9	359410	921392
Kerala Sub-region:		4	4	439618	563791	28	42	793474	1406740	77	103	10139884	15793532	109	149	11372976	17764063

5. FORESTRY DEVELOPMENT :

Forests cover approximately 42.57%* of the total area in the Sub-region against 27.14% in the State during 1974-75. There is, however, great variation in their distribution in different taluks of the Sub-region. Percentage of forest area to total area varies from 0.07% in Meenachil Taluk to 76.11% in Pathanapuram taluk. Out of 21 taluks, seven taluks have less than 20% of area under forests whereas the two taluks have more than 66% of their area under the forests (Table 3.5). The National Forest Policy stressed at maintaining one third of the total national land under forests and for this purpose 60% in the hilly region and 20% in the plains should be developed as properly sited and well managed forests. On this basis, the Sub-region has a deficit of 67367.34 hectares of the forest land as indicated in Table - 3.29.

5.1 Forest Types:

Forests of this Sub-region can be broadly divided into 5 categories as detailed below:-

(a) Southern Tropical Wet Evergreen Forests :

These evergreen dense forests contain trees of 45 metres or more height with a large number of species in intimate mixture. These forests occur on an elevation upto 1000 metres with adequate moisture and annual rainfall of over 2,500mm. The large areas of these forests are leased out for cardamum cultivation.

*Based on the statistics supplied by the Bureau of Statistics & Economics, Trivendrum.

(b) Montane Wet Sub-Tropical Evergreen Forests:

These evergreen forests occur at the elevations of over 1200 metres and thrive best at high elevations. Annual rainfall varies from 1900 mm to 7,600 mm in such areas and are found in sheltered pockets and declivities along the high ranges and the rest of the hills with grass lands, ^{mosses,} ferns, lichens and epiphytes.

(c) Southern Tropical Moist Deciduous Forests :

These closed forests of 30 to 35 metres high trees are characterised by almost entirely leafless species in the peak of the dry season. These forests are commercially the most valuable with teak as the most valuable specy. These forests require the rainfall of about 2000 mm. and an elevation upto 750 metres.

(d) Tropical Dry Deciduous Forests:

These forests occur in the eastern side of the Sub-region and composed of a mixture of species which are deciduous for several months in the dry season. These species are generally of about 15 metres height.

(e) Temperate Shola Grasslands:

These grass lands consist of small grass or taller erasser grass. These grass lands are being planted with Eucalyptus and Wattle. The grass lands are usually at an elevation of over 1200 metres.

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TABLE-3.29: SURPLUS & DEFICIT AREAS OF FORESTS IN KERALA SUB-REGION 1974-75.

Sl. No.	Name of the Taluk	Total Area (Hectares)			Required Forest Area as per National Forest Policy	Existing Forest Area *	Surplus/Deficit
		Hills	Plain	Total			
1.	North Wynad	74742	-	74742	44845.20	20950	-23895.20
2.	South Wynad	137820	-	137820	82692.00	86457	+ 3765.00
3.	Quilandy	20277.20	45415.80	75693	27249.48	3132	-24117.48
4.	Badagara	16494.60	38487.40	54982	17594.24	7020	-10574.24
5.	Ernad	90479.20	135718.80	226198	81431.28	97014	+15582.72
6.	Mannarghat	98967.60	10996.40	109964	61579.84	20886	-40693.84
7.	Chittur	63529.95	51979.05	115509	48513.78	38410	-10103.78
8.	Palghat	28813.20	43219.80	72033	25931.88	7311	-18620.88
9.	Mukondapuram	52641.60	78962.40	131604	47377.44	72123	+24745.56
10.	Kunnathunad	13554.40	54217.60	67772	18976.16	8198	-10778.16
11.	Kothamangalam	4276.35	24232.65	28509	8267.00	2214	- 6053.00
12.	Thodupuzha	73149.60	18287.40	91437	47547.24	52695	* 5147.76
13.	Devioclam	177416	-	177416	106449.60	120639	+14189.40
14.	Udumbanchola	107140	-	107140	64284.00	44416	-19868.00
15.	Peermade	130782	-	130782	78469.20	79876	+ 1406.80
16.	Meenachil	25295.55	46977.45	72273	24572.82	47	-24525.82
17.	Kanjirappally	17566.50	17566.50	35133	14053.20	8054	- 5999.20
18.	Pathanamthitta	138301.80	59272.20	197574	94835.52	122940	+28104.48
19.	Pathanapuram	80135.25	43149.75	123285	56711.10	93827	+37115.90
20.	Neyyattinkara	5473.90	49265.10	54739	13137.36	5726	- 7411.36
21.	Nodumangad	27802.50	64872.50	92675	29656.00	34872	+ 5216.00
Kerala Sub-region		1394659.20	782620.80	2177280	994174.34	@ 926807	-67367.34

* Based on the statistics supplied by the Bureau of Statistics & Economics, Trivendrum
 @ The area under forest as available from Forest Department Statistics indicates hectares against 926807 hectares given by Bureau of Statistics & Economics.

5.2. Classification of the Forests :

The forests are classified as (a) Reserved forests, (b) protected forests and (c) unclassified forests. The reserved forests are entirely under the Government control and the forest department can adopt all necessary measures for conservation and production purposes. In protected forests large number of rights and concessions are inherited from the previous owners or according to tribal rights exists and required to be honoured. These concessions thus prevent the management of these forests in a rational way. The other forests which have not been classified are unclassified forests.

In the Sub-region, 86.66% of the total forests area are reserved forests, 1.41% are protected forests and 11.93% are unclassified forests. All the forests in Kothanangalam, Thodupuzha Udumbanchola, Peermade, Kanjirapally, Pathanamthitta, Pathanapuram, Neyyattinkara and Nedunangad taluks are reserved forests whereas in other taluks the percentage of reserved forests varies from 39.73% in Ernad to 98.89% in Devicolan followed by Kunnathunad (92.98%), Chittur (92.47%), Mukandapuram (85.18%), North Wynad (84.41%), South Wynad (67.14%), Quilandy and Badagara (56.66%), Palghat (52.18%), Mannarghat (50.63%) and Ernad (39.73%). The protected forests are existing in North Wynad (15.59%), Mukandapuram (14.82%), Kunnathunad (7.02%) and Devicolan taluk (1.11%). These taluks are hilly and inhabited by the tribal population. Unclassified forests are existing in 6 taluks of the Sub-region. Ernad taluk is having the maximum percentage (60.27%) under unclassified forests followed by Mannarghat (49.37%), Palghat (47.82%)(Table 3.30).

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TABLE - 3.30 : Classification of Forests by Legal Status 1974-75: (Area in Hectares)

Sl. No.	Name of the Taluk	Total Forest Area 1974-75	Reserved forest Area	Protected forest Area	Other unclassified forest area
1.	North Wynad	24533.030 (100.00)	20707.870 (84.41)	3825.160 (15.59)	-
2.	South Wynad	49799.000 (100.00)	33437.000 (67.14)	-	16362.000 (32.86)
3.	Quilandy)	14605.404	8275.404	-	6330.000
4.	Badagara)	(100.00)	(56.66%)	-	(43.34)
5.	Ernad	104278.848 (100.00)	41478.848 (39.73)	-	62800.000 (60.27)
6.	Mannarghat	41251.640 (100.00)	20886.000 (50.63)	-	20365.640 (49.37)
7.	Chittur	59712.178 (100.00)	55214.446 (92.47)	-	4497.732 (7.53)
8.	Palghat	14010.128 (100.00)	7311.000 (52.13)	-	6699.128 (47.82)
9.	Mukundapuram	50612.000 (100.00)	43112.000 (85.18)	7500.000 (14.82)	-
10.	Kunnathunad	12816.000 (100.00)	11916.000 (92.98)	900.000 (7.02)	-
11.	Kothanangalam	2200.59 (100.00)	2200.59 (100.00)	-	-
12.	Thodupuzha	52659.190 (100.00)	52659.190 (100.00)	-	-
13.	Devicolan	148908.00 (100.00)	147258.000 (98.89)	1650.000 (1.11)	-
14.	Udumbanchola	47916.000 (100.00)	47916.000 (100.00)	-	-
15.	Peernade	79800.000 (100.00)	79800.00 (100.00)	-	-
16.	Meenachil	Nil	Nil	Nil	Nil
17.	Kanjirappally	6448.478 (100.00)	6448.478 (100.00)	-	-
18.	Pathananthitta	138153.000 (100.00)	138153.000 (100.00)	-	-
19.	Pathanapuram	91675.000 (100.00)	91675.000 (100.00)	-	-
20.	Neyyattinkara	5725.000 (100.00)	5725.000 (100.00)	-	-
21.	Nedumangad	36108.000 (100.00)	36108.000 (100.00)	-	-
Kerala Sub-region:		981211.486 (100.00)	850281.826 (86.66)	13875.160 (1.41)	117054.500 (11.93)

Source: Forest Department Statistics.

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5.3 Major Forest Produce:

The total major forest produce in the Sub-region was recorded to the tune of Rs. 6.37 crores during 1974-75. Pathanapuram taluk is the major production centre accounting for 46.99% of the total produce, followed by Pathanamthitta taluk accounting for 21.39% of the total forest produce of the Sub-region. Industrial timber, fuel wood and bamboos are the major industrial produce in the Sub-region. Due to lack of adequate information values are approximate and give an idea of the quantum and potentiality of the forest products. Two taluks viz., Meenachil and Neyyattinkara have not reported any forest produce. Though the forest land in Meenachil taluk have been 47 hectares only but in Neyyattinkara the forest area is reported as 5726 hectares. Among the remaining taluks of the Sub-region the industrial timber is reported around 6.34 lakh cubic metres amounting to approx. Rs. 5.2 crores and fuel timber approx. 2.22 lakh cubic metres amounting to approx. Rs. one crore. The total produce by the industrial timber and fuel wood in the Sub-region has been more than Rs.7 crores. The bamboo production is reported around 3.45 lakh tonnes worth Rs.16.32 lakhs during 1974-75. Among various taluks Pathanapuram is the highest forest producing taluk followed by Pathanamthitta, Udumbanchola, Nadunangad, Kunnathunad, South Wynad and Chittur taluks (Table 3.31). Among various taluks Devicollam is major producer of industrial timber in quantity whereas Pathanapuram of industrial timber in value; Pathanapuram of fuel wood and fire wood and Chittur of bamboo products.

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5.4 Minor Forest Produce:

Medical herbs, honey, wax and cane are the minor forest produces in the Sub-region. During 1974-75 two taluks Nayyantinkara and Meenacil have reported nil forest produce whereas for the other three taluks, namely, Quilandy, Chittur and Peermade information is not available. In all other taluks, the value of the total minor forest produce has been reported to the tune of Rs.6.5 lakhs in 1974-75 compared to Rs.3.59 lakhs in 1970-71. The major producers are Pathananthitta and Ernad taluks in the Sub-region. The average value per hectare of minor forest produce comes to Rs.0.66 in the Sub-region and varies from Rs. 1.33 to Rs. 0.04 among the taluks. Though the value of minor forest produce is quite low compared to major produces, it gives direct employment to the local people as the produces are manually collected and processed (Table 3.32).

6. PROBLEMS AND PROSPECTS OF LAND USE, AGRICULTURE, LIVESTOCK & FORESTRY DEVELOPMENT:

The study and analysis of existing land use pattern, development of agriculture, animal husbandry and forestry has revealed certain problems and has provided a rational base for outlining development needs/prospects of the Kerala Sub-region. The proposals contained and discussed herewith confirm to the potentialities and needs of the Sub-region as identified in earlier chapters. It takes note of the visible resources, gradual and modest beginning of such programmes which pick up as time passes, contingency of giving a shock to the affected people and the time lag in collecting an assortment of additional workers required for the project. Goals set in the /...

TABLE-3.31: Major Forest Produce in the Taluks of Kerala Sub-region 1974-75.

Sl. No.	Taluk	Industrial Timber				Fuel Wood and Charcoal				Bamboo				Total Value	
		Quantity (cmts.)	%	Value (in Rs.)	%	Quantity (in tons)	%	Value (in Rs.)	%	Quantity	%	Value (in Rs.)	%	(in Rs.)	%
1.	North Wynad	394.62	0.01	*3240.00	0.01	1104.50	0.50	49526.00	0.50	-	-	-	-	52766.00	0.08
2.	South Wynad	41262.67	0.65	*338767.00	0.65	26671.00	12.02	*1195928.00	12.02	26806	7.77	*26791.00	7.77	1661486.00	2.61
3.	Quilandy	6772.70	0.11	*55604.00	0.11	3131.00	1.41	*140394.00	1.41	-	-	-	-	195998.00	0.31
4.	Badagara	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	Ernad	72721.01	1.15	*597030.00	1.15	-	-	-	-	-	-	-	-	597039.00	0.94
6.	Mannarghat	2318.00	0.14	*19031.00	0.04	-	-	-	-	4100	1.19	*9339.00	1.19	38424.00	0.06
7.	Chittur	8994.45	0.14	*73844.00	0.14	1323.00	0.60	*59323.00	0.60	292697	84.83	*1384457.00	84.83	1517624.00	2.38
8.	Palghat	-	-	-	-	7045.00	3.17	*315898.00	3.17	-	-	-	-	315898.00	0.50
9.	Mukandapuram	974303.00	15.36	336967.50	0.65	4212.00	1.90	318325.00	3.20	4980	1.44	5925.00	0.36	661217.50	1.04
10.	Kunnathunad	6583.00	0.10	3046134.00	5.84	1649.00	0.74	41418.00	0.42	-	-	-	-	3087552.00	4.85
11.	Kothamangalam	6341.00	0.10	19506.86	0.04	-	-	-	-	*1476	0.43	6982.90	0.43	26489.76	0.04
12.	Thodupuzha	1384.00	0.02	112318.00	0.22	12230.00	5.51	175382.00	1.76	-	-	-	-	287700.00	0.45
13.	Devicolam	5024463.00	79.19	170623.00	0.33	1256.00	0.57	24456.00	0.25	7330	2.12	2574.00	0.16	197653.00	0.31
14.	Udumbanchola	12031.00	0.19	7482165.00	14.35	-	-	-	-	-	-	-	-	7482165.00	11.74
15.	Peermade	600.00	0.01	18000.00	0.03	-	-	-	-	-	-	-	-	18000.00	0.03
16.	Moonachil	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17.	Kanjirappally	16278.00	0.26	362038.00	0.69	2980.00	1.34	245300.00	2.45	-	-	-	-	607338.00	0.95
18.	Pathananthitta	48893.00	0.77	12324867.00	23.64	24320.00	10.95	1286950.00	12.93	*3506	1.02	16585.00	1.02	13628402.00	21.39
19.	Pathanapuram	107486.00	1.69	24063035.12	46.16	*129548.00	58.37	5808924.74	58.37	3755	1.09	67543.00	4.14	29939502.86	46.99
20.	Neyyattinkara	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.	Nedumanad	14058.00	0.22	3102400.00	5.95	*6479.00	2.92	290500.00	2.92	*383	0.11	1810.30	0.11	3394710.30	5.33
Kerala Sub-region		6344883.45	100.00	52125579.48	100.00	221948.50	100.00	9952324.74	100.00	345033	100.00	1632061.20	100.00	63709965.42	100.00

Note : 1. Industrial timber includes round wood, sawn timber, pulp wood, plylogs and cellulosic materials.

2. * The value in these taluks have been estimated on the average value of the taluks for which value and quantity both have been reported. These average values works out to be as Rs.8.21 per cumt for industrial timber; Rs.44.84 per tone for fuelwood and charcoal and Rs.4.73 per tone for bamboos.

TABLE - 3.32: Value of Minor Forest Products in Kerala
Sub-region 1970-71 and 1974-75 :

Sl. No.	Taluk	Main Minor Forest Produce	Value of Minor Forest Products (in Rs.)	
			1970-71	1974-75
1.	North Wynad	Drugs(Medical Herbs) Honey, Wax, Cane.	-	9525.00
2.	South Wynad	Drugs, Honey, Wax, Cane	N.A.	41988.00
3.	Quilandy)	Drugs(medical herbs),	N.A.	N.A.
4.	Badagara)	Honey, Wax, Cane.		
5.	Ernad	Drugs, Honey, Wax, Cane	12600.00	108650.00
6.	Mannarghat	Drugs, Honey, Wax, Cane	6200.00	41740.00
7.	Palghat	Drugs, Honey, Wax, Cane	16850.00	37025.00
8.	Mukundapuram	Drugs, Honey, Wax, Cane	38675.00	52860.00
9.	Kunnathunad	Drugs, Honey Wax, Cane	2850.00	4970.00
10.	Thodupuzha	Drugs, Honey, & Wax, Cane	2450.00	2275.00
11.	Kothamangalam	Green manure, splitted * rattens and reeds.		
12.	Devicolan	Drugs, Honey, Wax, Cane	10700.00	57100.00
13.	Udumbanchola	Drugs, Honey, Wax, Cane	4250.00	3750.00
14.	Meenachil	Nil	Nil	Nil
15.	Kanjirappally	Drugs, Honey, Wax, Cane	4150.00	6250.00
16.	Pathanapuram	Drugs, Honey, Wax, Cane	191575.00	61525.00
17.	Pathananthitta	Drugs, Honey, Wax Cane.	42816.00	183537.00
18.	Neyyattinkara	Nil	Nil	Nil
19.	Nedumangad	Drugs, Honey, Wax, Cane.	Nil	20500.00
Kerala Sub-Region:			358716.00	648735.00

* Information of Minor forest produce for Kothamangalam has been specified only in terms of quantity, as Green manures - 730 bundles, splitted norattens - 370 Nos., Reeds - 17630 Nos. value of these items has not been reported.

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proposals are to be achieved by 1985 and phasing needs to be done in coordination with other proposals, particularly in relation to development of irrigation and provision of infrastructure facilities and availability of inputs. It may be possible that the implementing agency may not be able to get adequate funds to implement all the proposals but it provides the dimensions of the problem for future reference.

The use of land resources is mainly influenced by geomorphic character of the terrain, pedological characteristics and hydrological conditions. Since agriculture and forests are the predominant user of land in the Sub-region their quality (soils) and quantity (area) are directly related to the nature of land forms. The analysis has revealed that forests predominate in the hill areas whereas agriculture in the plains.

The Sub-region is predominantly hilly. To promote balanced economy, the National Forest Policy has stipulated that India, as a whole, should aim at maintaining 1/3rd of its land in forests. For this purpose, 60% of the area in hilly regions and 20% in plains should be developed as properly sited and well managed forests. The Sub-region, however, has so much been deforested that now only 42.57% of total area is under forest. Even if, the area under pastures and tree crops, which is 1.53% of the total area, is included under forest, the total area under forests comes to only 44.10% of the total area. The ecological stability thus is crucial for the development of the Sub-region. This stability depends on the maintenance of the tree cover which is constantly being encroached upon by agriculture, mining hydro-electrical and industrial developments. The climate, topography and soil of the area are best suited to the forestry

and plantation. An attempt should be made, therefore, to increase the area under productive forestry or plantation.¹ In recent years, changes have been brought out and emphasis has been given on tree crops, i.e., coffee, tea, coconut, arecanut and cashewnut plantation. While, proposing the land use pattern of the Sub-region, this trend has been kept in view and emphasis has been given to tree crops to maintain economic balance at the regional level.

6.1 Proposed Land Use Pattern

Based on the study conducted by the National Bureau of Soil Survey and Land Use Planning Regional Centre, Bangalore the following broad land use pattern may be suggested:-

- (a) Western Ghats hill area should continue to remain under forest and used preferably for rosewood, teak, sandal wood and bamboo plantation. If such areas are under private ownership it should preferably be used for plantation of rubber, arecanut, coffee, tea & herbs.

¹The Sub-region is a part of the Western Ghats area which is a rich store house of botanical wealth. The evergreen rain forests are prime centres for faunal and floral evolution. Their destruction in effect closes many options for future generation. Very recently a Task Force has been constituted to recommend effective measures to conserve ecological balance to the Ghats Area. To get the best use from the rain bearing clouds which cross and are arrested by the Ghats, it has to be ensured that the natural cycles of precipitation, percolation, evaporation and transpiration are not disturbed and that rain water which descends to the ground is conserved either underground or in rivers, streams and reservoirs. This can only be achieved if the character of the soil, the vegetation cover, humidity and temperature are not altered drastically from their present conditions by future developments. The Task Force is of considered opinion that without the ecological regeneration of Western Ghats there can be no economic salvation for the millions of people living in the vast adjoining area.

(b) The extended western Ghats hill area under the control of forest department should be brought under teak, rosewood, sandalwood and bamboo plantation. Such areas which are cleared of forest and are under private cultivation should be used for rubber, cashewnut and coconut.

(c) On the hill and flat tops of the high level dissected laterite plateau scrub forest and grasses for cattle feed should be encouraged. On the hill slopes, rubber, pepper, coconut and cashewnut should be grown. Inter-cropping of coconut under rain fed conditions should be taken up with ginger, tapioca sweet potato, turmeric and banana. In the Valleys, coconut, arecanut, tapioca, paddy, Chillies, banana and vegetables should be cultivated.

(d) Low level dissected laterite hill tops should be used for cashewnut and coconut, whereas on slopes, coconut, arecanut with inter cropping of tapioca under rainfed conditions should be encouraged. Ginger, turmeric, pepper, banana, papaya and cocoa may also be grown depending on the availability of irrigation. In the valleys coconut, arecanut, tapioca, paddy, chillies and vegetables may be grown but pineapple, cocoa, pepper should be grown with coconut plantation, if irrigation is available.

6.2 Problem of Agricultural Development

As mentioned earlier agriculture is the greatest user of land in the Sub-region. The wealth of the Sub-region, therefore, lies in its fields - fields often fragmented, affected by erosion, tilled for so long without rest or fertilization. Over large areas, they

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seem to have reached the ultimate base level of fertility, Advances in agricultural technique, while not entirely lacking, affect but a small fraction of farming only in few taluks of the Sub-region. With increasing pressure on the land and sheer need for more food has lowered the farm income.

Efficient use of resources for agricultural development requires to be viewed from the stand point of combining the scarce resources with abundant skilled labour for rapid achievement of maximum food output. Land are reproducible capital but are limited but management and technical skill for adoption of improved technology are scarcest of all. It has been seen that more capital and labour applied to the land now in cultivation by prevailing primitive methods will only result in marginal increase in output. On the other hand, if management and technical skills are used with a limited amount of capital to develop systems of farming that involve combinations of improved technology, substantial increases in output are expected to be achieved.

The manifold inefficiencies and under development of Sub-regional agriculture except slightly higher yield in respect of rice than the average yield in Kerala State as revealed by the selected agricultural and related characteristics indicated in table - 3.33, however, are probably less the responsibility of the farmers than of nature and of society; of undulating terrain, precarious season and relatively poor soils. Doubtless the farmer is on the whole conservative and he has had need to be so; for ages past his farming practices has been so closely adjusted to the environment that there could be little need of change unless and until the innovations are proved to be decidedly profitable.

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In the Sub-region, the individual farmer, whether owner, tenant or hired labourer, is the key decision-maker in agriculture. If improved practices are adopted, he must be trained to use them and persuaded to adopt them. It has been observed that farmers in the Sub-region within limits of their knowledge and the alternative open to them are as rational in their economic decisions as farmers anywhere. They respond to price differences. They operate well within the limits of their knowledge. They also respond to the prevailing social values of the groups in which they live. Their knowledge of underlying factors affecting production is limited, as is their ability to calculate probable costs and returns as a basis for choosing from several alternatives.

TABLE - 3.33 : Selected Agricultural and related Characteristics of the Sub-region compared with State figures

Sl. No.	Indicators	Kerala State	Sub-region
1.	Density of population/sq.km. (1971)	549	315
2.	% of rural population (1971)	81.98	92.00
3.	% of tribal population (1971)	1.26	2.60
4.	% of agricultural workers (1971)	48.50	57.18
5.	% of cultivated land (1974-75)	57.84	46.20
6.	% of potential arable (cultivable land (1974-75).	60.28	48.77
7.	% of area sown more than once (1974-75)	35.25	22.86
8.	% of net irrigated area to net cropped area (1974-75).	27.98	10.34
9.	% of area under food crops (1974-75)	31.30	35.77
10.	% of area under non-food crops (1974-75)	68.70	64.23
11.	% of area under rice (1974-75)	29.65	24.28
12.	Yield (Kg.) of Rice/Hectare (1974-75)	1540	1590
13.	Yield (Kg.) of Food-grains/Hectare (1974-75).	1485	1550
14.	Per-capital cultivated land (in hectare) (1974-75)	0.10	0.15
15.	Participation rate	29.12	30.23

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Improvement in agriculture also involves the changing of rural attitudes and of institutions that have been built up over many generations. It requires a break in the closed circle of village culture that has grown up to protect the community against external exploitation. Accomplishment of a breakthrough will require agricultural leadership of a high order. The four requisites for overcoming resistance to change are: (a) knowledge (b) incentives (c) means and (d) efficient supply of inputs, a comprehensive plan for the development including all these aspects appears to be a necessity.

The problem of livestock development, the problem of labour supply and the use of labour saving devices are inter-related problems. Since cattle and labour are going to be costly in future, the greater use of labour saving devices such as tractors and power tillers and cheap electric power and pumps (whether for irrigation or drainage), oil processing and so on is a necessity. The application of these modern tools and implements on a large scale in near future has, however, limited scope keeping in view that the mechanisation may not be accepted by people specially the tribal population and the limited use of tractors for paddy cultivation. For example, as the experience has shown that it is difficult to replace oxen unless and until special type of machines are made available for paddy cultivation. Much research has gone into the production of improved varieties; the most notably are in regard to paddy, which has made a promising start in increasing the yield per hectare. A more vigorous attack on plant diseases insects, fungi and rags is urgently needed.

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Rural communications are nearly everywhere inadequate; this is a major factor in the development of agriculture and more specially in the development of dairy and of fruit vegetable crops, large increase in which is exceedingly desirable to offset the excess of carbohydrates in diets. In order to supply fertilizer and other inputs and to market increased production, the agricultural development depends highly on improved farm-to-village and village-to-market roads. Road conditions greatly affect the prices the farmer pays and receives and consequently they affect his incentives to supply more inputs to production. Evidence presented in the report suggests that one of the major problems facing the rural markets is deficient transportation facilities. In the Sub-region roads are poor. Absence of good roads will also come in the way of the development of cooperatives which are increasingly using trucks for collecting the agricultural produce and distributing seeds, pesticides, manures and fertilizers. Bad roads or rather tracks also impose a severe strain on bullocks, especially where kharif marketing coincides with rabi tillage. Great economies could be effected by improving bullock carts, in most areas of the Sub-region wheels are solid and the weight of the cart ridiculously much compared to its capacity. The increasing use of rubber tyres is a notable advance. Lack of adequate road system has probably been one of the most important problems facing the agricultural development, and any effort in this direction would provide high returns in stimulating increase in agricultural production.

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6.3. Surplus and Deficit Areas of Cereals

The level of output, population density and dietary habits etc., are the elements that determine the surplus and deficit of food production in an area. The term surplus when applied to cereals is the balance of net output after meeting the consumption requirements of the local population. The average per capita foodgrain consumption as suggested by the National Commission on Agriculture is between 176.24 Kg. to 190.99 Kg. per year. Since the consumption in rural areas is more than the urban areas, the average requirement of 190 Kg. per capita per year for adult unit of population is taken for the purpose of calculating foodgrain requirements in the Sub-region. This norm takes care of the nutritional requirements and the disparity in consumption among the various economic classes under the controlled programme of distribution. On this basis, the requirement of foodgrains by the estimated population of 1975 in the Sub-region, assuming a conversion ratio of 0.86 for adult unit would be 12,26,348 tonnes (Table 3.34). Keeping on allowance of 16% of the total production for seed, waste, cattle feed etc., the total production of foodgrains available for consumption works out to 3,94,027 tonnes which indicates that the Sub-region is producing 8,32,321 tonnes less than its requirements for the year 1974-75.

Such deficit has to be seen against the background of physical environment which largely determines what farmers grow and what people eat. The composition of food basket in the Sub-region which like Kerala State differs substantially from that of the whole country and, therefore, to assess the actual food requirements, the composition of food basket in the Sub-region need to be considered.

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The Composition of Food Basket and Food Grains Requirements

The composition of food basket in the Sub-region like Kerala State, differs from that of the country as a whole. Cereals account for a smaller proportion (42.17%) of calorie intake in the Sub-region as against (67.44%) in India. Pulses is relatively insignificant in the Sub-region contributing about 19% calorie per capita per day against twice as much in India. Thirdly, root crops particularly tapioca (Cassava) play by far a more important role in the dietary habit of the people in the Sub-region, which provides about 27% of the total calorie intake against the per capita availability of potatoes and of other tubers which together amount to less than 30 calories in India. Fourthly, the per capita availability of coconut Kernel in the Sub-region works out to a little over 57 grams per day, yielding about 254 calorie or 11% of the total calorie intake which is several times larger than the share of all oil-seeds taken together in the country as a whole. In brief, the distinguishing features of the diet of the people in the Sub-region like Kerala State are: (a) the relatively lower share of cereals and (b) the substantially higher share of tapioca and coconuts.

The above features of the dietary pattern of the Sub-region merely reflect the cropping pattern of the Sub-region as determined largely by its climatic and topographical peculiarities. A large proportion of the cultivated area is devoted to cash crops such as coconut, arecanut, cashew-nut, tea, coffee, rubber, spices etc., for export and cover a sizeable proportion of the total cropped area in the Sub-region. As against this, rice, the staple food of the local people is cultivated in about 24.33% of the total sown area. However, like other parts of India, the Sub-region does not produce other cereals, millets and

*Based mainly on United Nation's Publication "Poverty, Unemployment and Development Policy; a case study of selected issues with reference to Kerala". /...

TABLE - 3.34 : Production of Foodgrains and the Surplus/Deficit Areas of Foodgrains in the Kerala Sub-region 1974-75 :
(Figure of foodgrains in quintals)

Sl. No.	Taluk/Sub-region	Estimated Population 1975	Foodgrain production	Foodgrains available for consumption	Total Foodgrain requirements	Surplus/Deficit
1	2	3	4	5	6	7
1.	North Wynaad	140,961	146,240	122,842	230,329	- 107,487
2.	South Wynaad	310,131	249,810	209,840	506,753	- 296,913
3.	Quilandy	510,764	187,200	157,248	834,588	- 677,340
4.	Badagara	446,717	78,220	65,705	729,936	- 664,231
5.	Ernad	779,838	325,610	273,512	1274,256	- 1000,744
6.	Mannarghat	200,939	228,810	192,200	328,335	+ 135,135
7.	Chittur	341,871	1005,550	844,662	558,618	+ 286,040
8.	Palgaht	401,694	888,120	746,021	656,369	+ 89,652
9.	Mukundapuram	643,011	322,716	271,081	1050,679	- 779,598
10.	Lunnathurad	318,379	316,490	265,852	520,231	- 254,379
11.	Kothamangalam	163,000	76,111	63,933	266,342	- 202,409
12.	Thodupuzha	239,384	124,456	104,543	391,153	- 286,610
13.	Devicolen	146,536	77,205	64,852	289,440	- 174,588
14.	Udumbanchola	288,897	26,601	22,345	472,057	- 449,712
15.	Peernade	160,146	5,350	4,494	261,679	- 257,185
16.	Meenachil	383,340	91,220	76,625	626,377	- 549,752
17.	Kanjirappally	187,813	2,900	2,436	306,886	- 304,450
18.	Pathanapuram	338,206	170,960	143,606	552,628	- 409,022
19.	Pathanenthitta	424,596	59,020	49,577	693,790	- 644,213
20.	Neyyattinkara	609,674	175,340	147,286	996,208	- 848,922
21.	Nedumangad	469,294	132,870	1116,111	766,827	- 655,216
Kerala Sub-region:		75,05,191	46,90,799	39,40,272	122,63,481	-83,23,210

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Planned Restructuring of Economic/Social Activities in Rural Area

AREA OF ACTIVITY		INFRASTRUCTURAL SUPPORT		Programmes for	Incentives and Disincentives
Employment	Secondary Employment	Economic	Social		
Agriculture		<p>A Improved irrigation facilities Adequate and timely supply of inputs Saplings, seeds, fertilizers, pesticides and weed killers etc at favourable prices Extension services distributed on an regular basis (where feasible)</p> <p>B Extension services</p> <p>C Market and storage</p> <p>D Credit facilities</p>	<p>A elementary services Artificial insemination centres and animal banks</p> <p>B Recreation like Cinema, Library club etc</p>	<p>A Incentive for tree planting</p> <p>B Support for the introduction of new crops Risk cover Scientific advice</p>	<p>Encourage group farming</p> <p>Encourage crop rotation</p> <p>Encourage tree crops in a way that food for animals can be met adequately</p>
Animal husbandry	Animal husbandry	<p>Items A to D as indicated above</p> <p>F Fodder and veterinary services Extension services, improve animal health and disease resistance</p>	As above	<p>A Incentive for</p> <p>B Incentive for</p> <p>C Extension services support to</p> <p>D Disincentive for</p>	<p>Form collective group farming</p> <p>Subsidize fertilizers and pesticides</p> <p>Encourage crop rotation of crops</p> <p>Encourage tree crops as suggested for big farmers for orientation of land holdings</p>
Cooperatives	Cooperatives	Items A to F as indicated above	As above	<p>Items A to D as</p> <p>F Discourage</p>	
Handicrafts	Handicrafts	<p>A Rural extension</p> <p>B Extension services Career plan</p>	As above	<p>A Incentive for</p> <p>B Incentive for</p> <p>C Extension services products</p>	<p>Develop industries such as rope making, etc and other activities based on local products</p>
Forestry	Forestry	<p>A Transport including forest roads</p> <p>B Minor forest produce collection cooperative</p> <p>C Processing of forest produce</p> <p>D Working of forest area</p> <p>E Forest produce collection and movement distribution Credit facilities</p>	<p>Difficulties in transport Extension services & telegraph vehicles Extension services and extension work in the field for the improvement of forest</p>	<p>A Incentive for</p> <p>B Incentive for</p> <p>C Extension services</p>	<p>Encourage tribal / local people Production of major forest produce of economic importance and ecological</p>
Handicrafts	Handicrafts	<p>Items A to D as indicated above</p> <p>F Incentive for</p> <p>G Credit facilities</p>	As above	<p>Items A to D as</p> <p>F Incentive for</p>	
Handicrafts	Handicrafts	<p>A Innovative</p> <p>B Incentive for</p> <p>C Credit facilities</p>	As above	<p>A Financial</p> <p>B Incentive for</p> <p>C Extension services</p>	<p>Assured supply of raw materials, marketing facilities for finished goods technical training</p>

STRUCTURAL SUPPORT

Population Group	Primary Employment	Secondary Employment	Economic	Social	Programmes for
1. all farmers 1-2 Hects				A. ... B. ...	A. ... B. ...
3. Marginal farmers < 1 Hect			Items ...	A. ...	F. ...
4. Landless labourers					A. ... B. ...
5. Workers engaged in Forestry		g &	A. ... B. ... C. ... D. ... E. ...	A. ... B. ... C. ... D. ... E. ...	
7. Workers engaged in secondary sector					A. ... B. ...
8. Workers engaged in Tertiary sector			A. ... B. ... C. ...		A. ... B. ...

pulses in any significant amount. Hence, the Sub-region like Kerala State appears to depend heavily on imports from outside for the supply of considerable proportion of its foodgrain requirements specially rice.

In the recent Government Policy, therefore, self-sufficiency in rice has been stressed as a primary objective in the successive Five Year Plans of the State and consequently the rice production has doubled to 1.29 million tonnes from 1951 to 1971 in the Kerala State, giving an annual compound growth rate of 2.83%. This rate of increase, however, hardly kept up with the growth of population and the per capita availability of rice specially in the later part of 1960 from the internal production remained more or less at the same level as in the beginning of that decade. The acute shortage and steep rise in the price of rice made the commodity prohibitively expensive and turned this food into a luxury item for the middle class and low income families. Tapioca has, consequently emerged as a major substitute for rice.

Tapioca compares favourably with rice and other food crops in many respects. It gives some yield, however, low, even from marginal lands. It is highly adaptive to wide range of climatic conditions; it is comparatively free from attacks of pest and diseases and is a less demanding crop in terms of inputs such as fertilizer and agronomic practices. Tapioca is a comparatively cheap source of calaric. True, weight for weight, it gives less calaric than rice i.e., 100 grams of tapioca yield 157 calories as against 345 calories from an equivalent weight of rice. It may be noted, however, that the average yield of calories per hectare of tapioca is several times larger than that of rice.

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The average yield of tapioca, potatoes, wheat and rice in terms of calorie are presented in table 3.35.

TABLE - 3.35 : Yield per hectare of four main crops in India 1970-71

Crop	Yield per hectare	
	Tonnes	Millions of Calories
1	2	3
Tapioca	14.77	23.484
Potatoes	9.03	8.940
Wheat	1.30	4.524
Rice	1.13	3.932

Source: "Note for study team on Potato and tuber crops for National Commission on Agriculture" prepared by the Central Tuber Crops Research Institute, Trivandrum (mimeographed).

Recent years have also witnessed the introduction of new varieties of tapioca with an average yield ranging from 31.9 tonnes to 39.5 tonnes per hectare, more than twice the average yield of traditional local varieties. Thus, tapioca will continue to maintain if not increase the yield difference over rice in terms of calorie per unit of land, notwithstanding, the widespread acceptance of high-yield varieties of rice in the Sub-region. Moreover, keeping in view the dwindling and undependable supply of rice and other foodgrains from outside, the limited supply of land, particularly of land suitable for rice cultivation, and the higher yield potentialities of the tapioca compared to rice in caloric terms, the obvious and rational solution to the food problem in the Sub-region like Kerala State appears to be the substitution of tapioca for rice and other foodgrains. The area under tapioca and production accordingly have registered a substantial increase in the Sub-region. The recourse to increase

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production and consumption of tapioca has two favourable affects on the status of nutrition of the population: (a) in spite of a reduction in the availability of rice and a sharp rise in its price, the average intake of calorie has been maintained if not improved during recent years; (b) the increased availability of tapioca the poor man's potato, has averted famine and under nourishment of the poor strata of society.

In view of the substantially higher share of tapioca (Cassava) which is considered as poorman's food and supply nearly 27% of the total calories required, it has been assumed that 30% of the foodgrain requirements are met by tapioca. The quantum of deficit in the Sub-region is thus, reduced to 4,64,420 tonnes.

6.4. Extension of Agricultural Land and Intensity of Landuse

Agriculture, being the predominant user of land and the principal economic activity in the Sub-region, its primacy in economic development is too obvious to be emphasised. It will continue to remain the main occupation of the Sub-region. The importance of increasing agricultural productivity as a precondition for the overall development of the Sub-region is, therefore, necessary. There is a scope for extending area under cultivation from culturable waste, pastures and fallow lands which together account for 5.11% of the total area in the Sub-region. Out of the total arable land of 1,095,175 hectares in the Sub-region, 984,077 hectares are under net area sown. The remaining 111,098 hectares of land which are under fallow lands, culturable wastes and pastures can be brought under cultivation and fodder crops. It may be assumed that by providing additional irrigation facilities, subsidised inputs and using agronomic

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engineering methods, about 50% of the fallow lands, culturable wastes and pastures 55,550 hectares of land may be brought under cultivation by 1985. Thus, the net area sown is expected to rise from 9,84,077 hectares to 1,039,630 hectares by 1985.

The assessment of water resources has indicated that the Sub-region has a substantial irrigation potential and if harnessed would irrigate nearly 3,32,000 hectares against the existing irrigated area of only 99,165 hectares. Out of the total potential irrigated area of 3,32,000 hectares, it is estimated that about 155,000 hectares,¹ could be irrigated by 1985. Assured irrigation facilities would result in considerable increase in the area under double cropping and significant changes in the cropping pattern. It is expected that irrigation water available from the proposed schemes should be utilised for introduction of short duration paddy, vegetables and ginger. Tapioca may also be grown as second crop in the rainfed condition or in the irrigated area.

Introduction of double cropping in the Sub-region would be restricted to a large extent by the elevation of land. It is, therefore, proposed that only 40%² of the net area sown in 1985 should be brought under double cropping. Intensity of cropping in the Sub-region will accordingly go up from 123.86% in 1974-75 to 140% in 1985. The total cropped area would be about 14,55,482 hectares in 1985 against 1,209,037 hectares in 1974-75, a net increase of about 246,445 hectares.

¹This is based on assumption that all continuing major & medium schemes and proposed minor schemes would be completed by 1985. For details please refer to the section on Water Resources of this Report.

²Based on assumption that the proposed ratio between the net irrigated area and area under multiple cropping would be 10:27 in 1985 against the existing ratio of 10:24. /...

6.5 Cropping Pattern

The cropping pattern of the Sub-region is typical of an underdeveloped agricultural economy with most of the cultivated area is devoted to subsistence food crops specially rice mainly for domestic consumption and local market where the surpluses are traded to meet the immediate domestic and farm requirements, while the plantation crops such as coconut, rubber, coffee, tea, arecanut, and cardamom take invariably second to fourth position in most of the taluks of the Sub-region. Such a cropping pattern owes primarily to the limitations of physiographic conditions, moisture and soil and is aggravated by the socio-economic conditions. The regional variation in cropping pattern become apparent because of spatial differences in agronomic, economic and cultural conditions and is induced by the spatio-temporal variations in rainfall characteristics. The zones of low and un-reliable rainfall support jowar; in humid areas rice cultivation obviates the culture of other crops. The higher the intensity of irrigation, the greater is the area under superior cereals such as rice and the cash crops such as coconut, rubber, arecanut etc. Although, the cropping pattern appears to be relatively diversified where the irrigation facilities are developed yet in the taluks where the intensity of irrigation is higher or where there is possibility to extend further the irrigation facilities, there is a room for further diversification.

From the foregoing account it appears that the agricultural resources are not being properly utilised. It is un-economically desirable to waste the precious agricultural water and not to put the agricultural potentials to recommended uses. There is, therefore, need to adjust the cropping pattern to use resources to /...

the optimum level. With the development of irrigation and new methods of farming, the use of new high yielding strains and chemical fertilisers and the changing technical organisational farm practices, new problems in the sphere of agriculture are arising in the Sub-region. One of these is the changes in the cropping pattern that appears bound to come. In ordinary course of events the changes would come about through hit-and-miss methods in the illiterate and ignorant farm communities which may take a longer time and results in a considerable wastage of valuable agricultural resources. It is, therefore, desirable to cut short this period of adjustment which is important both for the farmers and the Sub-regional economy. Farm profits must be increased and the most efficient utilisation of Sub-regional resources achieved. From the preceding discussion following conclusions appears to be note-worthy:

- (i) The agro-climatic factors have the primary control in determining cropping pattern and the status of the crops therein; the others such as economic technical and organisational influences are weak in their operation over major portion of the Sub-region.
- (ii) The dominance of one or two crops is apparent upto second rank crop exhibiting a real specialisation.
- (iii) The taluks where the intensity of irrigation is high, the cropping pattern generally reveals a certain amount of diversity rather than speciality. On the whole, rice dominates as first and second rank crops in most of the taluks of the Sub-region thereafter ranks the plantation crops such as coffee, tea, coconut etc.

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The cropping pattern is usually determined by the farmers themselves on the basis of yields of various crops, the prevailing price structures and cost of cultivation. However, from the point of view of the national interest certain levels of production have to be planned for each of the crops under consideration. In order to promote a thorough understanding of the agricultural production potential of the land and matching it with the required levels of production, the National Commission on Agriculture has suggested the study of the following:-

- (i) Delineation of rainfall pattern.
- (ii) Identification of existing cropping pattern.
- (iii) Area required to meet the State/National target of production and an ideal distribution of such cropped areas.
- (iv) Juxtaposition of (ii) and (iii) and setting them together to determine possible changes.
- (v) Consideration of the relative factors like soil irrigation, etc., and arrive at a future cropping pattern on the basis of (iv).

This means that agricultural land use should be based on a proper assessment of the production potential of the land, determined on the basis of realistic classifications. The potential could be identified on the basis of the present cropping pattern, soil characteristics, ground and surface water resources, input-output characteristics etc. The agro-climatic boundaries delineated for the homogeneous soil and rainfall characteristics constitute the basis for identifying the productivity differences in agriculture for different crop activities. Planning should ensure that crops are raised under the most congenial conditions for achieving high productivity. This in fact should be /...

the underlying principle for developing appropriate cropping pattern that promote agricultural productivity of an area.

Having decided the gross area under crops, the next step is to allocate the most suitable area for that particular crop. The allocation of areas for different crops requires knowledge of the capability of the land in different parts of the Sub-region. The capability of the land, i.e., its capacity to produce permanently under specified uses, depends on the depth and texture of the soil, permeability, organic matter content and other characteristics that affect the use. The extent of slope and soil erosion also affects the capability of the land. Even though many farmers have made some kind of classification of the capability of their land and adopted cultivation, it is quite possible that they might not have taken into consideration all the above mentioned factors. For example, many farmers failed to recognise that steeply sloping lands cannot be cultivated safely with the method adopted for flat lands. The high pressure of population on land in the State also tempted the people to cultivate wherever possible without the least consideration of the capacity of the land to produce. In the context of limited availability of land and the efforts required to increase the land use efficiency, it is necessary that a detailed classification of lands in the Sub-region according to capability has to be attempted on a scientific basis. The only dependable way of determining the capability of the land is to make careful examination of all the above mentioned factors in the field.

The suitability of land and agro-climatic conditions in the Sub-region are ideal for the cultivation of a number of crops and have tempted the farmers to cultivate

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a host of crops in the same land as mixed crop. This has led to intensive cultivation of dry land in the Sub-region. Cropping patterns have not been scientifically fixed, and the cultivators shift from one crop to other influenced by the variations in demand and consequent effect on prices. The suitability of the land for a number of crops is made use of by the different Commodity Boards also, set up by the State and Central Governments, for extending the area under the crops in which each one is interested. This position very often results in an imbalanced growth of a particular crop area at the expense of other crops.

However, sound and scientific a land use policy may be, the success of its implementation depends on the assured income the farmer gets. Unlike in industry, the price of agricultural commodities fluctuate widely with the levels of supply, which mostly depends on climatic conditions. In the case of perennial crops, even if the price goes down the farmer is not in a position to change over to alternate crops fetching higher income, since he has to forgo the investments made in the previous many years and wait for another seven or eight years to get yield from a new crop with additional investment. Hence, it is very important that farmers are given clear picture about the possible demand of agricultural commodities in the long run, especially in the case of perennial crops, so that the area under such crops is not unduly increased. For the efficient use of the available land also, it is necessary that the area under each perennial crop in the State is not increased haphazardly without taking into consideration the aggregate demand of the produce within the country and outside. In order to overcome such a situation the Kerala State, Land Use Board has attempted to bring out

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the future prospects of some important perennial crops grown and the land use policy to be adopted in respect of them in the State in its publication "perspective land use plan for important perennial crops in Kerala", which may be summarised as follows.

The Land Use Board, has suggested expansion of area under tea, cardamom, cashew and pepper. Tea and cardamom can be grown only in the Western Ghats area where the agro-climatic conditions are most suitable for these crops. Thus, areas suitable for these crops in this region should be set apart for them. Growing of other crops should not be encouraged in these areas except for domestic use. The Land Use Board has suggested that about 8100 hectares of land (including 1500 hectares of fuel reserve in the existing tea gardens) are available for new cultivation. The National Commission on agriculture has, however, not suggested any increase in cardamom area. The Commission is of the view that small holders who possess about 60 per cent of the cardamom area are not in a position to take up any improvement measures to increase the yield rate, and has suggested that suitable measures be taken to increase productivity substantially. To maintain the relative position of Kerala among the different States in respect of cardamom production, an additional area of 33,000 hectares has to be brought under cardamom in Kerala by 1985. It is doubtful whether such an extent of area suitable for cardamom crop can be identified in the State. According to the Forest Department, at the most 10,000 hectares in forest area can be identified for the crop. Hence we have to depend on agricultural technology for increasing the productivity in the existing cardamom plantations. As suggested by the National Commission on Agriculture,

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research on cardamom for evolving high yielding disease resistant varieties and improved technology in the cultivation of this crop is to be given high priority, along with efforts for extension of area under this crop. The land use policy should be that all lands suitable for cardamom cultivation in the western ghat area, especially in Udumbanchola, Devicolan and Peermade taluks should be set apart for this crop since the most suitable climatic conditions for the crop exist in this tract. The problem of deforestation in the cardamom tracts should also be effectively tackled.

Pepper can be grown as mixed crop in coconut and arecanut gardens. Based on the future demand in external and internal markets, the production of pepper in India should increase three-fold by 2000 A.D. Since most suitable agro-climatic conditions for pepper cultivation exist in Kerala, the additional anticipated production has to come mainly from this State. There is great scope for increasing productivity and also for increasing the area under pepper by proper inter-cropping in the coconut and arecanut gardens. Thus, fresh areas are not necessary for expected level of production. Most of the pepper vines are over-aged and disease-affected. If proper attention is paid to the pepper vines by application of manures and fertilizers and timely plant protection measures, the average yield can be increased to at least 0.50 Kg. per vine.

In order to become self sufficient in the raw nut requirement of about 3 lakh tonnes for existing 272 cashew factories (employing about 1.35 lakhs persons, 80% of which are women), the annual production should increase from 1.22 lakh tonnes by at least 200 percent. In view of the large employment potential of industry, the highly

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suitable agro-climatic conditions for the crop and the prospects of cashew kernel in the world market it is necessary to step up production of raw cashew by short term measures i.e., increasing the yield rate through a package of agricultural practices and long term measures by extending the crop to new areas. There is a great scope for increasing productivity in cashew plantations by the application of fertilizers and adoption of plant protection measures. Expansion of cashew cultivation can be taken up only in the marginal lands in view of the low profit margin when compared to other perennial crops. The Land Use Board has estimated that there are at least 50,000 hectares of cultivable waste lands in the five northern districts of Kerala which can be brought under cultivation, either under cashew or other crops. Apart from this, areas suitable for this crop in other regions have to be identified.

In the case of coconut and rubber, expansion of areas is not suggested since the desired level of production can be obtained by increasing productivity in the existing plantations. Research programmes for evolving high yielding varieties and developing agricultural techniques to increase productivity have to be intensified.

In the case of coconut, there is ample scope for increasing the production from the land already put under this crop. Further, possibility of mixed cropping with cocoa, spices and other fruit crops is also high. The land use efficiency can be still increased in the coconut gardens by raising seasonal or annual crops in the inter spaces of the perennial crops. Even after allocating the required area for cocoa and other tree spices for mixed cropping, in order to meet the internal requirement of these products, still there will be plenty of coconut area
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available for mixed cropping. According to the programme adopted in the State, 133,000 hectares of coconut garden are to be brought under interplanting with cocoa by 1985.

The people of the Sub-region practicing traditional agriculture and are backward cannot sustain drastic changes in agriculture. Under food crops paddy will continue to remain the principal crop because of the dietary habits of the people and its suitability to the area. It is proposed, therefore, that the additional area to be brought under irrigation specially in the valleys and plain will be used for paddy. Tapioca, a good raw material for agro-based industries, can be grown as an inter-crop in the rainfed condition or on irrigated lands. Its cultivation on hill slopes, however, results in heavy soil erosion and, therefore, should be restricted in areas where soil conservation measures have been adopted. Moreover, it is expected that by introducing new varieties of Tapioca, its yield may be doubled and able to meet the increased demand. In view of this, the area under Tapioca has been slightly reduced.

Plantation crops, besides being suited to the area, are economically more remunerative. In view of this, a substantial increase in the area under these crops have been proposed thereby raising the percentage of area under these crops from 47.72% of the total cropped area in 1974-75 to 46.50% in 1985. The area under tree crops is also proposed to be increased to compensate the loss of the area under forest by deforestation and to maintain the ecological balance at the regional level. The proposed distribution of the total cropped area among the crops have been indicated in Table 3.36.

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TABLE - 3.36 : EXISTING AND PROPOSED AREA UNDER DIFFERENT CROPS IN KERALA SUB-region

Sl. No.	Crops	Existing (1974-75)		Proposed (1985)	
		Area in hectares	% to total cropped area	Area in hectares	% to total cropped area
1	2	3	4	5	6
1.	Paddy	293,561	24.28	407,067	28.00
2.	Other food-grains	10,302	0.85	14,555	1.00
3.	Tapioca	128,584	10.64	130,993	9.00
4.	Tea & Coffee	70,922	5.87	94,606	6.50
5.	Pepper	62,086	5.14	94,606	6.50
6.	Rubber	119,442	9.88	119,442	8.20
7.	Coconut	186,779	15.45	186,678	12.80
8.	Arecanut	34,918	2.89	43,665	3.00
9.	Cardamun	46,253	3.82	80,050	5.50
10.	Banana	20,241	1.67	29,110	2.00
11.	Other crops including vegetable	235,949	19.52	254,709	17.50
Total:		1,209,037	100.00	1455,481	100.00

The common cropping programme appears to be a necessity to help the agricultural development in the Sub-region. This leads to easy extension services, control and maintenance of genetic purity of crops, healthy competition among the cultivators and better control of crop diseases.

6.6 Output Prospect of Foodgrains:

The average yield of almost all the crops except rice and arecanut is lower in the Sub-region than the Kerala State (Table 3.37). The reason for such a low yield appears to be lack of irrigation facilities, application

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of high yielding variety of seeds, lack of plant protection measures, fertilisers, seeds and general economic backwardness of the cultivators. To increase the production of foodgrains and plantation crops besides the extension of irrigation facilities, the increase in the intensity of crops which is technically feasible and economically profitable as discussed earlier in the development efforts towards enhanced production in agriculture will need to be focussed on the following key elements:-

- (i) Expansion in the supply of fertilizers, plant protection, materials, farm machinery and agricultural credits
- (ii) Increased use of high-yielding varieties of seeds in case of cereals and tapioca
- (iii) Intensive efforts for raising the yield of plantation crops.

TABLE - 3.37: Average yield of selected crops in Kerala Sub-region and Kerala State 1974-75 :

Name	Yield in Kg./Hectare					Yield in Nuts/Hectare	
	Paddy	Tapio- Ca	Coff- ee	Tea	Rub- bber	Arecanut	Coconut
1	2	3	4	5	6	7	8
Kerala Sub-region	1590	15580	422	1270	580	149636	4936
Kerala State	1540	17696	431	1301	601	148072	4971

Source: Season and crop Report Kerala, 1974-75.

- (iv) A well-organised collection and marketing system for agricultural products will interest of the producer along with assurance of minimum prices for major agricultural commodities.

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- (v) Development of Livestock and animal husbandry which comprises the improvement in breeding, feeding, marketing and management of dairy and poultry products.

The hybrid seed growing process being complex and sophisticated, it is suggested that its supply be arranged from outside. For other crops, while nucleus and foundation seeds will be procured from outside, the multiplication can be arranged on the farms of progressive cultivators under expert guidance and supervision. In the interest of good extension, seed multiplication should be arranged and encouraged as far as possible in the villages.

The need for a proper extension service, so that cultivators learn to diagnose diseases, i.e., whether soil-borne, seed-borne or produced by attacks of pests or environmental effect, is there. In addition, they should know the use of necessary equipment and chemical for controlling diseases. The efficient supply of sufficient quantities of insecticides, pesticides and fungicides is another dimension of the extension programme.

It is difficult to estimate precisely the additional production resulting from the package of operations suggested. With these measures, it is expected that it would be possible to achieve a growth rate of 3% per annum for paddy against the envisaged growth rate of 3.61% for foodgrains in India.³ The production would rise by about 18% over 6 years, i.e., over the yield rate of 1978-79 (assuming the yield of 1974-75 being the yield for 1978-79).

³ Draft Five Year Plan 1978-83.

The output of foodgrains (rice and jowar) per hectare would work out to about 1820 Kg. against the output per hectare of 1543 kg. in 1974-75. About 421,622 hectares are proposed to be under foodgrains by 1985. The total output of foodgrains thus works out to about 767,350 tonnes. Keeping an allowance of 16% of total production for seeds, wastes etc., the total production of foodgrains available for consumption works out to 644,588 tonnes. The requirements of foodgrains for the estimated population of 9,500,000 in the Sub-region by 1985⁴ will be of the order of 1,552,300 tonnes. It may be noted, however, that the assumptions regarding the consumption requirements in the Sub-region, as stated in the earlier section of the report, appears to be on higher side because of the peculiar food habits of the people where 30% of the people, especially weaker sections of the society use tapioca. Keeping this in view, the quantum of foodgrain deficit would be about 442,000 tonnes in 1985 against 4,64,420 tonnes in 1974-75.

The other gains in output would be also substantial notably in area and yield of plantation crops. There is ample scope for increasing the area and productivity in the plantation crops to achieve the desired level of production. Thus, there would be substantial rise in terms of gross value per hectare of net sown area which will give boost to the Sub-regional economy in general and agricultural sector in particular.

⁴The estimated population for 1985 has been worked out taking an average growth rate of the State and the Sub-regional figure for the period 1961-71.

6.7. Requirement of Fertilizer

The low productivity of soil in the Sub-region is also related to the low utilization of fertilisers pesticides and modern implements. Since the Sub-region has the potential for plantation (tree) crops and the area under tree crops has to be increased to maintain ecological balance, the production of food grains for local consumption can be substantially increased by the increased use of fertiliser and HYV seed. Since substantial increase in irrigation facilities would irrigate about 55,835 hectares of additional land mainly for the cultivation of Paddy and other plantation crops, the use of fertilisers and HYV seed would increase tremendously. The estimated requirements of fertilisers will be about 47,005 tonnes of N, 45,710 tonnes of P and 63,770 tonnes of K (Table - 3.38).

TABLE - 3.38 : Requirement of Fertilizer in the Kerala Sub-region by 1985

Sl. No.	Crop	Area (Proposed) (in hectares)	(X) Requirement of fertilizer per hectare (in Kg.)			Total requirement (in Tonnes)		
			N	P	K	N	P	K
1.	Paddy	407,067	40	20	20	16280	8140	8140
2.	Other food grains	14,555	25	10	10	360	145	145
3.	Tapioca	130,993	25	10	10	3275	1310	1310
4.	Coffee & Tea	94,606	30	40	60	2840	3785	5675
5.	Other Crops	808,260	30	40	60	24250	32330	48500
Total:		1,455,481	-	-	-	47005	45710	63770

(X) Based on the discussions with local officers. In case of other food crops, the requirement is assumed to equal to the requirement of Tapioca.

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6.8. Proposed Market Centres:

The Sub-region is very much deficient in marketing facilities. The regulated markets exist only in Fathana-puram taluk. The main marketing needs are mainly met by 276 unregulated markets in the Sub-region, which are neither well-equipped nor evenly distributed. Small farmers and marginal farmers have no access to regulated markets and thus are unable to sell their products at a reasonable price. It is, therefore, necessary to offer a strong incentive to the multitude of small and marginal farmers to increase the yield and ensure attractive return through an assured remunerative price-structure, which the prevailing marketing pattern does not provide. Most of the products are collected during the peak period when the price is low and the small farmers part with their produce at a lower price, as they can ill-afford to wait for improvement in the price levels as they are hard pressed to meet their urgent commitments. The low price is ascribed not only to the peak production in the season but also to an organised move by the traders to mop up the produce through inter-mediaries as cheaply as possible. The majority of the farmers have neither the bargaining power nor the capacity to hold the stuff to be sold at a future date. The gradual increase in price level after this period hardly benefits the farmers but enables the traders and manufacturers to quote higher prices for the semi-processed goods. To have a salutary influence on the marketing trend ensuring an attractive return to the growers and a fair price for the consumer is necessary and for that a suitable organisational system like Kerala Coconut Development Corporation, should be created to have a grip over the marketing and processing of agricultural product including plantation crops.

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In view of this, it is suggested that each Panchayat should have Farm Product Collection Centre and a Regulated Market should be established at suitable location to serve the farmers better. The development of cooperative marketing should be encouraged among cultivators especially among small and marginal farmers.

6.9. Agricultural Credit:

Cultivators need credit for improved seeds, fertilizers, plant protection and irrigation etc. Assuming that they meet 25% of their needs themselves, the crop-wise requirements of credit for important food and plantation crops in respect of preparation of land, seed, fertilizers, pesticides and irrigation according to Lead Survey Report of the Syndicate Bank are as given in table 3.39.

TABLE - 3.39: Average Requirement of Credit for Important Crops in the Kerala Sub-Region:

Sl. No.	Crops	Requirement of Credit (Rs. per hectare)
1	2	3
1.	Paddy	950
2.	Pepper	700
3.	Coconut	950
4.	Arecanut	1400
5.	Tapioca	700

On an average a credit of Rs.1,000/- per hectare will be required for the cultivation of various crops. The total requirement of credit for the total cropped area of 1,455,481 hectares envisaged by 1985 would be about Rs.145.55 crores.

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6.10. Livestock and Animal Husbandry, its Development Prospects

The livestock of the Sub-region is of extremely poor quality and needs to be organised to provide employment and to give economic boost to the local people. Improvement in its quality depends on four factors viz., breeding, feeding, marketing and management. For improved breeding artificial insemination should be extended to all Panchayats in the Sub-region.

A concentrated effort is required for the development of stall feeding by developing pasture land for growing feed grass during dry season. Since open grazing on slopes may aggravate soil erosion problem, stall feeding is the only alternative for the development of livestock and animal husbandry. The difficulty to provide proper feeding which resulted in low production makes cultivator indifferent towards keeping farm animals. The figures for livestock population for the year 1966 to 1972 show an increasing trend in their number. Considerable decrease, however, has been recorded in bullocks and pigs.

The development of piggery and poultry has good potentials for development as a secondary occupation for the cultivators and main occupation for the landless labourers. Keeping in view the potential of development, it is envisaged that there would be 25% increase in the population of livestock and poultry by 1985 which would be able to provide employment to about 48,000 workers (Table - 3.40).

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TABLE - 3.40 : Proposed Livestock Population and Requirement of Mandays in Kerala Sub-region.

Sl. No.	Particulars	Existing Population, 1972	Proposed* Population, 1985	Man-days** per head	Total Mandays Required
1	2	3	4	5	6
1.	Bulls	2,209	2,761	7	19,327
2.	He-buffaloes	88,260	110,325	3	330,975
3.	Bullocks	178,079	222,599	7	1,558,193
4.	Cows	457,245	571,556	15	8,573,340
5.	She-buffaloes	71,420	89,275	15	1,339,125
6.	Sheep	7,269	19,086	1	9,086
7.	Goats	540,848	676,060	1	676,060
8.	Pigs	74,430	931,037	4	372,148
9.	Poultry	4,083,472	5,014,340	0.3	1,531,302
Total:		-	-	-	14,409,556

*25% of the existing population will be added in next 13 years if proper veterinary services, are provided in the Sub-region.

**Agricultural Geography by Loglie Symons Page No. 222.

The boost up the production from this sector collection Centres for livestock and animal produce Chilling Plants for storage of milk and meat products should be provided at suitable locations so that people of remote areas could avail off this facility.

6.11. Forest Development:

The area under forest is less in Sub-region than the area required under forest as envisaged under the National Forest Policy. Besides, this, a great proportion of the forest area is under scrub vegetation and is not

contributing much towards the economy of the Sub-region. There is, therefore, need to initiate scientific afforestation programme in the area devoid of forest cover with suitable species such as teak. Eucalyptus is also the suitable specie and is grown because of its quick cycling. Its application on vast area, however, should be judiciously restrained so that it does not create ecological problem in the foot hills. Plantation of rubber, cashew and local varieties of softwood should be selected for afforestation. For the first five to seven years inter-cropping should be allowed by tribals and local people under the supervision of district supervisor forest officer. Pepper and Coffee on the hills and tapioca on the slopes should be encouraged as inter-crop.

Forest produce should not be allowed to go out in raw form. It should be either semi-processed or processed in the sub-region itself to create more employment opportunities and raise the income of the local people. Industrial establishments may be encouraged to install small units for processing the forest produce.

6.12. Employment Potential in Primary Sector Excluding Mining by 1985

Like the estimate of additional agricultural production resulting from the package of operations suggested, any estimate of additional employment through the development programme of agriculture, animal husbandry and forestry and is beset with equal difficulties. In the following paragraph an attempt has been made to assess the employment potential in the primary sector of the economy in the Sub-region by 1985.

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Paddy normally absorbs maximum mandays per hectare per year. It is estimated to absorb 1.5 workers per hectare assuming that they will be working for 6 hours per day for 300 days per annum.¹ On this basis about 610,600 workers are expected to be gainfully employed in paddy cultivation by 1985. Other foodgrains require less mandays and is expected to provide employment to only 2,425 workers. Plantation crops especially those which require special care in harvesting and processing employ more labour. The area under important plantation crops is about 53.50% of the total cropped area and is estimated to provide employment to about 407,880 workers.

¹ The working group on Agriculture of the Committee on Unemployment set up by the Government of India(1972) in its report has suggested the requirements of labour force for providing irrigation facilities as follows:-

<u>Crop</u>	<u>Labour days per hectare</u>	
	<u>Irrigated</u>	<u>Dry</u>
Rice	116.32	94.57
Jowar	63.35	29.71
Bajra	66.73	49.52
Maize	59.54	50.40
Ragi	133.42	95.05
Wheat	104.06	74.70
Barley	61.76	57.99
Total pulses	50.37	37.84

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The scope of the employment opportunities under forestry is not much. Preparation of land, saplings and vigilance etc. does not generate more than 13 mandays per hectare. This was also discussed with local forest officers in case of North Wynaad taluk who were of the view that until and unless intensive forestry is done, the generation of mandays will be around 10 to 15 mandays per hectare. Assuming that forests will gainfully employ @ only 13 mandays per hectare, the forests will be able to generate employment for about 42,520 workers in the Sub-region.

The total employment likely to be generated in the primary sector, i.e., agriculture, animal husbandry and forestry would be about 1,451,100, i.e., 47.75% of the total estimated workers² in the Sub-region by 1985 against 68.34% in 1971 (Table 3.41). The balance of the labour force i.e. about 1,588,900 need to be absorbed in secondary and tertiary occupations. There is, thus, need to diversify the employment structure through the creation of non-agricultural occupation by creating suitable climate for industrial development, provision and strengthening of infrastructure and services.

6.13 - Programme of Development for Different Population Groups

The development strategy for Western Ghats has its primary objective, the conferment of benefits directly on each of the population groups living in the area. Such benefits will be in terms of gainful employment, provision of adequate infrastructure and facilities for productive activities and improvement in the living standards

² Assuming participation rate of 32% in 1985 against 30.23% in 1971.

such as banking, marketing, transport, communication, health, education etc. Keeping in view the overall development strategy, the programme of development, i.e., the kind of primary and secondary activities along with the infrastructure and other support for such activities which should be initiated in the Sub-region has to be spelt out population groupwise. For this purpose, population depended on primary activities which have been divided into four groups (i) big farmers having land more than 2 hectares (ii) small farmers having land between 1-2 hectare, (iii) marginal farmers having less than one hectare and (iv) land less labourers. Schedule Castes and Schedule Tribes have also been given special attention in restructuring of economic activities. Primary employment, infrastructure support and programme for incentives/disincentives are also suggested for each of these population groups.

The programme of development in the Sub-region has been structured for each specific group of people based on their actual needs as detailed out in the statement showing the proposed restructuring of economy/social activities.

Big farmers who can sustain cultivation activities are proposed to be given infrastructural support and incentive for agricultural activities. Small and marginal farmers should be persuaded to consolidate their land holdings and or organise cooperative or group farming so that their holding may yield good returns. Dry farming is also suggested so that they should not leave their land as fallow. Landless labourers will be working in plantation, big agricultural farms, forest areas and poultry or piggery farms and to assist them housing, transport facilities and credit facilities are to be

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Table - 3.41 : Estimated Employment Capacity in Agriculture, Forestry and Animal Husbandry in the Kerala Sub-region during 1974 and 1985 :

Area of Activity	1974 - 75		Area in hectares	1985	
	Total area in Hectares	Employment @ 300 days in a year		Employment @ 300 days in a year	
2	3	4	5	6	
Paddy	293,561	440,342	407,067	610,600	@ 1.5 persons per hectare.
Other foodgrains	10,302	1,717	14,555	2,425	@ 50 mandays per hectare.
Cassia	128,584	64,292	13,993	65,495	@ 150 mandays per hectare.
Tea & Coffee	70,922	65,012	9,606	86,720	@ 275 mandays per hectare.
Pepper	62,086	56,912	9,606	86,720	@ 275 mandays per hectare.
Rubber	119,442	59,721	11,442	59,720	@ 150 mandays per hectare.
*Coconut	186,779	31,129	18,678	31,115	@ 50 mandays per hectare.
*Arecanut	34,918	2,327	4,665	2,910	@ 20 mandays per hectare for adult palms.
Cardamum	46,253	61,671	8,050	106,735	@ 400 mandays per hectare.
Banana	20,241	23,615	2,110	33,960	@ 350 mandays per hectare.
Other crops	235,949	78,650	25,710	84,905	@ 100 mandays per hectare.
Forestry	981,212	42,520	98,212	42,520	@ 13 mandays per hectare.
Animal Husbandry	-	40,000	-	48,000	
Sub-total:	2,190,249	967,908	2,436,694	1,261,825	
**Allied activities				189,273	
Total:				1,451,100	

**Assuming that 15% of the workers engaged in Agriculture, Forestry and Animal Husbandry will be gainfully employed in allied and sideline activities.

*Irrigation needs are not taken into account while estimating the labour requirements for coconut and arecanut.

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provided. It has also been proposed to give incentive to these labourers for self employment in household, agro-based and forest-based industries such as coir, bidi-making, small wooden agricultural implements and other household items of daily needs.

Schedule castes and schedule tribes which also come under the above four population groups are given special attention in the development programme. Accordingly it has been suggested that they should be given preference in the allotment of new reclaimed land.

One of the important pre-requisites for the success of this programme would be the identification of small and marginal farmers who are ready to take up cooperative farming and other who are not interested either because of technical non-feasibility or because of their conventional outlook. Programmes for these two groups of farmers are to be initiated on different lines as indicated herewith.

Programme for Farmers Interested in Co-operatives/
Group Farming

The programmes of development for this group would be broadly as follows:

- I. Extension of land reclamation schemes on these farms which includes soil testing, contouring, bunding, and soil conservation methods.
- II. Extension of irrigation facilities. Minor and lift irrigation schemes should be created wherever feasible and pump sets be made available on priority basis to them.

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- III. Scientific crop rotation and cropping programme for each cooperative farm should be planned by agricultural scientists/experts.
- IV. Proper doses of water, fertilizer and plant protection chemicals are to be worked out on the basis of the soil capability and individual crop requirements and should be made available.
- V. Facilities for initial processing of farm produce should be located as far as possible on farms to reduce transportation cost. For proper marketing, farm produce collection centres with godown facilities need to be established at suitable locations.
- VI. To further strengthen their economic condition cooperative dairy farms, poultry farms/piggery farms are proposed for these farmers.

Programme for Farmers who are either not interested in Cooperatives or to whom Cooperatives are not Technically Feasible.

Most of these farmers are tribals or those whose farms are scattered. Most of these tribals families are to be settled on vested forest lands and induced to develop the habit for permanent cultivation and settlement. Programmes of development for this group of families would be as follows:

- I. Farmers should be encouraged to undertake reclamation of land, soil conservation methods under technical supervision of the agricultural expert or corporate agency. This work is proposed to be undertaken under "food for work" programme.

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II. Inputs should be given in kind and additional credit facilities should be given to meet other expenditures.

III. Cows/buffaloes/goats/pigs/poultry should be given to these farmers to supplement their income. For these programmes following schemes should be taken up by the Department of Animal Husbandry in cooperation with Agricultural Extension Department/Office.

A. Dairy Development (1000 families of small farmers and marginal farmers).

(i) Breeding Schemes:

- (a) Distribution of breeding bulls.
- (b) Artificial insemination for better breed.
- (c) Establishment of mobile breeding units.

(ii) Feeds and Fodder:

- (a) Supply of concentrate feed.
- (b) Conservation of fodder.
- (c) Fodder demonstration plots.
- (d) Utilisation of grass land and unreclaimed culturable waste land.

(iii) Collection, Storage, Processing and Marketing.

- (a) Milk collection centres.
- (b) Chilling plant.
- (c) Milk Transport vehicles.

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B. Goat Rearing: (500 families of small farmers and marginal farmers and 1,500 families from landless labourers.)

I. Breeding Schemes:

- (a) Supply of 2 female kids per family.
- (b) Artificial insemination for better milk/meat/wool.

II. Marketing:

- (a) Surplus kids will be purchased by the Goat farms. Milk will be consumed by the owner and his goats will be given for slaughtering, wool and skin will be purchased by the farm for further marketing to appropriate dealers.

C. Poultry Keeping: (500 families of small and marginal farmers and 1,500 families from workers engaged in agriculture, forestry, animal husbandry and allied occupations)

- (a) Distribution of chicks.
- (b) Distribution of feed upto 8 weeks on subsidy basis.
- (c) Subsidy for sheds or construction of sheds.
- (d) Assured marketing.

D. Piggery Development (500 families of small and marginal farmers and 500 families from workers engaged in agricultural, forestry and allied activities)

- 1. Distribution of piglings.
- 2. Distribution of concentrated feed.
- 3. Assured Marketing.

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E. Beekeeping: (500 Tribal families of landless agricultural workers and workers engaged in forestry occupation)

1. Distribution of Beehive boxes.
2. Collection of honey and marketing.

Construction of Rural Industrial Estate

1. Rural Industrial Estate of 150 sheds at suitable locations.
2. Mini Industrial Estate of 50 sheds at suitable locations.
3. Rural Industrial Sheds of 15 Nos. each at suitable locations.

Other Developmental Activities:

Construction of roads, upgradation of roads, lift and minor irrigation schemes, construction of buildings for educational, medical, recreational and other institutions.

SECTION - IV : MINING AND MINERALS DEVELOPMENT

Minerals play multiple roles in economic development. Like other resource products, they are a generator of economic growth, a source of capital formation within the region or country and in the case of exportable minerals, source of foreign exchange. More importantly, however, they are the physical substance of both industry and industrialised agriculture and it is their high internal utilisation that makes possible a high level of living. It is the use of resources which is important and the achievements of course will be ultimately measured not in terms of tonnes of ore and enlarged reserves but in terms of human development and the quality of living.

1. MINERAL RESOURCES

The Kerala Sub-Region may not be rich in a variety of minerals, but it contains good deposits of china clay, fire clay, steatite, quartz, mica, limestone, lineshell and kankar limestone, iron ore, magnesite, graphite and gold, some of which provide scope for mineral based industries. Distribution of minerals in Kerala Sub-Region is shown in Fig. 4.1.

A brief description of the nature and extent of reserves of important minerals, present state of development and the prospects of development of these minerals is given in the following paragraphs:

1.1 China Clay

China clay, a raw material for ceramic, refractory, fertilizer, paper and a host of other industries is reported

to occur in the Kasalia Sub-Region. Important deposits of china clay are found in the taluks of Mananthavadi (North Wynad) and Kunnathanad. Total deposits of china clay, as estimated by the State Department of Mining and Geology, in these taluks have been placed at 11.70 lakh tonnes. Talukwise and areawise description of these deposits are stated below:

(i) China Clay Deposits of Mananthavadi (North Wynad)

China clay occurs at Attachirakkal and Achhakunna. Clay is fairly plastic and white and is derived from the decomposition of felspathic rocks found in pockets. The reserves as estimated are 1.70 lakh tonnes. Mining has not been undertaken in this area.

(ii) China clay Deposits of Kunnathanad

In this taluk, deposits of china clay have been found at two places, namely Mathupillakkad and in Kunnathur village. Investigations by State Department of Mining and Geology have placed the reserves of China clay in these areas at 10 lakh tonnes.

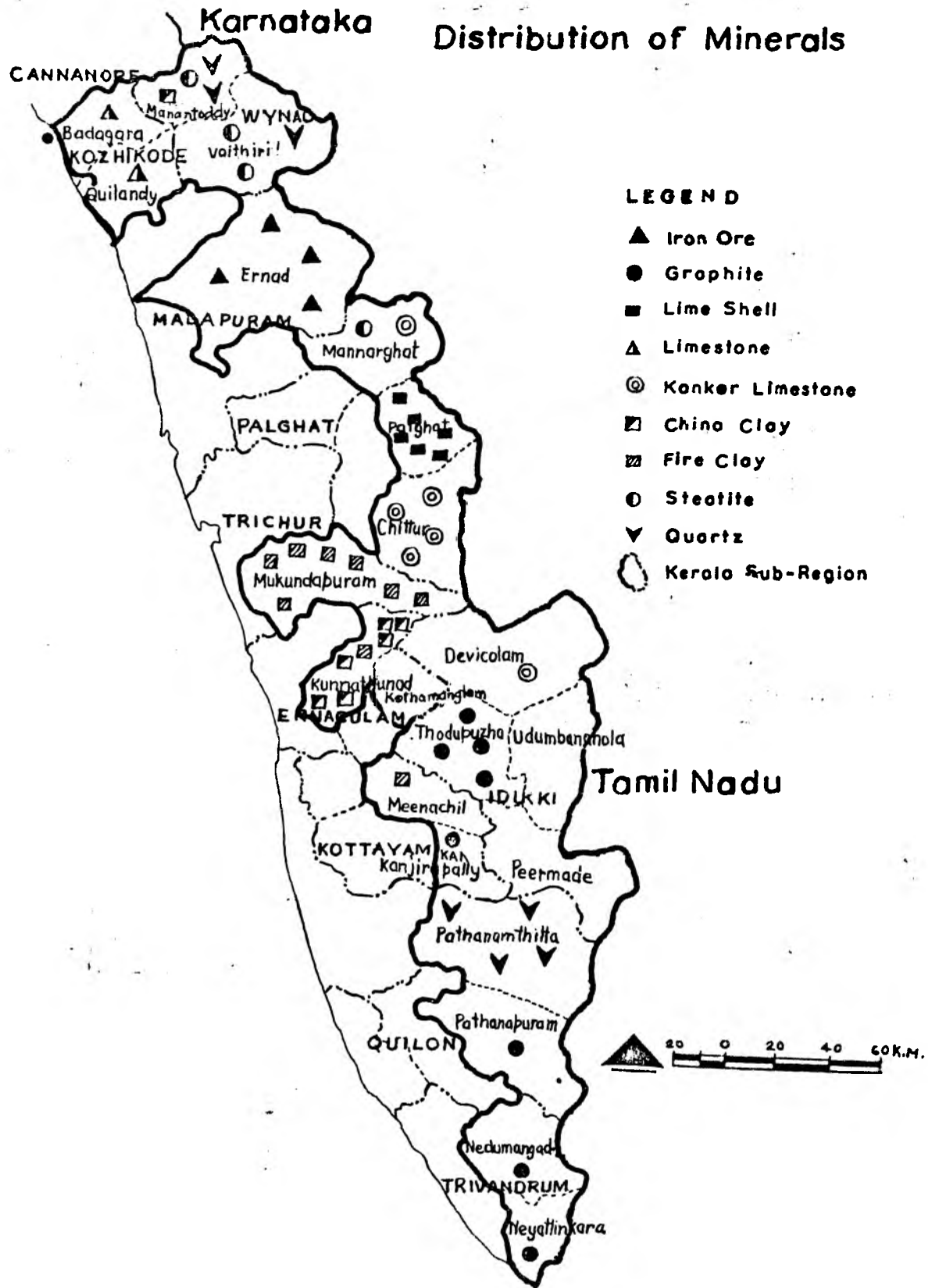
At Mathupillakkad, about 5 lakh tonnes of china clay has been estimated over an area of half sq. km. In Kunnathur village in an area of 0.28 sq. km, the occurrence of another 5 lakh tonnes of china clay has been estimated.

No mining has been undertaken in this taluk.

Fig. 4.1

KERALA SUB-REGION

Distribution of Minerals



1.2 Fire Clay

Fire clay, a raw material for refractory, ceramic and foundry industries, is another important mineral to be found in Kerala Sub-Region.

Fire clay deposits in Kerala Sub-Region has been reported from Mukundapuram, Kunnathunad and Meenachil taluks. State Department of Mining and Geology has carried out various investigations in these taluks and has assessed the deposits at 15.20 lakh tonnes. Talukwise description of the deposits are given below:

(i) Fire Clay Deposits of Mukundapuram Taluk

In this taluk fire clay occurs at Aripalan, Padiyar and Puthenchira covering about 1 sq.km. area. The average thickness of clay bearing portion is 3 to 4.5 metres. A total estimate of 14.50 lakh tonnes of reserves was proved in the area.

Mining has not been undertaken. The area is thickly populated. In order to mine the mineral, the area has to be acquired, in which case problem of rehabilitation will arise.

(ii) Fire Clay Deposits of Meenachil Taluk

In this taluk fire clay occurs at Kanakarry for the average thickness of 1.5 metres and the reserves are estimated around 0.70 lakh tonnes.

(iii) Fire Clay Deposits of Kunnathunad Taluk

Preliminary investigation by the State Department of Mining and Geology has revealed minor occurrences of

fire clay in the taluk. They are not of much economic significance.

1.3 Graphite

A variety of naturally occurring carbon graphite is highly acid-resistant and good conductor of heat and electricity and is also a refractory mineral. The mineral occurs in lump, flaky or powdery forms which, together with the total fixed carbon content, determine the uses.

Flaky graphite is used in the manufacture of refractory crucible and retorts for metallurgical operation (particularly non-ferrous), foundry facings etc. High grade amorphous or crystalline graphite with a tendency to form colloidal suspension in oil, is used as lubricant. Lump graphite is used in making protective paints. Amorphous graphite is used for 'lead' pencils.

Pure graphite is used as moderators in certain atomic reactors. Since Indian graphite does not satisfy the required specifications, graphite has since been derecognised as an atomic mineral.

1.3.1 Resources of Graphite in Kerala Sub-Region

Important workable deposits are known from the 'khondalite' rocks of Kerala Sub-Region; important deposits are reported from the taluks of Thodupuzha, Kanjirappally, Pathananthitta, Pathanapuram, Neyyattinkara, Udumbanchola and Peermade. The total estimated reserves

of graphite in these areas have been put at about 3.71 lakh tonnes. A brief description of these deposits and their present stage of development are given below:

(i) Graphite Deposits of Thodupuzha Taluk

This taluk is rich in graphite deposits. Vigorous investigations by the Geological Survey of India have been done in this area during 1967 and 1974. Total estimated reserves of graphite have been placed at 3.65 lakh tonnes.

Graphite deposits in this taluk are located at Piralinatton and Manakkad. The graphite bearing rocks are lateritised and weathered upto a depth of 40 metres. The graphite content of the rock is 20%.

Nine graphite bands occur at Piralinatton. The average thickness of bands varies from 0.45 to 2.70 metres and extension along the strike from 35 to 110 metres. The deposits are in three blocks. In block A, a reserve of 34527 tonnes of graphite has been estimated with graphite content of 17 percents. In Block B, the strike extension varies from 20 to 80 metres. The Block contains 35667 tonnes of graphite ore; graphite content being 13%. In Block C, the bands have length of 20 metres to 80 metres. A reserve of 31514 tonnes of graphite ore have been estimated.

In the Manakkad area graphite is found over an extension of 120 metres with a thickness of 4 metres. The estimated occurrence of graphite ore is 264000 tonnes.

The graphite in all the above areas are of good quality and flaky in nature. The ore to overburden ratio in the area is 1:3 and open cast mining is suitable to winover the ore.

At present, there is no mining activity. The ore is being tested at the National Metallurgical Laboratory and other laboratories for determining their beneficiation characteristics and its industrial utilisation for crucible manufacture, etc.

(ii) Graphite Deposits of Kanjirapally Taluk

Several occurrences of graphite have been estimated at Chirakkadavu and Thirthapadapuram of Kanjirapally-Vazhoor area of the taluk. Disseminated ore in these occurrences are being explored by drilling. The mineral occurs over considerable area. The graphite content varies from 5 to 15 percent. No estimate or reserves has been made so far.

(iii) Graphite Deposits of Pathanapuram Taluk

In this taluk graphite deposits are found at Karappanthodu area near Punalur and the reserves have been estimated at 0.03 lakh tonnes with an average content of graphite 15 to 17%. The prominent zone is 150 metres long and is 20 metres wide. There is no mining activity in this area.

(iv) Graphite Deposits of Neyyattinkara Taluk

Graphite occurs as veins and shoots associated with pegnetites traversing graphite bearing schists and gneisses at Chengalloor, Puliyarakonam and Maranalloor.

M/s. Morgan Crucibles exploited the graphite deposit at Puliurakonam and Chengalloor between 1900 to 1910. At present mineral is not mined.

In addition to these, other taluks where occurrences of graphite have been reported are Udumbanchola, Peernade and Pathanamthitta.

In Udumbanchola taluk, preliminary investigation by the State Department of Mining and Geology has revealed minor occurrences of graphite.

In Peernade taluk investigation carried out by the Department of Mining and Geology has revealed the occurrence of graphite at Kuttikanam, but further examination in the area showed that the deposit is not of any importance.

(v) Graphite Deposits of Nedumangad Taluk

In Nedumangad taluk graphite occurs at Velland, Changa, Kuttichel, Konni, Vittura and Aruvikara. In the above places the mineral is found associated with pegmatite found as intrusive in the rock, especially graphite bearing rocks. Graphite is of good quality and flaky variety, occurring as lumps, containing more than 70% to almost pure graphite.

In Changa area the deposit was explored by drilling and about 0.03 lakh tonnes of ore with 75% graphite content was estimated.

At present, there is no mining. In the past, during 1910-1914, the Morgan Crucible mined graphite at Vekkebad-Changa. The annual production was around 2000 to 3000 tonnes. At present, no working of mining could be located except for the dumps strewn all over at Changa.

Minor occurrences of graphite at Varavoor in Pathananthitta taluk have been reported but they are not of much economic importance.

1.4 Quartz

Another mineral found in the Kerala Sub-Region is quartz, which finds a number of uses especially in ceramics, pettery, glass, refractory and abrasives industries. In the Sub-Region, the occurrences of quartz are reported from Mananthvadi, Vaithiri and Pathananthitta taluks. Total reserves of quartz in the Sub-Region, as estimated by the State Department of Mining and Geology, has been placed at 7.80 lakh tonnes.

In Mananthavadi taluk quartz occurs at Mananthavadi in the form of large quartz reef and is estimated at 3 lakh tonnes.

In Vaithiri taluk quartz occurs at Aruvayal-Kunnu, Ambalayal and Mangalathu Kunnu and the total estimate is around 0.30 lakh tonnes.

In Pathananthitta taluk quartz is reported to occur at Anathadam near Rani, about 4.5 lakh tonnes of quartz is estimated over an area of 80,000 sq. metres on the Anathadam hill.

1.5 Steatite

Steatite or talc which in pulverized form is used in various industries like rubber, textiles, plastic, paper, cosmetics etc., occurs in Kerala Sub-Region in Mananthavadi, Vaithiri and Manarghat taluks.

In Mananthavadi taluk steatite occurs in talc-trenolite rock in lenticular bands at Edayannur. A reserve of 1.20 lakh tonnes has been estimated.

In Vaithiri taluk steatite occurs at several places at Kuppadi, Vangoor and Tutuleri, Thaluri and Chitalary and are being investigated to assess the reserves.

In Manarghat taluk, the occurrence of steatite has been located at Kulukkur near Anakkatty. The extent and nature of the occurrence are under detailed examination.

1.6 Iron Ore

Iron ore deposits have been reported from Ernad and Kunnathunad taluks. Of these, the deposits of Ernad is rich and extensive where as the deposit of Kunnathunad is very small and of no significance.

In Ernad taluk iron rich band of magnetite - Quartzite ranging in thickness between 200-300 metres extends to a distance of 2 kms. along hills such as Airakunnu and Theyyan Padikunnu near Vaniyanbalam. About 18 lakh tonnes, of iron ore has been estimated. Other small magnetite quartzite hills near Nilanbur has been estimated to contain 51 lakh tonnes of iron ore.

1.7 Mica

Mica associated with pegmatites have been located at Chullioode, Thirunelli, Polakunnu and Panamaram of

Vaithiri taluk and are being further investigated for their industrial potentiality.

At present, there is no production of mica from these areas.

1.8 Gold

In Eruad taluk around Nilambur several gold bearing veins occur and the important ones are at Arippunadalkunnu, Penkunnu and Munda Padankunnu. The content of gold in the quartz veins present in these areas is so low that economic exploitation has not been attempted.

Gravels in the older alluvial terraces and river beds in the Nilambur valley has been investigated. About 8.5 million cubic metres of gravels are estimated in an area of 6.45 sq. km. The gold content in the tested area is 0.08 to 0.70 grams per cubic metre of gravel.

Occurrence of gold of vein type from Mananthavadi in the Mananthavadi taluk has been reported but this may be regarded as more of scientific interest of doubtful commercial importance.

1.9 Limestone

Limestone is the prime raw material for the manufacture of cement, steel and chemicals. Small quantities are used by fertiliser, glass, paper, sugar and other industries.

In the Palghat taluk of the Kerala Sub-Region there are good deposits of limestone, based on which there is possibility of setting up of a cement plant.

The Pandarattu limestone of the taluk has been investigated by the Geological Survey of India and the Mineral Exploration Corporation Ltd. recently and the deposit has been estimated to be about 230 lakh tonnes. The deposit has been proved to persist to a depth of over 100 metres below the bed of a small stream that drains the deposit.

The limestone is crystalline and medium to coarse grained. Adequate tonnage of good quality limestone are available for supporting a cement plant of 1000 tonnes per day capacity.

The deposit has not been mined so far but is to be utilised for the establishment of a cement plant in the public sector.

1.10 Kankar Limestone

Investigations carried out by the Department of Mining and Geology have located Kankar limestone in Mannarghat, Chittoor and Devikulam taluks of the Kerala Sub-Region.

In Mannarghat taluk Kankar limestone occurs along the lower basin of Siruvani and Bhavani rivers at Kottathara and Agali. Deposit has 3 metres thickness and extends over 5 hectares of area. No estimate of the reserves has been made.

In Chittoor taluk the mineral occurs as tough nodules, concretions and as a cementing material. It occurs below a top soil of 0.5 metre to 3 metres in thickness and is discontinuous and irregular in its occurrence. The deposit is found in Kozhinjanpara and Chittoor areas where the total reserves have been estimated to be of the order of 35 lakh to 40 lakh tonnes.

Limestone bands are found associated with granite bands at Nadupani and Gopalapuram areas. Seven lakh tonnes of crystalline limestone has been estimated in these areas.

No mining has been undertaken in this area.

In Devikulam taluk prospecting operations at Champukkad had revealed the occurrence of 0.40 lakh tonnes of the mineral at an average depth of 1 metre in an area of 10 hectares.

1.11 Lineshell

Like limestone, lineshell is used in the manufacture of cement, sand lime brick and calcium carbide.

Lineshell in Kerala Sub-Region, is found in Quilandy and Badgara taluks.

In Quilandy taluk, the mineral occurs in Moorad rivers, land areas in paddy fields at Quilandy. The occurrence is limited to 0.5 to 1.2 metres from ground surface and is estimated at 0.10 lakh tonnes.

1.12 Magnesite

Magnesite is one of the most important basic refractories. It also finds use in chemical, abrasives,

foundry, battery, ferro-alloy, electrode and insulation board industries. But consumption in all these fields is below 3% of the total production and over 97% is used in the manufacture of refractories alone. In Kerala Sub-Region, so far the only important locality of magnesite is in Manarghat taluk where it occurs at Mulhe in the form of criss-crossed veins in rocks which cover an area of approximately 2 to 3 hectares. At Kulukkur near Anakatty the occurrence of magnesite has been located. The extent and nature of the occurrences are under detailed examination.

1.13 Genstone

Gen quality chrysoberyl are located in Neyyattinkara and Nedumangad taluks. In Neyyattinkara taluk gen quality Chrysoberyl occurs at Chenkul, Parassala, Ottasekharananglam as accessory mineral in irregular swarms of pegmatites. No estimates are available. Some of the areas are worth detailed examination for development of the mineral and are being investigated in detail.

In Nedumangad taluk, Chrysoberyl, occurs in the pegmatite veins traversing the gneisses of the area. Distribution pattern of the mineral in the old working located in the area indicate the existence of a zone of Chrysoberyl occurring area but the occurrence identified are all erratic in nature. The assessment of these deposits is planned.

The available information on the various mineral occurrences in Kerala Sub-Region are given in Table -4.1 Table 4.2 and Figure 4.2 show the estimated reserves of some of the important minerals in Kerala Sub-Region and their relative positions in the State.

Table - 4.1 : Nature and Extent of Reserves of Minerals in Kerala Sub-Region:

Mineral	Area			Reserves in lakh tonnes	Source and Dates of Estimates	Mining Operations
	District	Taluk	Localities			
1.	2.	3.	4.	5.	6.	7.
1. China Clay	Wynad	Mananthavadi (North Wynad)	i) Attachirakkal	1.70	State Department of Mining and Geology from 1972 to 1975.	Mining has not so far attempted
			ii) Achakunnu			
	Ernakulam	Kunnathunad	i) Muthupilakkad	5.00	State Department of Mining and Geology.	Mining has not so far attempted.
			ii) Kunnathur	5.00		
Reserves of China Clay =				11.70 Lakh tonnes		

1	2	3	4	5	6	7
2. Fireclay	Kottayam	Meenachil	Kanakkary	0.70	State Deptt. of Mining and Geology in 1971-72.	Mining has not so far attempted
	Trichur	Mukunda- puram	i)Aripalam ii)Padiyar iii)Puthenchira	14.50	State Deptt. of Mining and Geology in 1972-74.	No mining operation taken up so far.
Total reserves of Fire Clay =				15.20	Lakh tonnes.	

1	2	3	4	5	6	7
3. Graphite	Kottayam	Kanjirapally	i) Chirakkadavu ii) Thirthapada- puram	No Estimate of reserves has been made so far.	State Deptt. of Mining and Geology in 1974-75.	No mining operations is undertaken so far.
	Idukki	Thudupuzha	i) Piralimattom ii) Manakkad	3.65	Geological survey of India between 1967 and 1974	No mining oper- ations so far undertaken.
	Quilon	Pathanamthi- tta	Varavoor	Not estimated	-	No mining operation.
	-do-	Pathanapuram	Karappauthadu	0.03	Geological Survey of India 1967- 68.	No mining operation at present
	Trivandrum	Nedumangad	1)Vellanad 2)Kuttichur 3)Kanni 4)Vithura 5)Aruvikara	Not estimated (Assessment of the depo- sits is planned)	Geological Survey of India in 1968/1970 and State Department of Mining and Geology 1960 and 1961 (Field season)	No mining operations at present.

1.	2.	3.	4.	5.	6.	7.
Graphite	Trivandrum	Nedumangad	Changa	0.03	X	M/s Morgan Crucible mined graphite at Vellanad -Changa during 1910-1914, the annual production has been reported to be around 2000 to 3000 tonnes.
-do-	-do-	Neyyatthi-kara	i)Chengalloor ii)Puliyarako-nam iii)Maranalloor	"Not esti-mated		M/s. Morgan Crucible exploited the gra-phite deposits at Puliyarakonam and Chengalloor around 1900 and 1910.
Graphite	Trivandrum	Neyyatthi-kara		N.A.	Geological Survey of India and State Depart-ment of Mining & Geology in 1958 & 1969.	No mining operations taken up so far.
Total reserves of Graphite = 3.71 lakh tonnes						

1.	2.	3.	4.	5.	6.	7.	
4.	Quartz	Wynad	Mananthavadi	Mannanthavadi	3.00	State Deptt. of Mining & Geology.	No mining operations.
		Wynad	Vaithini	i) Aruvayalkunnu ii) Ambala vayal iii) Mangalathukunnu	0.30	State Deptt. of Mining & Geology in 1975-76.	Mining not attempted.
		Quilon	Pathanamthitta.	Annthadam near Ravi.	4.50	State Deptt. of Mining & Geology in 1969.	
Total reserves of Quartz =					7.80		

5.	Steatite	Wynad	Mananthavadi	Edayannur	1.20	State Deptt. of Mining & Geology from 1972 to 1975.	Mining has not so far attempted.
		Wynad	Vaithiri	1) Kupaddi 2) Vengoor 3) Tutuler	No estimates are being made to assess the reserves.	State Deptt. of Mining and Geology in 1975-76.	No mining operation.

1.	2.	3.	4.	5.	6.	7.
	Wynad	Vaithiri	4) Thaluri 5) Chitalary	Not. estimated	State Deptt. of Mining & Geology in 1975-76.	Mining has not so far
	Palghat	Mannarghat	Kulukkur near Annakkatty	No esti- mates available	State Department of Mining and Geology in 1965.	No mining operations under taken till now.

Total reserves of Steatite = 1.20 lakh tonnes

6. Iron Ore	Malappuram	Ernad	i) Airakunnu		Geological Survey of India and the State Department of Mining and Geo- logy between 1967 and 1974.	No mining operations under taken till now.
			ii) Theyyam Padikunnu near Vaniyambalam	18.00		
			iii) Nilambur	51.00		

Total reserves of Iron Ore = 69.00 lakh tonnes.

1.	2.	3.	4.	5.	6.	7.	
7.	Mica	Wynad	Vaithiri	i) Chulliode ii) Thirunelli iii) Palakunnu iv) Panamaram	Not estimated	State Deptt. of Mining and Geology in 1975-76.	Mining not attempted.
		Quilon	Pathanapuram	i) Perumtholil	Not estimated.	Geological Survey of India 1967-1968.	Mining not attempted.
		Quilon	Pathanapuram	ii) Changapara iii) Karappanthodu in punalur			
8.	Gold bearing Quartz reef and Gold.	Wynad	Mananthavadi	Mannanthavadi	8.5 million cubic metres of gravels (the gold content is 0.08 to 0.70 gr. per cubic metre of gravel)	Geological Survey of India between 1956 and 1960.	No mining operations undertaken till now.

1.	2.	3.	4.	5.	6.	7.
9. Limestone	Palghat	Palghat	Pandarattu	230.00	Geological Survey of India and Mineral Exploration Corporation (Ltd.) in 1965-67.	No mining operations taken up so far..

Total reserves of Limestone = 230.00 lakh tonnes

10. Kankar Limestone	Palghat	Mannarghat	Along the lower basin of Siruvani and Bhavani rivers at Kottathara and Agali	No estimate available	-do-	-do-
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	Palghat	Chittoor	i) Kozhiniyamm- para ii) Chittur- firkas	Between 35 lakh tonnes to 40.00 lakh tonnes.	State Deptt. of Mining & Geology in 1962-63.	No. mining operations undertaken till now.
	Idukki	Devicolam	Champakkad	0.40	State Deptt. of Mining & Geology in 1967-68.	No mining operations so far under- taken.
Total reserves of Kankar Limestone =				40.40 lakh tonnes.		
11. Lime- shell	Kozhikode	Quilandy	At Moorad bridge and surrounding paddy area near Moorad river Kunnathur and Quilandy.	0.10	State Deptt. of Mining & Geology in the year 1971-72 (field season)	By pitting in land portion and quarrying from river beds.
		Badagara		Nil	Nil	Detailed investigation is planned.
Total reserves of Limeshell =				0.10 lakh tonnes		

1.	2.	3.	4.	5.	6.	7.
12. Magnesite	Palghat	Mannarghat	Mulhe	No estimate available. It is under detailed examination.	State Deptt. of Mining & Geology in 1965.	No mining operations undertaken till now.
13. Gem stone	Trivandrum	Neyyattinkara	i)Chenkol ii)Parasala iii)Ottasekh- aramangalam	Not estimated	Geological Survey of India and State Deptt. of Mining and Geology in 1958 and 1968.	No mining operation taken up so far.
	Trivandrum	Nedumangad	Nedumangad	Not estimated (Assessment of the deposits is planned)	Geological Survey of India in 1969 and 1970 and State Deptt. of Mining & Geology in 1960 and 1961 (field seasons)	No operations taken up so far.
14. Magnetite- Quartzite	Ernakalam	Kothamanglam	-	Reserves not estimated since the deposits are very small and impersistent.	Progress report of GSI. 1966-67.	Nil

Source : State Department of Mining and Geology, Kerala.

Table -4.2 : Estimated Reserves of Important Minerals in the Kerala Sub-Region and the State.

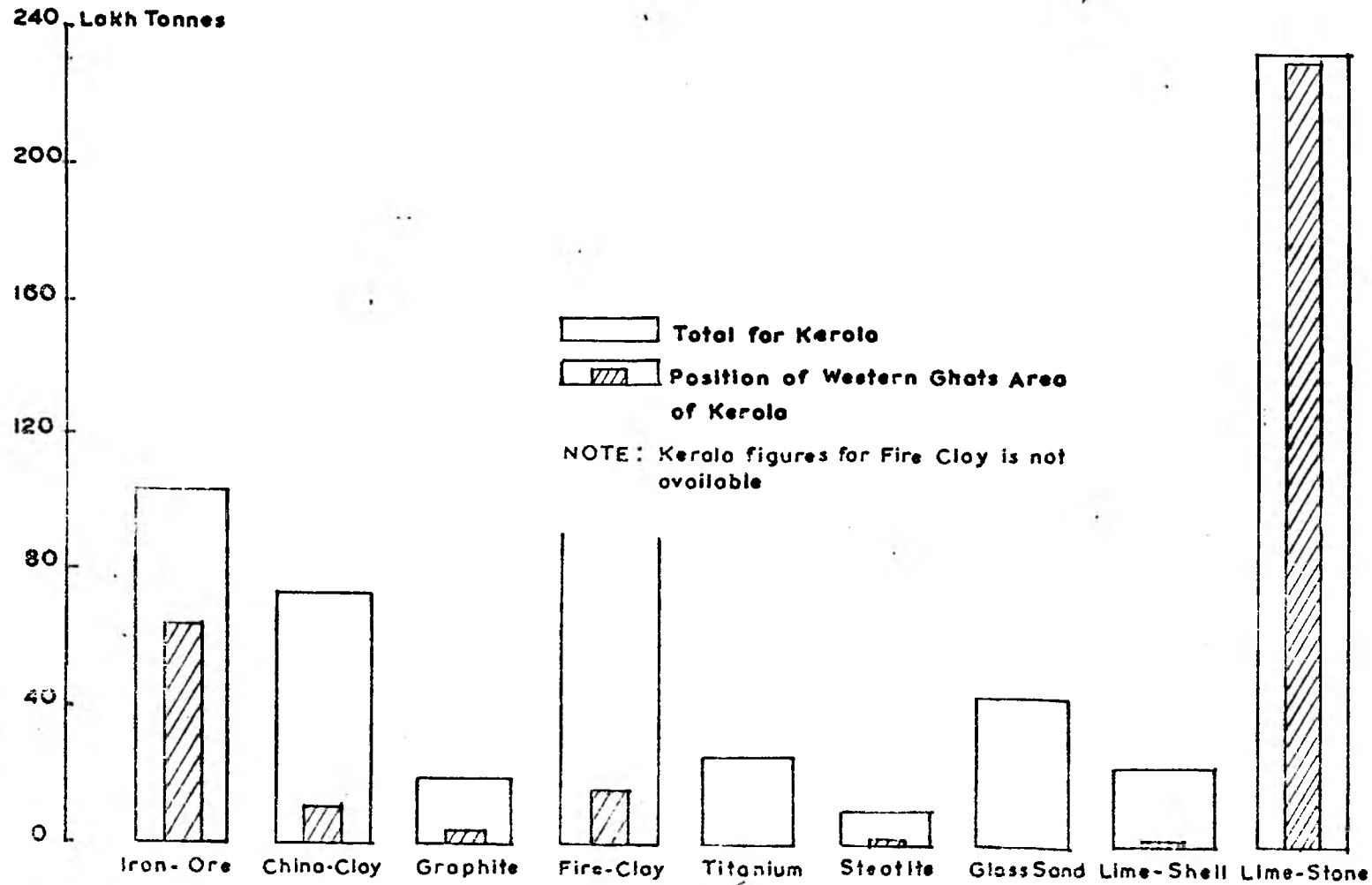
(Figures in Lakh Tonnes)

Minerals	Kerala	Kerala Sub-Region
Iron Ore	107.20	69.00
Graphite	18.80	3.71
Limestone	232.40	230.40
Limeshell	22.50	0.10
Steatite	7.86	1.20
China Clay	70.90	11.70
Fire Clay	N.A.	15.20
Titanium	24.30	-
Glass Sand	41.60	-

- Source :
1. Reserves figures for Iron Ore for Kerala based on Inventory of Iron Ore, 1971.
 2. Reserves figures for limestone for Kerala based on Inventory of Limestone, 1975.
 3. Reserves figures for Graphite-Limeshell, Steatite, China Clay, Titanium based on the Report on Task Force on Industrial (Non-Metallic) Minerals, 1972. The Steering Groups for Assessment of Natural Resources, Planning Commission.
 4. Reserves figures for all the minerals shown in the Table based on information supplied by Department of Mining and Geology, Kerala.

From Table 4.1 and Table 4.2 it is clear that a host of minerals occur in the Sub-Region. A majority of them can probably be economically developed, if detailed investigations are carried out. At present, there is almost no production of minerals in this very particular part of Kerala. Even for the entire state, production

Estimated Reserves of Important Minerals in State and in Kerala Sub - Region



WESTERN GHATS REGIONAL SURVEY & PLAN

TOWN AND COUNTRY PLANNING ORGANISATION ; MINISTRY OF WORKS & HOUSING ; GOVERNMENT OF INDIA.

is confined only in respect of clays, limeshells, silica sands, sillimanite, rutile and ilmenite. The total value of production of minerals was only Rs. 20.5 million as against the total value of Rs. 17,669 million for the country as a whole in 1979.

Kerala has many mineral based industries such as Kerala Minerals and Metals Ltd., Travancore Titanium Products, Chalakudi Potteries, Pallathara Bricks and Tiles Limited, Indian Rare Earths Limited, Travancore Cements Ltd., the Kerala Ceramics Ltd., the Travancore Ogale Glass Manufacturing Co. Ltd., the Excel Glass Limited and Standard Potteries. Even though there are no resources of basic metal minerals in Kerala there are two smelters, one for aluminium and another for zinc. An oil refinery functions at Cochin. Setting up of units for manufacture of titanium dioxide and titanium sponge, super refractories for steel plants, calcium carbide, cement etc. and for utilisation of graphite, iron ores and bauxite are under consideration.

2. Development- Strategy for Mineral Resources in the Sub-Region.

In order to take full advantage of the physical resource which is one of the most important determinants for future development, there is strong need to develop the resource in such a way, as to get maximum benefits and also to ascertain their availability as far as it can possibly go. The steps which are required to be taken on short term and long term basis for the development and improvement of the resources, making it more profitable, are grouped into four broad categories, which are further detailed in the ensuing paragraphs:

- (1) Proper development of the resources
- (2) Conservation of the resources
- (3) Reduction in the overall cost of mining, the need and means for stabilisation of the external market and internal use.
- (4) Inter sectoral linkages and evolution of an organisational base for ensuring services and facilities to the mining population.

2.1 Proper Development of the Resources :

This includes a full investigation and correct evaluation of the resources by geological investigations, detailed prospecting by drilling and pitting of the resources, specially the known minerals of the Sub-Region. Some of the specific steps required to be taken are:

- (a) Detailed proving of the potential deposits of the known minerals have to be carried out to establish firm reserves. This will help in a better planning of the mineral resources.
- (b) Detailed prospecting of all concessions in advance of commencement of development and extraction.
- (c) Extraction of ore in various concessions have to be taken on a long term and pre-planning programmes.
- (d) Field investigations including drilling, mapping and further investigations by way of drilling and pittings in the areas found to be promising.

- (e) Extensive exploration of graphite deposits is very urgently required to have a proper idea of the reserves and grades. There are difficulties in the use of indigenous graphite as the same is very low in carbon content. To establish beneficiation plant, there is need to have a proper idea of the total reserves and grades in different deposits not only in the Sub-Region but also in the adjoining areas.
- (f) Assessment of quality and quantity of quartz and limestone. It has to be worked out whether they can be commercially exploited.
- (g) Assessment of quality and quantity of steatite and Magnesite.

In this regard the latest attempt of the State Government to take the help of UNDP for an intensive exploration of the mineral potential of the State is worth mentioning here. The project as approved by the Government of India, envisages intensive exploration over an area of approximately 14500 sq. km. comprising the districts of Cannanore, Calicut, Trichur, Ernakulam, Kottayam, Idukki, Quilon and Trivandrum to carry out an integrated assessment of graphite, iron and gold ores.

2.2 Conservation of Resources:

Conservation is concerned with the utilization of resources - the rate, purpose, and efficiency of use. This includes the beneficiation of graphite ore.

2.3 Reduction in the Overall Cost of Mining :

This includes the improvement in the means of transport i.e. roads, rails and port for economical and quick

movement of ores from the pit-mouth to the place of consumption.

In regard to road transport the following steps are required:

- (a) Widening, repair and improvement of the existing roads linking the mining areas with loading points.
- (b) Road links between mines and loading points to be upgraded and missing links provided, where necessary. These two items required to be studied in details and the name of the roads with length are to be indicated.

2.4 Intersectoral Linkages :

In the overall regional and national picture, mining is one part of the overall economy and therefore, planning for mineral development should be seen within the framework of overall planning. This requires the co-ordinated development of minerals; intersectoral linkages between the allied sectors of economy like agriculture, forest, power, industry, transport and services are to be established and maintained. For example, most of the mining areas are in the areas known to contain a high percentage of forest land. Where mining operations are carried out, neither the plantation, nor forestry will exist on such lands and both plantation and other forestry will come after mining operations are over depending on the kind of land surface that will result after the mining operation. Where land surface will develop into deep ravines, gullies, pits, valleys and so on, perhaps forestry will be easier to be undertaken. Only in shallow mining activities where surface

is evenly scratched that agriculture can be undertaken. So forestry is one of the main uses to which land after being mined, can be put back. In order, that this is accomplished, it is necessary that the mine operator must make provision for putting the land back into forest use after the operations are over. Such provisions may take the form of (i) carefully grading the land after mining act is over so as not to leave too many gullies and steep ravines (ii) benching and other grading operations which will help the forest department for undertaking afforestation.

SECTION-V : FISHERY DEVELOPMENT

The Kerala Sub-Region, with its coast-line of 70 Kms. and a vast resources of inland water bodies, provides good scope for the development of fishery resources, and an opportunity to augment foreign exchange earnings, supplement the protien content of the diet of the people and provide employment to the fast growing working force.

1. FISHERY RESOURCES:

The coastal and inshore waters are known to be very rich in fishing resources especially because of the huge shoals of mackerels and sardines which regularly visit the shores during the fishing season and yield abundant catches. Prawns constitute an economically important demersal resource. There exists a vast potential for extending the fishing operations beyond the traditional fishing zone with the help of modern techniques of fishing.

The school of shoaling fishes like mackerels, sardines have been located upto 50 kms. in offshores waters and it is likely that these resources exist even beyond this limit. At present, these resources are exploited by traditional methods and the craft and the gear used for this purpose cannot be used for extending the area of operation. Further increase in catch will, therefore, depend on increase in the number of mechanised vessels and use of sufficient modern gears like purse seines, pelagic trawl for exploiting pelagic resources. The use of modern gear and craft not only extends the area of operation, but also if used with proper knowledge

can extend the period prior to and beyond the normal fishing season.

The prospects of development of inland fisheries in the Kerala Sub-Region is quite good considering the vast resources of inland water bodies such as reservoirs, tanks, ponds and rivers. The important rivers in the Sub-Region are Bharatpuzha, Beypore, Periyar, Chalakug, Pamba and Kabbini. These are perennial rivers. Perennial reservoirs across these rivers also provide good potentials for pisciculture. There are already nine major and medium irrigation schemes benefiting the taluks of Palghat, Chittur, Mukundapuram, Kunnathunad, Neyyattinkara and Nedumangad. Nine more large schemes are in various stages of completion and their benefits lie in the additional taluks of Vaithiri, Sultan Battery, Quilandy, Badagara, Mannarghat, Kothamangalam, Thodupuzha, Meenachil, Pathanamthitta and Pathanapuram. Of these continuing projects, in terms of total design benefits, the schemes namely the Kallada, and the Pamba are fairly large ones with abundant additional food production potentials.

Twenty five more projects are under contemplation to accrue benefit additionally to two taluks namely Ernad, Devicoolam. Nature and estimate of inland fishery resources in the Kerala Sub-Region are given in Table 5.1 and Table 5.2. Important rivers and water bodies are shown in Fig. 5.1

The Kerala Sub-Region comes under the influence of south-west monsoon from June to September and of north-east monsoon from September to November. Nearly two thirds of the total annual rainfall is received through the south-west monsoon between June and August.

KERALA SUB-REGION

FISHERY RESOURCES

Rivers and Water Bodies



Rainfall through the north-east monsoon is often uncertain. The annual normal rainfall in the Sub-Region varies from 2001 mm to 3577 mm. The concentration of rainfall in the Sub-Region has its impacts on the development of fresh water fishing in the rivers.

Table 5.1 : Nature of Inland Fishing Resources in the Kerala Sub-Region.

District	Taluku	Nature of Fishing Resources		
		Rivers '(in Kms.)'	Tanks '(Hectares)'	Others '(Hectares)'
Wynad	Mananthavodi	12	-	-
	Vaithiri)	-	4.33	6.00
	Sultan Battery)			
Kozhikode	Quilandy	30	25.00	1052.00
	Badagara	35	30.00	50.00
Malappuram	Ernad	125	18.14	-
Palghat	Mannarghat	20	2.75	7000.00
	Chittur	30	4.00	-
	Palghat	40	3.25	-
Trichur	Mukundapuram	45	80.80	-
Ernakulam	Kunnathunad	20	28.75	-
	Kothamanglam	-	-	-
Idukki	Thodupuzha	33	9.40	6660.00
	Devicolam	-	-	586.80
	Udambanchola	-	6.21	1106.00
Kottayam	Meenachil	35	5.00	-
	Kanjirappally	20	4.00	-
Quilon	Pathanamthitta	156	24.50	30.00
	Pathanampuram	90	4.78	-
Trivanduram	Neyyattinkara	28	27.32	-
	Needumangad	120	15.20	1500.00
Total		839	293.43	17990.80

Source: Directorate of Fisheries, Kerala.

Note : The lengths of inland water (rivers) are approximate.

Table 5.2: Estimate of Inland Fishing Resources in the Kerala Sub-Region:

(Figures in tonnes)

District	Taluk	Estimate of Fishing Resources			
		River	Tanks	Others	Total
Wynad	Mananthavadi	-	-	-	-
Kozhikode	Vaithiri)	-	5	5	10
	Sultan Battery)				
	Quilandy	16	2	12	30
	Badagara	20	3	2	25
Malappuram	Ernad	33	22	1	56
Palghat	Mannarghat)	30	6	21	57
	Palghat)				
	Chittoor)				
Trichur	Mukundapuram	70	6	2	78
Ernakulam	Kunnathunad	3	8	1	12
	Koṭhamanglam	-	-	-	-
Idukki	Thodupuzha	3	4	200	207
	Devicolam	-	-	26	26
	Udumbanchola	-	2	46	48
	Peermade	-	-	40	40
Kottayam	Meenachil	10	10	-	20
	Kanjirapally	15	-	-	15
Quilon	Pathanamthitta	30	10	15	55
	Pathanapuram	15	3	-	18
Trivandrum	Neyyattinkara	1	4	-	5
	Nedumangad	5	3	12	20
Total		251	88	383	722

Source : Directorate of Fisheries, Kerla.

2. FISHING ACTIVITIES:

Marine Fishing: Of the two main fishing activities, marine fishing is a seasonal industry extending over a period of 9 months. The fishing season commences in September soon after the monsoon and lasts till the end of May. Even during the fishing season, there are brisk and slack periods. The brisk period is during the occurrence of shoaling fishes like macerels and sardines in abundance in shallow waters. This season normally begins in mid-September and ends by January though occasionally smaller stray shoals are sighted during the month of February and March also. Miscellaneous varieties are found throughout the lean season from February to May. Marine fisheries are practically closed down during the monsoon months.

Marine fishing is carried on with five main types of fishing techniques namely:

- (i) Operation of beach seines,
- (ii) Gill net fishing in off-shore waters,
- (iii) Cast net fishing in shallow waters,
- (iv) Seasonal hook and line fishing,
- (v) Mechanised fishing.

Of these, the beach seine type of fishing is the main activity. Majority of the active fishermen engaged in marine fishing undertake this type of fishing and are solely dependent on it. The activity is carried on at all the coastal points where the conditions are most suitable such as relative evenness of the sea-bottom, relative freedom from heavy surf.

A fishing boat is an essential and important equipment in fishing and plays a major role in the development of the fishing industry.

There are 86 mechanised boats (52 in Neyyattinkara taluk; 8 in Quilandy and 26 in Badagara) engaged in fishing.

Mechanisation of fishing crafts is one of the most important steps in the improvement in the fishing industry, as it is directly responsible for the increase in fish production in the Sub-Region. The mechanised boats can exploit distant fishing grounds which are normally not visited by non-mechanised boats. Moreover, these boats enable the fishermen to devote more time for fishing and land fish in good condition as the time for travelling to and fro is considerably reduced.

Inland Fishing: Inland fisheries is also an important activity and is resorted to by fishing communities residing in the interior. It is pursued throughout the year in the river creeks where known varieties of choice fish occur. They have an additional importance because they can be exploited at less capital cost than most marine fisheries, and because they usually occur in or near well-populated area, so that distribution and marketing problems are simplified. Over and above, inland fishing is much remunerative during monsoon when marine fisheries is particularly closed. Even meagre quantity caught fetches better prices due to heavy demand from the public.

Inland fish production takes place in fresh water and brackish water resources, each type having capture

and culture fisheries. Fishing from natural stocks, in the same manner as hunting, is known as capture fisheries. The impoundments of water which are comparatively smaller in extent such as ponds and tanks and which require stocking of seed fish followed by periodical harvesting, constitute culture fisheries. They constitute culture fisheries as long as stocking of seed fish is necessary and turn into capture fisheries when fish start breeding in these resources and stocking is no longer necessary. The fresh water resources comprise riverine system, reservoirs, ponds, tanks, etc.

The collection of inland fishery statistics, as is being done in the field of marine fisheries by adopting a suitable methodology and mechanism, has not made much progress. At present, as reported, the fish productions are estimated on the basis of market arrivals of inland fish, water area leased out, value of lease amounts, etc. Inland fishing techniques can be broadly classified into two categories viz. fishing by cast nets, gill nets, etc., and fishing by stake nets.

2.1 Fishing Villages and Fish Landing Centres:

Neyyattinkara, Quilandy, Badagara, Mukundapuram, Vaithiri, Sultan Battery, Chittoor, Palghat, Mannarghat and Ernad are important fishing taluks of the Sub-Region. Out of these, Neyyattinkara, Quilandy and Badagara are maritime taluks and account for more than 98% of the fish catch of the Sub-Region.

Kollengode, Poovar and Vizhinjam in Neyyattinkara, and Badagara in Badagara taluk are important fish landing centres. Fig. 5.2 shows important fishing taluks

and fish landing centres. The fish landing centres are situated at points on the coast which are free from rocks and which have sandy sea-bottom. These facilitate the beach-seine type of fishing which is the main activity and as such the fishermen population is found concentrated all along the coast along which beach seine operations are carried on.

As shown in Table 5.3 and Fig. 5.3 these are 39 marine and 27 inland fishing villages.

3. FISH PRODUCTION AND ITS UTILISATION:

Marine Fish Production: Sea fishing has been an occupation with the coastal people of the State from time immemorial. Fishing operations have, however, largely remained near the shores venturing out into the open sea only a few Kilometres from the base upto distance which could easily be covered by sailing craft and the fishing was developed solely by the traditional community of fishermen for centuries. But now the impetus given during the last 25 years, has raised the status of fishing industry and made it viable and independent occupation.

In the Kerala Sub-Region fish production comes from marine as well as from inland waters. Marine fish production accounts for more than 98% of the total fish catch in the Sub-Region. In 1979, the total fish production from marine sources was 32,231 tonnes. (Table 5.4) The annual fish production is solely dependent on the appearance of mackerels and sardines in the coastal waters of the taluks of Badagara and Quilandy of Kozhikode district and Neyyattinkara taluk of Trivandrum

Fig. 5.2

KERALA SUB-REGION

Important Fishing Taluks & Fish Landing Centres

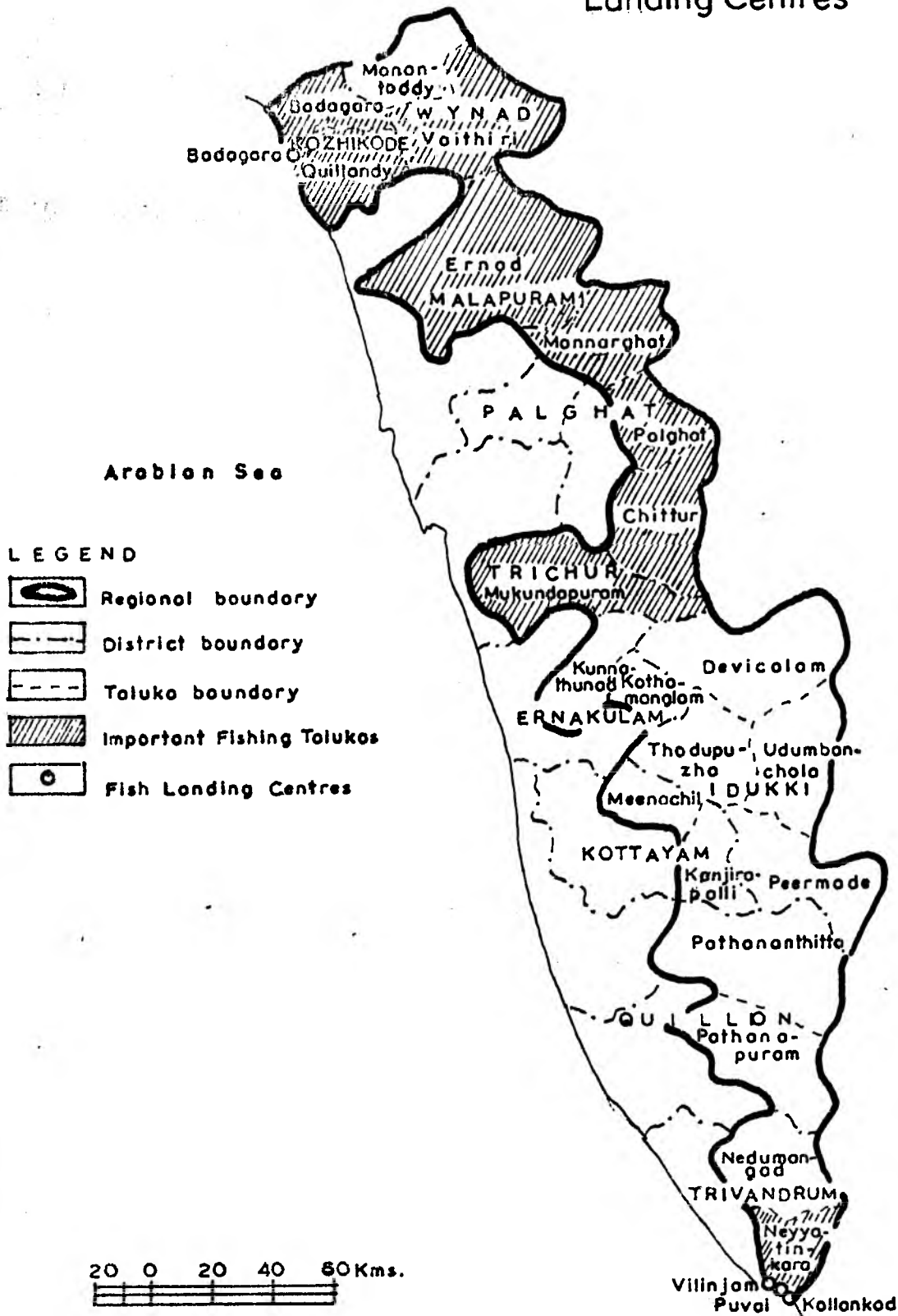


Table: 5.3 : Fishing Villages in the Kerala Sub-Region.

Taluk	Name of the Fishing Villages	
	Marine Fishing Villages	Inland Fishing Villages
1	2	3
Neyyattinkara	1. Kollengode	1. Vadakkara
	2. Paruthiyor	2. Chirayinkil
	3. Poovar	3. Aroor
	4. Karimkulam	4. Poongode
	5. Kochuthura	5. Ariyoor
	6. Puthiyathura	6. Nedumangad
	7. Pallam	
	8. Pulluvilla	
	9. Adimalathura	
	10. Vizhinjam	
	11. Kovalam	
	12. Panathura	
Quilandy	13. Kannankadava	7. Prayar
	14. Kappad	8. Mangad
	15. Kadalore	9. Aroor
	16. Ezhukudikkal	
	17. Edakkulam Beach	
	18. Cheriamangad	
	19. Valiamangad	
	20. Virrumukkandi	
	21. Quilandy	
	22. Kollam	
	23. Moodadi	
	24. Venmukom-Kadalore	
	25. Thikkadi	
	26. Melady	
	27. Iringal	

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Table 5.3 (Contd...)

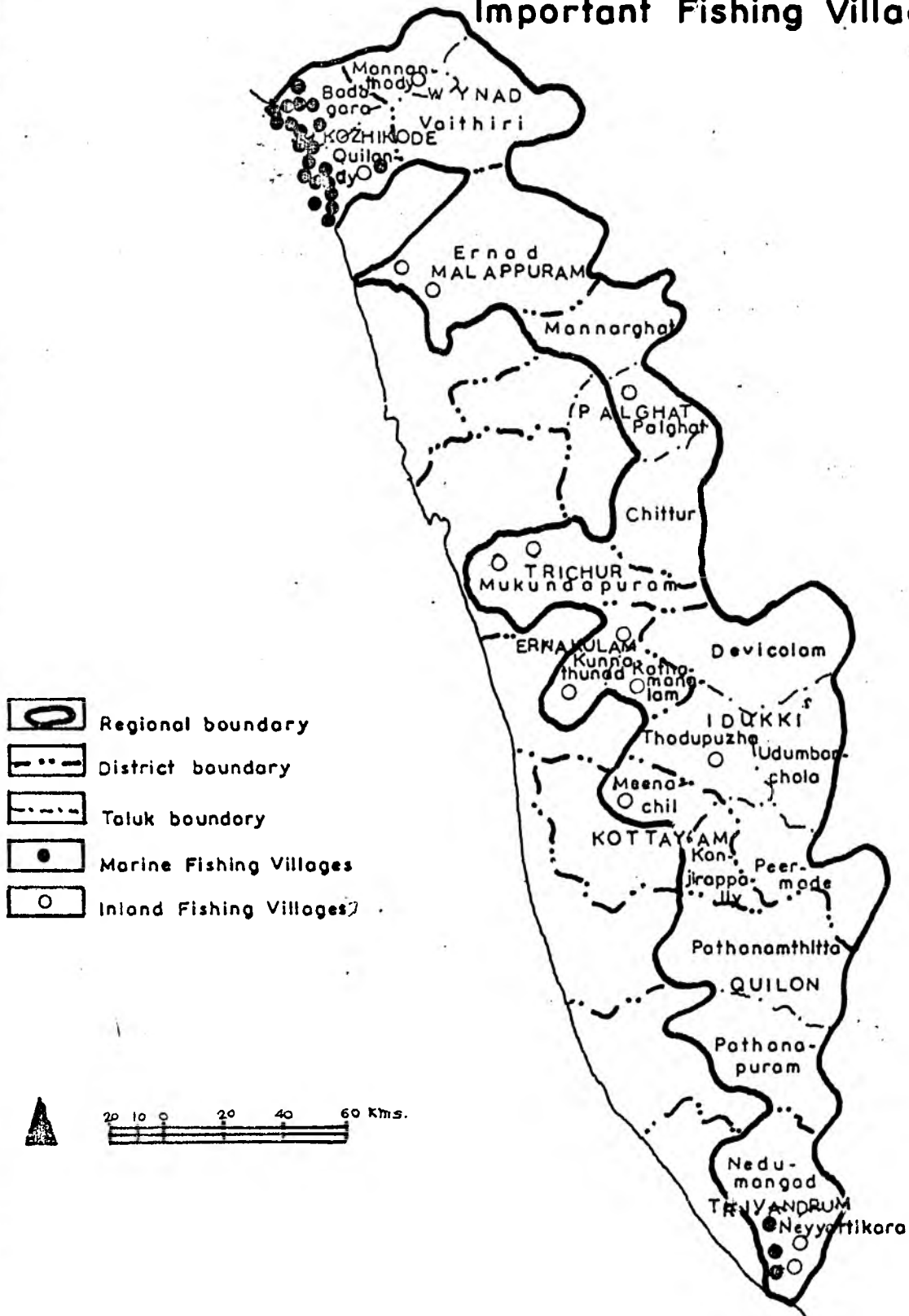
1	2	3
	28. Iringal-Kottakkal	
Badagara	29. Badagara	10. Vellor
	30. Chorodu	
	31. Muttungal	
	32. Madappally	
	33. Uralungal	
	34. Quchiyam	
	35. Madakkara	
	36. Vellikulangara	
	37. Ghombola	
	38. Azhiyoor	
Ernad		11. Mundakkal
		12. Puthur
Wynad		13. Mangalssery
Devicolam		14. Kadallor
		15. Karivallor
Udumbanchola		16. Muthukada
Thodupuzha		17. Sinkarappally
Mukundapuram		18. Kallayi
		19. Vellayani
Palghat		20. Kannadi
Mannarghat		21. Arinallor
Kunnathunad		22. Ernakulam
		23. Palipuram
		24. Kothamangalam
Meenachil		25. Perumthanam
		26. Puthupally
Pathanamthitta		27. Kottam

Source: Directorate of Fisheries, Govt. of Kerala.

Fig. 5.3

KERALA SUB-REGION

Important Fishing Villages



district. But the appearance of these two are very much erratic which affect the total production of the marine fish. These seasonal variation play a very important role in the economic status of fishermen families engaged in marine fishing.

Table-5.4: Marine Fish Production-1979.

	Taluks	Production (in tonnes)
1.	Quilandy	11291
2.	Badagara	5645
3.	Neyyattinkara	15295
	Total	32231

Source: Directorate of Fisheries, Kerala:

Inland Fish Production: Inland fish production in the Sub-Region during 1974-75 was 262 tonnes (Table-5.5) which compared to the total fish production in the Sub-Region and also to the total inland fish production of the State was almost negligible. During 1975-76 the inland fish production in the State was 23208 tonnes which accounted for about 5% of the total catch in the State in that year.

Production of fish as in the State of Kerala, in the Sub-Region also, can be viewed from two angles. Firstly, as a source of food for the local population, and secondly, as an item of export.

Table-5.5: Inland Fish Production and its Value in the Kerala Sub-Region 1974-75.

District	Taluk	Production of Fish in Tonnes	Value of Fish in Rupees
Wynad	Mananthavodi	-	-
Kozhikode	Vaithiri	2	2500
	Sultan-Battery		
	Quilandy	30	33000
	Badagara	25	30500
Malappuram	Ernad	36	72400
Palghat	Palghat	30	46350
	Chittoor		
	Mannarghat		
Trichur	Mukundapuram	77	251900
Ernakulam	Kunnathunad	10	21000
	Kothamanglam	10	22050
Idduki	Thodupuzha	2	2000
	Udumbanchola	-	-
	Peermade	-	-
Kottayam	Meenachil	20	60000
	Kanjirapally	15	45000
Quilon	Pathanamthitta	-	-
	Pathanampuram	-	-
Trivandrum	Neyyattinkara	-	-
	Nedumangad	15	45000
Total		272	631700

Note: Figures for production and value for Kothamanglam taluk relate to the figures for Muvattapuzha taluk on the whole.

Source: Directorate of Fisheries, Kerala, Trivandrum.

Fish finds a very important place in the diet of the local population and a good section of the population of the area relish fish so with the pace of time and increase of population the demand of fish for local consumption will increase accordingly.

There is high demand of frozen and canned fish specially prawns in foreign countries. This provides good scope for stepping up the fish catch and their export abroad. In 1976, the export of fish from Kerala was 31153 tonnes which was 50.1% of the total fish exported from India that year. Any increase in the export targets would largely depend on Kerala's ability and capacity to increase its catch of fish. Specially with the introduction of deep sea fishing trawlers, mechanisation of fishing crafts etc., it is expected that in the near future the total catch will increase many times of the present level of catch. The Fishery Department of the State has drawn up a Master Plan to spread over a period of 20 years for the comprehensive development of the fishery resources.

4. PROBLEMS OF FISHING, SUPPLY, DEMAND AND MARKETING:

There is a huge disparity in fish landings during different periods of the year. Only during the period between October to January, the average daily fish landing is far in excess of the actual demand with the result that there is a steep fall in the retail price of fish in the local markets. During the rest of the year the fish supply being limited, the price of fish tend to rise. Marine fishing is practically closed during the initial two months of the monsoon when the area is very rough. During this period, the population

of the Sub-Region depends for their fish supply from inland catches. The prices of fish are considerably high during this period.

The major part of the fish-catch is consumed locally in fresh condition. It is transported by trucks and pick-up vans. In the interior, it is transported by head loads as well. The use of bicycles by fishermen for marketing of fish in the Sub-Region is also very common. Important fish markets in the Sub-Region are given in Table 5.6 and shown in Fig. 5.4.

The marketing of fish, which are of prime quality or established acceptability, does not pose problems, as reasonable price to the producers gets stabilised by the trade. The marketing of species, which are caught in large quantities having wide variations in their annual landings, or which are caught in appreciable quantities but have no acceptability in the markets for obtaining reasonable return to the producers present serious problems in marketing.

In the above categories, the marketing of oil sardines and mackerels needs special consideration because they constitute about 60% of the catches. Development have no doubt, taken place in providing greater ice production and cold storage capacity in the State during the successive plans thereby increasing the market - ability of these fishes in fresh (iced) condition and in extending the area of marketing to inland regions not far away from the landing sites. In 1979, there were 13 ice plants and 2 cold storages in the Sub-Region. But, despite the facilities developed, it is a common experience that large quantities are still being disposed of

Table-5.6: Important Fish Markets in the Sub-Region:

Sl. No.	Name of the Market	Taluk	District
1.	Nedumangad	Nedumangad	Trivandrum
2.	Punaloor	Pathanapuram	Quilon
3.	Palai	Meenachil	Kottayam
4.	Kanjirapally	Kanjirapally	Kottayam
5.	Mundakkayam	Kanjirapally	Kottayam
6.	Peermade	Peermade	Idukki
7.	Yelappara	Peermade	Idukki
8.	Munnar	Devicolam	Idukki
9.	Chalakyudy	Mukundapuram	Trichur
10.	Otavakode	Palghat	Palghat
11.	Palghat	Palghat	Palghat
12.	Chittoor	Chittoor	Palghat
13.	Sholapur	Chittoor	Palghat
14.	Quilandy	Quilandy	Kozhikode
15.	Kuttiyadi	Quilandy	Kozhikode
16.	Badagara	Badagara	Kozhikode
17.	Ernad	Ernad	Malappuram
18.	Milambar	Ernad	Malappuram
19.	Vaithiri	Vaithiri (South Wynad)	Wynad
20.	Mananthavadi	Mananthavadi (north Wynad)	Wynad

Source: Kerala Fisheries, Facts and Figures 1977,
Directorate of Fisheries, Govt. of Kerala.

at very low price for extraction of oil and reduction to fishmeal. There is urgent need to expand the markets for these fishes in distant places, particularly keeping in view that the catches are likely to be further increased by exploiting the extended resources recently discovered.

The fish landing sites constitute the primary stage of marketing fish. The producers offer their marketable surplus for sale, not by weight system, but by measures of heaps, lots or baskets, such unit measures vary not only from locality to locality but also within the same locality and for the same types of fish depending upon the size of the catch.

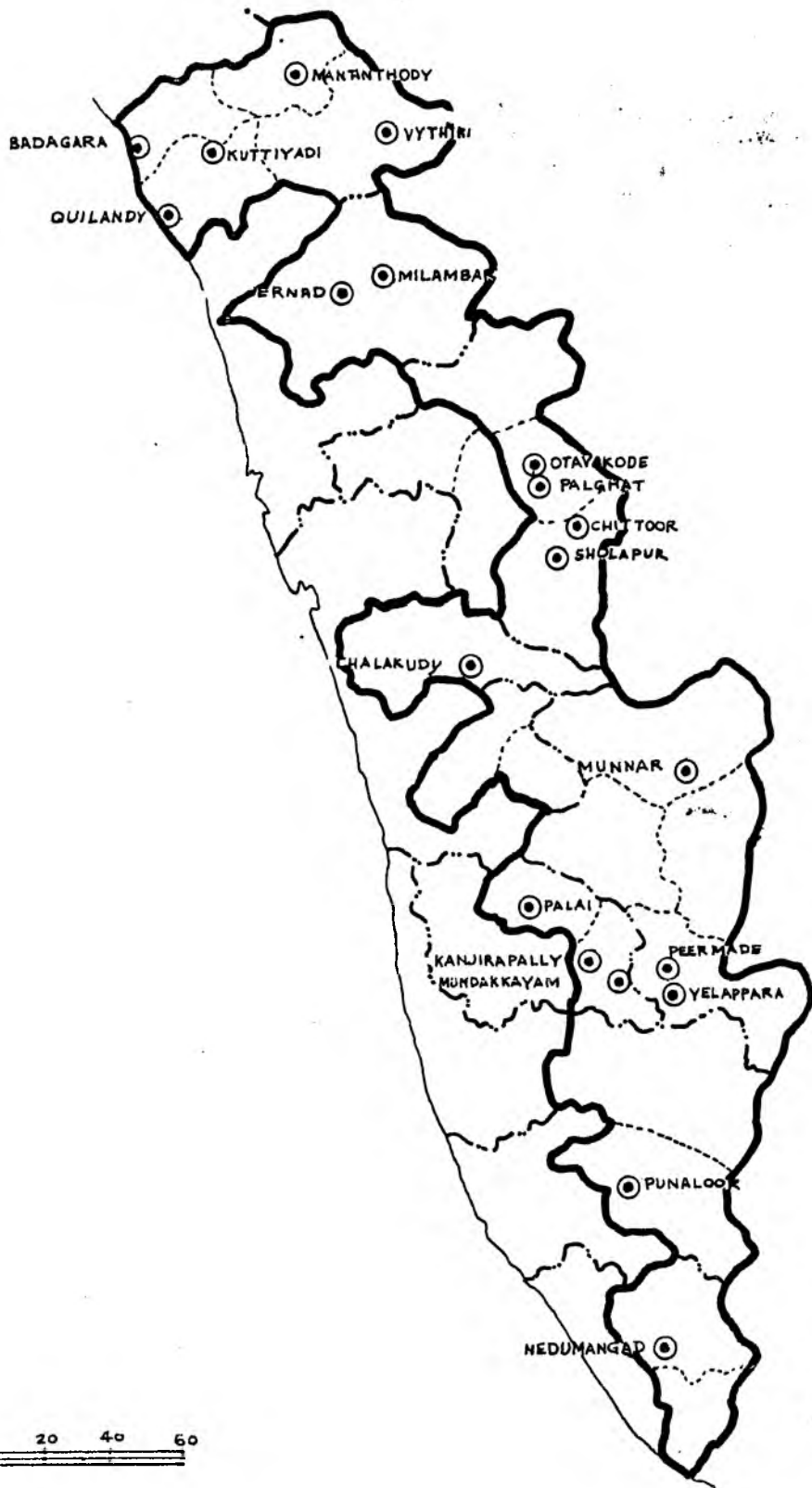
The provision of marketing sheds at the fish landing sites where catches are being landed on the open beaches or open grounds, is a basic necessity. No data are available on the number of sites where such facilities are already provided, but it can safely be stated that such facility does not exist at a large number of landing sites along the coast. There is urgent need to provide marketing sheds at least at suitable fish landing centres.

Another essential facility would be the provision of feeder roads, linking those fish landing sites which have considerable marketable surplus with the nearest railway stations or motorable roads for onward transportation by rail or by motor trucks. A quick means of transport is necessary for marketing fresh fish in good quality to the terminal markets.

Fig. 5.4

KERALA SUB-REGION

Important Fish Markets



Unlike marine fish which come only from capture fisheries, the inland fish production is contributed both by capture and culture fisheries from the fresh-water resources in the inland taluks and additionally from brackish waters in the maritime taluks. The marketing problems, which arise out of considerable variations characterising marine fish production creating glut and lean periods are not of any significant dimensions in the case of production from the inland fisheries. Besides, the inland fish production, in general, is characterised by fewer species which have established acceptability and are marketed in fresh condition mostly by weight system. The marketing of catch from culture fishery resources, netted out periodically during the whole year from perennial waters and 2-3 months prior to monsoon from long seasonal tanks would not cause problems, as the netted catch can be held in a live condition in net enclosures for making phased supplies to the nearby markets. The problem would, however arise in case of capture fisheries of riverine, estuaries and reservoirs, because of scattered landings at several places. It would therefore, be necessary to identify the potential centres where such landing could be concentrated so that marketing condition could be improved by providing marketing sheds, preservation and transport facilities.

5. ECONOMIC STATUS AND SOCIAL CONDITIONS OF FISHERMEN POPULATION:

Fishermen in the Sub-Region's maritime taluks are mostly settled all along the coast and the estuaries of the rivers and are engaged in marine fishing while those in the inland fishing, villagers pursue fishing in

the rivers, ponds, tanks, reservoirs, etc. The marine fishing taluks are Neyyattinkara, Quilandy and Badagara and there are 39 fishing villages spread in these three taluks. Important inland fishing taluks are Mukundapuram, Vaithiri, Sultan Battery, Ernad, Chittoor, Palghat and Mannarghat. There are 27 inland fishing villages in the Sub-Region.

5.1 Fishermen Population:

According to the estimate made by the Directorate of Fisheries, the total fishermen population engaged in marine and inland fisheries, in 1979 were 94084 and 8150 respectively. Their details are given in Table 5.7 and shown in Fig. 5.5.

Fishing is a seasonal industry, offering employment only for a period of nine months in a year. Owing to this seasonal character, fishermen are compelled to resort, to more than one occupation.

Fishermen who are actively engaged in catching fish and which form their principal means of livelihood have been classified as "Active fishermen". More than 90% of the total number of active fishermen are engaged in marine fishing in the maritime taluks of Badagara, Quilandy and Neyyattinkara. Female labour is completely excluded so far as fishing operations are concerned. The number of active fishermen engaged in fishing form about 20% of the total fishing population and about 38% of the total male population. Table 5.8 shows the distribution of active fishermen population.

Table-5.7: Talukwise Distribution of Fishermen Population in the Kerala Sub-Region -1979.

S.No.	District	Taluk	Fishermen Population		
			Male	Female	Total
<u>MARINE</u>					
1.	Kozhikode	Quilandy	14020	13772	27792
		Badagara	10379	9963	20342
2.	Trivandrum	Neyyattinkara	23346	22604	45950
Total for the Marine			47745	46339	94084
<u>INLAND</u>					
3.	Trichur	Mukundapuram	3525	3304	6829
4.	Palghat	Chittoor)	189	222	411
		Palghat)			
		Mannarghat)			
5.	Malapuram	Ernad	87	70	157
6.	Wynad	Vaithiri)	390	363	753
		Sultan-Battery)			
Total for the Inland			4191	3959	8149
Total for the Sub-Region:			51936	50298	102233

Source: Directorate of Fisheries, Kerala:

5.2 Nature of the Fishing Occupation:

It has been mentioned earlier that the fishing industry is subjected to seasonal variations, the principal season being that of shoaling fishes like mackerels and sardines. This season normally lasts for 4 months during which period fishermen and specially the active marine fishermen have little time to engage themselves

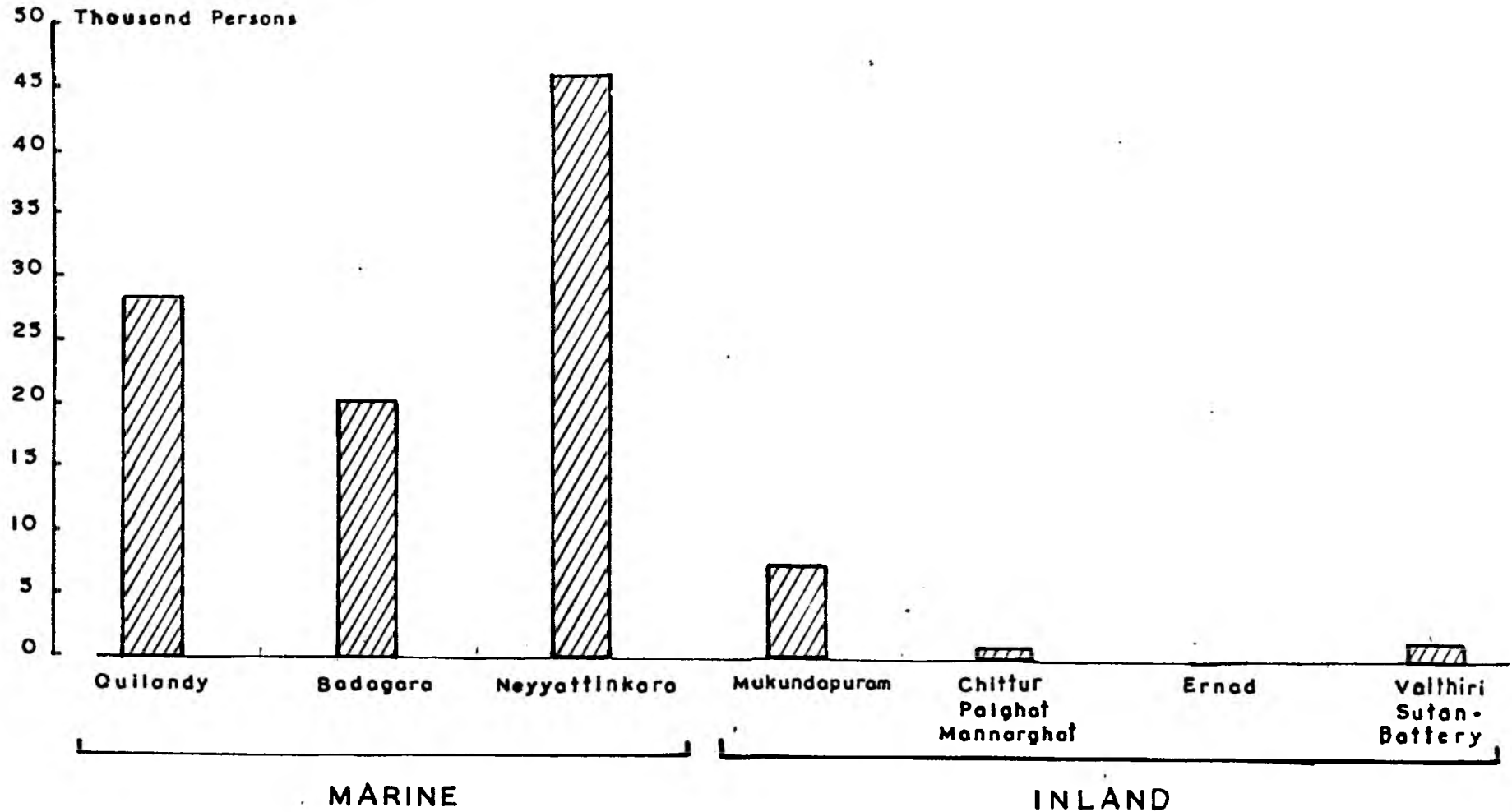
Table 5.8: Distribution of Active Fishermen Population - Both Marine and Inland in the Kerala Sub-Region-1979:

S.No.	Name of Taluk	Active Fishermen		
		Marine	Inland	Total
1.	Neyyattinkara	8017	-	8017
2.	Mukundapuram	-	1336	1336
3.	Chittoor)	-	114	114
4.	Palghat)			
5.	Mannarghat)			
6.	Quilandy	4941	336	5277
7.	Badagara	4688	89	4777
Total		17646	1875	19521

Source: Directorate of Fisheries, Kerala.

in any subsidiary occupation. Table 5.9 shows the type of engagement of fishermen in the fishing activities. Only during the lean season, fishermen are compelled to resort to more than one type of activity, thereby keeping themselves busy throughout and getting maximum returns. A small section of the community considers fishing as a secondary source of livelihood and devotes more time to other occupation like agricultural labour, cultivation, etc. Table 5.10 gives the extent of land possessed by fishermen in the Sub-Region. It may be seen from the Table that more than 65% of the households have very small piece of agricultural land say less than 5 cents per household. Only 504 households (out of 16826) are such which had land more than 50 cents per household.

Fishermen Population in Kerala Sub-Region—1979



WESTERN GHATS REGIONAL SURVEY & PLAN

Table 5.9: Talukwise Distribution of Occupation of Fishermen Population in the Kerala Sub-Region:

Name of Taluk	Fishermen Engaged in Fishing		Fishermen Engaged in Other Fishing Activities.	
	Full Time	Part Time	Marketing of Fish	Other Activities
1. Neyyattinkara	6463	1554	1832	1062
2. Quilandy	4665	276	992	62
3. Badagara	4369	319	128	72
4. Mukundapuram	708	628	365	70
5. Chittoor)	46	68	-	-
6. Palghat)				
7. Mannarghat)				
8. Ernad	-	-	6	4
9. Vaithiri)	-	-	-	-
10. Sultan Battery) (South Wynad)	-	-	135	10

Source: Directorate of Fisheries, Kerala:

5.3 Economic Status of the Fishermen Population:

The details as regards the economic status of the fishermen population are presented in Table 5.11. It may be seen that the annual income of the fishermen households from fishing activities generally varies from rupees 500 to rupees 3000. In case of maritime taluk of Neyyattinkara, only 2 percent households had an annual income from fishing activities above rupees 3000, and 4% of them had an annual income of rupees between 2000 to 3000, 20% of the households had an annual income Rs.1000 to 2000 while rest of them had an annual income from fishing activities much below rupees

Table-5.10: Extent of Land Possessed by Fishermen of the Kerala Sub-Region.

	0-5 Cents	6-10 Cents	11-25 Cents	26-50 Cents	More than 50 Cents	Total
1. Neyyattinkara	8121	607	279	63	28	9098
2. Mukundapuram	303	320	201	119	102	1045
3. Ernad	10	2	5	6	2	25
4. Quilandy	775	1146	1048	566	210	3745
5. Badagara	1374	603	484	183	142	2786
6. Vaithiri Sultan Battery (South Wynad)) 55))) 19))) 29))) 10))) 20))) 133))

Source : Directorate of Fisheries, Kerala :

Table-5.11: Income Distribution of Fishermen of the Kerala Sub-Region - Talukwise:

Name of the Taluk	Annual Income of the Households					Total
	Rs. 0-500	Rs. 501-1000	Rs. 1001-2000	Rs. 2000-3000	Above Rs. 3000	
1. Neyyattinkara	3081	3732	1881	297	157	9148
2. Mukundapuram	186	344	434	70	11	1045
3. Ernad	9	1	15	-	-	25
4. Quilandy	773	2007	815	120	28	3743
5. Badagara	300	1093	951	214	88	2646
6. Vaithiri) Sultan Battery)	8	25	26	51	17	127

Source: Directorate of Fisheries, Kerala:

1000 per annum. The situation is more or less the same, in almost all the taluks.

5.4 Social Conditions for the Fishermen Population:

The prosperity of the fishing industry depends to a large extent on the nearness of the market. In the absence of a local market, fishermen find their business unprofitable. In those taluks, where consuming centres are far away, fishermen population is less, while in those taluks where there are more consuming centres, the fishermen population are also much more.

Literacy: Fishing industry in the Sub-Region is still carried on by primitive methods and with meagre capital and resources, though some progress has been made in the mechanised fishing, capital investments of a high order as such, are practically non-existent in this industry and the pattern is based on co-operative endeavour by the fishermen only for manual work.

Table-5.12 gives distribution of literacy sex-wise among fishermen population. The Table-5.12 indicates that only 49.6% are literates in the case of marine fishermen population, while the percentage is 71% in the case of inland fishermen population. Among male population, percentage of literacy observed is 26% in the case of marine fishermen population as against 30% in the case of inland fishermen population.

Age Distribution: The fishermen population actively engaged in the fishing industry is found to be young between the ages of 15 to 45 years. Old persons over 60

Table 5.12: Literacy Among Fishermen Population of the Kerala Sub-Region (Talukwise).

Name of the Taluk	Illiterates		Literates		Total	
	Male	Female	Male	Female	Male	Female
1. Neyyattinkara	15351	15760	7995	6844	23346	22604
2. Quilandy	4057	4837	9963	8933	14020	13770
3. Badagara	3847	4055	6532	5908	10379	9963
4. Mukundapuram	843	994	2682	2310	3525	3304
5. Chittoor)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
6. Palghat)						
7. Mannarghat)						
8. Ernad	29	20	58	50	87	70
9. Vaithiri)	164	177	226	186	390	363
10. Sultan Battery) (South Wynad))						

Source: Directorate of Fisheries, Kerala.

years are mostly left out on account of hard nature of work. Table-5.13 shows the distribution of fishermen population in specified age groups. It is seen from this Table that 46.02% population is in the age group of 15 to 44 years followed by 40.30% under 15 years who are mostly dependents. The fishermen population falling in age group of 46-54 years though not actively engaged in the industry, indirectly help the industry and forms about 7.32%. There are only 6.36% of the total population whose age is over 55 years.

Working Conditions: The fishermen usually have to toil in the open air. Only during rest hours, they would take shelter under a ^abarrack covered by coconut palm leaves. The cool breeze at sea also protects them against heat of the sun all the time.

On account of the arduous work in fishing operation, a good number of fishermen above 40 years are found to be affected by T.B. Further they are easily susceptible to Cholera. Skin diseases are also found to be quite common in the community perhaps due to the nature of the occupation.

Major part of the fishermen's life is spent either on the sea-shore or in the fishing craft itself. In case of need, when exigencies demand, brisk fishing operations, the fishermen are found seldom visiting their houses for days together. All amenities like food, drinking water, etc. are provided by their family members in the barracks erected temporarily on the sea-shores.

Table-5.13: Age Distribution of Fishermen in the Kerala Sub-Region (Talukwise) 1979:

Name of Taluk	'Less than 15 years		'15 to 44 years		'45 to 54 years		'55 years & above		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Neyyattinkara	9852	9655	10318	9806	1758	1708	1418	1435	23346	22604
Mukundapuram	1237	1139	1719	1604	319	322	250	239	3525	3304
Ernad	23	21	51	37	7	9	6	3	87	70
Quilandy	5606	5451	6621	6760	885	814	908	747	14020	13772
Badagara	3945	3728	4802	4834	854	744	778	657	10379	9963
Vaithiri) Sultan Battery)	195	181	155	156	21	10	19	16	390	363
Total	20858	20175	23666	23197	3844	3607	3379	3097	51747	50076

Source: Directorate of Fisheries, Kerala.

5.5 Housing Conditions of the Fishermen Population:

Majority of the fishermen population live in huts or in Kutcha houses. Only in those taluks where the fishermen are economically well-off, have pucca houses. Table-5.14 shows the housing condition of the fishermen population of the Sub-Region.

Table-5.14: Housing Condition of Fishermen in the Kerala Sub-Region:

Name of the Taluks	Huts	Kutcha	Pucca
1. Neyyattinkara	3592	4622	884
2. Mukundapuram	395	375	75
3. Ernad	2	23	-
4. Quilandy	1526	1639	580
5. Vaithiri) Sultan Battery)	16	110	1

Source: Directorate of Fisheries, Kerala.

6. STRATEGY FOR DEVELOPMENT OF FISHERY RESOURCES:

The main object of fishery is, of course, to catch fish and this must be the guiding principle for the area where the scope for development of fishery resources is immense, which wishes to improve the diet of the people through the fishery development and wants to provide part-time work or subsidiary occupation to a sector of the village people. Fishery development will also help to boost ancillary industries like boat buildings, manufacture of nets and other fishing tackle,

making of cans and boxes, production of ice, etc.

The Kerla Sub-Region with its coast-line of 70 Kms. and a vast resources of inland water provides good scope for the development of fishery resources. The scope for increasing foreign exchange earnings from marine products appear to be considerable in view of the rich potential (Kerala is an important exporter of fish and accounts for more than 50% of the total export of fish from India and 80% of the total foreign exchange earnings from this source). Besides this, the development of fishery resources would create employment for the fast growing labour force of the Sub-Region.

It, therefore, appears desirable that greater attention be paid to the development of fisheries for augmenting the foreign exchange earnings, supplementing the protien contents of the diet of the people and providing employment. Keeping these in view, the main thrust for the development of fishery resources in the Sub-Region may be:

- i) to significantly step up the annual level of fish production;
- ii) to improve the system of preservation, processing, distribution and marketing of fish;
- iii) to develop an integrated approach for the development of the fishing industry;
- iv) to improve the socio-economic conditions of fishermen and to increase the employment potential of this sector.

6.1 Fish Production: The Fishery Department of the State has drawn up a master plan, spread over a period of

20 years, for the comprehensive development of fisheries in the State with a target of 14 lakh tonnes of catch. This means an increase in the fish catch from 8.36 lakh tonnes in 1975-76 to 14 lakh tonnes by the end of the plan i.e. 1991.

6.1.1 Marine Fishery: The maritime taluks of the Kerala Sub-Region, have together generally accounted for about 4% of the total fish catch of the State. Keeping the same proportion of 4%, the target for the Sub-Region would be about 56,000 tonnes at the end of the plan, i.e. 24,000 tonnes additional production by 1991. This sought to be achieved by the expansion of the fishing grounds and the fishing grounds and the fishing operations. The expansion of fishing grounds and the fishing operations envisage the extension of the fishing activities beyond the traditional fishing zone of 10 to 12 fathoms through the introduction of modern means and techniques of fishing. This will require a three-fold approach, namely, the enlargement of survey and exploration efforts, the introduction of an adequate number of large fishing vessels, and the development of fishing jetties and harbours alongwith ancillary facilities for processing and marketing. So far, fishery resources have been effectively surveyed only to a depth of 25 fathoms. There are large gaps in the information, between 25 to 40 fathoms, while there is very little information regarding fishery resources beyond the 40 fathom line.

An important aspect of the fishery development in Kerala is the mechanisation of the fishing crafts. As per 1972 information the State had 2641 mechanised

boats. The development proposed under the twenty year plan include (i) putting into operation a fleet of 555 trawlers and 8100 mechanised boats, (ii) construction of the fishing harbours at Vizhinjam and Mopla Bay. The lighterage port at Neen-dakora, though not envisaged as a fishing harbour, is at present, the most important fishing centre of the State using mechanised boats. The works on three landing and berthing centres at Ponnani, Beypore and Baliapatam are in progress; that at Azhicode is completed. The Fishery Department also has proposal for ground anchorages or landing places at Palacode, Thalai, Cheruvathoor, Chetwai, Thettapally, Chandragiri etc.

The twenty year plan has, as its target, the development of 16 well equipped fishing harbours with necessary shore facilities.

6.1.2 Inland Fisheries : Some of the basic needs and problems facing the development of inland fisheries in the Kerala Sub-Region which need attentions are :

Reservoir Fisheries : Considerable importance has been given in the Five Year Plans for the construction of reservoir which are impoundments on rivers so as to form artificial lakes. These reservoirs are primarily meant for irrigation and the generation of electricity but these man-made lakes constitute new and extensive areas for inland fishery development. It has been estimated that nearly 5698 hectares of water spread area are available in this way and some 1440 hectares more will be available in very near future. Based on the average yield varying from 5 to 8 kg./ha., the fish production from the reservoirs can reasonably be assumed

to be about 57 tonnes. It could, however, be several times more. A yield of about 40 Kg./ha., has been achieved in some of the Indian reservoirs. This indicates that the reservoirs have a potential for inland fish production. The Indian major carps, viz, catla, rehu, mrigal, occupy the most important place in the reservoir fish production.

One of the problems facing the development of reservoir fisheries in the State including the Kerala Sub-Region is that the reservoir and the adjacent land is controlled by other departments such as Forest, P.W.D. (Irrigation). The hydro electric reservoirs are controlled by the Electricity Board. They sometimes object the fish culture specially in the case of hydro-electricity project. This has become a bottle neck for the development of reservoirs controlled and managed by Electricity Board.

Fish-Seed Stocking and Distribution: With a heavy demand of seed fish of major carps for fish culture in-ponds and tanks, and overall deficit of seed fish production in general, it would be necessary to establish a seed fish farm of a suitable capacity to produce enough fingerlings for stocking the reservoirs.

Central Fish Seed Farm: In order to produce the fish seed required for stocking in the ponds and tanks and other water bodies for the development of fish culture in the Kerala Sub-Region, it is quite necessary to start a central fish seed farm for producing the required fish seeds of different varieties of fast growing species. The farm should be located in the central place so that

the seed can be transported and distributed to various places in the State as well as in the Kerala Sub-Region from central seed farm.

Fish-Seed Stocking and Distribution Centre : The seeds produced in the Central Fish Seed Farm have to be transported to various ponds and tanks and other fish farms. Since it will be difficult to transport fish seed from the Central Fish Seed Farm to various places covering long distances according to the demand from pisci-cultu-rists then and there, it will be better to construct fish seed stocking and distribution centres at different places, so that the requirements of fish seed in each taluk can be readily met by that centre.

Financial Assistance to Fishermen : In order to give encouragement for taking up pisciculture, the interested individuals or institutions should be given financial assistance in addition to the technical advice. The assistance given is to meet the cost of construction of fish ponds, maintenance and other contingent expenditure connected with the fish culture.

Need for a Training Institute : It is of much importance that the people who are interested to take up piscicul-ture should acquire some technical knowledge on the scientific aspects of fish culture. In the Kerala Sub-Region specially in the hilly areas where tribal people are inhabiting and those who are often engaged in fish-ing as a part-time occupation from the neighbouring rivers, lakes, ponds etc. It will be of much use if they

are given training in pisciculture, so that they can take up fish culture on modern scientific methods and increase their income. The field staff engaged in development of fisheries can also be given training. So a training institute to impart training to the pisciculturists as well as the departmental officers engaged in inland fisheries development activities can be started.

Co-operative Societies for In-land Fisheries: The inland fishermen are scattered here and there and they are not getting the required assistance from the government or other agencies due to the lack of their combined effort and also lack of co-operation among them. So it is necessary that the idea and the benefit of co-operation should be extended to them also.

6.2 Fish Preservation, Processing, Distribution and Marketing of Fish:

This would include (a) provision of ice at important fish landing centres, cold storage plants, ice plants, linking of fish landing centres and fishing villages by approach roads, (b) provision for processing of frozen and filleted fish, facilities such as establishment of fish curing yards, (c) provision of well-knit transport system linking the fish producing areas and the places of its consumptions, introduction of insulated van for transport of fish.

In the Sub-Region, at present, there are 13 ice plants with total capacity of 97 tonnes of ice per day. Besides there are 3 cold storages with total capacity of 41 tonnes. In the State, the present daily production

of ice is about 550 tonnes. This has to be augmented and more deep freezing plants set up. The production of ice as proposed by twenty-year-plan is to be stepped up to 950 tonnes daily and storage capacity expanded to 2,200 tonnes, within a span of twenty years.

With anticipated increase in fish catch it would be desirable to create more facilities for the distribution of fish for internal consumption. For this, it is essential to introduce insulated vans as well as broad van to facilitate the movement of the ice to fishing villages and fish from those villages to the consuming centres.

Fish landing centres as well as selected fishing villages are required to be properly linked with the main roads. The villages and the length of the approach roads required to be constructed will be indicated after detailed study of the area.

In order to meet the demand for fresh fish as well as processed fishery products, there is need to establish a chain of cold storages with processing units at important fishing centres and storage units, at both production and distribution centres. These facilities are required to be set up at fishing ports and also at inland centres so as to facilitate marketing of the various types of marine fish caught by the travelers on a remunerative basis.

These programmes for the development of fisheries, aiming at producing sufficient fish for local consumption as well as building up a modern export oriented fishery

industry in the Sub-Region will need other essential requisites such as fish canning units for the preservation and canning of fish. At present, there are 2 canning units in the Sub-Region engaged in processing fish, but with the expected increase in fish catch in future, there is scope for setting up additional canning units. It is also proposed to develop centres as fish distribution centres with allied facilities.

6.3 The Socio-Economic Conditions of Fishermen and to increase the Employment Potential of this Sector:

The various development activities proposed under these fields would be oriented not only towards augmenting fish production but also towards the economic betterment of the fishing community. Some of the specific items under this head would be: assistance to the fishermen primarily for the preservation of craft material, improving the designs of the boats and provisions of "on board" storage facilities, use of out-board motors for mechanisation, provision of improved types of sails, assistance in the procurement of marine gear and gear material, provision of mechanised facilities for fishing by traditional methods, assistance to fisheries co-operative societies, imparting of training to the fishermen youth, developing the infrastructure in coastal fishing villages, etc.

As the fishermen belong to socially and economically backward class, efforts to strengthen the cooperative movement is highly essential. Also there is need for developing the infrastructure in coastal fishing villages. Important fishing villages will be selected

for developing them as centres with social and economic infrastructure in them and to cater to the needs of the surrounding villages. Further, a scheme to link the fishing villages by approach roads will also be visualised. This would help in improving both the socio-economic conditions of the fishing community as well as to ensure the more rational disposition of their catch.

6.4 Need for an Integrated Approach for the Development of Fishing Industry:

The fishery industry, like any other, must be seen and developed as an integral whole and no one step can safely be taken without reference to those which go before and those which must follow after. For instance, the problems of developing a fishery industry are by no means concerned with processing alone. Initially it may, start with the catching of the fish; but the mechanisation of a fishing fleet and introduction of larger craft are closely associated with the availability of adequate harbours with facilities for handling the vessels and their catches. These facilities are construction, maintenance and repair of the yards for the vessels, with cold storages and market facilities for the catch. Fish, being a highly perishable commodity, it is most essential that in the tropical areas where spoilage rates are high, such spoilage would be inhibited as much as possible by the use of ice on the vessels and could storage ashore. Supplies of fish in the seas bear no relationship to the demand for fish on land and storage facilities are absolutely essential if advantage is to be taken of the seasonal abundance which characterizes many of the commercially valuable species.

It is not enough to provide good cold storage facilities. Unless the fish can be distributed inland, or to the larger centres of population, the industry will not develop, nor will the people of the fishing area benefit as they should. Improved transportation facilities are an essential factor and may themselves lead to expansion of the industry by providing new markets within the Sub-Region, outside the Sub-Region, State or Country.

The improvement of road system, again, may be effective only if it is backed by the provision (probably at a later stage of development) of special refrigerated trucks. Nonetheless, rapid and direct transport from the fishing base to centres of consumption can help a great deal to get over the problems raised by the inadequacies of traditional methods of processing.

Less than half the total production of fish is eaten fresh. For maximum utilization, it is certainly desirable that the harvest of the sea/rivers be used directly, as far as possible, for human consumption. But because raw fish is highly perishable, and in most parts of the area there are limitations of transport facilities, the use of the catch is confined to areas adjacent to the shores of the sea, lakes, rivers. Some means of preservation must be used, if inhabitants of other areas are to be benefited from this excellent source of protein. Not only must the fisheries products be prepared in a form which is acceptable and which retains desirable nutritive and palatable characteristics, the cost must be at a level which makes the products

available to people in all parts of the area and in all walks of life.

In addition to the many processes (salting, drying in sun or wind, canning, pickling) for enabling fish to be eaten by sectors of the population far removed from the sources of supply as much as one quarter of the total catch is turned into fish meal for animal feeding.

The fish-processing industry is more sophisticated than is the harvesting of the catch. In its more advanced forms it also requires a great deal of capital. On the other hand, fish processing as practised by traditional methods, is a comparatively simple affair, based on local skills and facilities taking advantage of simple preservatives such as salt. Besides, the traditional and orthodox modern forms of processing, a great deal of attention has been devoted in recent years to the possibilities as they are now called. The technical problems involved are very considerable and are specially difficult where such materials are required to be tasteless, odourless and unnoticeable or unidentifiable when mixed with other foodstuffs.

What is important to realize is that no matter at what level processing is carried out - whether the sundrying of fish for sale in a nearby village or the preparation of shell fish for sale at a luxury price ten thousand kms. away - it cannot be seen as an isolated incident in the chain of events which must take place from the moment the fish leaves the water to its final state as human food.

SECTION - VI. WATER RESOURCES PLANNING

1. RIVER SYSTEMS

The mountain ranges of Western Ghats form the eastern boundary of the Kerala State. The terrains of the portion of the Ghats under study are steep and mountainous forming the upper part of the geological highland* of the State. The rapidly falling terrains receiving heavy precipitation through the South-West and North-East Monsoons facilitate formation of many a swift rivers. There are as many as 44 rivers+ of which 41 flow westwards and 3 eastwards. Some of these rivers originate in the adjoining states namely Karnataka and Tamil Nadu. Twenty two of these rivers including the three east flowing rivers drain the sub-regional ghats portion. The study of the river systems was done by various agencies* at different times. The three Irrigation Commissions, Khosla and the then Central Water and Power Commission have included all these west flowing rivers in one basin namely "the basin of the West flowing rivers between Kanyakumari and Tapi". Recently in 1974, the Irrigation Department of the Kerala State Government has done a commendable job in comprehensively reassessing the water resources and their utilisation in addition to bringing upto date the

* 75 metres above M.S.L.

+ These are more than 15 km long.

* The First Irrigation Commission - 1901-1903

The Third Irrigation Commission 1971

Khosla - 1949

CW&PC - 1960

contents of the Master Plan of water resources of the state. Being more authentic, comprehensive and recent than all aforesaid agencies, most of the information especially on water resource assessment and projection of future demand on water pertaining to the sub-region has been largely drawn from this study.

A brief account of the salient features of the rivers in the study area is given in the following few paragraphs:

1.1 Salient features of the rivers:

The following rivers drain the Sub-region

<u>West flowing</u>	<u>East flowing</u>
i) Mahe	i) Kabbini
ii) Kuttiadi	ii) Bhavani
iii) Korapuzha	iii) Pambar
iv) Chaliyar	
v) Kadalundi	
vi) Bharatapuzha	
vii) Karuvannur	
viii) Chalakudy	
ix) Periyar	
x) Muvattupuzha	
xi) Meenachil	
xii) Manimala	
xiii) Pamba	
xiv) Achencoil	
xv) Kallada	
xvi) Ithikara	
xvii) Vamanapuram	
xviii) Karamana	
xix) Neyyar	

West flowing rivers:

i) The Mahe river: This river is also called the Mayyazhipuzha rises from the western slopes of the Wynad Hills at an elevation of plus 910 metres+. This river drains a small part of Mananthavadi and Vaithiri taluks of the Wynad district. The river runs for 54 km before it empties itself into the Arabian sea and drains a total area of 394 sq. km. of which about 229 sq. km. falls with the study area.

ii) The Kuttiadi river: Also known as the Murat river, this rises from the Narikota ranges on the western slopes of the Wynad Hills at plus 1220 metres and flows through Badagara and Quilandy taluks of the Sub-region. It joins the sea board at Kottakkal 7 km south of Badagara. The river drains 583 sq. km. area along its length of 74 km., and its entire catchment is confined to the Sub-region of the Ghats.

iii) The Korapuzha river: This is formed by the confluence of the Agalapuzha - backwater, and the Punnurpuzha which originates at plus 610 metres from the Arikankunnu. It runs a total length of 40 km and drains an area of 620 sq. km.

iv) The Chaliyar river: This forms one of the major river systems of the state. It originates from the Ilambalari Hills in Gudalur Taluk of the Tamil Nadu portion of the Western Ghats region at plus 2066 metres.

+ The elevation is with respect to the Mean Sea Level.

Also known by the name the Beypore river, has a number of tributaries - the Chalippuzha, the Punnapuzha, the Pondiyar, the Karimpuzha, the Cherupuzha, the Kanhirapuzha, the Kurumbanpuzha, the Vadapurampuzha, the Iringipuzha and the Iruthillypuzha. This interstate river drains a total area of 2923 sq. km. of which 2535 sq. km. lie in the Kerala State and most of it lies in the Sub-region. It flows for a total length of 169 km.

v) The Kadalundi river: Known also by the name the Karimpuzha and the Oravanpurampuzha, the Kadalundi is formed by its tributaries the Olipuzha and Veliyar. The Olipuzha originates from the Cherakkobbanmala at plus 1160 metres, and the Veliyar from the forests of Erattukombanmala at plus 1190 metres. The river runs for 130 km. to cover 1122 sq. km. under its catchment. Only the upper reaches of the streams lie in the study region in Ernad taluk.

vi) The Bharatapuzha river: This is another interstate river and the second longest in the state. It rises from the Anamalai Hills in Tamil Nadu and traverses the districts of Coimbatore in Tamil Nadu and Palghat, Malappuram and Trichur districts of Kerala to join the Arabian sea near Ponnani Town.

The main tributaries of the river are the Gayathripuzha, the Amravathi or the Kannadi, the Kalpathipuzha, and the Thuthapuzha.

Over its 209 km. run, the river has a catchment area of 6186 sq. km. of which 4400 sq. km. lie

in Kerala. Almost two-thirds of the Palghat district which lies in the study region is drained by the Bharatapuzha.

vii) The Karuvannur river: This river is fed by its two main tributaries viz the Manali which originates from the Vaniampara Hills at plus 365 metres, and the Kurumali whose sub-tributaries - the Chimony and the Muply originate from the Pumalai at plus 1100 metres. This river runs for 48 km. draining an area of 1054 sq. km. of which 480 sq. km. of Chittur Taluk is within the sub-region.

viii) The Chalakudy river: This interstate river is formed by the confluence of five streams - the Parambikulam, the Kuriarkutty, the Sholayar, the Karappara and the Anakayam. All these streams originate from the Anamalai Hills. The Parambikulam and the Sholayar rise from the Coimbatore district of Tamil Nadu, and the Karappara and the Kuriarkutty from the Palghat district of Kerala. At plus 470 metres, the Parambikulam meets the Kuriarkutty. The Karappara joins the main river at plus 455 metres, while the Anakayam at plus 365 metres. Initial stretch of the river is in thick forests with many falls till the river reaches the plains at Kanjirapally. After Kanjirapally, the river takes a tortuous course of 35 km. through fertile and picturesque tracts.

The river drains 1704 sq. km. area of which 1404 sq. km. lie in Kerala draining parts of the Palghat, Trichur and Ernakulam districts. Its total length is 130 km.

ix) The Periyar river: This is the longest river of Kerala and the largest in water resource potential. It starts from the Sivagiri Group of Hills at plus 1830 metres. The beginning stretch flows northerly. The Mullayar, a tributary, joins the Periyar at plus 854 metres. The river passes through narrow gorges, and, between Kuravan Malai and Kurathi Malai before the Idukki gorge. After receiving its major tributary - the Muthirapuzha, the river takes west-north - westerly direction and loses a head of 244 metres in the next 15 km. run. After receiving the Chalakkudy in its last course, the river expands into a broad sheet of water. The river over its 244 km. run drains 5398 sq. km. area of which 5284 sq. km. lie in Kerala largely confined to the Ernakulam and Idukki districts of the sub-region.

More than half of Idukki district is drained by this river.

x) The Muvattupuzha river: This is formed by the confluence of three rivers, namely, the Thodupuzha, the Kaliyar and the Kothamangalam. The Thodupuzha rises from the Taragamkanam Hills at plus 1094 metres. After flowing north-westerly for 38 km., the Thodupuzha joins the other two rivers at Muvattupuzha. The Kaliyar is formed by the merger of the Kamb Aar and the Toni Aar. After running westerly for 42 km., the Kaliyar meets the Kothamangalam. The Kothamangalam originates from the Neriamangalam Ranges of the Thodupuzha Forest.

The length of the river is 121 km. and its catchment is 1554 sq. km. This river drains Thodupuzha, and Kothamangalam taluks of Ernakulam district and Meenachil taluk of Palghat district.

xi) The Meenachil river: This river is formed by several streams originating from the Western Ghats. The principal stream - the Kadapuzha Aar rises from Araikannu Mudi and Phazavatti Mudi at altitudes varying from plus 914 to plus 1097 metres. The length of the river is 78 km. and the drainage area is 1272 sq. km. The Meenachil and the Thodupuzha taluks are drained by the river.

xii) The Manimala river: This originates from Tata-malai at plus 1156 metres and takes a southerly course till Mundakayam. It confluences with the Pamba river at Neerettupuram. It drains an area of 847 sq. km. over its 90 km. length. Portions of Peermade and Kanjirapally taluks are drained by the river.

xiii) The Pamba river: This is the third longest river of Kerala and is formed by the confluence of the Pamba Aar, the Kakki Aar, the Aruddai Aar, the Kakkad Aar and Kall Aar. The Pamba originates in several streams in the Pullichil Malai, Naga Malai and Sundara Malai in the Peermadu Plateau at plus 1650 metres. A branch of the Achencoil river and the Manimala river join the Pamba near Pannai, and at Nirettupuram respectively.

The river drains 2235 sq. km. area over its 176 km. length. The river drains Pathanamthitta taluk of the Sub-region.

xiv) The Achencoil river: This river is formed by a few streams originating from the Pasukida Mettu, Ramakkal Teri and Rishi Malai at altitudes ranging between plus 760 metres and plus 160 metres. It flows generally in a north-westerly direction. The river splits into several smaller branches towards its last stretch, and its main branch joins the Pamba at Veeyapuram.

The river drains 1484 sq. km. area over its 128 km. length. Parts of Pathanamthitta and Pathanapuram taluks of the study area are drained by the upper reaches of the river.

xv) The Kallada river: The three river, namely, the Kulathupuzha, the Chendurni and the Kalthuruthy join together near Parappan by the side of the Trivandrum - Shenkottah road. The streams of the Kulathupuzha originate in Karimalai Kadakkal in Papanasam range at plus 1524 metres and in Sirikala Hills at plus 1372 metres, and in Ponmudi ranges at plus 1067 metres. The Chendurni Aar originates from the Karimalai Kodakkal and Alwarkurichi peaks and joins the Kulathupuzha after some run. The streams of the Kalthuruthy rise from Perianuruthi Malai at plus 853 metres, Padikattu Malai at plus 853 metres, Kottuvasal Teri at plus 792 metres, Pillaiyar Kovil Malai at plus 808 metres and Suvarnagiri Malai at plus 488 metres.

The length of the river is 121 km. with a drainage area of 1699 sq. km. Pathanapuram taluk is

drained by the river.

xvi) The Ithikkara river: This originates from the low hills near Madathurikunnu at plus 240 metres and from the hills south-west of Kulathupuzha. The river has a length of 56 km. and a catchment area of 642 sq. km. The initial course of the streams lies in the Pathanapuram taluk.

xvii) The Vamanapuram river: This river rises from the Chemunji Hotai at plus 1860 metres. The important tributaries of the river are the Kaladparai Aar, the Pannivadai Aar, the Ponnudi Aar, the Upper Chit Aar, the Manjappara river and the Kilimannoor Aar. The river drains an area of 687 sq. km. over its 88 km. length. Parts of Pathanapuram taluk and Nedumangad taluk are drained by the river.

xviii) The Karavana river: This starts from the Chemunji mottai and the Agastya Malai of the Nedumangad Hills. The river is formed by the confluence of the Kavi Aar, the Attai Aar, the Vaiyapadi Aar and the Todai Aar. The Killi Aar is its main tributary.

The river has a catchment area of 702 sq. km. over its length of 68 km. Parts of Nedumangad and Neyyattinkara taluks lie in the catchment of the river.

xix) The Neyyar river: This is the southern most river of Kerala. It rises from the Agastya Hills at an elevation of plus 1860 metres. The Kallar and the Karavalli Aar are the important tributaries. It drains an area of 497 sq. km. over its total course

of 56 km. It drains mainly the Neyyattinkara taluk.

East flowing rivers:

xx) The Kabbini river: A tributary of the Cauvery, this is an east flowing interstate river rising in Kerala, and traversing through Karnataka and Tamil Nadu falls into the Bay of Bengal. It originates in the Wynad District and is fed by its tributaries, namely, the Panamaram, the Mananthody, the Babali and the Noolpuzha.

The Mananthody rises in the Thondarmudi Malai at plus 1500 metres. The Panamaram originates from Lakkidi at an elevation of plus 1350 metres and joins the Mananthody river north of Panamaram. Below this point of confluence, the river takes the name the Kabbini. Near the State border, the Bhavalipuzha joins the Kabbini and, from here onwards the river runs along the state border towards north-east for 12 km. and then flows north to traverse through Karnataka. The Noolpuzha rises near the eastern border of Wynad district and runs north to join the Kabbini in Karnataka.

The catchment area of the river upto the point it crosses the state border is 2070 sq. km. of which 1920 sq. km. lie in the Wynad district.

xxi) The Bhavani river: This is another tributary of the Cauvery river and originates in the Western Ghats near Bhavaniar Betta at plus 2500 metres in the Nilgiris of Tamil Nadu. After draining 78 sq.km. of Tamil Nadu and running for 13 km. enters

the Kerala State to run south-wards for 29 km. upto Mukkali and thence turns around sharply circling the Malleswara peak. It runs almost north-easterly till it reenters Tamil Nadu at Kalkandiyoor.

The river drains 562 sq. km. of Mannarghat taluk of Kerala.

xxii) The Pambar river: This is yet another tributary of the Cauvery. It rises in the Benmore Tea Estate in the Western Ghats at plus 1950 metres in the Devicolam taluk of Kottayam district. The river is known as the Thalayar in its upper reaches. From Kovilkadavu, the bed of the river falls steeply and at its 30th km., it enters Tamil Nadu. The Thenar, rising from Kerala at plus 1920 metres joins the Pambar in Tamil Nadu to form the Amaravathy, a main tributary of the Cauvery.

The drainage area of the Pambar in Kerala is 384 sq. km. mainly confined to the Devicolam taluk of the Idukki district.

1.2 River Basins:

For convenience and technical reasons, certain rivers are sometimes grouped to form the river basins. Thus, the Korapuzha, the Chaliyar and the Kadalundi are grouped into one basin. The Kallada river is combined with the Pallickal to form a basin group, and the Vamanapuram - together with the Ayroor forms a basin group. The rest of the rivers individually form basins in their respective

names. Thus, the rivers in the Kerala Sub-region fall into 20 river basin groups. The rivers and the river basin groups are depicted in Fig. 6.1

2. ASSESSMENT OF WATER POTENTIALS:

2.1 Rainfall:

The water resource potentials depend primarily upon the intensity, duration and distribution of rainfall. The study area receives heavy and assured rainfall between June and August. Kerala comes under the influence of the South-west Monsoon from June through September, and of the North-east monsoon, from September through November. Nearly two-thirds of the total annual precipitation is received through the South-west monsoon and, the contribution of North-east monsoon is often uncertain. The average monthly rainfall distribution as available in some of the districts of the State is given in Table 6.1 and is depicted in Figure 6.2. As may be seen from the Table, the annual normal rainfall varies from 2001 to 3577 m.m. The average annual rainfall of the State is 3085 m.m. The maximum precipitation is on the Western slopes of the Western Ghats amounting to about 5200 m.m. while the lowest is recorded in the vicinity of the Palghat gap as well as the southern extremity of the State where it is only about 1524 m.m. It is still less on the eastern slopes.

2.2 Method of Assessment of runoff:

Assessment of runoff is done based on the gauge and discharge data of water courses for a few

KERALA SUB - REGION

RIVER BASINS

BOUNDARIES

- REGIONAL
- STATE
- DISTRICT
- TALUK
- RIDGE LINE

RIVER BASINS

- ① MAHE
- ② KUTTIADI
- ③ CHALIYAR
- ④ BHARATHAPUZHA
- ⑤ KARUVANNUR
- ⑥ CHALAKUDI
- ⑦ PERIYAR
- ⑧ MUVATTUPUZHA
- ⑨ MEENACHIL
- ⑩ MANIMALA
- ⑪ PAMBA
- ⑫ ACHENCOIL
- ⑬ KALLADA
- ⑭ ITHIKARA
- ⑮ VAMANAPURAM
- ⑯ KARAMANA
- ⑰ NEYYAR
- ⑱ KABBINI
- ⑲ BHAVANI
- ⑳ PAMBAR



WESTERN GHATS : SURVEY & PLAN

TOWN & COUNTRY PLANNING ORGANISATION, MIN. OF WORKS & HOUSING, GOVT. OF INDIA.

KERALA SUB-REGION WATER RESOURCES Rainfall

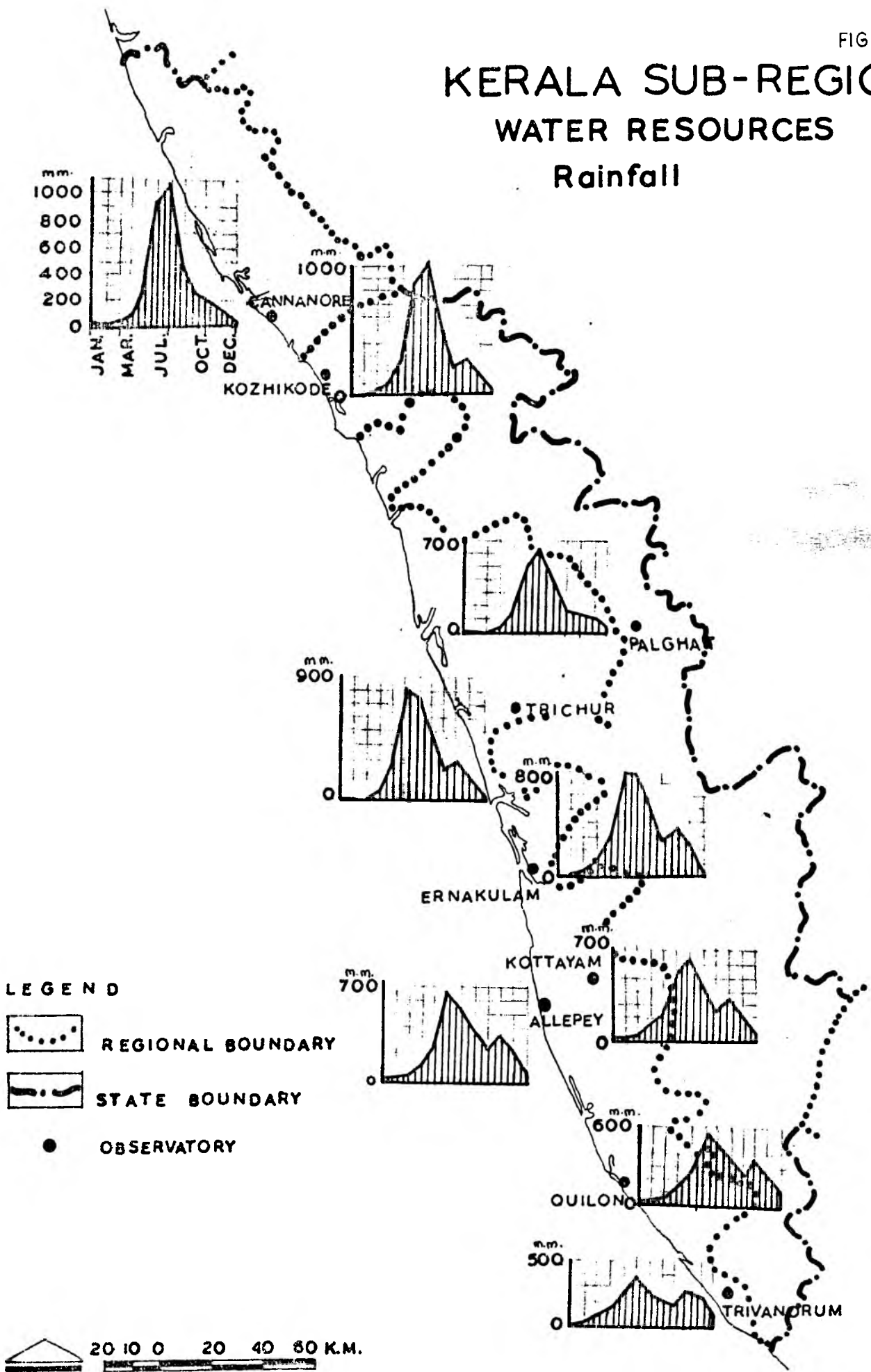


Table: 6.1 Distribution of normal Rainfall

District	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct	Nov	Dec.	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cannanore	5.3	4.8	11.2	58.6	200.6	923.0	1063.5	584.7	239.4	218.0	106.0	22.8	3437.9
Kozhikode	9.0	6.8	18.4	84.0	233.5	853.9	1005.9	530.5	239.2	286.6	160.1	33.4	3461.3
Palghat	9.1	9.3	26.6	80.0	175.2	532.2	657.1	361.9	175.7	257.4	144.3	30.4	2459.2
Trichur	10.1	9.2	28.4	91.1	283.5	800.3	747.6	441.7	245.5	305.7	163.5	32.8	3159.4
Ernakulam	18.0	23.6	54.4	136.1	310.1	792.1	785.9	523.5	296.6	365.7	216.9	54.6	3577.5
Kottayam	31.2	27.0	59.5	133.1	237.4	585.8	628.0	412.4	263.5	330.8	213.6	72.2	2994.5
Alleppey	27.6	31.6	59.7	134.1	293.7	666.1	548.1	371.3	272.3	328.1	224.0	64.0	3020.9
Quilon	24.1	32.1	83.6	166.3	260.3	547.4	449.6	318.1	226.2	344.9	242.9	64.8	2760.2
Trivandrum	21.2	18.0	48.0	118.1	213.9	391.1	257.4	204.5	168.9	280.2	210.2	70.1	2001.6

years and the rainfall data for a comparatively longer period. But such data is not adequately available for all basins. With the constraints in the data, and considering the topography, slope, soil condition, vegetation, climatic conditions, etc., the Irrigation Department of the state has assessed the water yield of all the river basins.

Fortunately, most of the gauged discharge data is reported available only for the 'high land' topographic zone which forms the Western Ghats. The run-off is worked using a dependability factor of 75 percent in the formulae* employed.

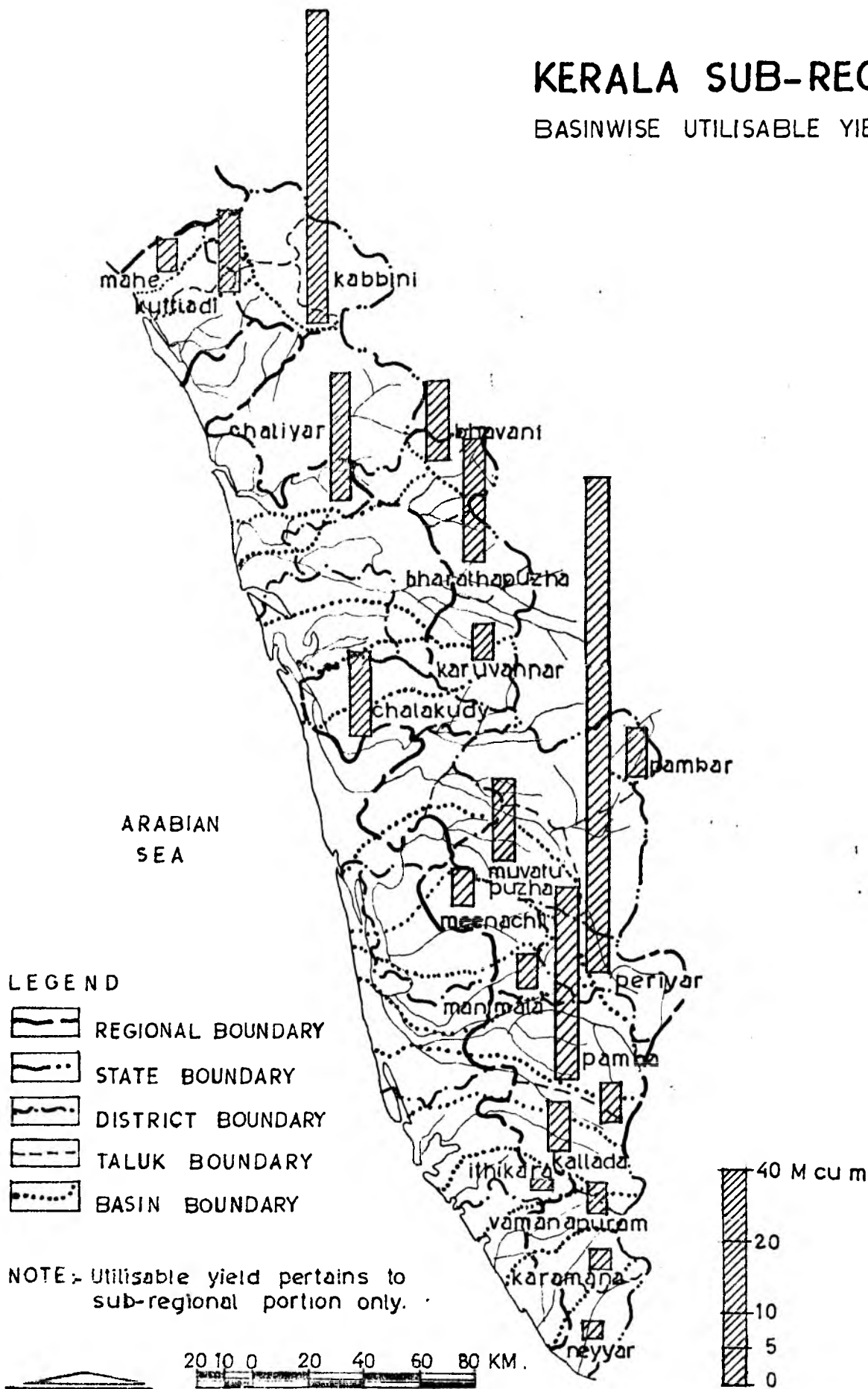
The utilisable quantum in the high lands is taken to be the entire runoff whereas for midland (15 m to 75 m) 50% of the runoff is taken as utilisable. However, 15 per cent deduction is made towards evaporation losses, spillage etc. in the water runoff estimate of the 'high land'.

For the sub-regional area, the area being almost entirely 'high land', the yield is worked out proportionate to the area of the basin falling within the sub-region. The basinwise assessment of utilisable runoff is set out in Table 6.2 and illustrated in Figure 6.3.

* 1) Regression equation	2) Inglis formula
$R_o = aP_1 + bP_2 + K$	$R = 0.85P - 12$
Where R_o = runoff	R = annual runoff in inches
a, b, k = station constants	P = annual rainfall in inches.
P_1 = Current year rainfall	
P_2 = antecedent year rainfall	

KERALA SUB-REGION

BASINWISE UTILISABLE YIELD



WESTERN GHATS : SURVEY AND PLAN

TOWN & COUNTRY PLANNING ORGANISATION, MIN. OF WORKS & HOUS., GOVT. OF INDI.

Table: 6.2 Assessment of Utilisable runoff in the Sub-region

River basins	Total catchment area in sq. km. in Kerala	Catchment area within the region in sq. km.	Total yield in M.cu.m. in Kerala	Total utilisable yield in M.cu.m. in Kerala	Utilisable yield in the Sub-region M.cu.m./M.cu.m.	Intensity of Utilisable runoff M.cu.m./sq.km.	Taluks falling in the basin
1	2	3	4	5	6	7	8
1. The Mahe	394	229	803	445	259	1.13	Badagara Mananthavadi
2. The Kuttiadi	583	583	1626	1015	1015	1.74	Badagara Quilandy
3. The Great Chaliyar Basin (Korapuzha,, Kallai, Chaliyar Kadalundi)	4377 (+ 388 in Tamil Nadu)	2832	7135 (+ 640 in Tamil Nadu)	2616 (+ 544 in Tamil Nadu)	1693	0.60	Ernad Mannarghat Quilandy
4. The Bharathapuzha	4400 (+ 1786 in Tamil Nadu)	2174	6540 (+ 938 in Tamil Nadu)	3349 (+ 797 in Tamil Nadu)	1655	0.76	Mannarghat Palghat Chittur
5. The Karuvannar	1054	480	1887	963	438	0.91	Chittur
6. The Chalakudy	1404 (+ 300 in Tamil Nadu)	1057	2541 (+ 580 in Tamil Nadu)	1539 (+ 494 in Tamil Nadu)	1158	1.10	Chittur Mundakkayam Kunnathunad

1	2	3	4	5	6	7	8
7. The Periyar	5254 (+ 154 in Tamil Nadu)	4507	11341 (+ 266 in Tamil Nadu)	8004 (+ 226 in Tamil Nadu)	6866	1.52	Kunnathunad Kothamangalam Devicolam Udumbanchola Peermade Thodupuzha
8. The Muvattupuzha	2004	1240	3814	1812	1121	0.90	Kunnathunad Kothamangalam Thodupuzha
9. The Meenachil	1272	598	2349	1110	522	0.87	Meenachil Thodupuzha
10. The Manimala	847	328	1829	1108	429	1.31	Peermade Kanjirapally
11. The Pamba	2235	1825	4641	3164	2583	1.42	Pathanamthitta
12. The Achencoil	1484	604	2287	1249	508	0.84	Pathanamthitta Pathanapuram
13. The Kallada (including the Pallickal)	1919	993	2270	1368	708	0.71	Pathanapuram
14. Ithikara	642	167	761	429	111	0.66	Pathanapuram
15. The Vamanapuram	867	437	1324	889	448	1.03	Pathanapuram Nedumangad

1	2	3	4	5	6	7	8
16. The Karamana	703	442	836	462	290	0.66	Nedumangad Neyyattinkara
17. The Neyyar	497	497	443	229	229	0.46	Neyyattinkara
18. The Kabbini	1920	1920	4238 (4333 by Inglis formula)	4238	4238	2.21	Manathavadi S. Battery
19. The Bhavani	562	562	1019	1019	1019	1.81	Mannarghat
20. The Pambar	384	384	708	708	708	1.84	Devicolam
Total	32802	21859	57771	35716	25998	1.19	

It may be seen from the Table that the proportion of utilisable runoff from the total runoff varies from basin to basin depending upon the variations in the contributing factors. The intensity of runoff varies from 0.46 in the Neyyar basin to 2.21 in the Kabbini. Interestingly, in the Mahe, the Kuttiadi and the Chaliyar basins that are adjacent and contiguous to the Kabbini basin, the intensity of runoff is significantly low being 1.13, 1.74 and 0.6 respectively. It may also be noted that the runoff intensity of the east flowing rivers is more than that of the west flowing rivers. For the Sub-region as a whole, the intensity of runoff works out to 1.19 M.cu.m./ sq. km.

The Sub-region covers 56 percent of the State but contributes as much as 82 percent of the annual yield of the state. The utilisable runoff, however works out to 61 percent of that of the State.

	Area in sq. km.	Annual yield in M.cu.m.	Utilisable runoff M.cu.m.
1. State	38590	70323	42772 (60.8)
2. Sub-region percentage to state	21859 56.6	57771 82.2	25998 (45.0) 60.8

Note: Figures in brackets indicate percentage to annual yields.

The relatively lower utilisable component in the Sub-region compared to the State may be

attributed to its poor physical conditions and the attendant losses.

The present indications of the ground water potential in the Sub-region are that the prospect of Sub-surface water for large scale use is of least significance. For all practical purposes, therefore, ignoring ground water availability should hardly make any difference in the planning for water resources in the Sub-region.

It may, therefore, be concluded that the water wealth of the study area refers only to the surface water potentials utilisable quantum of which is in the order of 26,000 M.cu.m.

3. LEVEL OF WATER UTILISATION:

The major user groups of water are the agricultura, domestic and industrial sectors. The agricultural demand on water normally varies from 70 to 95 percent of the total water use. The drawl of water for agricultural activities is primarily through the means of irrigation that are conventionally known as major and medium schemes, and minor schemes including lift irrigation schemes and wells.

3.1 Irrigation Schemes:

Need for Irrigation: The economy of Kerala is essentially agrarian. The geo-metereological conditions

of the State are more conducive for agricultural activities of both food and cash items. From the point of economy, the cash crops occupy a more significant position in the Ghats than the food crops. The prevalent cash crops of the Ghats include rubber, coffee, tea, cardamom, pepper, cocoa, etc. In the areas of assured irrigation, wet crops such as sugarcane and paddy are cultivated. Garden crops like tapioca, banana and other plantations are mostly grown where irrigation facilities are available to supplement the shortage of rainfall.

Dry spells even during September and October are not uncommon. Moreover, even during the normal monsoon months, the distribution of rainfall is uneven. To abate these monsoon misfortunes due to the vagaries of nature by resorting to protective and productive artificial water supply to the crops, provision of irrigation facilities is an absolute necessity in the State, and more so in the Ghats which normally experience flashy runoff of the precipitation leaving inadequate moisture to the crops. There are a number of irrigation schemes both large and small in the study area, but, by and large, due to undulating surface conditions, the command areas mostly lie in the plains.

3.1.2 Major and Medium irrigation projects:

a) Completed Schemes:

There are nine completed major schemes that partly or wholly benefit the Sub-region with an aggregate net ayacut of about 57400 hectares within the

Sub-region. All these schemes have adequate storage provisions to irrigate second crops in their entire ayacut areas.

Of the schemes, 5 lie in the Bharathapuzha basin benefiting Palghat and Chittur taluks. The other 4 schemes lie one each in the Chalakudy, the Periyar, the Karuvannar and the Neyyar basins benefiting Kunnathunad, Kothamangalam, Mukundapuram, Neyyattinkara and Nedumangad taluks (Table 6.3).

The talukwise benefits of these schemes are:

<u>Taluks</u>	<u>Net hectares</u>
Palghat	11996
Chittur	10266
Kunnathunad	19330
Mukundapuram	13878
Neyyattinkara	1093
Nedumangad	810
Total	<u>57373</u>

All these schemes provide irrigation minimum upto the second crops in their entire ayacut areas. Thus the gross benefits of these schemes will be about 1.05 lakh hectares within the study area.

The Malampuzha irrigation project in the Palghat district is the largest in Kerala with a storage capacity of 226.96 M.cu.m. to irrigate 21045 hectares of paddy land in the Palghat district

Table: 6.3 Completed Large irrigation schemes in the Sub-region

Basin/ Scheme (year of Commission)	Across the river	Taluks benefited in the Sub-region	Net Ayacut in the Sub- region in hectares	Water spread area in hectares	Cost estimate in Lakh Rs.
1	2	3	4	5	6
<u>Bharatapuzha</u>					
1. Malampuzha (1966)	Malampuzha	Palghat Chittur	7562 1520	2202	580
2. Walayar (1964)	Walayar	Palghat	3992	256	131.66
3. Pothundy	Alayar	Chittur	3723	275	234.25
4. Gayathri Istage (1960)	Meenkara	Palghat Chittur	442 2593	12	220
5. Gayathri II stage (1966)	Chulliar	Chittur	2430	16.5	
<u>Chalakydy</u>					
6. Chalakydy	Chalakydy	Mukundapuram	9190	NA	NA
<u>Periyar</u>					
7. Periyar	Periyar	Kummatnunad	19330	NA	1150
<u>Karuvannar</u>					
8. Peechi	Manali	Mukundapuram	4688	500	235
<u>Neyyar</u>					
9. Neyyar	Neyyar	Neyyattinkara Nedumangad	1093 810	NA	401
Total			57373		

contributing to an additional production of nearly 38560 tonnes of paddy. Of the culturable command area of the scheme, only about 43 percent lies within the study area.

The Walayar project, again in the Palghat district has its entire ayacut in the Sub-region. This scheme was partially commissioned in 1956. This provides irrigation for two crops of paddy over its entire ayacut to additionally produce annually 6470 tonnes of food grains.

The Pothundy scheme benefits the Chittur and Alathur taluks of the Palghat district and has an ayacut of 5465 hectares of paddy lands of which Chittur taluk shares 68 percent. The additional food production of the entire ayacut is 10930 tonnes.

The Gayathri scheme was constructed in two stages, the first stage on the Meenkara is intended to irrigate 3440 hectares of which 88 percent lies in the Chittur and Palghat taluks.

The second stage of the Gayathri project across the Chulliar serves an ayacut of 2430 hectares entirely in the Chittur taluk. The additional food production in the ayacuts of both the stages is 6070 tonnes.

The Chalakudy project was also taken in two stages. This scheme benefits 11495 hectares in the Chalakudy basin, 1500 hectares in the Karuvannar basin and 5000 hectares in the Periyar

basin mainly for the first two crops. About 16390 tonnes of food grains are estimated as additional production in the entire ayacut. The benefits of the project in the Periyar basin falls outside the Sub-region, and also its benefits in the Karuvannar basin is still a proposal. Of the existing ayacut of the project in the Chalakudy basin about 80 percent lies in the Mukundapuram taluk.

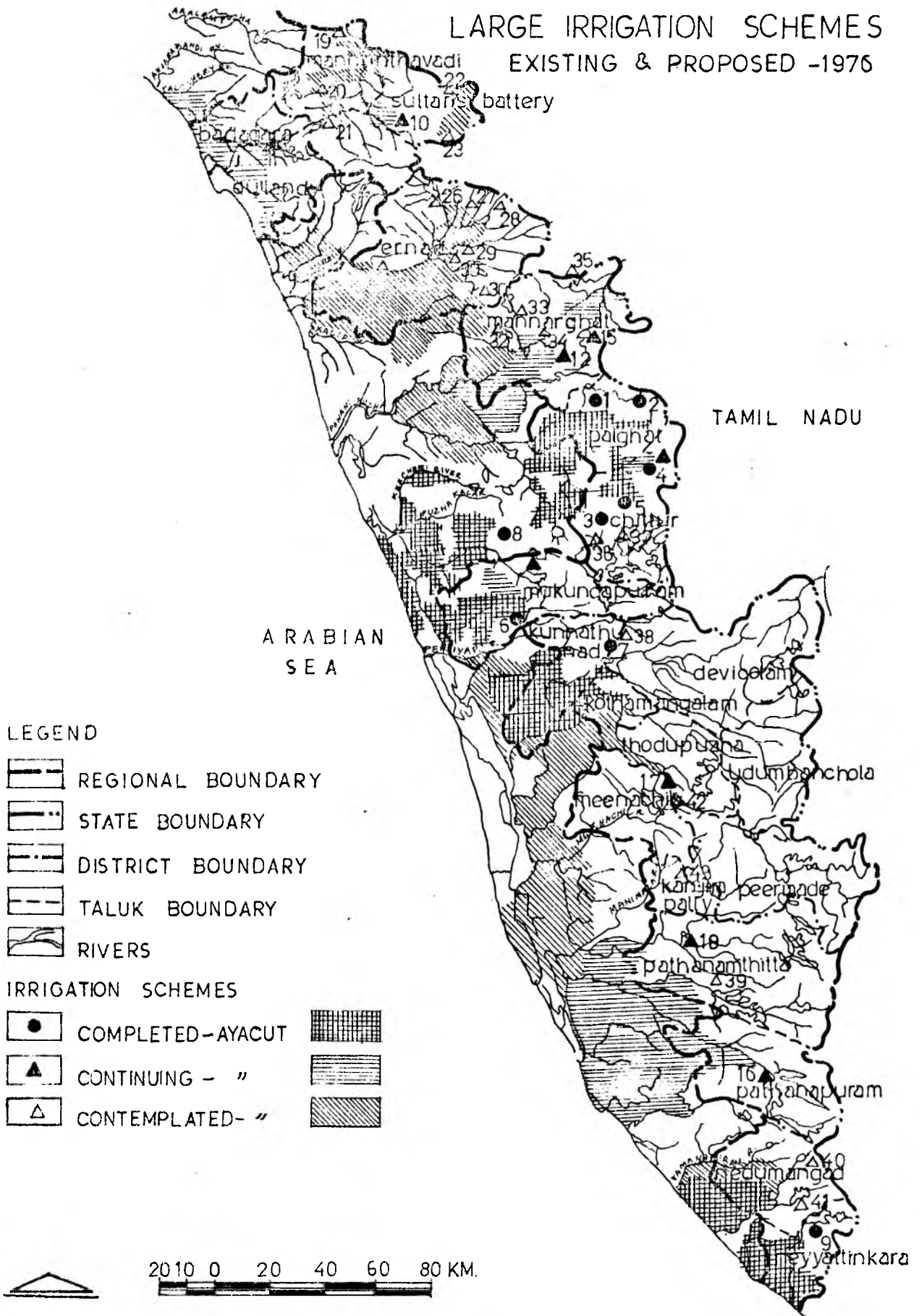
The Periyar Valley project along with the Chalakudy diversion scheme depends on the runoff of the Periyar river in addition to the tail race of the hydel power project in the upper reaches. The net ayacut is 32380 hectares with almost two-thirds in Kunnathunad taluk. The scheme provides irrigation also to the third crop to an extent of 20840 hectares. The additional food production in the entire ayacut is estimated at 42298 tonnes annually.

The Peechi scheme serves 17555 hectares for the first two crops including 8100 hectares of dry crops. Only Mukundapuram taluk is benefitted by the scheme to an extent of 4688 hectares.

The Neyyar project across the southern most river of the State benefits 15520 hectares in the basin of which 3780 hectares lie in Tamil Nadu. Of the 11740 hectares of ayacut in Kerala, 3440 hectares are wetlands and the rest dry lands. Within the study region, only the Neyyattinkara and Nedumangad taluks are the beneficiaries to an extent of only 16 percent of the benefit in the state. Locations of these schemes may be seen in Figure 6.4.

KERALA SUB-REGION

LARGE IRRIGATION SCHEMES EXISTING & PROPOSED -1976



b) Continuing Projects:

Nine schemes are reported to be under construction and that will bring about 54000 hectares under irrigation. These schemes benefit thirteen taluks of the Sub-region. The talukwise benefit will be as under-

<u>Taluk</u>	<u>Net hectares</u>
1) South Wynad	4650
2) Badagara	6940
3) Quilandy	8213
4) Mannarghat	7280
5) Palghat	6486
6) Chittur	10287
7) Mukundapuram	2000
8) Pathanamthitta	1738
9) Pathanapuram	1345
10) Thodupuzha	1320
11) Kunnathunad	900
12) Kothamangalam	2000
13) Meenachil	965
Total	54124

The salient facts of the schemes are set out in Table 6.4.

The Karapuzha project, the construction of which is at full swing presently is on the east flowing river, the Kabbini in the Wynad district. The project will use up 110 M.cu.m. in providing irrigation to a

Table: 6.4 Continuing Projects (Major & Medium) in the Sub-region

Basin/Scheme	Across the river	Taluks benefited in the Sub-region	Net ayacut in hectares in Sub-region	Total net ayacut in hectares	Total addl. production in tonnes	Cost estimate in Lakh Rs.
1	2	3	4	5	6	7
<u>Kabbini</u>						
1. Karapuzha	Panamaram	South Wynad	4650	4650	12725	389
<u>Kuttiadi</u>						
2. Kuttiadi	Kuttiadi	Badagara Quilandy	4940 8213	14500 (+9340 in Chaliyar & Mahe)	40550	1360
<u>Bharathapuzha</u>						
3. Kanhirapuzha	Kanhirapuzha	Mannarghat Palghat	2957 486	9720	25300	926
4. Chitturpuzha	Chitturpuzha	Palghat Chittur	6000 10287	17300	32160	531.61
<u>Karuvannar</u>						
5. Chimoni-Mupli	Chimoni - Mupli	Mukundapuram	2000	606000	166180	2936
<u>Bhavani</u>						
6. Attapady	Siruvani	Mannarghat	4323	4323	6425	476
<u>Kallada</u>						
7. Kallada	Kallada	Pathanamthitta Pathanapuram	1500 1345	52420	131540	4500

1	2	3	4	5	6	7
<u>Muvattupuzha</u>						
8. Muvattupuzha	Thodupuzha	Thodupuzha Kunathunad Kothamangalam	1320 900 (app) 2000 (app)	17400 (+3645 in Periyar)	170 000	1100
		Meenachil	865			
<u>Pamba</u>						
9. Pamba	Pamba	Pathanamthitta	238	19800	81650	1889.5
Total			54124			

gross area of 9300 hectares entirely in the South Wynad taluk.

The Kuttiadi project will irrigate 14500 hectares in Kozhicode, Quilandy and Badagara taluks. The ayacut of the project extends to the Mahe river basin for about 1340 hectares benefiting partly the Badagara taluk and to the Chaliyar basin for 8000 hectares benefiting Quilandy taluk to some extent. The project provides irrigation even to the third crop over 3100 hectares.

The Kanhirapuzha Irrigation project located in the Mannarghat taluk holds 60 M.cu.m. of water submerging 512 hectares of land. The scheme benefits 118 villages in Mannarghat, Palghat and Ottapalam taluks enabling cultivation of second crop over 2500 hectares and third crop over 2430 hectares. Only about one third of the ayacut is confined to the Sub-region.

The Chitturpuzha project work is in fact remodelling of the existing old project. The old project consists of four anicuts namely Moolathara, Thambaramadakku, Kunnankattupathy and Noornee - all across the Chitturpuzha feeding 8100 hectares of paddy fields in Chittur taluka. These anicuts needed repair. Moreover, under the agreement with Tamil Nadu for, that has intercepted the Aliyar - a tributary to the Chitturpuzha, an assured supply of 206 M.cu.m. of water is being made to Kerala by Tamil Nadu. To receive this supply it was necessitated to remodel the ~~Chittur~~ Chitturpuzha anicuts. In fact, in the first stage, only the anicuts at Moolathara and Thambaramadakku

are being reconstructed. The ayacut of the scheme will add 9085 hectares more to its present ayacut of 8215 hectares. Palghat and Chittur taluks hold almost 90 percent of the ayacut of the project.

The Chimoni is part of the integrated project namely the Chimoni-Mupli-Kole. Only a small portion of the ayacut lies in Mukundapuram taluk.

The Attappady across the Siruvani is in the Bhavani basin - an east flowing river. The reservoir will hold 6017 M.cu.m. Of its 4323 hectare ayacut which is entirely in the Mannarghat taluk, 1840 hectares will be under paddy and 2483 hectares will be under sugarcane. The paddy alone will require 117 M.cu.m. of water for two crops annually.

The Kallada scheme consists of a dam to store water and a weir to divert the flow to the irrigation canals. The ayacut of 52420 hectares lies between the rivers-the Achencoil and the Ithikara in Quilon district. Less than half of the ayacut lies within the Sub-region. The scheme provides irrigation to the second crop over its entire ayacut.

The Muvattupuzha river valley scheme makes use of the tail race water of the Idikki hydro-electric scheme in the Periyar basin. The firm discharge of the power project is 40.32 cu.m. The scheme will

irrigate 48845 gross hectares in Muvattupuzha, Thodupuzha, Kunnathunadu, Kanyannur, Kothamanglam, Vaikom, Meenachil and Kottayam taluks within the Sub-region. A part of the ayacut of the project to an extent of 3645 hectares lies in the Periyar basin and that falls outside the Sub-region.

The Pamba project utilises 20 cu.m. of the tail race of the Sabarigiri hydro-electric project. The ayacut of the project is between the Pamba and the Achencoil on the left bank and between the Pamba and the Manimala on the right bank. Very small portion of 238 hectares out of the 19800 hectares of its entire ayacut lies within the study area. The project irrigates the third crop too over 6400 hectares.

The continuing schemes are shown in Figure 6.4.

c) Contemplated Projects:

A number of projects have been contemplated by the State Government for irrigation and multipurposes. Of them within the study area, 25 schemes for which investigations have been conducted and potentials are approximately assessed are listed in Table 6.5. These schemes can bring about 176900 net hectares under assured irrigation invariably upto the second crop. On the accomplishment of commissioning these schemes, the highest beneficiary will be the Earned taluk with 74300 hectares of its land having become wet with assured irrigation facilities for at least two crops. There are nine schemes under proposal in

Table: 6.5 Contemplated Projects (Major and Medium) in the Sub-region

Basin/Scheme	Across the river	Taluks benefited in Sub-region	Total net ayacut in hectares	Approx ayacut in Sub-region	Addl. food production in ayacut (tonnes)	Cost estimate in Lakh Rs.
1	2	3	4	5	6	7
<u>Kabbini</u>						
1. Thirunelli	Thirunelli	Mananthavadi	4860	4860	13780	650
2. Thondar	Thondar	Mananthavadi	3040	3040	9330	299
3. Banasuragar	Karamanthodu	South Wynad	11940	11940	37430	1137
4. Manjat	Manjat	South Wynad	2800	2800	7800	318
5. Noolpuzha	Noolpuzha	South Wynad	4250	4250	12600	290
<u>Chalivar</u>						
6. Iringipuzha	Iringipuzha	Ernad	8140	4200	26700	775
7. Arecode Barrage	Chaliyar	Ernad	2347	2347	6000	300
8. Chalipuzha	Chalipuzha	Ernad	30214	30214	89600	2600
9. Maruthapuzha	Maruthapuzha	Ernad	16818	16818	73600	845
10. Punnapuzha	Punnapuzha	Ernad	740	740	2345	64.4
11. Karimpuzha	Karimpuzha	Ernad	1875	1875	5724	150
12. Vadapurampuzha	Vadapurampuzha	Ernad	14536	14536	NA	NA
13. Olipuzha	Olipuzha	Ernad	2428	2428	7035	309.75

1	2	3	4	5	6	7
14. Palakuzhipuzha	Palakuzhipuzha	Mannarghat	2428	1200	6740	179
15. Silent Valley	Silent Valley	Mannarghat	8100	8100	29800	1031
16. Tailrace of Kerala Bhavani	Tenkara Valley	Mannarghat	12140	12140	43000	805
<u>Bhavani</u>						
17. Arali (+ Thukkidi)	Varaharapallam	Mannarghat	2000	2000	NA	NA
<u>Chalaky & Bharathapuzha</u>						
18. Pambar diversion	Bhavani	Mannarghat	1600	1600	NA	NA
19. Panthanthodu	Panthanthodu	Ernad	1200	1200	NA	NA
20. Karappara	Karappara	Chittur	5060	5060	6460	645
21. Kuriarkutty	Kuriarkutty	Chittur	9025	9025	9650	951
<u>Periyar</u>						
22. Idamalayar	Idamala Valley	Devicolam	20200	20200	92000	1439
<u>Achencoil</u>						
23. Konni	Achencoil	Pathanam - thitta	5000	5000	NA	600
<u>Vamanapuram</u>						
24. Vamanapuram	Vamanapuram + Chittur	Nedumangad	12140	6000	49200	747.28
<u>Karamana</u>						
25. Karamana	Karamana	Neyyattin-kara	5300	5300	NA	348
<u>Total</u>			176873			

Source: Water Resources of Kerala by PWD, Kerala

Ernad, five in Mannarghat, three in South Wynad, two each in Mananthavadi and Chittur, one each in Pathanamthitta, Devicoolam, Nedumangad and Neyyattinkara. The talukwise likely benefits on completion of the schemes will be somewhat as under:

<u>Taluk</u>	<u>Net hectares</u>
1) Mananthavadi	7900
2) South Wynad	18990
3) Ernad	74358
4) Mannarghat	25040
5) Chittur	14085
6) Devicoolam	20200
7) Pathanamthitta	5000
8) Nedumangad	6000
9) Neyyattinkara	5300
Total	<hr/> 176873 <hr/>

In the Mananthavadi taluk under the Kabbini basin if the Mananthavadi multipurpose project - a scheme designed to utilise the Kerala's share of the Cauvery waters - were to irrigate, a few thousands of hectares of land in the taluk would have come under irrigation. Since the scheme is envisaged to serve only as a storage in the taluk for its water to be diverted to the Valapattanam basin mainly to generate power, the irrigation by the tail race of the power house lies outside the basin as well as the Taluk. The proposed five schemes in the basin will have a total storage capacity of 553 M.cu.m.

The Chalipuzha in the Chaliyar basin will utilise the tail races of the proposed Chalipuzha and Cholattipuzha hydro-electric schemes and the runoff from an independent catchment. It is found technically possible to combine the canal system of this project with that of the Maruthapuzha scheme to command the entire ayacut between the Choliyar and the Kadalundi rivers in Ernad taluk.

The Maruthipuzha reservoir is intended as a balancing reservoir depending on the tail race of the Kerala Pandiar Punnapuzha hydel power scheme which will be let into the Maruthapuzha. This power scheme in turn depends on the Pandiar Punnapuzha power scheme proposed by the Tamil Nadu Electricity Board.

The low level canal of the Vadapuram reservoir will join the canal from the Arecode barrage downstream. At times of lean flow in the Chaliyar, the Barrage, to meet its needs may have to be supplemented by the Vadapuram reservoir.

In the Bharatapuzha basin, the tail race, water of the Kerala Bhavani Hydro-electric scheme is envisaged to be utilised by a project to irrigate the paddy fields of the Tenkara Valley within Mannarghat taluk.

The Silent Valley project depends on the tail race water from the hydel power station proposed in the valley. Should the proposal of power generation be dropped, this irrigation scheme may not materialise.

In fact, the Kuriarkutty and Karappara Projects are inter-basin ventures between the Chalakudy and the Bharathapuzha basins. The Kuriarkutty and the Karappara are the tributaries of the Chalakudy, and, the proposal is to use their waters for power generation and irrigation in the Chitturpuzha valley of the Bharatapuzha basin.

In the Idamala Valley of the Periyar basin, hydro-electric schemes are contemplated. It is envisaged to use the tail race waters of the power plants by damming them to irrigate arable lands in the forest area, and about 608 hectares of this forest area have been reported (1974) cleared for cultivation.

Downstream of a proposed hydel power project across the Kallar in the Achencoil basin, near Konni, an irrigation project to use up the tail race waters of the powerhouse and also from an independent catchment area is proposed by the Irrigation Department of the State.

The Vamanapuram Valley project envisages to wet the entire ayacut on the left bank of the river partly lying in Nedumangad and two villages on the right bank of the river.

The catchment of the Arali project in the Bhavani basin has been reduced by more than 50 sq.km. because of the construction of two dams upstream by the Tamil Nadu government. The ayacut of 1000

hectares of the project is extended by additional 1000 hectares by the Thukkidi storage serving as a supplement to the Arali. The Pathan Thodu diversion and the Pambar diversion are in fact inter-basin schemes. The Pathanthodu's flow is diverted to the adjacent valley by a contour canal of 2 km long to irrigate 1200 hectares. The Pambar stream, a tributary of the Siruvani, is diverted to irrigate in Mannarghat taluk.

The contemplated schemes in the Sub-region are shown in Figure 6.4

Apart from these schemes, there are possibilities of creating a few more large irrigation means which may be investigated.

d) Level of irrigation by large schemes:

Thus, the known large schemes-all completed, continuing and under contemplation-which are 43, on completion will together provide assured irrigation to minimum two crops in about 288400 net hectares of land within the Sub-region. The break up is:

<u>Stage</u>	<u>No. of schemes</u>	<u>Net ayacut within the Sub-region</u>
Completed	9	57373
Continuing	9	54124
Contemplated	<u>25</u>	<u>176873</u>
Total	<u>43</u>	<u>288370</u>

3.1.3 Minor Irrigation Schemes:

So far, the large irrigation means have been a very few meeting a fraction of irrigation needs. This condition prevailed since long largely for want of financial resources and also significantly due to the availability of a thorough survey of the water resources potentials, possibilities of economically tapping the potentials and feasibility studies. All these years, therefore, the minor irrigation schemes requiring relatively much less resources and gestation time have been the way out though could serve not to a significant level compared to the level of requirements.

Minor means of irrigation include bunds, diversion weirs, bandharas, tanks, ponds, wells, lift irrigation schemes, etc. Some-times, the lift irrigation schemes could be of 'large' scheme category depending upon the amount of financial investment.

As of 1974-75, a number of minor schemes are reported to have benefitted an aggregate net area of 34414 hectares. However, no continuing schemes were reported during 1974-75 in the study area. There were proposals to take up some schemes in the immediately following years (that could have been completed by now) that would ultimately benefit by irrigating a net area of 6490 hectares. Even these proposals were reported in respect of only three taluks, namely, Mananthavadi, Ernad and Devicolam. In Mananthavadi, the proposals pertain to only lift irrigation schemes.

However, in the Kabbini basin in Kerala covering the Wynad district in the study area, the Irrigation Engineers of the State have tentatively fixed the sites for nine lift irrigation schemes to benefit a total net area of about 8100 hectares. The sites are:

- 1) Panappatte
- 2) Palamula
- 3) Mattappara
- 4) Kottanad
- 6) Kurumbala
- 7) Cherukara
- 8) Therumala
- 9) Chempakapadi.

For three crops, the water utilisation of these schemes are estimated at 285 M.cu.m.

In the Bhavani basin in Kerala, mostly confined to the Mannarghat taluk of the Sub-region, again the irrigation experts of the State have tentatively fixed nine sites for lift irrigation purposes, and they are:

	<u>Site</u>	<u>Net ayacut in Hectares</u>
1)	Mukkali	276
2)	Kakkupady	772
3)	Kokkumpalayan	260
4)	Karavada	200
5)	Parappantherai	140
6)	Sirkadavu	364
7)	Narasinkal	384
8)	Malkandy	80
9)	Kottathara	180
	Total	<hr/> 2656 <hr/>

There are ample possibilities and also some proposals in the rest of the basins of the West flowing rivers. But since the locations are not as yet known, it is difficult here to indulge guessing them. However, this can be elaborated and refined once these details become available.

With the data available, the position of minor irrigation schemes in the taluks of the Sub-region is as presented in Table 6.6.

Table 6.6: Benefits from Minor Schemes -
Talukwise: 1974-75

Taluk	Unit : Hectare	
	Completed	Proposed
1	2	3
1. Mananthavadi	983*	4403*
2. South Wynad	1210	-
3. Quilandy	2095	-
4. Badagara	1665	-
5. Ernad	3133	950
6. Mannarghat	747	2656
7. Palghat	238	-
8. Chittur	731	-
9. Mukundapuram	4182	-
10. Kunnathunad	4829	-
11. Kothamangalam	NA	-
12. Meenachil	1892	-
13. Kanjirapally	19	-
14. Devicolam	900	1137
15. Udumbanchola	55	-

1	2	3
16. Thodupuzha	835	-
17. Peermade	60	-
18. Pathanamthitta	2580	-
19. Pathanapuram	2790	-
20. Nedumangad	2464	-
21. Neyyattinkara	3006	-
Total	34414	9146

* In 1981: benefits from completed: 897 Ha,
continuing: 277 Ha and proposed:
1510 Ha : Source: A.E.E, M.I.Sub-Division.

The known minor schemes can ultimately bring a total net area of about 43560 hectares under assured irrigation.

3.1.4 Extent of Irrigation by Known means:

Thus far the different known means of irrigation have been discussed. There could be a few more large schemes and many more minor means of irrigation which need to be studied and investigated. The large schemes have relatively long gestation periods - sometimes more than a decade, whereas, the minor schemes hardly need a year provided the finance is available. For serving the purpose of deriving an idea about the possibility of irrigation in the foreseeable future of a decade or so, the potentials of the known schemes should suffice.

Accordingly, therefore, the total net benefits that all the known means of irrigation - existing and proposed accrue to the Sub-region works out to 3.32 lakh hectares of which irrigation during 1974-75 was to an extent of 91800 hectares, and that of the proposed schemes is 1.86 lakh hectares.

Ultimately, the largest beneficiary will be the Ernad taluk with 78400 hectares followed by Mannargh at with 35700 hectares under irrigation. The least benefited (as of 1974-75) is Kanjirapally (19 hectares) followed by Udumbanchola (55) and Peermade (60). Only seven taluks will have more than 20000 hectares, three taluks between 10000 and 20000 hectares under assured irrigation. Table 6.6 sets out the ultimate position of irrigational benefits and Figure 6.5 illustrates this position.

Table 6.7 Ultimate benefits by known irrigation means(1974-75)

Unit : Hectare

Taluk	Completed		Continuing	Proposed.		Total
	Large	Minor	Large	Large	Minor	
1	2	3	4	5	6	7
1. Mananthavadi	-	983	-	7900	4403	13286
2. South Wynad	-	1210	4650	18990	-	24850
3. Quilandy	-	2095	8213	-	-	10308
4. Badagara	-	1665	6940	-	-	8605
5. Ernad	-	3133	-	74358	950	78441
6. Mannarghat	-	747	7280	25040	2656	35723
7. Palghat	11996	238	6486	-	-	18720
8. Chittur	10266	731	10287	14085	-	35369
9. Mukundapuram	13878	4182	2000	-	-	20060

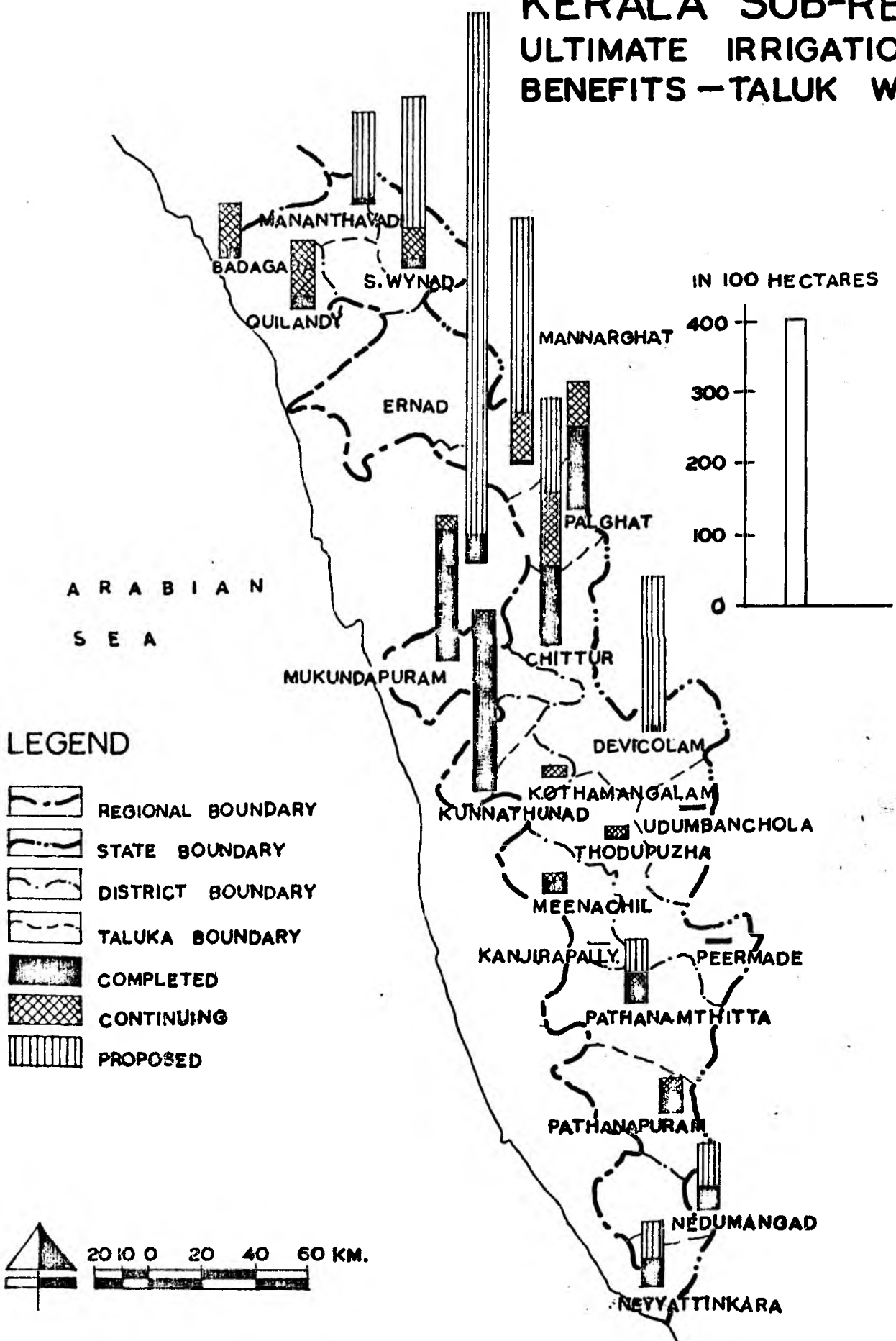
1	2	3	4	5	6	7
10.Kunnathunad	19330	4829	900	-	-	25059
11.Kothamangalam	-	NA	2000	-	-	2000
12.Meeanchil	-	1892	965	-	-	2857
13.Kanjirapally	-	19	-	-	-	19
14.Devicolam	-	900	-	20200	1137	22237
15.Udumbanchola	-	55	-	-	-	55
16.Thodupuzha	-	835	1320	-	-	2155
17.Peer made	-	60	-	-	-	60
18.Pathanamthitta	-	2580	1738	5000	-	9318
19.Pathanapuram	-	2790	1345	-	-	4135
20.Nedumangad	810	2464	-	6000	-	9274
21.Neyyattinkara	1093	3006	-	5300	-	9399
Total	57373	34414	54124	176873	9146	331930

Note: No confining minor scheme is reported.

3.1.5 Irrigation by various sources: 1974-75

Apart from the schemes discussed above, there are additional sources privately owned and locally improvised in seasons. These sources provide irrigation for another 7380 hectares. Thus the total area getting irrigation is 99165 hectares (1974-75), of which canals alone account for 81384 hectares (82.1%). Ground water sources such as the tubewells and masonry wells provide irrigation for insignificantly small area. Tanks and bunds account for 13% of the total irrigated area. Additional area that has been brought under irrigation during the four years ending 1974 is nearly

KERALA SUB-REGION ULTIMATE IRRIGATION BENEFITS - TALUK WISE



WESTERN GHATS SURVEY & PLAN

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TABLE-6.8: TALUKAWISE NET AREA IRRIGATED BY DIFFERENT SOURCES 1970-71 & 1974-75.

(Area in hectares)

Taluka	Canals		Lift Irrigation Schemes		Bunds		Tanks		Wells	Total		
	1970-71	1974-75	1970-71	1974-75	1970-71	1974-75	1970-71	1974-75	1970-71	1974-75	1970-71	1974-75
Mananthanadi	550 (65.6)	638 (64.8)	167 (19.9)	216 (22.0)	-	-	122 (14.5)	130 (13.2)	-	-	839	984
South Wynad	626 (89.7)	1035 (85.5)	-	-	-	-	72 (10.3)	175 (14.5)	-	-	698	1210
Quilandy	1474 (99.7)	2760 (95.9)	-	96 (3.3)	-	-	5 (0.3)	21 (0.7)	-	-	1479	2877
Badagara	1428 (100.0)	1665 (100.0)	-	-	-	-	-	-	-	-	1428	1665
Ernad	-	273 (9.6)	-	83 (2.9)	1844 (96.3)	2200 (77.6)	70 (3.7)	280 (9.9)	-	-	1914	2836
Mannarghat	302 (100.0)	747 (100.0)	-	-	-	-	-	-	-	-	302	747
Palghat	12230 (99.9)	15459 (99.9)	-	-	-	-	4 (No g.)	4 (No g.)	-	-	12234	15463
Chittur	16914 (98.4)	17538 (97.5)	-	-	282 (1.6)	448 (2.5)	-	-	-	-	17196	17986
Mukundapuram	14710 (88.4)	15260 (84.5)	1215 (7.3)	1656 (9.2)	436 (2.6)	760 (4.2)	278 (1.7)	383 (2.0)	-	-	16639	18059
Kunnamthunad	9149 (32.2)	12775 (82.3)	1352 (12.1)	1352 (8.7)	-	-	631* (5.7)	1397* (9.0)	-	-	11132	15524
Kothamangalam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thodupuzha	28 (4.1)	28 (3.4)	-	-	511 (74.6)	650 (77.8)	139 (20.3)	139 (16.6)	7 (1.1)	18 (2.2)	685	835
Devicollam	383 (56.2)	517 (57.4)	-	-	260 (38.1)	331 (36.8)	39 (5.7)	52 (5.8)	-	-	682	900
Udumbanchola	-	-	-	-	-	55 (100.0)	-	-	-	-	-	55
Poormade	-	-	-	-	-	55 (91.7)	-	5 (8.3)	-	-	-	60
Meenachil	7 (0.4)	7 (0.4)	78 (4.7)	78 (4.1)	1243 (78.2)	1466 (77.5)	318 (19.2)	335 (17.7)	6 (0.4)	6 (0.3)	1652	1892
Kanjirappally	-	-	-	-	4 (50.0)	15 (78.9)	4 (50.0)	4 (21.1)	-	-	8	190
Pathanamthitta	1604 (70.3)	1902 (73.7)	341 (14.9)	341 (13.2)	-	-	337 (14.8)	337 (13.1)	-	-	2282	258
Pathanapuram	1847 (79.5)	2214 (82.3)	-	-	24 (1.0)	24 (0.9)	451 (19.4)	451 (16.8)	-	-	22322	2689
Neyyattinkara	5540 (77.8)	7274 (70.8)	386 (4.5)	972 (9.5)	64 (0.9)	643 (6.3)	1134 (15.9)	1391 (13.5)	-	-	7124	18280
Nodumangad	610 (39.7)	1292 (51.6)	-	-	323 (21.0)	409 (16.3)	602 (39.2)	803 (32.1)	-	-	1535	2504
Total	67402 (84.1)	81384 (82.1)	3539 (4.4)	4794 (4.8)	4991 (6.2)	7056 (7.1)	4206 (5.2)	5907 (6.0)	13 (No g.)	24 (No g.)	80151	99165

Note: Figures in brackets indicate percentage to total. * Includes 'Bunds'
Source:-- Data obtained from the State Government.

19000 hectares. Major contribution to this increase has been by canals which brought under irrigation an addition of about 14000 hectares during this period. Talukawise position of irrigation by different sources in 1970-71 as well as 1974-75 may be seen from Table 6.8 and Fig.6.6. It is evident from the table that canals are the dominant source of irrigation in all except six talukas, viz., Ernad, Thodupuzha, Udumbanchola, Meenachil and Kanjirappally. In all these six talukas, the dominant source is 'bunds'.

3.1.6 Level of Irrigation during 1971-75

Level of irrigation* in the part of Kerala under Western Ghats is very poor being 10.34 percent of the netsown area in 1974-75. The picture was still worse in 1970-71 with only 8.45 percent of the net sown area irrigated. Kanjirappally, Peermade and Udumbanchola are the taluks where the provision of irrigation facilities is very poor being about 0.1 percent of the net sown area. Mukundapuram has 38 percent of its net sown area irrigated. In Kunnathunad, Chittur and Palghat taluks about 30 percent of the net sown area gets irrigation and in Neyyattinkara taluk, it is about 23 percent. In the rest of the taluks, the level of irrigation is below 5 percent except in Pathanapuram where it is about 10 percent.

3.1.7 Suggestions:

The level of irrigation compared to the potentials and needs has not been satisfactory in

* For details please refer to Section on Agriculture.

the Sub-region. The area under agricultural practice is almost half of the geographical area of the study region. In spite of the vast potentials of water resources in the river basins of the Sub-region, the utilisation in agriculture has remained to irrigate only one tenth of the net sown area. Though generally it should be suggested that the proposed large irrigation schemes should be taken up fast to meet the irrigation requirements, supplemented by minor means of irrigation, particular attention and priority should be accorded for the new schemes of all types in the taluks of Udumbanchola, Peermade, Kanjirapally and Mannarghat. In the Second phase, Devicolam, Thodupuzha, Mananthavadi, South Wynad, Ernad, Meenachil, Pathanamthitta, Nedumangad, Badagara and Quilandy taluks should be taken up for development of irrigation facilities.

In the taluks of Udumbanchola, Peermade, Kanjirapally, Meenachil, Thodupuzha, Kothamangalam, Badagara, Quilandy, where the possibility for creation of large irrigation schemes is bleak, minor irrigation facilities should be resorted to in large measure. Chances of diversion of water from schemes in adjoining areas can be investigated.

3.1.8 Quantitative assessment of water utilisation in Irrigation

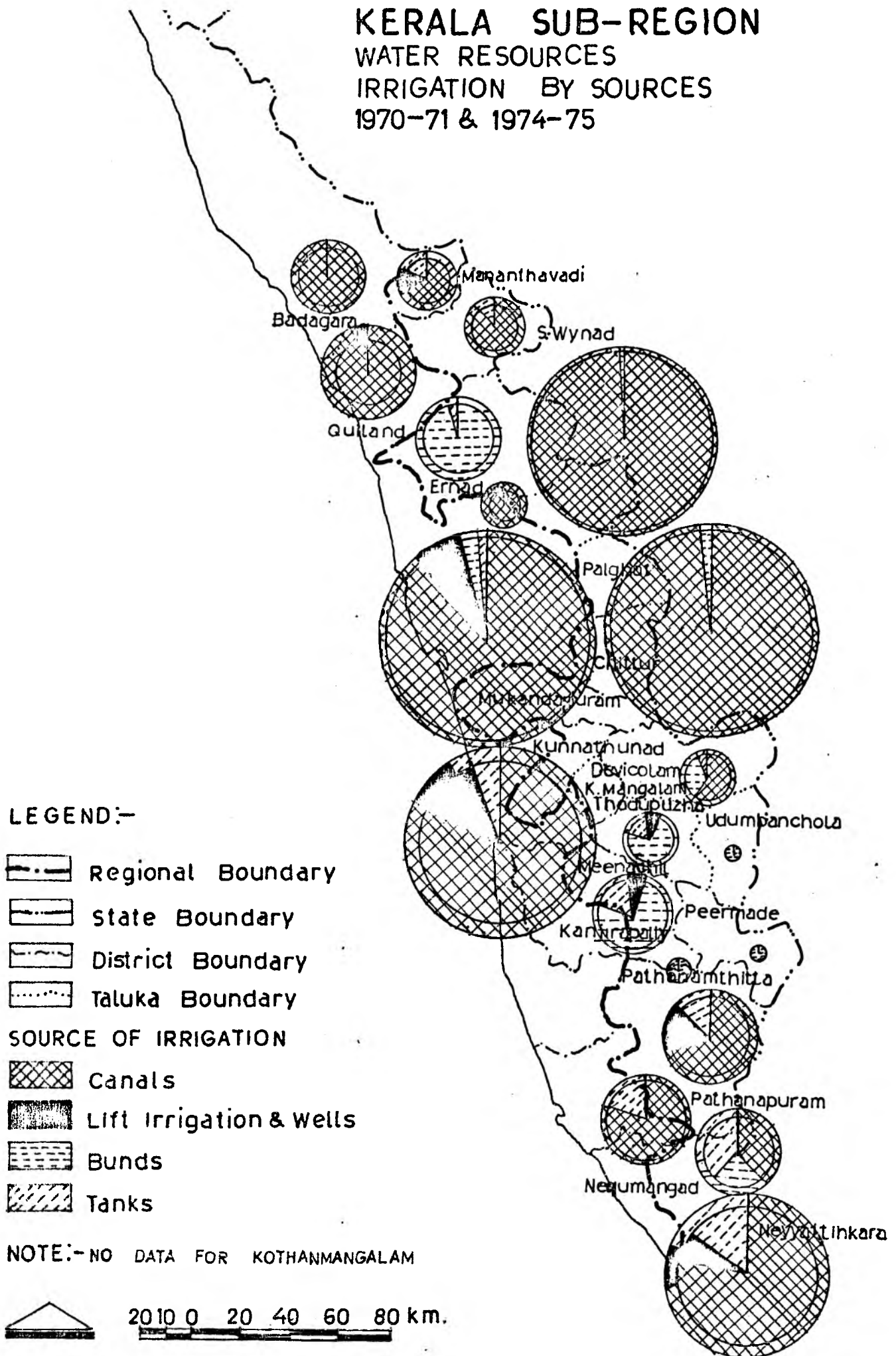
Water requirement for crops: Quantum of water required for various crops differ considerably from project to project and from crop to crop depending upon the geo-hydrological conditions. The

KERALA SUB-REGION

WATER RESOURCES

IRRIGATION BY SOURCES

1970-71 & 1974-75



Sub-region, by and large, underlies lateritic soils which are generally porous with poor retentivity. This results in more than normal requirements of water for different crops.

The provision of irrigation schemes being largely for permanently watering ~~of~~ the crops, the water requirements of paddy, and sometimes, additionally for garden crops can be taken as a general yardstick to estimate the quantity of water in use and need.

Based on the experience of irrigation in different projects in the State, the Irrigation department has worked out the requirement for two crops as 152 cm. and for the third crop at 114 cm. Deducting the utilisable rainfall available during the crop duration, the net depth of water to be supplemented by artificial watering will be about 279 cm. for three crops. Allowing for seepage and other losses, the total requirement works out to 343 cm. for three crops.

The yields of plantation crops such as coconut, arecanut, banana etc. which are cultivated on the garden lands can be greatly increased if they are watered during the summer months. A depth of 60 cm. of water is considered adequate for this purpose.

However, almost all irrigation projects discussed earlier provide only for two crops and, therefore, in computing the quantum of water utilisation, only about 2.75 metres depth of water is taken adequate.

a) Large Schemes: It may be noted that some of the irrigation schemes fully or partly benefit areas outside the Sub-region but have their storages within the study area, and naturally the storage is from the surface runoff of the Sub-region. The nine existing projects are estimated to utilise about 3290 M.cu.m. of water out of a total mean runoff of nearly 14600 M.cu.m. The Periyar project alone is estimated to use up 900 M.cu.m. in irrigation out of, roughly 11500 M.cu.m. of mean annual runoff from its 5300 sq.km. catchment area. The next is the Chalakudy scheme to utilise 540 M.cu.m. of water out of 2200 M.cu.m. runoff from its 1200 sq. km. catchment.

Including all the existing and proposed schemes, the total quantum of water that will be utilised for irrigation is computed to be 11160 M.cu.m. whereas the mean runoff will be in the order of 25500 M.cu.m. Of this, the Chaliyar basin above accounts for 2100 M.cu.m. of water utilisation and 4140 M.cu.m. of mean runoff. The Bharathepuzha basin has ten large irrigation projects which together will use up about 2700 M.cu.m. of water out of, nearly, 3000 M.cu.m. runoff.

b) Minor Schemes: As seen earlier, about 31400* hectares were under irrigation in 1974-75 and, nearly, 9150 hectares were proposed to be brought under irrigation. On the norms assumed, the quantum of water utilisation as of 1974-75 will be about 950 M.cu.m. by existing schemes and 255 M.cu.m. by the proposed ones.

* Irrigation by ground water sources negligible.

In addition, in 1974-75, about 7380 hectares were under irrigation by private sources. They being almost surface water sources, the utilisation could be about 205 M.cu.m. of runoff.

c) Total Water Utilisation: Thus, the level of water use in irrigation by 1974-75 was about 4445 M.cu.m. and all the known irrigation schemes on completion will utilise about 12570 M.cu.m. of surface water. It may be recalled that the utilisable surface water yield in the Sub-region is estimated at 26000 M.cu.m. This only indicates the ample scope for tapping the runoff for intensive and extensive agricultural uses.

3.2 Domestic Water Needs:

Safe and protected water for domestic use is a prime need of the community. Rain water available from the surface and sub-surface sources have been being used from time immemorial and largely it used to be safe with hardly any harmful pollutant load. But **as** the person-land ratio is fast shrinking, the sources are overstrained of their natural recuperative and purifying capacity, and hence the necessity to **protect** the water especially for human consumption.

In the Ghats portion under study, the sources are largely the surface flows and natural storages which are parts of the surface runoff. In order to work out the quantum of water that is being

used for domestic purposes, the adequate requirement for an individual is taken as 160 litres* a day on an average including for drinking and sanitation purposes.

The 1971 population of the Sub-region was 68.81 lakhs and extrapolating for 1974-75, the population comes to 74.3 lakhs. On the basis of the norms assumed, the domestic water requirements during 1974-75 is computed as 434 M.cu.m.

For 1981, though the Census is now over, the population figures for the Sub-region are not readily available. Making use of the forecast of population by the Registrar General, Census Operations, the Sub-regional population count for 1981 comes to 87.3 lakhs, and for 1991, 105.7 lakhs, and, the corresponding domestic water needs are 510 M.cu.m. in 1981 and 617 M.cu.m. 1991.

Domestic water supply schemes in operation at present are mostly in the coastal towns, and, a few rural water supply schemes have also been commissioned mostly in the plains.

3.3 Industrial Water Requirements:

Industries are one of the major water users. In Kerala, the industrial activities are concentrated in coastal areas that too in the Periyar, Kallada, Chaliyar and Neyyar basins. The Sub-region is dominated by small scale and household industrial

* Assumption made by the State Government of Kerala.

activities, and comparatively the agro-based industries are preponderant. 61 percent of the industrial employment is in agro based industries followed by forest based industries with 19 percent of units and 21 percent of employment. And all industrial groups in the Sub-region are less water intensive. As it is not feasible to work out the water needs of these industrial establishments for it forms very negligible fraction of the total water needs, it is assumed that about 2 percent of the agricultural water needs would suffice to meet the industrial water demand. Accordingly during 1974-75, the industrial water need might have been about 90 M.cu.m. and by 1991 or so, that is a decade hence, it may be in the order of 250 M.cu.m.

3.4 Water for other uses:

Other than the major water user groups seen thus far, there are other uses which cannot be individually accounted for. One such important and rather a major use of water particularly in the Sub-region is in its Hydro-electric projects. Incidentally, all the hydro-power projects of the State are in the Ghats forming the Sub-region. As many as nine such projects in the Kuttiadi, the Chalakudy, Periyar and Pamba basin are in operation. Three of these make use of the tail race waters of the schemes upstream and the rest six use a total mean annual runoff of nearly 3200 M.cu.m. The break up is as follows:

Existing Hydro-electric Schemes

Basin	No. of Schemes	Mean annual runoff in Mm ³	Remarks
1	2	3	4
Kuttiadi	1	205	
Chalakydy	2	348	One uses tailrace waters.
Periyar	5	1909	Two use tailrace waters.
Pamba	1	740	-
Total	9	3202	

There are possibilities of constructing 30 more hydro-power schemes in future. These schemes are estimated to utilise about 9300 H.cu.m. of mean annual runoff. In the Periyar basin alone, there are 9 schemes for future development and in the Pamba 5, 5 in the Kuttiadi, 3 in the Chalakydy, 2 in the Pambar and the rest one each in the Valapattaram, Bharathapuzha, Achencoil, Kallada, Kabbini and Bhavani basins.

But the water after the power generation flow down the streams which can be picked up for any use, thus, resulting practically in no use up of the water. Therefore, this amount is not taken to constitute consumption as such, though there could

be some waste of the waters in the process of power generation.

For all these uses, 5 percent of the total needs of water is taken adequate. Thus, it works out to about 245 M.cu.m. in 1974-75, and 670 M.cu.m. a decade hence.

3.5 Aggregate Water Demand:

Thus, the demand on water for 1974-75 in all the uses works out to 5214 M.cu.m. which will increase to 14110 M.cu.m. by 1991 or so. This is only 54 percent of the utilisable surface runoff in the Sub-region. This only indicates that so far water resources are concerned, the Sub-region is fortunate being endowed with the resources in abundance. However, judicial allocation and use of water in any case has to be exercised for, otherwise wrong use may cause deficit of usable water in certain areas besides endangering the quality of the waters. As may be seen nearly 3 lakh hectares more cultivable areas could be safely brought under minimum two crop irrigation.

4. FLOOD CONTROL

Kerala enjoys an annual average precipitation of 3085 mm. The Ghats receive as much as over 5000 mm. of rainfall during the six monsoon months. The monsoonic rains are torrential and sometimes violent. The rugged steepy terrains of the Ghats render the rains roll down furiously in

flashy streams that reign disasters in the low lands.

The Sub-regional ghats have no effects of flood which nevertheless is not a matter of complacency, for the maladies of flood in the plains, the remedies lie in these highlands. The streams are deep in the highlands but are silted and shallow in the low lands. The siltation of the river beds is caused by the deposition of the eroded soils from the upstream highlands. Necessarily the flood moderation measures have to be taken more in the catchment areas of the basins than at their swollen stems.

The fury of the floods can be to a great extent moderated if the flows of the streams are impounded in the upper reaches of the basins. Fortunately, creation of a number of irrigation and hydel power reservoirs are found feasible in the ghats. Construction of reservoirs only to tame the floods will be a luxury and an uneconomical venture. Therefore, to construct the contemplated reservoirs on a priority developmental programmes will substantially serve to improve the States' economy saving both on the purchase of food grains as well as on the flood control works in the coastal reaches. Moreover, afforestation programmes should be consciously pursued to arrest erosion of soil by the runoff.

In the courses of gradual descends of the streams and rivulets and, before they pick up the silt carrying velocity, wherever possible particularly in the loose soil stretches, 'trap weirs' or check bunds should be constructed in addition to contour bundings.

Some allowance should be provided in the capacities of contemplated reservoirs in addition to the irrigational/power requirements.

Shifting cultivation should be summarily banned. Rehabilitation of displaced and unbounded labour population in the 'vested forests' should be discouraged. For such uses, the waste lands and unproductive scrub lands should be earmarked in or near the existing settlements.

The Periyar, Chaliyar and Karuvannar basins which are said to be frequently affected by floods may be taken first for construction of flood moderating measures.

5. WATERSHED MANAGEMENT

In these days, when development has become a matter of universal concern for its unhealthy impression left on the environment, the aspect of management of watershed assumes the highest importance in planning the water resources which are so vital and crucial for the survival for all living things. Watershed management in its bare realm implies rational, optimal and wise use of water and soil. The soil and water resources have to be conserved. This should be taken also with a view to safeguard the historic wealth of flora and fauna against any possible danger to them. All growth is not development.

Watershed management calls for a comprehensive planning of every river basin. Construction of dams, power plants, flood control measures, afforestation, exploitation of mineral resources, if any, installation of large industrial establishments, provision of economic and social overheads, development of agriculture - all should be viewed in an integrated and comprehensive manner so that the overall development is not at the cost of the wholesomeness of the ecosystem. In a limited sense, the study of the soil characteristics and capabilities in the ayacuts is a step in the right direction in management of a watershed.

No two watersheds are alike. Therefore, there is no universal remedy for the problems in the different watersheds. The techniques should be by and large to increase the infiltration and recharging capacity of the soils by suitably checking the rapidity of the flows in the gently sloping terrains. This would necessitate studies of the watershed in its topography, slope, soils, rainfall, land use, vegetation and other developments. It should be the endeavour to bring maximum of the cultivable lands under irrigation, and at the same time it should also be seen that it is not at the cost of precious wealth of fauna and flora.

The normal soil conservation measures are contour bunding, terracing, construction of check dams, stabilisation of gullies, rising retaining walls, training water courses and protection of

reservoirs. The reservoirs should be dredged of their silts to effect adequate storage to help adequate irrigation and flood moderation.

Exploitation of commercial forests should not exceed the optimal level. Conversion of forests lands for rehabilitation or agriculture should be avoided.

Specific measures in the different basins cannot be attempted here at the Sub-regional level.

The agricultural lands in the occupation of tribals on the hill ranges are mostly in the valleys. Because of perennial irrigation and continuous cultivation, the soil is depleted of its fertility. Soil replenishing measures may have to be resorted to restore fertility to the soil.

Soil conservation measures should be an integral part of measures for irrigation and power development.

SECTION - VII POWER DEVELOPMENT

Electrical energy is one of the most important pre-requisite and infrastructure in present day economy. The per capita consumption of electricity is reckoned as an index of economic development and standard of living. Power Generation and supply in the State is by the Kerala State Electricity Board.

1. POWER POTENTIALS OF THE SUB-REGION

Notwithstanding the fact that power utilisation does not confine to the administrative limits of source location, it is nonetheless important to know the potentials of power the study zone is endowed with. Since long water has been the only source of power generation in the State. Fortunately the State is endowed with heavy precipitation and fast falling terrains that facilitate ideal conditions for power generation. Incidentally, the Sub-region comprising the high lands of the State, has, within it, all the known possible sites for hydro-power production. The ultimate power that could be economically developed has been roughly assessed at 2600 M W at 60 percent load factor with an installed capacity of 3600 MW.

2. POWER GENERATION

Present: There are nine hydro-electric projects in the Sub-region which together have a firm capacity of about 850 MW (at 60% LF) with an installed capacity of about 1010 MW. Five of these

schemes lie in the Periyar basin in the Idikki district, two in the Chalakudy basin in the Trichur district, one each in the Kuttiadi basin in the Kozhicode district and in the Pamka basin in the Quilon district. The details are set out in Table 7.1. (Fig. 7.1).

The Kuttiadi river is dammed above the Oorakuzhi falls to utilise the runoff from a catchment of 39 sq. km. for power production.

The Sholayar river, a tributary of the Chalakudy, is dammed and the stored water is diverted through a tunnel to the power house situated on the right bank of the Anakayam river - another tributary of the Chalakudy. Under the Parambikulam-Aliyar Project agreement, the Government of Kerala is entitled for 348.29 M.cu.m. of water amounting to 11.04 cumecs. average from the Kerala Sholayar reservoir, delivered and measured at the Kerala Sholayar power house.

The Peringalkuthu left bank scheme is the first project completed in the Chalakudy basin. A dam in the Chalakudy below the Anakayam valley supplies water to the penstocks of the power house. The Pallivasal scheme is the first in the State to have been commissioned. The barrage across the Munnar gorge diverts the waters of the Mudirapuzha to the power house at Pallivasal. Two dams at Sethu - Parvathipuram (Kundale) and Madupatty help firm up the power developed at Pallivasal.

The Sengulam project makes use of the tail race water of the Pallivasal scheme.

Fig:7.1

KERALA SUB-REGION POWER DEVELOPMENT POWER SCHEMES (Existing & Potential)

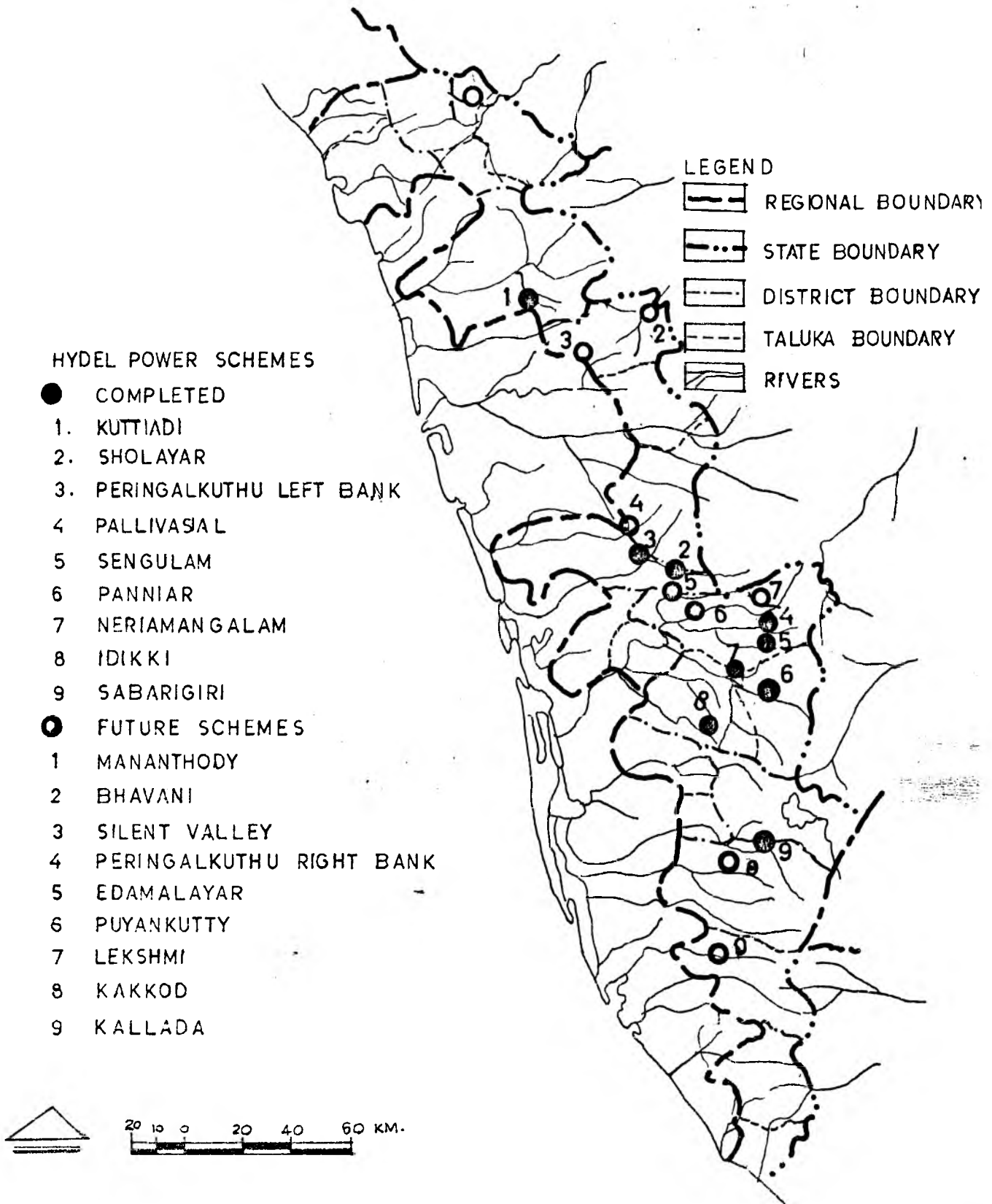


Table 7.1 Existing Hydel Power Projects in the Sub-region

Name of the Scheme (Year of completion)	Location (Basin and Taluk)	Head in metres	Firm Power draft cumecs	Power developed at 60%		Installed capacity MW	Cost in lakh Rs.
				LF	MW		
1. Kuttiadi (1972)	Kuttiadi (Kuttiadi:Quilandy)	658	5.66	48		75	525
2. Sholayar (1966)	Sholayar (Chalaky; Mukundapuram)	320	11.04	44.3		54	650
3. Peringalkuthu L.B. Scheme (1957)	Peringalkuthu (Chalaky; Mukundapuram)	182.8	14.16	32		32	399.3
4. Pallivasal (1940)	Pallivasal (Periyar;Devicolam)	600	7.08	32.5		37.5	431
5. Sengulam (1950)	Sengulam (Periyar, Devicolam)	360	8.49	40		48	358
6. Panniar (1963)	Panniar (Periyar Udumbanchola)	243	8.49	27.4		30	630
7. Neria-mangalam (or Kallarkutty)	Neriamangalam (Periyar;Devicolam)	195	19.10	45		45	360
8. Idikki	Moolamattom (Periyar, Thodupuzha)	667	40.78	350		390	6821
9. Sabarigiri	Sabarigiri (Pamba, Pathanamthitta)	750	23	230		300	4200
Total				849.2		1011.5	

Source: Water Resources of Kerala, Govt. of Kerala.

The Panniar joins the Periyar on the upstream of Sengulam power house. Two dams across the Panniar at Anayirankal and Ponmudi feed the power plant located opposite to the Sengulam project on the left bank.

The Neriamangalam project also known as the Kallarkutty project uses the tail race water of the Sengulam scheme as well as the water from a free catchment of the Mudhirapuzha. The Idikki project, the biggest so far in the State, is fed from three dams one across the Idikki gorge, the second across the Cheruthoni and the third across the Killivilli Thodu. The power house is at Moolamattam on the right bank of Nachar.

The Sabarigiri project is named after Sabarigiri the abode of the forest deity Lord Ayyappa. The project is fed by the two inter-tunnelled reservoirs across the Kakki and the Pamba and is located on the right bank of the Moozhiyar.

3. PER CAPITA POWER CONSUMPTION

Power consumption is one of the indicators of prosperity. The per capita consumption of power in the sub-region was 44 kWh (based on 1971 population) in 1975-76, which is not even half of the State's average of 94 kWh in the same period (Table 7.2). The power consumption is obviously very low in the Sub-region.

Talukawise analysis of per capita power consumption shows that the power consumption is

Table 7.2 Per Capita Power Consumption of electricity - Talukwise 1974-75

Taluka	Total power consumption (MkWh) 1975-76	Per capita power consumption (based on 1971 Popn.) (KWH)
1	2	3
1. Mananthavadi	1.735	13
2. South Wynad	2.665	9
3. Quilandy	4.324	9
4. Badagara	3.843	9
5. Ernad	7.150	10
6. Mannarghat	2.774	15
7. Palghat	27.770	75
8. Chittur	10.034	57
9. Mukundapuram	65.419	111
10. Kunnathunad	45.905	157
11. Kothamangalam	N.A.	N.A.
12. Thodupuzha	24.903	114
13. Devicoolam	2.057	15
14. Udumbanchola	2.238	8
15. Peermade	8.541	58
16. Meenachil	5.264	15
17. Kanjirappally	1.907	11
18. Pathanamthitta	9.514	24
19. Pathanapuram	31.989	103
20. Neyyattinkara	11.622	21
21. Nedumangad	16.383	38
Sub-Region	294.037	44
Kerala State	1996.98	94
All-India	60245.81	110

Sources: 1) Electricity Department of the State Government
 2) Central Electricity Authority (Commercial Directorate).

satisfactory only in four talukas, viz; Mukundapuram, Kunnathunad, Thodupuzha and Pathanaparam- in all these four talukas the per capita consumption is atleast 100 kWh which is more than even the State's average consumption. There are 12 talukas where the per capita consumption is very low being less than 25 kWh.

4. SECTORWISE POWER CONSUMPTION

Industrial sector is the major power consumer in the sub-region. During 1975-76; it consumed about 156 MkwH of power accounting for about 53 per cent of the total power consumption. Agricultural sector accounts for only about 12 per cent. The total power consumption was 294 MkwH (Table 7.3). Talukawise analysis of power consumption shows ~~of~~ all the talukas falling in the Sub-region, It is dominant only in thirteen talukas listed below. The share of industrial sector to total power consumption is given in brackets.

- 1) Pathanapuram (87.5%)
- 2) Kunnathunad (68.8%)
- 3) Peermade (88.8%)
- 4) Palghat (63.6%)
- 5) Udumbanchola (62.3%)
- 6) Nedumangad (58.0%)
- 7) Mananthavadi (55.7%)
- 8) South Wynad (50.8%)
- 9) Mukundapuram (49.8%)
- 10) Neyyattinkara (47.1%)
- 11) Chittur 37.4%)
- 12) Meenachil (35.2%)
- 13) Ernad (29.4%)

Table-7.3: Categorywise Energy Consumption in the Kerala Sub-Region Talukawise (1975-76).

Taluka	Unit: MKWH								Total 1975-76
	Domestic 1975-76	Commercial 1975-76	Industrial 1975-76	Irrigation 1975-76	Railways	Street Lighting 1975-76	Public Works 1975-76	Bulk Sales & Others	
1	2	3	4	5	6	7	8	9	10
1. Mananthanadi	0.296 (17.1)	0.266 (15.3)	0.967 (55.7)	0.131 (7.6)	-	0.075 (4.3)	-	-	1.735
2. South Wynad	0.645 (24.2)	0.482 (18.1)	1.353 (50.8)	0.028 (1.1)	-	0.157 (5.9)	-	-	2.665
3. Quilandy	1.433 (33.1)	1.072 (24.8)	1.408 (32.6)	0.063 (1.5)	-	0.348 (8.0)	-	-	4.324
4. Badagara	1.194 (31.1)	0.893 (23.2)	1.173 (30.5)	0.053 (1.4)	-	0.290 (7.5)	0.240 (6.2)	-	3.843
5. Ernad	1.868 (26.1)	1.908 (20.7)	2.100 (29.4)	0.860 (12.0)	-	0.414 (5.8)	-	-	7.150
6. Mannarghat	0.279 (10.1)	0.220 (17.9)	0.486 (17.5)	0.563 (20.3)	-	0.076 (2.7)	-	1.150 (41.5)	2.774
7. Palghat	4.400 (15.8)	3.300 (11.9)	17.650 (63.6)	1.370 (4.9)	-	1.050 (3.8)	-	-	27.770
8. Chittur	2.910 (16.1)	2.600 (14.4)	6.740 (37.4)	4.900 (27.2)	0.004 (Neg.)	0.680 (3.8)	0.200 (1.1)	-	18.034
9. Mukundapuram	6.424 (9.3)	7.704 (11.8)	32.584 (49.8)	17.921 (27.4)	-	0.646 (1.0)	0.140 (0.2)	-	65.419
10. Kunnathunad	3.498 (7.6)	1.179 (2.6)	31.586 (68.8)	9.365 (20.4)	-	0.277 (0.6)	-	-	45.905
11. Kothamangalam	NA	NA	NA	NA	NA	NA	NA	NA	NA

contd.....

Table-7.3.....Contd.

1	2	3	4	5	6	7	8	9	10
12. Thodupuzha	0.729 (2.9)	1.167 (4.7)	3.028 (12.2)	0.045 (0.2)	-	0.214 (0.9)	-	19.720 (79.2)	24.903
13. Devicolam	0.244 (11.9)	0.313 (15.2)	0.129 (6.3)	0.061 (3.0)	-	0.080 (3.9)	-	1.230 (59.8)	2.057
14. Udumbanchola	0.286 (12.8)	0.489 (21.8)	1.394 (62.3)	0.013 (0.6)	-	0.056 (2.5)	-	-	2.238
15. Peermade	0.301 (3.5)	0.529 (6.2)	7.586 (88.8)	0.046 (0.5)	-	0.079 (0.9)	-	-	8.541
16. Meenachil	1.674 (31.8)	1.454 (27.6)	1.854 (35.2)	0.059 (1.1)	-	0.210 (4.0)	0.013 (0.2)	-	5.264
17. Kanjirappally	0.915 (48.0)	0.558 (29.3)	0.325 (17.0)	-	-	0.109 (5.7)	-	-	1.907
18. Pathanamthitta	3.104 (32.6)	1.629 (17.1)	2.864 (30.1)	0.097 (1.0)	-	0.520 (5.5)	-	1.300 (13.7)	9.514
19. Pathanapuram	1.789 (5.6)	1.381 (4.3)	27.986 (87.5)	0.444 (1.4)	-	0.389 (1.2)	-	-	31.989
20. Neyyattinkara	3.358 (28.9)	1.980 (17.0)	5.474 (47.1)	0.056 (0.5)	-	0.754 (6.5)	-	-	11.622
21. Nedumangad	1.493 (9.1)	1.623 (9.9)	9.495 (58.0)	0.350 (2.1)	-	0.422 (2.6)	3.000 (18.3)	-	16.383
Grand Total	36.840 (12.53)	30.747 (10.46)	156.182 (53.12)	36.425 (12.39)	0.004 (No. g.)	6.846 (2.33)	3.593 (1.22)	23.400 (7.96)	294.037 (100.00)

Note: Figures in brackets indicate percentage to the respective total.

The above list indicates that the share of industrial sector is more than 50 per cent in eight talukas and in three talukas, the share is less than 40 per cent.

Agricultural sector is not dominant in any taluka. In Mannarghat (41.5%), Thodupuzha (79.2%) and Devicolam (59.8%) talukas, the largest use was in the "bulk sales and miscellaneous sector".

Domestic sector is the largest consumer in the following four talukas:

- 1) Kanjirappally (48.0%)
- 2) Quilandy (33.1%)
- 3) Pathanamthitta (32.6%)
- 4) Badagara (31.1%)

4.1 Trend of Power Consumption

During 1970-71 and 1975-76, total power consumption in the Sub-region has increased by about 97 per cent as compared to 31 per cent for the State as a whole for the corresponding period. The annual growth rate (compound) between 1970-71 and 1975-76 for the Sub-region works out to about 14.5 per cent as compared to 5.5 per cent for the State as a whole. This shows that the Sub-region's power consumption is on a rapid increase. The rate of growth in power consumption can be seen in Table 7.4

The highest annual growth rate in power use during 1970-71 to 1975-76 has been registered

Table 7.4 Categorywise Energy Consumption in the Sub-region (1970-71 and 1975-76)

Category	1970-71	Per-cent to total	1975-76	Per-cent to total	Growth rate (%) to 1975-76	Annual growth rate (%)
1	2	3	4	5	6	7
1.Domestic	14.525	9.73	36.840	12.53	153.6	20.5
2.Commercial	12.623	8.45	30.747	10.46	143.6	19.5
3.Industrial	105.425	70.60	156.182	53.12	48.1	8.2
4.Irrigation	9.519	6.38	36.425	12.39	282.7	30.8
5.Railways	0.002	Neg.	0.004	Neg.	100.0	14.9
6.Street Lighting	3.869	2.59	6.846	2.33	76.9	12.1
7.Public Works	1.225	0.82	3.593	1.22	193.3	24.0
8.Bulk Sales & others	2.140	1.43	23.400	7.96	993.5	61.4
Total	149.328	100.00	294.037	100.00	96.9	14.5

Source: The State Government.

Neg. Negligible

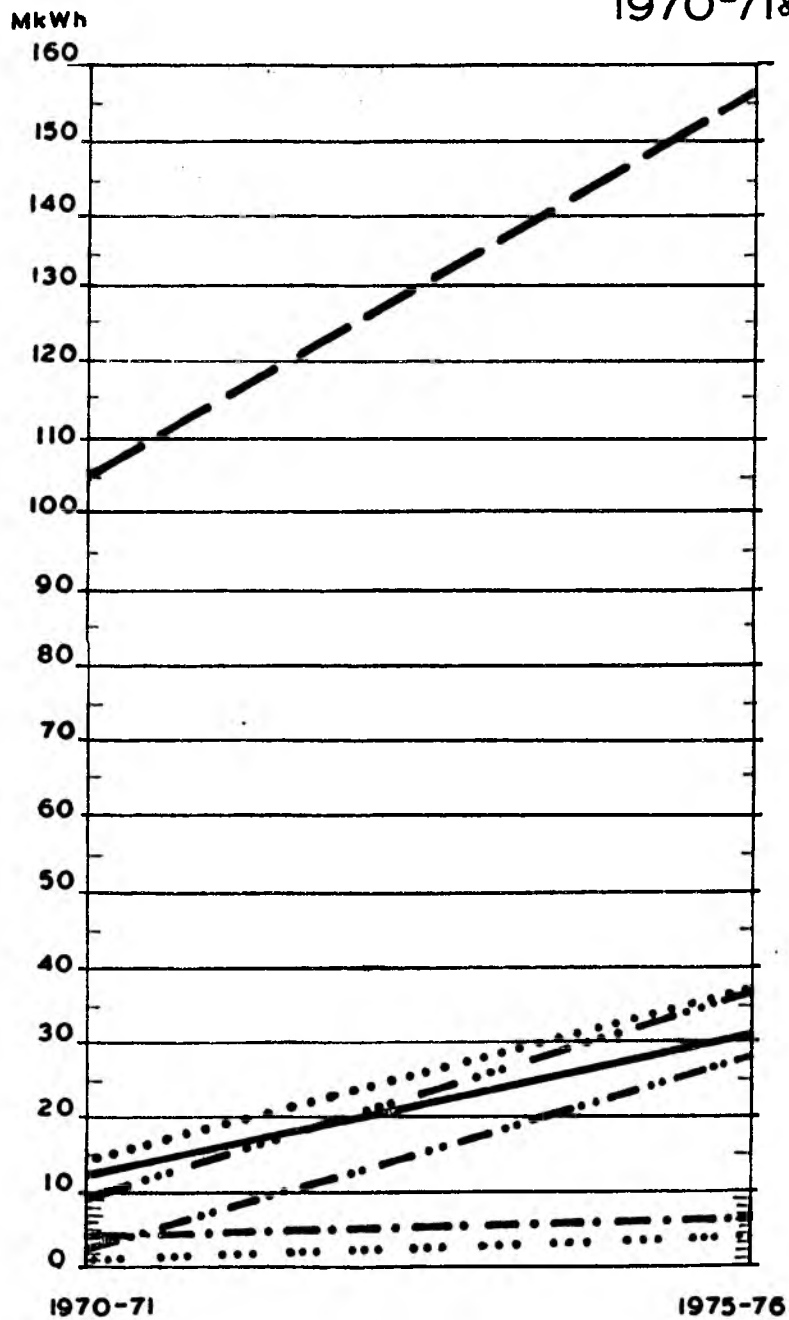
FIG: 7.2



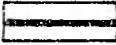





KERALA SUB-REGION

POWER DEVELOPMENT

Energy Consumption

1970-71 & 75-76



- | | |
|--|---|
|  DOMESTIC |  RAILWAYS |
|  COMMERCIAL |  STREET LIGHTING |
|  INDUSTRIAL |  PUBLIC WORKS |
|  IRRIGATION |  BULK SALES & OTHERS |

in the "bulk sales and miscellaneous sector" followed by agriculture sector. Energisation of a large number of pumpsets has pushed up the power consumption significantly in the agricultural sector during 1970-71 and 1975-76. (Fig.7.2).

4.2 Talukawise position

The talukawise growth in power consumption can be seen in Table 7.5. It is evident from this table that there are wide variations in the growth rates among different talukas. It varies from as low as 4.2 per cent in Kunnathunad to as high as 75.4 per cent in Thodupuzha. Among the 21 talukas, nine talukas have growth rates more than the Sub-region's average. The growth in power consumption has been comparatively quite high in the talukas of Thodupuzha (75.4%), Devicoolam (57.7%) and Pathanamthitta (40.8%). In all other talukas, the annual growth rate is less than 30 per cent. The growth rate has been less than 10 per cent in the talukas of South Wynad (8.3%), Palghat (8.0%), Kunnathunad (4.2%), Peermade (4.3%) and Kanjirappally (5.6%).

4.3 Domestic Connections

Though all the towns in the Sub-region are electrified, the benefit of the electrification has not reached each and every urban dweller. This is evident from Table 7.6 which gives townwise number of domestic connections and number of households. Assuming that one domestic connection serves one

Table 7.5 Annual rate of growth of energy consumption :
Talukwise: 1970-71 and 1975-76

District/ Taluka	<u>Energy Consumption</u>		Rate of growth %, (1970- 71 to 1975-76)	Annual rate of growth (%) compound
	1970-71 (MkWh)	1975-76 (MkWh)		
1	2	3	4	5
1. Mananthavadi	0.494	1.735	251.2	28.5
2. South Wynad	1.785	2.665	49.3	8.3
3. Quilandy	2.514	4.324	72.0	11.4
4. Badagara	2.056	3.843	86.9	13.2
5. Ernad	2.446	7.150	192.3	23.9
6. Mannarghat	1.648	2.774	68.3	11.0
7. Palghat	18.910	27.770	46.8	8.0
8. Chittur	9.782	18.034	84.3	13.0
9. Mukundapuram	27.208	65.419	140.4	19.2
10. Kunnathunad	37.383	45.905	22.8	4.2
11. Kothamangalam	Not	available		
12. Thodopuzha	1.502	24.903	1558.0	75.4
13. Devicolam	0.211	2.057	874.9	57.7
14. Udumbanchola	1.033	2.238	116.6	16.7
15. Peermade	6.893	8.541	23.9	4.3
16. Meenachil	1.907	5.264	176.0	22.0
17. Kanjirappally	1.449	1.907	31.6	5.6
18. Pathanamthitta	3.410*	9.514	179.0	40.8
19. Pathanapuram	17.075	31.989	87.3	13.3
20. Neyyattinkara	6.677	11.622	74.1	11.8
21. Nedumangad	4.945	16.383	231.3	27.1
Total	149.328	294.037	96.9	14.5

* Pertains to 1972-73

Source: The State Government.

Table 7.6 Townwise number of domestic connections and households - 1971

Name of Town	Taluka	No. of households 1971	No. of Domestic connections(1971)	Percentage (4÷3)
1	2	3	4	5
1.Perumbavoor	Kunnathunad	3617	2427	67.1
2.Chalakydy	Mukundapuram	5931	1050	17.7
3.Irinjalkuda	Mukundapuram	3877	1300	33.5
4.Thodupuzha	Thodupuzha	3382	1000	29.6
5.Munnar	Devicolam	902	815	90.4
6.Mannarghat	Mannarghat	2169	490	22.6
7.Palghat	Palghat	16521	7210	43.6
8.Hemambikanagar	Palghat	1384	351	25.4
9.Chittur- Thatha-Mangalam	Chittur	5359	1800	33.6
10.Nemmara	Chittur	2344	550	23.5
11.Balarammapuram	Neyyattinkara	3002	400	13.3
12.Kovalam	Neyyattinkara	2478	500	20.2
13.Neyyattinkara	Neyyattinkara	4600	1002	21.8
14.Nedumangad	Nedumangad	2500	300	12.0
15.Punalur	Pathanapuram	2276	617	27.1
16.Palai	Meenachil	2918	900	30.8
17.Kanjirapally	Kanjirapally	3108	662	21.3
18.Mundakkayam	Kanjirapally	1731	400	23.1
19.Ponkunnam	Kanjirapally	2154	208	9.7
20.Malappuram	Ernad	5125	418	8.2
21.Pantalayani	Quilandy	3801	970	25.5
22.Manjeri	Ernad	2591	500	19.3
23.Badagara	Badagara	7569	1370	18.1
Total (Urban Area)		89339	25240	28.3

Source: Census 1971.

household, it is derived from the Table that only about 28 per cent of the urban households are provided with electric connections in their houses. This can be attributed to the abject poverty of the people as well as the absence of adequate distribution network to cover the entire area of a town.

Townwise analysis shows the position of electrification is satisfactory only in two towns viz. Peermade and Munnar. In all other towns, the position is highly unsatisfactory.

5. RURAL ELECTRIFICATION

According to 1971 Census, there are 425 inhabited villages in the Sub-region, of which 396 villages or 93 per cent have been electrified up to March 1975, (Table 7.7.). This shows that rural electrification has made considerable progress in the Sub-region. All the villages in the talukas of Palghat, Chittur, Mukundapuram, Kunnathunad, Thodupuzha, Peermade, Meenachil, Kanjirappally, Pathanamthitta, Pathanapuram, Neyyattinkara and Nedumangad-12 talukas in all-have been electrified.

About 14900 pumpsets have been energised in the Sub-region upto March, 1976. The maximum number is found in the taluka of Mukundapuram and the least in Badagara.

6. TRANSMISSION AND DISTRIBUTION

The transmission network in the Sub-region consists of 220 KV, 66 KV, 22 KV, and 11 KV lines. The

Table 7.7 Number of Villages Electrified and Pumpsets Energised in the Sub-region (as on 31.3.76)

Taluka	Total number of inhabited villages as per 1971 Census	Number of villages electrified	Number of pumpsets energised
1	2	3	4
1. Mananthavadi	11	10 (90.9)	85
2. South Wynad	20	16 (80.0)	100
3. Quilandy	34	33 (97.1)	5
4. Badagara	23	21 (91.3)	5
5. Ernad	45	34 (75.6)	427
6. Mannarghat	19	13 (68.4)	207
7. Palghat	26	26(100.0)	949
8. Chittur	33	33(100.0)	2536
9. Mukundapuram	53	53(100.0)	6766
10. Kunnathunad	15	15(100.0)	3269
11. Kothamangalam	NA	NA	NA
12. Thodupuzha	16	16(100.0)	227
13. Devicolam	9	7 (77.8)	34
14. Udumbanchola	12	10 (83.3)	7
15. Peermade	6	6 (100.0)	7
16. Meenachil	22	22(100.0)	144
17. Kanjirappally	6	6(100.0)	Nil
18. Pathanamthitta	19	19(100.0)	6
19. Pathanapuram	16	16(100.0)	21
20. Neyyattinkara	20	20(100.0)	36
21. Nedumangad	20	20(100.0)	42
Total	425	396(95.2)	14908

Source: 1) The State Government.

2) Census, 1971.

3) Figures in brackets indicate percentage of the village electrified to total.

The total lengths of these lines in the study area given below:

<u>Capacity</u>	<u>Length in circuit KM</u>
220 KV	285
110 KV	446
66 KV	668
33 KV	Nil
22 KV	111.00
11 KV	3732.65
6.6 KV	Nil

The talukawise lengths of transmission and distribution lines can be seen in Table 7.8. It is evident from this table that the talukas of Mannarghat and Nedumangad have only low tension (11 KV) transmission lines Fig.7.3.

6.1 Sub-Stations

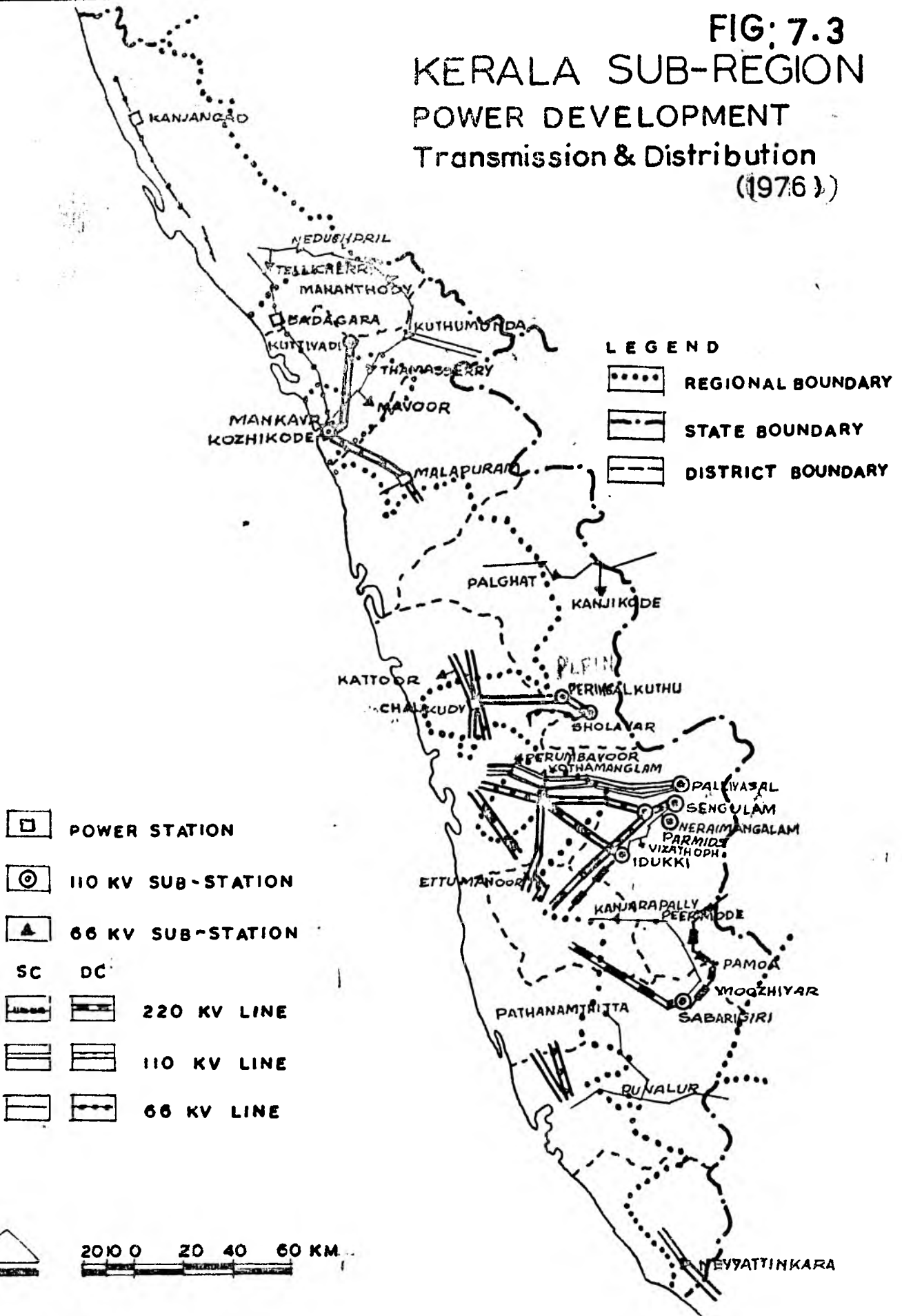
There are 26 sub-stations in the Sub-region. Of these, 20 are connected by 66/11 KV lines and only 4 sub-stations by 110 KV lines.

The list of sub-stations may be seen in Table 7.9.

7. LOAD FORECAST

The load depends upon many variables of socio, economic, politico and physical realms. It is a complex exercise to consider all facets of development

FIG: 7.3
KERALA SUB-REGION
POWER DEVELOPMENT
Transmission & Distribution
(1976)



LEGEND

- REGIONAL BOUNDARY
- STATE BOUNDARY
- DISTRICT BOUNDARY

- POWER STATION
- 110 KV SUB-STATION
- 66 KV SUB-STATION
- SC DC
- 220 KV LINE
- 110 KV LINE
- 66 KV LINE

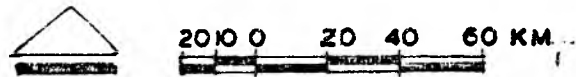


Table 7.8 Lengths of Transmission & Distribution lines in the Sub-region - 1975.

Taluka	220 KV	110/ 132 KV	66 KV	33 KV	22 KV	11 KV	6.6 KV
1	2	3	4	5	6	7	8
1. Mananthavadi	-	-	35.00	-	-	82.67	-
2. South Wyna	-	-	62.00	-	-	131.63	-
3. Quilandy	-	49.00	-	-	-	195.16	-
4. Badapara	-	18.00	-	-	-	124.37	-
5. Ernad	-	64.00	8.0	-	-	29.90	-
6. Mannarghat	-	-	-	-	-	120.00	-
7. Palghat	-	-	62.00	-	56.00	148.00	-
8. Chittur	-	-	6.00	-	55.00	226.00	-
9. Mukundapuram	-	133.00	65.00	-	-	437.00	-
10. Kunnathunad	30.00	38.00	90.00	-	-	247.86	-
11. Kothamangalam							
12. Thodupuzha	70.00	52.00	19.00	-	-	103.98	-
13. Devicolam	-	42.00	132.00	-	-	65.44	-
14. Udumbanchola	-	4.00	-	-	-	94.48	-
15. Peermade	24.00	-	32.00	-	-	223.00	-
16. Meenachil	53.00	46.00	32.00	-	-	165.93	-
17. Kanjirappally	8.00	-	-	-	-	85.50	-
18. Panthanamthitta	100.00	-	26.00	-	-	309.46	-
19. Pathanapuram	-	-	44.00	-	-	246.67	-
20. Neyyattinkara	-	-	55.00	-	-	233.70	-
21. Nedumangad	-	-	-	-	-	195.90	-
Total	285.00	446.00	668.00	-	111.00	3732.65	-

Source: State Government.

Table 7.9 List of Sub-Stations in the Sub-Region

	Location (Taluk)	Category
1. Mannanthavadi	(Mananthavadi)	66/11 KV
2. Kuthumunda	(South Wynad)	66/11 KV
3. Malappuram	(Ernad)	110/66 KV
4. Malappuram	(-do-)	66/11 KV
5. Palghat	(Palghat)	66/11 KV
6. Kanjikode	(Palghat)	66/22 KV
7. Kozhinjampara	(Chittur)	66/22 KV
8. Pudukad	(Mukundapuram)	66/11 KV
9. Kattoor	(-do-)	66/11 KV
10. Chalakudy	(-do-)	110/66 KV
11. Chalakudy	(-do-)	66/11 KV
12. Perumbavoor	(Kunnathunad)	66/11 KV
13. Moolamattom	(Thodupuzha)	66/11 KV
14. Vazhathope	(-do-)	66/11 KV
15. Sengulam	(Devikulam)	66/110 KV
16. Pallivasal	(-do-)	66/11 KV
17. Peermade	(Idikki)	66/11 KV
18. Ettimannur	(Meenachil)	66/11 KV
19. Kanjirappally	(Kottayam)	66/11 KV
20. Pathanamthitta	(Quilon)	66/11 KV
21. Pamba	(Pathanamthitta)	66/11 KV
22. Moozhia	(-do-)	66/11 KV
23. Punalur	(Pathanapuram)	66/11 KV
24. Neyyattinkara	(Trivandrum)	66/11 KV
25. Badagara	(Badagara)	110/11 KV
26. Kulamavu	(Thodupuzha)	66/11 KV

Source: The State Government.

in so far their demands for electric power are concerned and to forecast the requirements in precise terms. The per capita consumption of electric energy hitherto has been unsatisfactory in the Sub-region compared to the State and the nation. There have been wide gaps between the plan aspirations and plan achievements. It is, therefore, difficult to project the demand based on the plan targets or sectoral programmes. Moreover, the power intensive industrial sector is on the low key in the Sub-region, and an impressive spurt of its activities in the foreseeable future seems to be a remote possibility. To have an idea of the likely power demand, the past trends of power consumption in the background of stepped up developmental activities in the area under the various special programmes have been taken as basis.

During 1971-76, the power consumption has been registering an annual increase of 14.5 percent. Now, with the special programmes afoot, a rate of about 20 percent is assumed to project the demand. Accordingly, the electrical energy demand for 1981 would be in the order of 600 MkWh, and by 1991, it may go upto 1800 MkWh. This would mean, at 60 percent load factor, a firm power of nearly 350 MW by 1991.

8. FUTURE SCHEMES

Out of the 2600 MW of firm power potentials of the State, only 850 MW (32.8%) has been so far tapped. Thus, there ~~are~~ still abundant potentials ~~yet~~ untouched. The projects that have been envisaged

by the State Government for tapping the hydro electric power are set out in Table 7.10. Some useful information of some of these schemes is given in the following paragraphs (Fig. 7.1).

The lower Barapole power scheme in the Valapattinam basin proposes to use the tail race waters of the power scheme contemplated by the Karnataka State in the upper reaches of the river. The firm power discharge of the project in Karnataka will be about 19 cumecs.

The Kuttiadi hydel power project holds less usable storage compared to its installed capacity. To firm up the power generation of the project, a combined reservoir is proposed to be formed by two dams-one across the Oripuzha, a tributary of the Kuttiadi and the other across the Karamanthodu, a tributary of the Kabbini. The reservoir is expected to be linked with the Kuttiadi reservoir by a tunnel. This will be used for augmenting the power generation of the Kuttiadi by 40MW additionally.

The Pandiyar - Punnapuzha project is proposed by the Tamil Nadu Government. The tail race waters of the project can be used downstream by the Kerala government. The Tamil Nadu government are however investigating an alternative scheme for diverting the tail race water eastwards for irrigation in the Moyar Valley in Tamil Nadu.

The cholathipuzha power scheme will be a

Table: 7.10 Future Hydro-Electric Projects in the Sub-region.

S.No.	Scheme	Location Basin	Head in metres	Firm power draft Cumecs	Power potential at 60% LF	Installed capacity	Cost in Lakhs Rs.
1.	Lower Barapole	Near Makut forest range (Valapattanam)	150	19.8	40	NA	650
2.	Kuttiadi Augmentation	Kuttiadi (Kuttiadi)	658	3.0	40	75	400
3.	Pandiyar- Punnapuzha	Rt bank of Kara- kottapuzha (Kuttiadi)	497	11.6	83.3	NA	1550
4.	Lower Pandiyar- Punnapuzha(Tail- race)	Vellakkatta (Kuttiadi)	279	12.32	53	70	1120
5.	Cholathipuzha	L.B. of Chali- puzha (Kuttiadi)	723	4.25	42	60	700
6.	Chalipuzha	R.B. of Chali- puzha (Kuttiadi)	564	5.66	37	NA	1400
7.	Silent Valley	Silent Valley (Bharathapuzha)	840	8.5	93	120	2488
8.	Karappara- kuriarkutty	Karappara (Chalakydy)	187	karapara	62	82	1360
			191	pulickal			
			42	Kuriar- 9.26			
				kutty			

S.No.	Scheme	Location (Basin)	Head in metres	Firm power draft cum- ecs	Power potential at 60% LF	Installed capacity	Cost in Lakhs Rs.
1.	2.	3.	4.	5.	6.	7.	8.
9.	Peringalkuthu R.B.	Peringalkuthu (Chalakydy)	262	15.57	50	NA	900
10.	Adirapally	Adirapally (Chalakydy)	157	33.4	74	75	560
11.	Idamalayar	Idamalayar river (Periyar)	128	43.75	62.8	90	1266.4
12.	Idikki II stage	Idikki (Periyar)	667	40.78	350	390	1550
13.	Neo Pallivasal	Pallivasal (Periyar)	578	7.36	56.9	60	670
14.	Lakshmi L.D.	Bison-Valley (Periyar)	-	10.14	76	NA	
15.	Idikki III stage	Idikki (Periyar)	667	9.2	87	NA	420
16.	Perinjankutty	Perinjankuttyriver (Periyar)					
		a) Anamalai-Manali	145	13.5	24	50	NA
		b) Sengulam-Mudira puzha PH	125	19.08	29	60	"
		c) Sengulam PH	360	5.38	24	NA	"
		d) Ranniar PH	243	3.82	12	NA	"
		e) Neriamangalam PH	195	9.2	23	NA	"
		f) Perinjankutty PH	371	28.6	146.5	200	"

1.	2.	3.	4.	5.	6.	7.	8.
17.	Perinjankutty IIstage (Periyar)						
	a)Upper Panniar PH		183	19.65	50	75	NA
	b)Panniar-PerinjankuttyPH		49	33.33	21	30	"
	c)Perinjankutty PH		370	10.95	50	100	"
	d)Anayirankal-kunju- thanni PH		229	2.54	11	15	"
18.	Puyankutty	Puyankutty river (Periyar)	213	33.98	100	120	"
19.	Lower Periyar	Below NeriamangalamPH (Periyar)	183	83.09	267	420	"
20.	Sabarigiri Aug- mentation	Sabarigiri (Pamba)	750	2.4	2.4	NA	128
21.	SwamisaraNan	Moozhiyur (Pamba)	750	0.3	2.76	NA	30
22.	Kakkad(Sabarigiri tail race)	Below Moozhiyur (Pamba)	128	28.4	51.6	75	910
23.	Urumpani	Urumpani (Pamba)	82	19.5	21	NA	1200
24.	Azhutha-Pamba	Kanamalai (Pamba)	87	46.5	53	NA	1400
25.	Achencoil	Achencoil (Achencoil)	116	5.67	8	NA	NA
26.	Kallada Dam	Kallada dam (Kallada)	NA	NA	12.3	NA	NA

1.	2.	3.	4.	5.	6.	7.	8.
27.	Mananthody Multi-purpose (Kabbini)	Valappattanam basin	604	14.16	110	200	2000
28.	Kerala Bhawani Multipurpose	Seramankandy (Bhawani)	444	11.46	66.7	100	918
29.	Pambar	Pambar (Pambar)	NA	NA	29.2	NA	NA
30.	Iravikulam	Iravikulam (Pambar)	NA	NA	23.4	NA	NA

joint venture by the Tamil Nadu and Kerala Governments,

The Karappara-Kuriarkutty multipurpose project is envisaged as an integration of three dams and three power stations utilising the waters of the Karappara, the Pulickal and the Kuriarkutty, all tributaries of the Chalakudy river. The tail race waters of these power stations will provide irrigation in the Chitturpuzha valley.

Till the completion of the Peringalkuthu Right Bank scheme, the Adirapally project will be able to generate only 72.5 MW.

The Idikki second stage is to meet the peak load deficiency in the State's grid. Three more generators of 130 MW each as additional to the existing ones will be installed.

The Madupatty and Kundale dams are not adequate to control the entire run off from the Munnar catchment. It is proposed, therefore, to create additional storages by dams at Periavurai and Grahams land with an inter-connecting tunnel and, also at Palar and Lekshmi. These would continuously yield 17.5 cu.m. at the Munnar head-works and of this the Neo-Pallivasal scheme will use 7.36 cu.m., and the Lekshmi left bank scheme will use 10.14 cu.m.

The Idikki Third stage envisages diversion of water by Kallar and Rettayar dams to the Idikki reservoir.

The Perinjankutty hydel project consists of a huge dam across the Perinjankutty river - a tributary of the Periyar. This reservoir will regulate 198.22 M.cu.m. of yield from a catchment of 141 sq. km. below the Idikki III stage, and 707.92 M.cu.m. from the catchments of the Idamalayar, the Puyankutty, the western Kallar, the Mudirapuzha and the Panniar. In the course of diversion, power is expected to be developed at the Anamalai-Manali underground power station, and the Sengulam-Mudirapuzha power house. The existing power generation at Sengulam, Neriamangalam and Panniar will be firmed up, and the augmentation totals to 59 MW at 60% LF.

In the Perinjankutty second stage, the tail race waters of the Lekshmi left bank scheme, the Anayirankal power house and the yield from the Bison valley catchment are proposed to be diverted to the Panniar where it will be dammed. The upper Panniar at the foreshore of Ponmudi reservoir will generate 50 MW, the Panniar-Perinjankutty, 21 MW, the Perinjankutty 50 MW and the Anayirankal-Kunjuthani power house, 11 MW.

The Lower Periyar hydel project is to utilise the releases from the existing and proposed power schemes in the upstream of the project site together with the uncontrolled yield available in the free catchment below Neriamangalam, Perinjankutty and Idikki dams. The tail race waters of Neriamangalam power station and Perinjankutty power station together with the runoff from a free catchment of 181 sq. km. below the dams of Kallarkutty, Perinjankutty, Idikki

and Cheruthani will be utilised by the project for power generation. The power scheme on the left bank of the river will be implemented in two stages.

For augmenting the Sabarigiri hydro project the Kullar, the Gaviar and the Meenar-tributaries of the Pamba will be intercepted at four points by storage dams and interconnected. The runoff from a free catchment of Mooshiyar, upstream of the Sabarigiri power house is also proposed to be diverted into the Kakki reservoir for power development.

The Kakkad project is using the Sabarigiri tail race waters. It is also possible to intercept runoff from a free catchment of the Mooshiyar and other sub-tributaries of the Kakkad.

The Mananthavady multi-purpose scheme is proposed across the Mananthavadi river - a tributary of the Kabbini, an east flowing river. The waters will be diverted to the Valapattanam basin for power generation, and the tail race waters will be available for irrigation in the Valapattanam basin.

The Kerala Bhavani multi-purpose scheme using the yield from a catchment of the Kabbini within Kerala will be located in the neighbouring Thenkara valley and the tail race waters will be utilised for irrigation.

9. SUGGESTIONS

Availability of power is not a problem, but the installations of the carriers of power to the points

of consumption has been a problem in the sense that in the Ghats, long dead distances between clusters of residences require huge investments without economic return. The habitats are scattered all over the area and to reach electricity to each of them is indeed a formidable job. Nonetheless, electrification is essential for any development and hence it cannot be avoided and should not be postponed.

Although there is no dearth of power at present, postponement of tapping the waters of their power potentials will result in irretrievable losses. It is a national waste in view of the fact that many States are power-scarce, and the production capacities of the vital industries are under-utilised for want of power. The power potentials are not distributed uniformly across the country but fortunately the Kerala State possesses a fairly sizeable quantum of potentials in her rivers. The development of power, therefore, has to be taken up on a priority basis to feed the national grids to serve the power scarce regions. The multipurpose projects, to start with will serve both the essential needs of irrigation as well as power generation.

SECTION VIII : INDUSTRIAL DEVELOPMENT

The Kerala Sub-Region had 1706 industrial units in the organised sector of industry, employing 16,310 persons, and 12,122 units in the unorganised sector, employing 27,538 persons in 1974. During 1974 the total investment in the organised sector of industry was Rs.12.29 crores while the value of production was Rs.38.92 crores. During the period 1971-74, there has been considerable progress in the development of industry in the Sub-Region. The industrial units in the Sub-Region have increased from 990 in 1971 to 1706 in 1974 and employment from 11,413 persons in 1971 to 16,310 persons in 1974, registering growth of 72.3% and 41.5% respectively. The increase in investment was from Rs.10.50 crores in 1971 to Rs.12.29 crores in 1974 and in the value of production from Rs.26.81 crores in 1971 to Rs.38.92 crores in 1974, thus registering growth of about 17% and 47% respectively. Despite this overall progress in the industrial sector the growth has not been adequate enough to provide relief for the people in the over-crowded agricultural sector.

There is relatively little scope for the extension of agricultural land. Therefore, the scope for the creation of additional employment opportunities in the agriculture sector is also limited. In these circumstances, a rapid expansion of the industrial sector offers one of the means of providing gainful employment to the fast growing labour force and for raising the standard of living of the people.

1. INDUSTRIAL STRUCTURE AND PATTERN OF GROWTH :

The distribution of industrial activity in the Kerala Sub-Region has been very much un-even owing to unfavourable factors like diversified topographical conditions, deficiencies of infrastructure facilities and lack of certain industrial raw materials like minerals. On the whole, the existing structure of organised industries in the Sub-Region is very much dominated by the agro-based industries.

A study of the distribution of industries in the Sub-Region in 1971 and 1974 reveals that industries have agglomerated in five taluks of the Sub-Region namely Palghat, Chittur, Mannarghat, Mukundapuram and Kunnathunad (Fig.8.1 and Fig.8.2). These five taluks taken together accounted for more than 75% of the total number of units, 80% of the total employment, 86% of the total investment and 82% of the total industrial production of the Sub-Region in 1974. Those taluks which were better in 1971 have improved their positions in 1974 while those taluks which were lagging behind are still continuing the same trends (Table 8.1).

The existing structure of organised industries in the Sub-Region is very much the outcome of the type of raw materials found in the area. This is very clearly brought out in Table 8.2 which gives a resource based classification of industries, pattern of investment and output, and their present employment pattern.

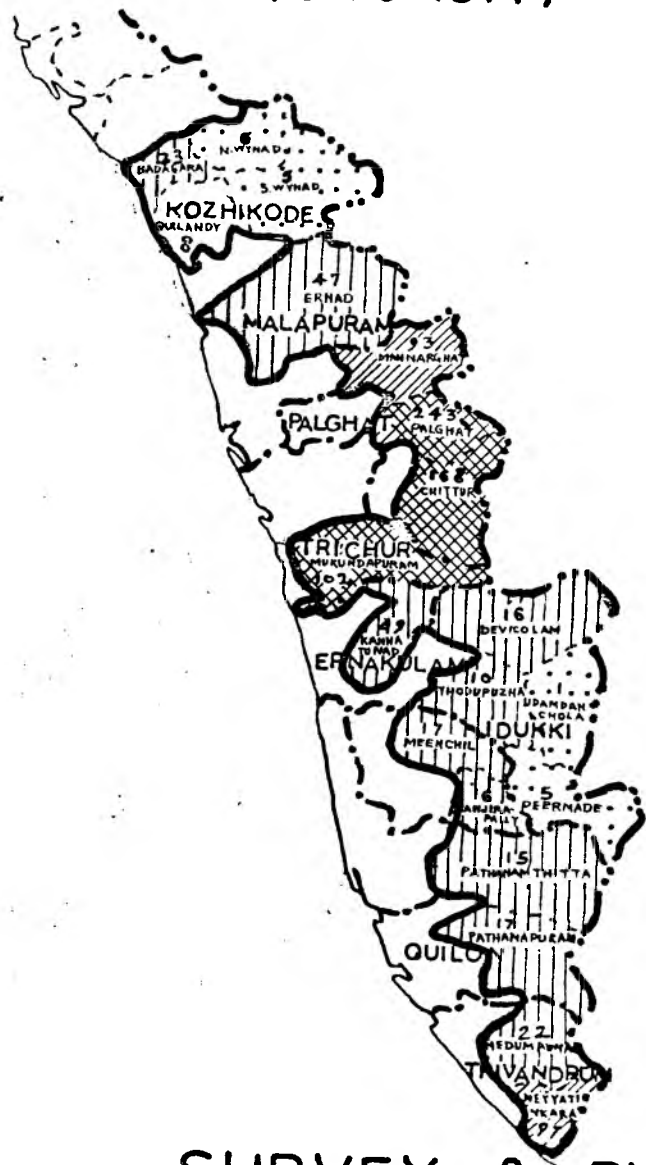
It may be seen from Table 8.2 that out of the total number of 1706 units, agro-based industries with 1025 units (60.7%) constituted the single largest

STUDY OF INDUSTRIAL DEVELOPMENT : Kerala Sub-Region










FIG. 8.1

Concentration of Industries
(Units-1971)

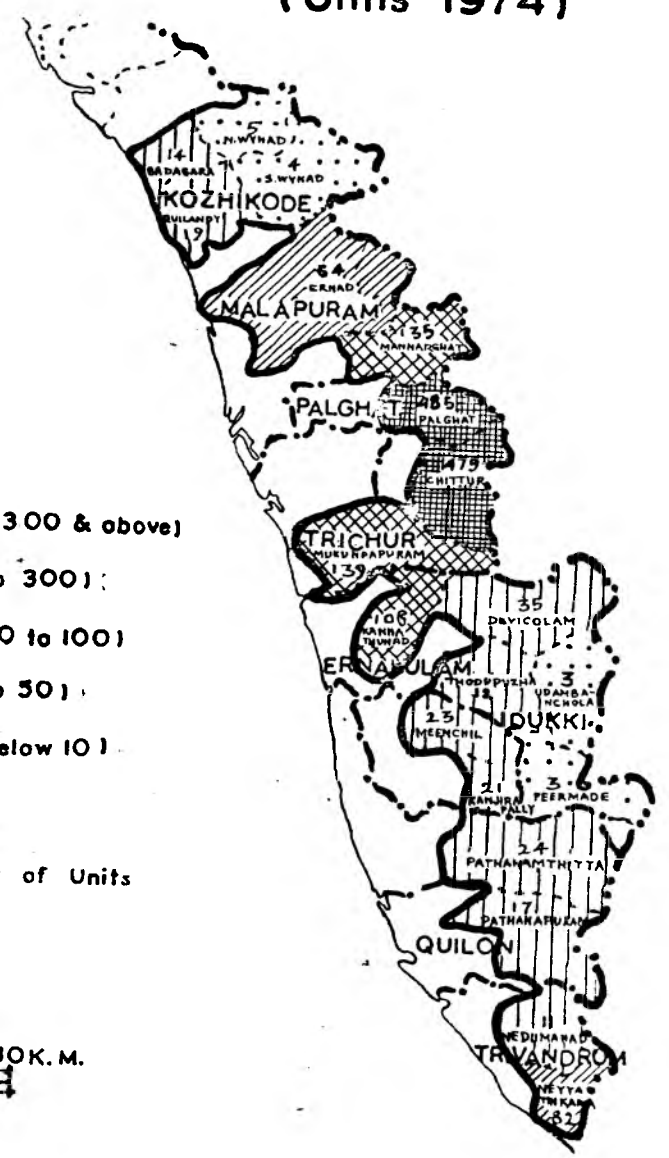
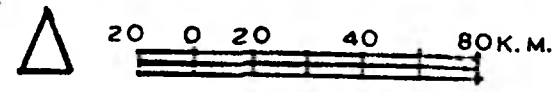
Concentration of Industries
(Units 1974)



LEGEND

-  Regional boundary
-  State boundary
-  District boundary
-  Taluk boundary
-  Very high concentration (300 & above)
-  High concentration (100 to 300)
-  Medium concentration (50 to 100)
-  Low concentration (10 to 50)
-  Very low concentration (below 10)

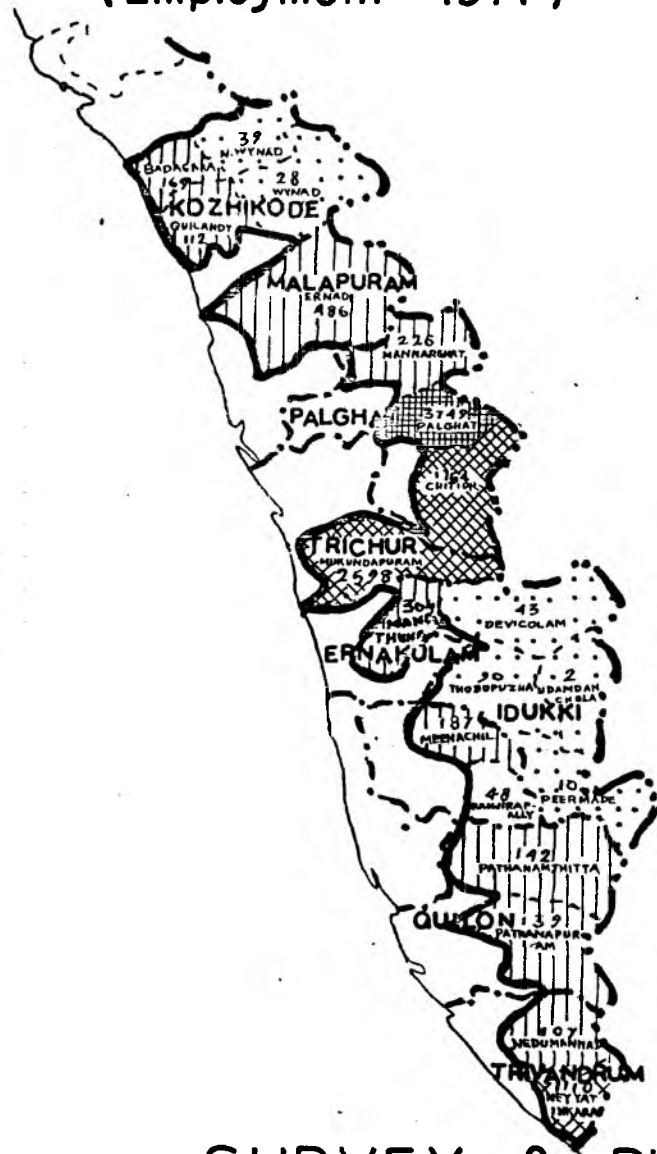
N. B: Figures indicate Number of Units












STUDY OF INDUSTRIAL DEVELOPMENT: Kerala Sub-Region

Concentration of Industries (Employment - 1971)

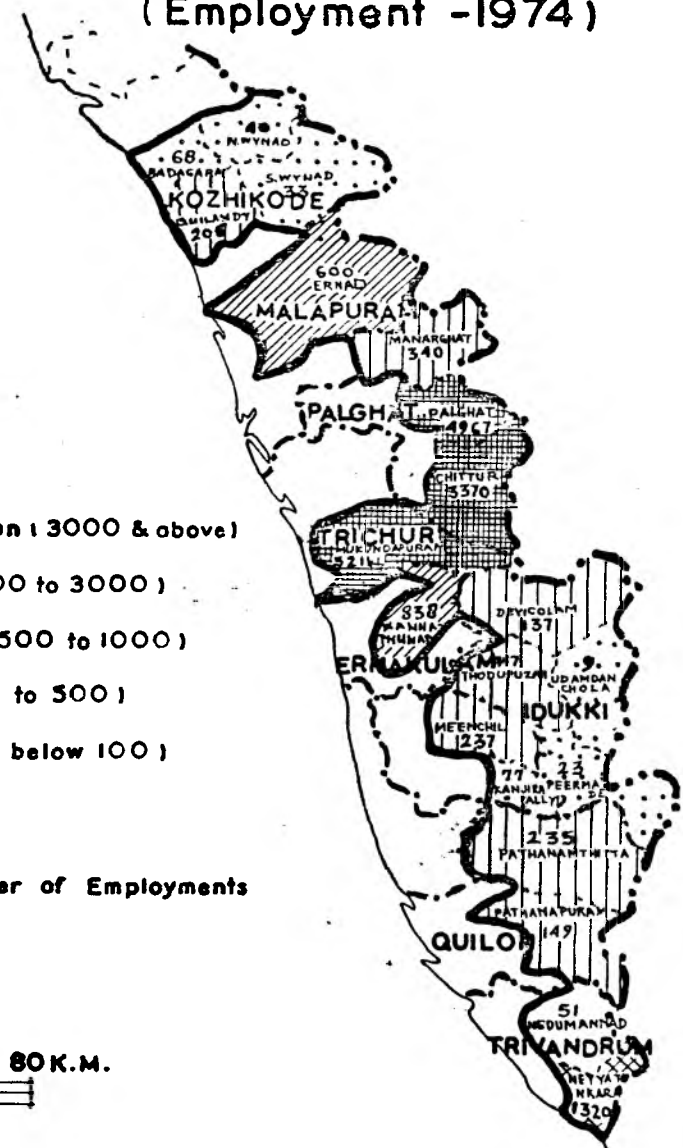
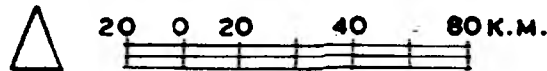
Concentration of Industries (Employment - 1974)



LEGEND

-  Regional boundary
-  State boundary
-  District boundary
-  Taluk boundary
-  Very high concentration (3000 & above)
-  High concentration (1000 to 3000)
-  Medium concentration (500 to 1000)
-  Low concentration (100 to 500)
-  Very low concentration (below 100)

N.B: Figures indicate Number of Employments



SURVEY & PLAN FOR WESTERN GHATS

TOWN AND COUNTRY PLANNING ORGANISATION ; MINISTRY OF WORKS & HOUSING ; GOVERNMENT OF INDIA .

Table 8.1 : Taluk-wise Distribution of Total Number of Units
And Employment In Kerala Sub-Region In 1971 And
1974.

Sl. No.	Taluk	1971		1974		Percentage Variation	
		No. of Units	Employment	No. of Units	Employment	Units %	Employment
1	2	3	4	5	6	7	8
1.	Mananthavadi	5 (0.50)	39 (0.33)	5 (0.3)	40 (0.2)	0.00	+ 2.56
2.	Vaithiri) Sultan Battery)	5 (0.50)	28 (0.24)	4 (0.2)	33 (0.2)	-20.00	+17.86
3.	Quilandy	18 (1.82)	112 (0.97)	19 (1.1)	206 (1.3)	+ 5.5	+83.93
4.	Badagara	33 (3.33)	169 (1.46)	14 (0.8)	68 (0.4)	+57.57	-59.76
5.	Ernad	47 (4.74)	486 (4.21)	64 (3.8)	600 (3.7)	+36.17	+23.46
6.	Mannarghat	93 (9.39)	226 (1.96)	135 (7.9)	340 (2.1)	+45.16	+50.44
7.	Palghat	243 (24.55)	3749 (32.44)	485 (28.4)	4967 (30.4)	+99.59	+32.49
8.	Chittur	168 (16.97)	1764 (15.27)	475 (27.8)	3370 (20.7)	+182.74	+91.04
9.	Mukundapuram	102 (10.30)	2598 (22.48)	139 (8.1)	3211 (19.7)	+36.27	+23.60
10.	Kunnathunad	49 (4.95)	304 (2.63)	108 (6.3)	858 (5.13)	+120.40	+175.66

Table 8.1 Contd.....

Table 8.1 (Contd.)

1	2	3	4	5	6	7	8
11.	Kothamanglam	11 (1.11)	142 (1.23)	22 (1.3)	253 (1.5)	*100.00	*78.17
12.	Thodupuzha	10 (1.01)	90 (0.78)	12 (0.7)	147 (0.9)	* 20.00	* 63.33
13.	Devicolam	16 (1.62)	43 (0.37)	35 (2.1)	137 (0.8)	*118.75	*218.60
14.	Udumbanchola	1 (0.10)	2 (0.01)	3 (0.2)	8 (0.04)	*200.00	*300.00
15.	Peermade	5 (0.50)	10 (0.08)	8 (0.5)	23 (0.1)	* 60.00	*130.00
16.	Meenachil	17 (1.72)	187 (1.62)	23 (1.3)	237 (1.4)	* 35.29	* 26.74
17.	Kanjirapally	16 (1.62)	48 (0.42)	21 (1.2)	77 (0.5)	* 31.25	* 60.42
18.	Pathanamthitta	15 (1.52)	142 (1.23)	24 (1.4)	235 (1.4)	* 60.00	* 65.49
19.	Pathanapuram	17 (1.72)	139 (1.20)	17 (1.0)	149 (0.9)	* 00.00	* 7.19
20.	Neyathinkara	97 (9.80)	1110 (9.61)	82 (4.8)	1320 (8.1)	- 15.46	* 18.92
21.	Needumangad	22 (2.22)	167 (1.45)	11 (0.6)	51 (0.3)	- 50.00	- 69.46
Total		990	11555	1706	16310	72.32	41.15

Source:- Director of Industries, Government of Kerala.

Table 8.2 : Investment, Output And Employment In Organised Industries In Kerala Sub-Region In 1971 And 1974.

Category of Industry	1971			1974			Percentage variation					
	No. of Units	Employment	Investment Rs. '000	Production Value Rs. '000	No. of Units	Employment	Investment Rs. '000	Production Value Rs. '000	Units	Employment	Investment	Production Value
Agro-Based	504 (50.90)	5167 (44.72)	221142.9 (80.50)	222142.9 (83.08)	1025 (60.08)	7632 (46.18)	93954.8 (76.43)	314007.0 (80.67)	+103.37	47.7	+10.84	+41.99
Forest-Based	232 (23.43)	2526 (21.86)	6855.6 (6.53)	18397.5 (6.91)	324 (19.0)	3534 (21.7)	10731.4 (8.73)	26349.7 (6.77)	+ 39.65	39.9	+56.54	+43.22
Mineral-Based	32 (3.23)	1483 (12.83)	5874.0 (5.58)	8455.3 (3.18)	54 (3.2)	1935 (11.9)	6745.8 (5.49)	17109.8 (4.40)	+ 68.75	+30.5	+14.83	+102.35
Live-Stock-Based	17 (1.71)	55 (0.48)	136.9 (0.13)	504.3 (0.19)	23 (1.3)	65 (0.4)	1650.4 (1.34)	631.4 (0.16)	+ 35.3	+18.2	+1113.24	+25.20
Fish-Based	5 (0.5)	66 (0.57)	103.4 (0.10)	256.0 (0.10)	6 (0.3)	55 (0.3)	629.4 (0.51)	894.4 (0.23)	+ 20.0	-16.6	+510.68	+249.22
Non-Resources-Based	200 (20.20)	2258 (19.54)	7529.6 (7.16)	17415.6 (6.54)	274 (16.06)	3079 (18.9)	9221.4 (18.9)	30261.1 (7.50)	+37.00	+36.3	+22.47	+73.76
Total	990	11555	105175.7	266172.0	1706	16310	122933.8	389252.4	+72.32	+41.5	+16.88	+46.24

Source:- Director of Industries, Government of Kerala.

category of industry in 1974. This was followed by forest-based industries with 324 units (19%), non-resource based industries with 274 units (16.6%) and mineral-based industries (3.2%). Livestock-based and fish-based industries formed a negligible proportion of the total number of units in the Sub-Region. The number of workers employed in each category is found to have followed the same trend as exhibited by the share of each category in total number of units (Fig.8.3 and Fig.8.4).

Investment and production in different industrial groups are also found to have fairly followed the pattern of distribution of different categories in the total number of units. Agro-based industries with an investment of Rs.9.3 crores formed more than 75% of the total investment in all industrial units in this Sub-Region. However, forest-based industries with an investment of Rs.107.3 lakhs accounting for 8.7% of the total investment ranked second to agro-based industries. Non-resource based industries with an investment of Rs.92.2 lakhs accounted for 7.5% of the total investment and was third on this score and it was followed by mineral-based industries which had 5.49% of the total investment in the organised industries sector. Livestock and fish-based industries together had a negligible share in the total investment i.e. only 1.85%.

The agro-based industries constituting the largest category employing the largest number of workers having the largest share in total investment ranked first with respect to production as well. In 1974, they produced an output of worth Rs.31.40 crores

accounting for 80.67% of the total value of production. Forest-based industries produced 6.77% of the total value of production and ranked next to agro-based industries. Non-resource based industries contributed 7.50% of the total value of production. Next in order come the mineral-based industries (4.40%) live-stock-based industries (0.16%) and fish-based industries (0.93%).

Thus the analysis of the total number of units, employment, investment and output in the Kerala Sub-Region reveals that the agro-based, the forest-based and non-resource-based industries dominated the industrial scene in 1974; the mineral-based industries were not found to be very significant. This can be explained by the relatively limited availability of the mineral resources in the Sub-Region. Livestock and fish-based industries had hardly any place in the industrial spectrum of this area.

It is interesting to note that more or less the same pattern of industrial development existed in the Sub-Region in 1971. A perusal of the information pertaining to the industrial development in the Sub-Region in 1971 reveals that in 1971 also the agro-based, the forest-based, and the non-resource-based industries dominated the industrial scene of the Kerala-Sub-Region.

Having analysed the different types of industries and their significance in the industrial economy of the Sub-Region it would be pertinent to have a look on the pattern of growth, in their number, employment, investment, and output during 1971-74.

Fig.8.3

STUDY OF INDUSTRIAL DEVELOPMENT: KERALA SUB-REGION — Type of Industries(Units)1974

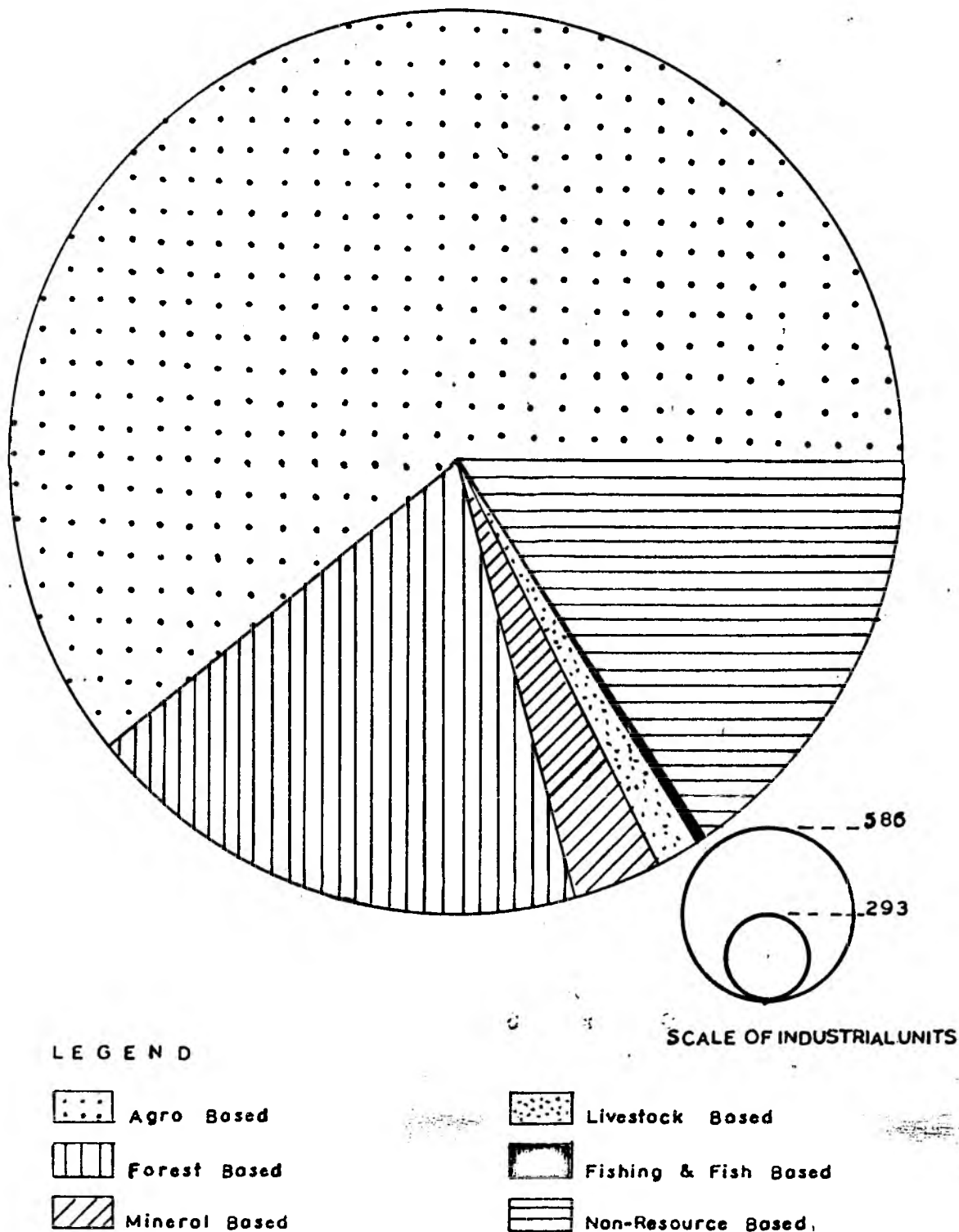
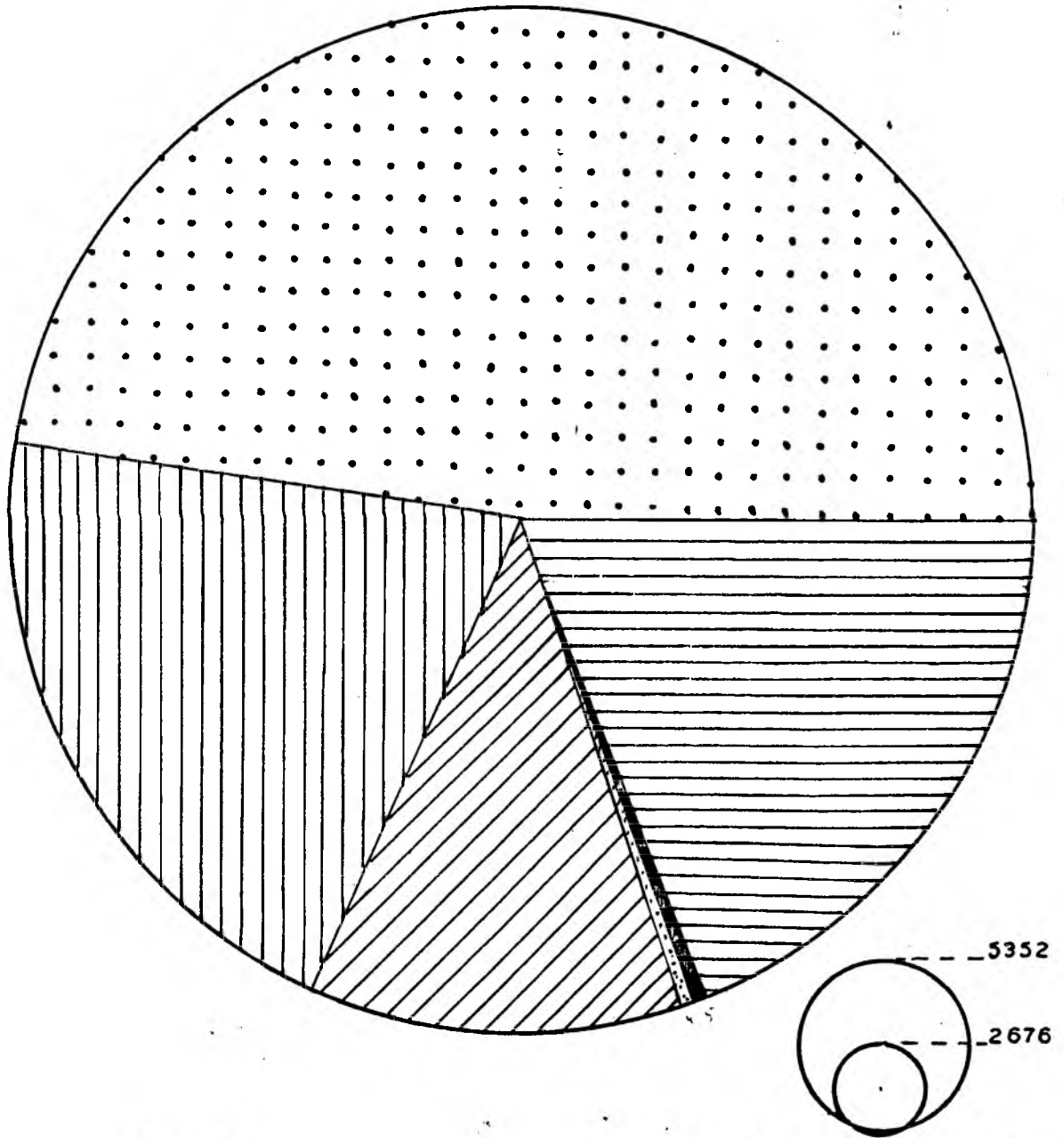


Fig.8.

STUDY OF INDUSTRIAL DEVELOPMENT KERALA SUB-REGION -Type of Industries(Employment)1974



LEGEND

- Agro Based
- Forest Based
- Mineral Based

SCALE OF INDUSTRIAL EMPLOYMENT

- Limestone Based
- Fishing & Fish Based
- Non-Resource Based

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TOWN & COUNTRY PLG. ORGN; MIN. OF WORKS & HOUSING ; GOVERNMENT OF INDIA

As mentioned earlier, there were 990 units of industries in 1971 which increased to 1706 in 1974 indicating a growth of 72.3% and an average annual growth rate of 17.95%. This high rate of growth was brought about by a significant growth of agro-based industries which registered a growth of 103.4% and mineral-based industries which grew by 69%. During 1971-74, the other industrial groups, however, registered a lower percentage of growth than the average (72.1%) for the Sub-Region.

Employment in all these industries taken together increased by 41.5% during 1971-74 as the total number of workers employed increased from 11555 in 1971 to 16310 in 1974. Here again the agro-based industries registered a growth of 47.7% which is marginally higher than the average for all the industries. It is worth mentioning here that the employment in fish based-industries instead of growing, has shown a declining trend.

The total investment in all major industrial groups together increased from Rs.10.51 crores in 1971 to Rs.12.29 crores in 1974 indicating a growth of 17% which does not seem to have corresponded to the magnitude of growth in the total number of units. This may be because of the fact that majority of the units are small and relate to small scale industries. It is worth mentioning in this regard that the average investment per unit has declined from Rs.197.4 lakhs in 1971 to about Rs.73.00 lakhs in 1974 and thereby reduced the capital intensity.

Although fish-based and live-stock-based industries showed fantastic growth of investment but they form a negligible proportion of the total investment. Among the remaining categories, forest-based industries registered a growth of 56.54% in its investment, followed by non-resource-based industries (22.47%). The agro-based industries which exhibited a growth of 103.4% in number of units, registered a growth of only 10.84% in investment. This not only corroborates the growth of small scale units but also the fact that the maximum increase of such small scale units has been confined to the agro-based industries.

Between 1971-74 all these industries together exhibited a growth of 47.7% in its total output(value). In terms of produced value of goods, fish-based industries again exhibited a very high percentage growth (249.22%) but its contribution to total output is negligible, same is the case with mineral-based industries. Barring these two minor categories, the non-resource-based industries exhibited a remarkable growth of 73.76% in its produced value, followed by forest-based (43.22%) and agro-based industries (41.90%).

Talukwise distribution of number of units and employment in each group of industries in 1974 is given in Table 3.3.

As mentioned earlier, agro-based industries accounted for 60.7% of the total number of industrial units and about 46.8% of the total industrial employment in the Sub-Region. It has also been discussed above that there is heavy concentration of industries in a few

Table 8.3 : Talukwise Distribution Industrial Units and Employment In Major Industrial Groups In 1974 In The Kerala Sub-Region.

Taluka	Agro-Based		Forest-Based		Mineral-Based		Livestock-based		Fish-Based		Non-Resources-Based		Total	
	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Manantholadi	2 (0.2)	25 (0.3)	-	-	-	-	-	-	-	-	3 (1.1)	15 (0.5)	5 (0.3)	40 (0.24)
Vaithiri Sultan-Battery	-	-	1 (0.3)	13 (0.4)	-	-	-	-	-	-	3 (1.1)	20 (0.6)	4 (0.2)	33 (0.20)
Quilandy	10 (0.97)	146 (1.9)	4 (1.2)	34 (0.1)	1 (1.9)	4 (0.2)	1 (4.3)	2 (2.7)	1 (16.7)	14 (25.5)	2 (0.7)	6 (0.2)	19 (1.1)	206 (4-26)
Badagara	1 (0.1)	7 (0.1)	4 (1.2)	20 (0.6)	2 (3.7)	6 (0.3)	-	-	-	-	7 (2.6)	35 (1.1)	14 (0.8)	68 (0.41)
Ernad	8 (0.8)	72 (0.9)	44 (13.6)	484 (13.7)	-	-	6 (26.1)	18 (24.0)	-	-	6 (2.2)	26 (0.8)	64 (3.8)	600 (3.68)
Mannarghat	117 (11.4)	254 (3.3)	14 (4.3)	68 (1.92)	-	-	1 (4.3)	6 (8.0)	-	-	3 (1.1)	12 (0.4)	135 (7.9)	340 (2.08)
Palghat	378 (36.9)	2356 (30.9)	24 (7.4)	376 (10.6)	5 (9.3)	520 (26.9)	1 (4.3)	2 (2.7)	-	-	77 (28.1)	1713 (55.6)	485 (28.4)	4967 (30.45)
Chittur	414 (40.4)	2900 (38.0)	32 (9.8)	310 (8.8)	2 (3.7)	55 (2.8)	4 (17.4)	15 (20.0)	1 (16.7)	3 (5.5)	22 (8.0)	87 (2.8)	475 (27.8)	3370 (20.66)
Mukundapuram	13 (1.3)	727 (9.5)	54 (16.7)	819 (23.2)	43 (79.6)	1346 (69.6)	-	-	3 (50.00)	34 (61.8)	26 (9.5)	285 (9.3)	139 (8.1)	3211 (19.69)
Kunnathunad	8 (0.8)	83 (1.1)	46 (14.2)	347 (9.8)	-	-	-	-	-	-	54 (19.7)	408 (13.3)	108 (6.3)	838 (5.13)
Kothamangalam	2 (0.2)	9 (0.1)	9 2.8	186 (5.3)	(1.9)	4 (0.2)	-	-	-	1 (16.7)	4 (7.3)	9 (3.3)	50 (1.6)	253 (1.55)
Thodupuzha	1 (0.1)	10 (0.1)	7 2.2	91 2.3	-	-	-	-	-	-	4 (1.5)	46 (1.5)	35 (2.1)	147 (0.90)
Devicoolam	27 (2.6)	84 (1.1)	5 1.5	41 (1.2)	-	-	-	-	-	-	3 (1.1)	12 (0.4)	3 (0.1)	137 (0.84)
Udambanchola	-	-	-	-	-	-	-	-	-	-	3 (1.1)	8 (0.3)	8 (0.5)	8 (0.04)
Peermade	-	-	6 (1.9)	18 (0.5)	-	-	4 (4.3)	2 (2.7)	-	-	1 (0.4)	3 (0.1)	23 (1.3)	23 (0.14)
Meenachil	9 (0.9)	70 (0.9)	7 (2.20)	127 3.6	-	-	-	-	-	-	7 (2.6)	40 (1.3)	23 (1.3)	237 (1.45)
Kanjirappally	6 (0.6)	10 (0.1)	10 (3.1)	50 1.4	-	-	-	-	-	-	5 (1.8)	17 (0.6)	21 (1.2)	77 (0.47)
Pathanamthitta	8 (0.8)	82 (1.1)	10 (3.1)	130 3.7	-	-	-	-	-	-	6 (2.2)	23 (0.7)	24 (1.4)	235 (1.44)
Pathanamparam	-	-	11 (3.4)	111 (3.14)	-	-	-	-	-	-	6 (2.2)	38 (1.2)	17 (0.1)	149 (0.91)
Neyathinkara	20 (1.95)	795 (10.4)	29 (8.95)	280 (7.19)	-	-	9 (39.1)	30 (40.0)	-	-	24 (8.8)	215 (6.1)	82 (4.8)	1320 (8.1)
Nedumangad	1 (0.1)	2 (0.0)	7 (2.2)	29 0.8	-	-	-	-	-	-	3 (1.1)	20 (0.6)	11 (0.6)	51 (0.31)
Total	1025	7632	324	3534	54	1935	23	75	6	55	274	3079	1706	16110

Source:- Director of Industries, Government of Kerala.

taluks and since agro-based industries formed the major chunk of the total industrial units in the Sub-Region, therefore, this category of industry is also highly localised. It becomes very clear from Table 8.3 that out of the 1025 agro-based industries about 77.5% units are located in Chittur (40.4%) and Palghat (36.9%) taluks. Similarly out of a total of 7632 persons employed in agro-based industries about 69% are accounted for by these two taluks.

The growth of forest-based industries has been more evenly spread as compared to agro-based industries. Table 8.3 shows that although the development of forest-based industries has been well dispersed, but still the growth has been much more marked in some taluks than the others. For example Mukundapuram taluk accounted for the largest proportion of number of units (16.7%) and employment (23.2%) in this category of industries. Ernad with 13.6% of the units and 13.7% of employment ranked second and Kunnathunad taluk also maintains the same position in this regard, the third position is occupied by Neyyattinkara. The development is shared more or less evenly by rest of the taluks of the Sub-Region.

The non-resource-based industries occupy the third position in the industrial economy of the Sub-Region and come next to forest-based industries. In 1974 they contributed 16.6% of the total industrial units, and 18.9% of the total number of persons employed in the organised industrial sector of the Sub-Region (Table 8.3). At the first instance, it appears from Table 8.3 that the non-resource-based industries are

well dispersed all over the Sub-Region. However, a close scrutiny of the taluk-wise data shows that even the non-resource-based industries are highly localised in a few taluks of the Sub-Region, namely, Palghat, Kunnathunad, Mukundapuram and Neyyattinkara. These four taluks taken together accounted for about 68.4% of the total non-resource-based industries and about 86.6% of the employment in this category of industries.

It can be concluded from the above analyses that a large proportion of industrial units and employment in all categories of industries are concentrated in a few taluks of the Sub-Region namely Palghat, Chittur, Mukundapuram, Mannarghat, Kunnathunad etc. (Fig.8.3).

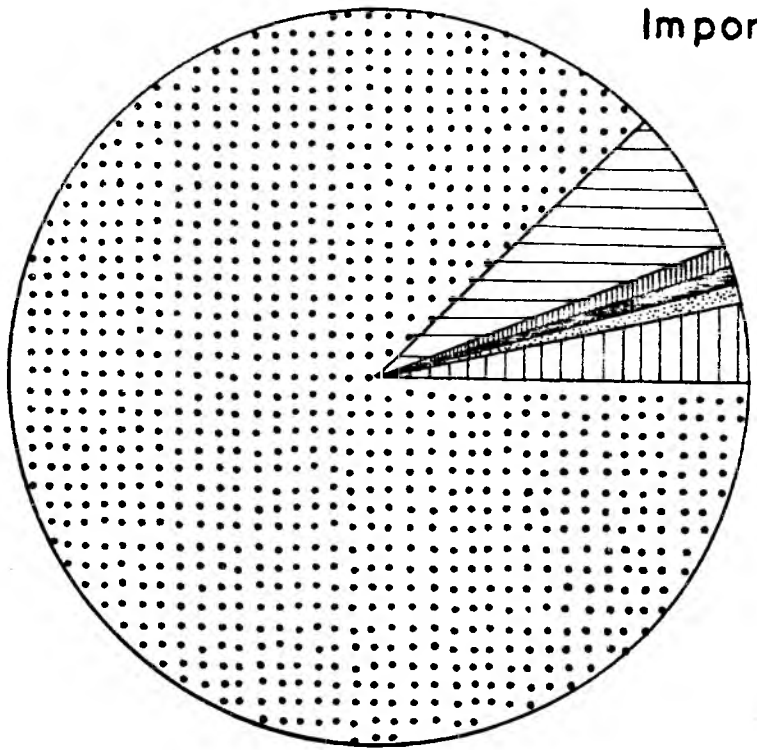
In the case of mineral-based industries there were only 54 units, employing about 1935 persons in 1974 and Mukundapuram taluk alone accounted for 79.6% of the total number of units and 69.6% of the total employment in these industries as shown in Table 8.3. Because of the poor development of mineral resources, this group of industries could not have but a poor share in the total number of industrial units and employment of the Sub-Region.

Live-stock-based and fish-based industries form an insignificant proportion of the total number of units and employment of the Sub-Region. It may be noted that though small in number, they are also concentrated in a few taluks.

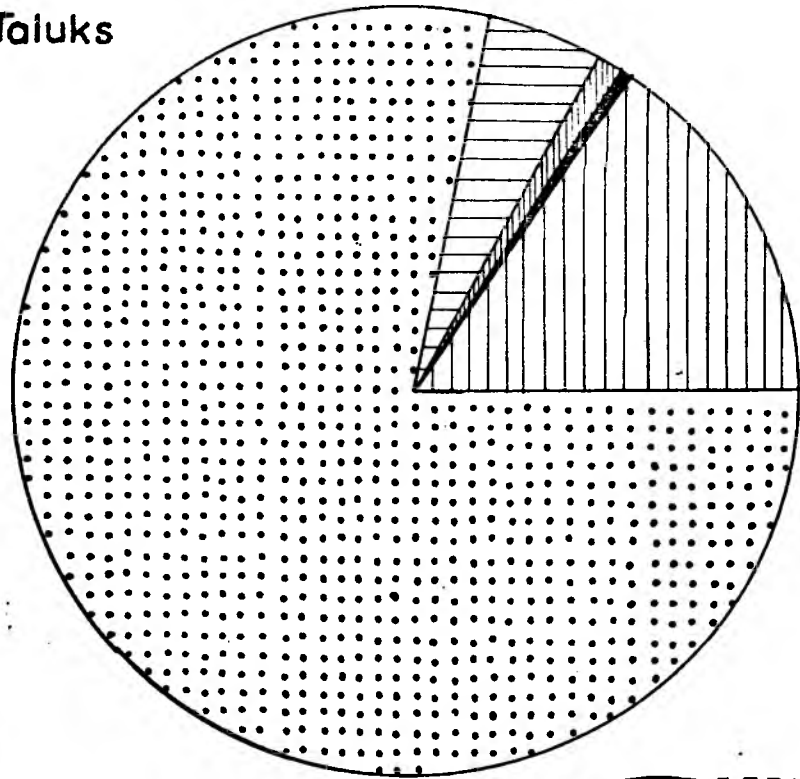
After having a grasp of the broad analysis of industries classified into major industrial groups at the Sub-Region and taluk level as described above, it

KERALA SUB-REGION ; INDUSTRIAL UNITS (Categorywise) —1974

Important Taluks









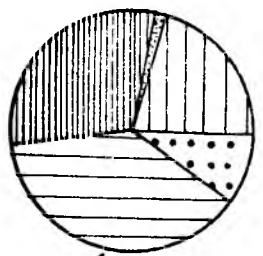
Chittur



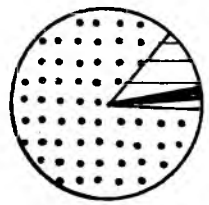
Palghat

LEGEND

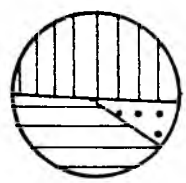
-  Agro Based
-  Forest Based
-  Mineral Based
-  Limestone Based
-  Fish Based
-  Non Resource Based



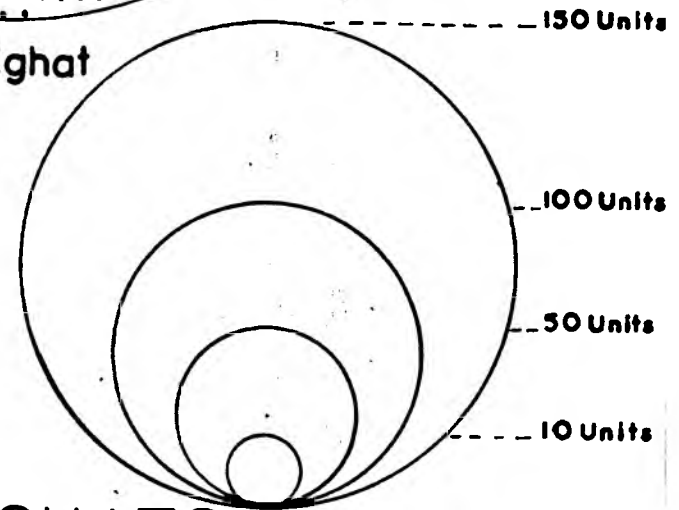
Mukandapuram



Mannarghat



Kunnathunad



SURVEY & PLAN FOR WESTERN GHATS

is worthwhile to discuss each group of industries in detail, in order to get a more comprehensive picture of the existing industrial structure, which in turn would provide certain guide-lines for development of industries in future in the Sub-Region.

1.1 Agro-Based-Industries

It has already been mentioned that the agro-based industries accounted for more than 50.9% of the total number of factory units and ~~44%~~ of its employment in 1971 and 60.8% and 46.8% respectively in 1974. It may be noted from Table 8.4 that in 1974 there were about 1025 agro-based industrial units employing about 7632 persons.

Out of a total of 1025 units as many as 805 units (78.54%) were rice mills which employed only 41.73% of the total number of workers in the agro-based group of industries. This can be explained by the fact that almost all the rice mills are small units.

The next important position was occupied by rice/flour and flour mills as far as number of units were concerned. However, if we consider the employment per industrial unit, about 40% of the total employment was contributed by only 6 factories consisting of 5 spinning mills and 1 sugar mill. The third position regarding the number of units was occupied by rice/flour/oil and oil mills; they constitute about 4.41% of the total agro-based industries in the area. There were about 25 other agro-based industries mostly plantation based, which employed 959 persons (12.89% of the

total) and ranked third in their contribution to employment in agro-based industries. The growth registered by agro-based industries during 1971-74 was quite impressive in the sense that the number of units had increased by 103.4% and employment by 47.71% and the growth was mainly confined to rice mills as shown in Table 8.4.

Spatially the development of agro-based industries is concentrated in Mannarghat, Palghat and Chittur taluks of the Palghat district of the Sub-Region. Table 8.5 reveals that in the year 1974, out of a total of 1025 industrial units, about 909 units, and 5510 industrial workers out of a total of 7632 persons have been concentrated in these three taluks. The two major conclusions that emerge from the above analysis are; firstly, the growth in agro-based industries that has taken place during 1971-74 has been confined mainly to rice-mills, and secondly the development of these industries shows a high degree of concentration in a few taluks of Palghat district of the Sub-Region.

1.2 Forest-Based-Industries

An analysis of the existing forest based industries reveals that they have registered very modest growth rate during 1971-1974. Table 8.6 shows that in 1971 there were about 232 industrial units which employed 2526 workers. In 1974 the number of units rose to 324^{and} employment to 3534 persons thus the total number of units increased by 39.65% and total employment by 39.90% during 1971-74. Category-wise analysis reveals that the number of units and employment in saw

Table-8.4: Percentage Variation In Number of Industrial Units and Employment In Agro-Based Industries, 1971 and 1974.

Sl. No.	Industry	1971		1974		Percentage Variation	
		Units	Employment	Units	Employment	Units	Employment
1.	Rice Mills	303 (60.11)	1139 (22.04)	805 (78.53)	3185 (41.73)	+165.68	+179.63
2.	Rice/Flour Mills	52 (10.31)	104 (2.01)	57 (5.56)	102 (1.33)	+ 9.62	- 1.92
3.	Rice/Flour/ Oil Mills.	23 (4.56)	167 (3.23)	32 (3.12)	269 (3.52)	+ 39.13	+ 61.08
4.	Oil Mills	37 (7.34)	229 (4.43)	46 (4.48)	330 (4.32)	+ 24.32	+ 44.10
5.	Flour Mills	65 (12.89)	218 (4.21)	52 (5.07)	136 (1.78)	- 20.00	- 37.61
6.	Spinning Mills	4 (0.79)	1874 (36.26)	5 (0.48)	1986 (26.02)	+ 25.00	+ 5.98
7.	Sugar Mills	1 (0.20)	606 (11.72)	1 (0.09)	630 (8.25)	0.00	* 3.96
8.	Plantation based and others.	19 (3.77)	830 (16.06)	27 (2.63)	984 (12.89)	+ 42.11	+ 18.55
Total		504	5167	1025	7632	+103.4	47.7

Note:- Figures in brackets show vertical percentage of total number.

Source: Director of Industries, Government of Kerala.

mills increased by 48.23% and 42.43% respectively, in furniture by 22.50% and 15.93% respectively and in others including plywood 49.25% and 46.41% respectively during 1971-74.

The locational pattern of the forest-based industries shows a relatively greater "dispersion" over wide areas (see Table 8.7). However, the intensity of development is more marked in the taluks of Mukundapuram, Kunathunad, Ernad, Chittur, Palghat, Nanyattinkara and Kothamanglam as indicated in Table 8.7.

1.3 Minerals-Based Industries

Even though the Kerala Sub-Region can not be said to be rich in mineral resources, still it has a small number of mineral-based industries mainly engaged in bricks and tile making and a few in lime and cement products. A product-wise break up of mineral-based industries of the Sub-Region is given in Table 8.8. From the point of view of employment and the bulk of output produced, tile industry is the most important mineral-based industry of the Sub-Region.

A careful analysis of the Table 8.8 reveals that more than 70% of the total number of industrial units and more than 60% of the total employment in mineral-based group of industries were concentrated in Mukundapuram taluk alone. During 1971 and 1974 this taluk alone accounted for 81.3% of the total number of units and about 70% of the total employment in mineral-based industries of the Sub-Region.

Table 8.5 : Talukwise Distribution Of Agro-Based Industries In Kerala Sub-Region - 1974

District/ Taluk	Rice Mills		Rice Flour Mills		Rice Flour Oil Mills		Oil Mills		Flour Mills		Spinning Mills		Sugar Mills		Others		Total		
	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<u>Kochikode</u>																			
1. Manjerthala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	25	2	25
2. Vaithiri Sultan Battery)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Quilandy	-	-	-	-	-	-	1	9	-	-	-	-	-	-	9	137	10	146	
4. Badagara	-	-	-	-	-	-	1	7	-	-	-	-	-	-	-	-	1	7	
Sub-Total	-	-	-	-	-	-	2	16	-	-	-	-	-	-	11	162	13	178	
<u>Malapuram</u>																			
1. Ernad	-	-	2	6	-	-	3	14	-	-	-	-	-	-	3	52	8	72	
<u>Palghat</u>																			
1. Mannarghat	50	100	30	60	4	26	3	8	30	60	-	-	-	-	-	-	117	254	
2. Palghat	373	1208	-	-	-	-	3	48	-	-	2	1100	-	-	-	-	378	2356	
3. Chittur	376	1762	-	-	13	150	3	16	20	60	1	282	1	630	-	-	414	2900	
Sub-Total	799	3070	30	60	17	176	9	72	50	120	3	1382	1	630	-	-	909	5510	
<u>Trichur</u>																			
1. Mukundapuram	-	-	-	-	9	92	-	-	-	-	-	-	-	-	4	635	13	727	
Sub-total	-	-	-	-	9	92	-	-	-	-	-	-	-	-	4	635	13	727	
<u>Ernakulam</u>																			
1. Kunnathunad	-	-	-	-	-	-	8	83	-	-	-	-	-	-	-	-	8	83	
2. Kothamanglam	-	-	-	-	-	-	1	5	-	-	1	4	-	-	-	-	2	9	
Sub-total	-	-	-	-	-	-	9	88	-	-	1	4	-	-	-	-	10	92	

Table 8.5 (Contd.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<u>Idukki</u>																			
1.	Thodupuzha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	10	1	10
2.	Devicollam	-	-	19	19	1	4	6	60	1	1	-	-	-	-	-	-	27	84
3.	Udumbanchola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	Peermade	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total		-	-	19	19	1	4	6	60	1	1	-	-	-	-	1	10	28	94
<u>Kottavam</u>																			
1.	Meenachil	-	-	-	-	-	-	5	19	-	-	-	-	-	-	4	51	9	70
2.	Kanjirapally	-	-	-	-	5	7	1	3	-	-	-	-	-	-	-	-	6	10
Sub-total		-	-	-	-	5	7	6	22	-	-	-	-	-	-	4	51	15	80
<u>Quilon</u>																			
1.	Pathanamthitta	-	-	-	-	-	-	4	8	-	-	-	-	-	-	4	74	8	82
2.	Pathanamparam	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total		-	-	-	-	-	-	4	8	-	-	-	-	-	-	4	74	8	82
<u>Trivandrum</u>																			
1.	Neyyattinkara	6	115	5	15	-	-	7	50	1	15	1	600	-	-	-	-	20	795
2.	Needumangad	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	1	2
Sub-total		6	115	6	17	-	-	7	50	1	15	1	600	-	-	-	-	21	797
Total for the Sub-Region.		805	3185	57	102	32	279	45	325	52	136	4	1982	1	630	25	959	1025	7632

Source:- Director of Industries, Government of Kerala.

Table 8.6 : Percentage Variation In Number of Industrial Units
And Employment In Forest-Based Industries Between
1971 And 1974.

Sl. No.	Industry	1971		1974		Percentage Variation	
		Units	Employment	Units	Employment	Units	Employment
1.	Saw Mills	85	667	126	950	+48.23	+42.43
2.	Furniture	80	452	98	524	+22.50	+15.93
3.	Others Including Plywood	67	1407	100	2060	+49.25	+46.11
Total		232	2526	324	3534	+39.66	+39.90

Source : Director of Industries, Government of Kerala.

The reasons for the non-development of mineral-based industries in the Sub-Region are not very far to seek. It is a well recognised fact that the growth of existing industries has been very much influenced by the raw-material resources of the Sub-Region and its economy is marked by complete absence of any deposits of coal and metallic minerals. The former disadvantage could to a certain extent be compensated by the existence of vast hydro power potential of the Sub-Region. In fact power generation itself becomes an important industry of the Sub-Region. However, for metallic mineral ores there is little scope for substitution. Since most of the metallic minerals, ferrous and non-ferrous deposits occur at a considerable distance from the Sub-Region, the cost of transporting these and delays involved on the way place this Sub-Region on a relative disadvantage from the point of view of investment in certain linked industries as well.

1.4 Live Stock-Based Industries:

Livestock-based industries may be classified into three categories, namely, leather-tanning, leather goods and dairy and milk products. The growth pattern of these industries is indicated in Table-8.9.

It may be seen from Table 8.9 that out of a total of 17 units employing 55 persons, 16 units were manufacturing leather goods employing 49 persons in 1971. Similarly in 1974 out of a total of 23 units employing 65 persons, 22 units were engaged in leather goods manufacturing and employed about 59 persons. A nearly complete absence of leather-tanning industry

Table 8.7: Talukwise Distribution of Forest-Based Industries In Kerala Sub-Region
1971 And 1974.

Taluk	1971								1974							
	Saw Mills		Furniture		Any Other		Total		Saw Mills		Furniture		Any Other		Total	
	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<u>Chikode</u>																
Antholi	1	16	-	-	-	-	1	16	-	-	-	-	-	-	-	-
Chhiri (Tan Battery))	2	17	-	-	-	-	2	17	-	-	-	-	1	13	1	13
Gandy	-	-	4	16	1	2	5	18	-	-	2	12	2	22	4	34
Magara	4	30	8	27	-	-	12	57	-	-	4	20	-	-	4	20
<u>Mapuram</u>																
Mad	7	68	16	116	12	221	35	405	8	75	22	153	14	256	44	484
<u>Path</u>																
Marghat	5	30	2	6	-	-	7	36	10	60	4	8	-	-	14	68
Path	8	48	4	40	7	210	19	298	11	74	5	52	8	250	24	376
Putur	10	70	9	27	3	70	22	167	18	115	8	25	6	170	32	310
<u>Pur</u>																
Madapuram	7	69	6	72	29	617	42	758	9	90	7	36	38	693	54	819
<u>Pulan</u>																
Mathunad	22	144	1	9	-	-	23	153	42	308	1	9	3	30	46	347
Manangalam	3	100	-	-	-	-	3	100	3	100	2	37	4	49	9	186
<u>Piki</u>																
Putuzha	1	8	1	2	1	3	3	13	2	16	2	5	3	70	7	91
Manchola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 8.7 (Contd..)

Table 8.7 (Contd..)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
14.	Devicolam	1	8	11	3	1	12	3	23	1	12	3	11	1	18	5	41
15.	Peermade	-	-	4	8	-	-	4	8	2	6	4	12	-	-	6	18
	<u>Kottayam</u>																
16.	Kanjirappally	7	28	-	-	-	-	7	28	10	50	-	-	-	-	10	50
17.	Meenachil	-	-	1	3	4	98	5	101	-	-	1	3	6	124	7	129
	<u>Quilon</u>																
18.	Pathanamthitta	3	12	1	4	1	45	5	61	5	18	2	13	3	99	10	130
19.	Pathanapuram	2	10	3	13	6	79	11	102	2	11	3	14	6	86	11	111
	<u>Trivandrum</u>																
20.	Needumangad	2	9	2	6	-	-	4	15	3	15	4	14	-	-	7	29
21.	Neyyathinkara	-	-	17	100	2	50	19	150	-	-	24	100	5	180	29	280
	Total	82	567	80	452	67	1407	232	2526	123	850	96	487	96	2011	324	3534

Source:- Director of Industries, Government of Kerala.

Table 8.8: Talukwise Distribution of Mineral-Based Industries
In Kerala Sub-Region 1971 And 1974.

Sl. No.	Taluk	Industry	Location	1971		1974	
				Units	Employment	Units	Employment
1.	Quilandy	Lime	Milady	-	-	1	4
2.	Badagara	Lime	Kakkatil, Kuthiadi, Kunnumal, Eramale.	2	4	2	6
3.	Palghat	Bricks & Tiles.	Palghat, Olavak, Kotic, Polpully.	5	520	5	520
4.	Chittur	Tiles & Bricks Country Bricks.	Chittur, Thathemangad, Kozhinjampara	1	50	1	50
5.	Mukundapuram	Tiles, Mosai- les, Bricks - Cement Pro- ducts & lime factory.	all over the taluk.	22	900	43	1346
6.	Kothamanglam	Any other (Chalks)	Iramalloor	1	4	1	4
Total for Sub-Region				32	1483	54	1935

Source:- Director of Industries, Government of Kerala.

Table -8.9 : Percentage Variation In Number of Units And Employment In Live-Stock-Based Industries In Kerala Sub-Region - In 1971 And 1974.

Sl. No.	Industry	1971		1974		Percentage Variation	
		No. of Units	Employment	No. of Units	Employment	Units	Employment
1.	Leather Tanning	-	-	-	-		
2.	Leather Goods	16	49	22	59	+46.7	+20.4
3.	Dairy and Milk Products	1	6	1	6	0.0	0.0
Total		17	55	23	65	+35.3	+18.2

Source: Director of Industries, Government of Kerala.

Table 8.10 : Taluk-wise Distribution of Live-Stock-Based Industries In Kerala Sub-Region 1971 And 1974.

Sl. No.	Taluk	1971								1974							
		Leather Tanning		Leather Goods		Dairy & Milk		Total		Leather Tanning		Leather Goods		Dairy & Milk		Total	
		Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment	Units	Employment
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	Quilandy	-	-	1	2	-	-	1	2	-	-	1	2	-	-	1	2
2.	Ernad	-	-	5	15	-	-	5	15	-	-	6	18	-	-	6	18
3.	Palghat	-	-	-	-	-	-	-	-	-	-	1	2	-	-	1	2
4.	Chittur	-	-	3	10	-	-	3	10	-	-	4	15	-	-	4	15
5.	Mannarghat	-	-	-	-	1	6	1	6	-	-	-	-	1	6	1	6
6.	Peermade	-	-	1	2	-	-	1	2	-	-	1	2	-	-	1	2
7.	Neyyathinkara	-	-	6	20	-	-	6	20	-	-	9	30	-	-	9	30
Total		-	-	16	49	1	6	17	55	-	-	22	59	1	6	23	75

Source:- Director of Industries, Government of Kerala.

could easily explain the poor growth of livestock-based industries in the area. From this, it may also be inferred that the shortage of raw material and lack of entrepreneurial skills and initiative have been the major growth retarding factors in this field as well.

The Talukwise distribution of industrial units and employment is given in Table-8.10. It may be seen from Table-8.10 that whatever little progress made in this line of production during 1971-74 has been shared mainly by three taluks, namely, Neyyattinkara, Ernad, and Chittur.

1.5 Fish-Based Industries:

Fish-based industries occupy the least important position in the present industrial structure of the Sub-Region. Table-8.11 shows talukwise distribution of fish-based industries in the Sub-Region.

Table-8.11: Talukwise Distribution of Fish-Based Industries In Kerala Sub-Region In 1971 and 1974.

Sl. No.	Taluks	1971		1974	
		Units	Employment	Units	Employment
1.	Quilandy	1	25	1	14
2.	Chittur	-	-	1	3
3.	Mukundapuram	3	34	3	34
4.	Kothamangalam	1	7	1	4
Total		5	66	6	55

Source:- Director of Industries, Government of Kerala

It may be seen from the Table 8.11 that the Sub-Region presents not only a picture of poor development but also of a complete backwardness in regard to fish-based industries.

1.6 Non-Resource-Based Industries:

The growth pattern of non-resource-based industries in the Sub-Region during 1971-74 is indicated in Table 8.12. An analysis of Table-8.12 reveals that the total number of units in this group of industries had risen from 200 in 1971 to 274 in 1974 i.e. an increase of about 35.8% during 1971-74 and employment had risen from 2258 in 1971 to 3079 in 1974 i.e. an increase of about 37.71% during the same period. Another important inference that could be drawn from Table-8.12 is that engineering industries accounted for about 80.50% of the total number of units, and 52.30% of the total employment in non-resource-based industries in 1971. Similarly in 1974 engineering industries accounted for 84.67% of the total number of units and 59.33% of the total employment in this group of industries. It becomes clear from the above analysis that the growth in non-resource-based industries has been confined mainly to engineering industries.

Talukwise distribution of the non-resource-based industries in 1974 shows a fair degree of "dispersion" over wide areas, (See Table 8.13). However, looking at the level of development, it is much more marked in the taluks of Palghat, Chittur, Mukundapuram, Kunnathunad and Neyyattinkara. It may be noted from Table-8.13 that Palghat is not only the most developed taluk of the Sub-Region but also has a most diversified industrial structure.

Table 8.12: Percentage Variation In Number of Units And Employment In Non-Resource Based Industries In Kerala Sub-Region Between 1971 And 1974.

Sl. No.	Industry	1971		1974		Percentage Variation	
		No. of Units	Employment	No. of Units	Employment	No. of Units	Employment
1.	Engineering Industry	161 (80.50)	1181 (52.30)	232 (84.67)	1827 (59.33)	+44.09	+54.69
2.	Agricultural Machinery	9 (4.50)	380 (16.82)	9 (3.28)	405 (13.15)	0.0	+ 6 58
3.	Sheet Metal Work	19 (9.50)	395 (17.49)	13 (4.74)	411 (13.34)	-31.57	+ 4.05
4.	Builders' Hardware	3 (1.50)	80 (3.54)	6 (2.18)	112 (3.63)	+100.00	+40.00
5.	Electrical Goods	7 (3.50)	207 (9.16)	7 (2.55)	285 (9.26)	0.0	+37.68
6.	Textiles	-	-	-	-	-	-
7.	Others	3 (1.50)	15 (0.66)	7 (2.55)	39 (1.26)	+133.33	+160.00
Total		202	2258	274	3079	+35.64	+36.35

Source: Director of Industries, Government of Kerala.

1.7 Village and Small Industries (Unorganised):

The Kerala Sub-Region had a total number of 12122 units of village and small industries. These consists of 11041 handloom industries, 1007 handicrafts, 61 village industries and 13 khadi industries (Table-8.14). Thus handloom industries are found to be the dominating sector constituting more than 91% of the total village and small industries in the Sub-Region. Handicrafts come next to the handloom industry. These village and small industries provided employment to : 26315 persons on full time basis and another 1223 persons were employed on part time basis. Excluding the part time workers, these small units have on an average 2.12 workers per unit.

Spatially, these units are not found to be ubiquitous and evenly distributed in the 21 taluks of this Sub-Region. Neyyattinkara with 3529 units accounts for more than one-third of the total number of units in the Sub-Region. Nedumangad having about one fourth of the total units, comes next in order.

Badagara taluk has about 13 per cent of the total units while Quilandy, Chittur and Palghat have 10.36%, 2.61% and 6.02% of the total number of village and small industries respectively.

The maximum concentration of small scale industrial units in Neyyattinkara is because of the preponderance of handloom industry in this taluk. So is the case with other taluks like Nedumangad, Quilandy which had some concentration of small industries. By virtue of having the largest number of small industrial units

Table 8.13 (Contd.....)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	<u>Kottayam</u>																
16.	Meenachil	6	37	1	3	-	-	-	-	-	-	-	-	-	-	2	40
17.	Kanjirappally	5	17	-	-	-	-	-	-	-	-	-	-	-	-	5	17
	Sub-total	11	54	1	3	-	-	-	-	-	-	-	-	-	-	12	57
	<u>Quilon</u>																
18.	Pathanamthitta	6	23	-	-	-	-	-	-	-	-	-	-	-	-	6	23
19.	Pathanapuram	5	29	1	9	-	-	-	-	-	-	-	-	-	-	6	38
	Sub-total	11	52	1	9	-	-	-	-	-	-	-	-	-	-	12	61
	<u>Trivandrum</u>																
20.	Neyyathinkara	22	200	-	-	2	15	-	-	-	-	-	-	-	-	24	215
21.	Needumangad	3	20	-	-	-	-	-	-	-	-	-	-	-	-	3	20
	Sub-total	25	220	-	-	2	15	-	-	-	-	-	-	-	-	27	235
	Total for the Sub-total	232	1827	9	405	13	411	6	112	7	285	-	-	7	39	274	3079

Source:- Director of Industries, Government of Kerala.

Table 8.14 : Talukwise Distribution of Village And Small Industries In Kerala Sub-Region (Unorganised Sector) In 1974-75.

Sl. No.	District	Khadi Industries			Village Industries			Handloom Industries			Handi Craft Industries			Total		
		No. of Units	Employment	Part Time	No. of Units	Employment	Part Time	No. of Units	Employment	Part Time	No. of Units	Employment	Part Time	No. of Units	Employment	Part Time
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	Manantholady	-	-	-	-	-	-	1	4	-	6	85	-	7	89	-
2.	Vaithiri Sultan Battery	-	-	-	-	-	-	2	6	-	1	7	-	3	13	-
3.	Quilandy	1	129	14	6	81	30	1225	3699	-	24	56	-	1256	3965	44
4.	Badagara	1	21	5	1	5	2	1626	3370	-	-	-	-	1628	3396	7
5.	Ernad	1	-	20	2	1	17	203	653	-	63	121	-	269	775	37
6.	Mannarghat	-	-	-	-	-	-	34	70	-	14	40	-	48	110	-
7.	Palghat	2	65	10	1	38	17	527	1012	-	200	400	-	730	1515	27
8.	Chittur	1	5	2	2	6	1	534	1309	-	385	495	-	922	1815	3
9.	Mukundapuram	5	278	40	5	143	78	232	384	-	146	832	-	386	1637	118
10.	Munnathunad	-	-	-	-	-	-	2	6	-	20	30	-	22	36	-
11.	Kothamanglam	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.	Thodupuzha	-	-	-	-	-	-	3	160	-	53	106	-	56	266	-
13.	Devicollam	-	-	-	3	33	19	1	12	-	6	30	-	10	75	19
14.	Udambanchola	-	-	-	1	3	10	-	-	-	-	-	-	1	3	10
15.	Peermade	-	-	-	-	-	-	-	-	-	-	8	12	8	12	-
16.	Meenachil	2	99	14	4	26	62	85	175	-	13	41	-	104	341	76
17.	Kanjirappally	-	-	-	8	32	148	-	-	-	20	65	-	28	97	148
18.	Pathanamthitta	4	5	25	6	12	62	18	68	-	17	75	-	42	160	87
19.	Pathanapuram	-	-	-	2	40	-	50	136	-	20	87	-	72	263	-
20.	Neyyathinkara	1	100	20	18	590	593	3500	4500	-	10	190	-	3529	5380	613
21.	Nedumangad	-	-	-	2	30	84	3000	3900	-	1	37	-	3003	3967	34
Total		15	702	150	61	1040	1073	11041	21864	-	1007	2709	-	12122	26375	1223
		(0.11)	(2.67)		(0.50)	(3.95)		(91.08)	(83.09)		(8.31)	(10.29)		(100.00)	(100.00)	(100.00)

Source:- Director of Industries, Government of Kerala.

the Neyyattinkara taluk also provides employment to the maximum number of workers i.e. 5380. Nedumangad and Quilandy taluks provided employment to almost an equal number of workers i.e. 3967 and 3965 respectively.

2. INFRASTRUCTURE FOR INDUSTRIAL DEVELOPMENT

It is a well recognised fact that industries tend to get attracted at locations, where besides the availability of raw materials, a number of infrastructural facilities such as, land, water, power, transport, market organisation and management, including entrepreneurship exist. A general picture of the extent to which the various infrastructural facilities are presently available in the Kerala Sub-Region is attempted below. Although only aggregative picture is presented here, it may be emphasised that it is the conjunction of at one place and not their total availability at different places that will contribute most to the development of industries.

2.1 Transport

Even if a region is potentially rich in its natural resources, as partly Kerala Sub-Region is, economic utilisation of these resources becomes possible only if the sources of raw materials and markets for final product are easily approachable by some mode of transport.

Kerala Sub-Region is served by a road network consisting of national and state highways, district roads and to some extent by the railway network. From accessibility point of view Ernad, Palghat and Nedumangad are

best served as they have national highways, state highways and also the railways. Mukandapuram is served by national and state highways. Quilandy and Badagara are served by national highway as well as railways. Meenachil and Neyyattinkara are served by state highways and also by railways. Taluks served by state highways only are Vaithiri and Sultan Battery, Mannarghat, Chittur, Kunnathunad, Kanjirapally, Pathanamthitta, Pathanapuram, Thodupuzha, Devicolam, Udubanchola and Peermade. Mananthavadi taluk is neither served by any highway nor by railways.

On the whole a requisite frame work of road transport facilities within the Sub-Region is already in existence. With additional improvement in transport facilities they can come up to adequate standard and thus be able to bear the strains of industrialisation without creating any serious bottlenecks.

2.2 Water

The study on water resources of the Sub-Region has made an assessment of the water resources position in the Kerala Sub-Region and has drawn attention to the availability of considerable quantities of utilisable water flows in the numerous rivers of the Sub-Region and has emphasised the importance of obtaining a regulated supply by construction of reservoirs at appropriate points alongwith river courses.

The Sub-Region enjoys abundant rainfall and it has a number of perennial rivers. The Sub-Region has twenty river basins of which three are of easy flowing. On the whole, the water supply position in the Sub-Region

is generally favourable for regional dispersal of industries, and with better coordination between programmes of industrial development and irrigation and power projects there are prospects of abundant water supply being available in many locations where industrial development could be fostered.

2.3 Power

The Sub-Region is not endowed with coal or oil resources. However, the Sub-Region has a rich hydroelectric potential, which is being harnessed for industrial as well as other uses. At present, there are nine power generation schemes in the Sub-Region and all of these are hydel. The total firm capacity is 850 MW (60% LF) installed capacity of these schemes is about 1010 MW. The most important scheme in the Sub-Region is Idukki which has, at present, installed capacity of 390 MW.

2.4 Markets

At present, the absence of a ready market seems to be a serious constraint to the development of various consumer goods industries. Consumption demand can be built only slowly with a progressively developing economy. This is in fact a long process. To bring it about, the agricultural income must go up, wages in industries must progressively lead to saving and a change from agricultural to non-agricultural occupations must take place on a large scale.

2.5 Organisation, Management and Entrepreneurship

Organisation and management which are necessary

prerequisites for industrial development, have not developed in this Sub-Region and must be recognised as a retarding factor. The people lack entrepreneurial ability, which can be developed only when the State and the Central Governments come forward to provide the necessary stimulus for industrial growth through special policies for industrial promotion.

It can be concluded from the above brief account that there is a need for an integrated approach, wherein the resources development in the Sub-Region must be matched with adequate industrial infrastructure and policy measures for the promotion of industries.

3. STRATEGY AND POLICY FRAME FOR DEVELOPMENT OF INDUSTRIES IN THE SUB-REGION.

A recapitulation of the various points brought out in the foregoing analysis helps to draw up an effective developmental policy consistent with the needs of the economy of the Sub-Region. Among the facts thrown up by the analysis, the following may bear repetition:

1. Because of diversified topography and poor infrastructure facilities specially transport and communication the development of industries in the Sub-Region, on the whole, has been comparatively very poor.
2. There are serious imbalances in the spatial distribution of industries along with inter-industry, and intra-industry imbalances.
3. Industries have agglomerated in four taluks

of the Sub-Region namely, Palghat, Chittur, Mannarghat and Mukkundapuram. These four taluks taken together have accounted for more than 73% of the total number of units, 75% of the total employment, 86% of total investment and 82% of the total industrial production of the Sub-Region.

4. The existing structure of organised industries in the Sub-Region is very much the outcome of the type of raw materials found in the area.
5. Agro-based industries constituted the single largest category of industry in the Sub-Region with largest number of industrial units (60%), largest number of industrial workers (47%), largest share of industrial investment (74%) and production (80%).
6. Among the agro-based industries also, the development has been confined mainly to rice mills, which accounted for 78% of the total number of units, 42% of the total workers in the agro-based group of industries.
7. Forest-based industries occupied the second position with 19% of the total industrial units, 22% of the total employment and 8.73% of the total industrial investment in the Sub-Region.
8. Barring few units, manufacturing lime, bricks and tiles, the Sub-Region is devoid of mineral based industries. This is, because of the

absence of industrial fuel like coal and development of metallic minerals.

9. Fish-based and livestock based industries occupied a very insignificant position.
10. In the case of village and small industries too there are big gaps. Handloom industries alone accounted for 90% of the total village and small industries in the Sub-Region while village and Khadi industries were occupying very insignificant position. About 60% of the industrial units were located in two taluks namely Neyyattinkara and Nedumangad.

It follows, from the above analysis that the development task, so far as the industrial sector is concerned, would be to correct the present structural imbalances and to provide a well planned integrated industrial system.

A carefully formulated and dispersed industrialisation programme, operating through a graduated hierarchy of the centres would help to moderate and eventually perhaps check the planless drift to larger cities. The fostering of industrial development in intermediate cities and towns and linking such a programme to the surrounding rural areas by promoting trade etc. is probably the best way to bring benefits of modern industrialisation to villages and ensure a functional spatial organisation in these areas.

It should be realised from the outset, that possibility of establishing medium or large scale industries in rural centres are practically nil, unless loca-

tion (proximity to local raw materials) is a decisive factor. 'Foot loose' industries will prefer a location in the larger urban centres. In general, therefore, rural industries will be small, and labour rather than capital intensive, and must at least initially, concentrate on a limited number of selected rural centres, which could be designated as "rural growth centres or growth points" in the regional plan.

Another major plank of industrialisation of the Sub-Region would be the proper exploitation of the natural resources like mineral, fishery, plantation and livestock. Minerals of industrial importance are china clay, fire clay, limestone, graphite and iron ore. At present, almost there is no production of minerals in the Sub-Region. In order to take full advantage of this resource, there is strong need to develop it and establish the correct estimate of the resource both quantitatively and qualitatively.

The rich marine resources have not been tapped properly so far. The programmes of deep sea fishing, mechanisation of fishing crafts, the development of infrastructure facilities to pave the way for these activities, will augment the fish catch. This will help not only in meeting the domestic and export demand but will also help growth of a number of allied industries.

Forest resources, as available at present, there is not much scope for expansion of plywood factories. The existing plywood units are facing a growing shortage of raw materials because of the difficulties connected with adequate regeneration of evergreen forests.

Because of concentration of saw mills in few taluks there is excessive and fast cutting of forests in those taluks, while other taluks though richly endowed with forest resources but are lagging behind in industrial development. These taluks provide good scope for setting of forest based-industries.

Livestock provides good scope for industrial development in the Sub-Region. Although the department of Animal Husbandry has taken up several development schemes, much lee-way has yet to be made to improve the animal wealth in the Sub-Region.

Apart from projects based on locally available resources which could be promoted, certain other consumer items could also be manufactured in the Sub-Region. Such consumer industries would require purchase of raw materials from the adjoining areas. However, such consumer industries need encouragement to make the Sub-Region nearly self sufficient in certain basic consumer products and also to provide employment and training facilities within the Sub-Region.

The availability of a reasonable infrastructure is an important factor. For most industries, good roads, telephone and postal connections, an adequate water and electricity supply, reasonable educational/training facilities etc. are important locational criteria. Infrastructural deficiencies in growth centres must be remedied.

Another important factor in the development of industries is to make a preliminary identification of

industries that could be located in the Sub-Region. Such industries will generally have one or more of these characteristics: process local agricultural raw materials/products; labour intensive; manufacture agricultural inputs for local markets; make low-cost consumer goods for local use; manufacture goods for which there is an increasing demand, etc.

In order to attract industries in industrially backward areas some incentives are to be given. Policy measures such as (temporary) tax exemption, special credit facilities, and infrastructural provision (including suitable cheap land) may be attractive 'pull' factors in this connection. In large urban centres the government can use other instruments (like a restrictive licensing policy, high taxes and land prices) that act as "push" factors for industries in the Sub-Region.

Keeping these in view, the broad objectives of development of industries in the Sub-Region may be:

1. To create non-agricultural employment for under and unemployed rural population in the area itself,
2. To process local raw materials,
3. To make full use of existing skills in the area,
4. To provide essential inputs and consumer goods to farmer and other local people,
5. To strengthen the economic base of rural centres,

6. To help curb the flow of migrants to urban centres and also outside the Sub-Region.

While fulfilling these objectives the development of industries will:

1. Provide an internal market for local raw materials and food stuffs in a developing agricultural sector especially plantation,
2. Contribute towards internal specialisation and exchange, reducing dependency on the developed regions,
3. In some instances atleast produce appropriate farm inputs contributing directly towards greater agricultural productivity.
4. Stimulate agricultural production and thus create a greater demand for industrial products and services in the rural area.

Based on the objectives and policy measures outlined in the proceedings paragraphs, a tentative action programme for possible industries in the Sub-Region has been drawn up and discussed in the paragraphs that follow. Possible industries in different lines of production are suggested after making broad assessment of the resource potentials of the Sub-Region, gaps in the existing industrial development, availability of infrastructure, local needs and demands of the Sub-Region.

3.1 Agro-Based Industries

3.1.1 Agricultural Resources:

Agriculture is the most important occupation providing employment to 67% of the total working force of the Sub-Region. The present pattern of agricultural land use shows a very little diversification in the cropping pattern in respect of food crops which is mainly rice but we get a well diversified pattern in the case of non-food (commercial) crops, comprising sugar-cane, banana, coconut, arecanut pepper, tea, coffee, rubber, cardamum etc. Out of a total cropped area of 1189.18 thousand hectares about 60.25% is covered by the four major crops viz rice, coconut, rubber and tapioca. Of this total cropped area rice accounted for 24.28%, coconut 15.45%, rubber 10.88% and Tapioca 10.64%. According to the study on agricultural development in the Sub-Region, coconut and rubber are the most important commercial crops so far as area under cultivation is concerned.

Production of Food Crops: On the basis of average yield rate worked out for different crops, in the sectoral report on agriculture, the total production of major food crops could be placed at 24.76 lakh tonnes, (rice 467760 tonnes, Jowar 2051 tonnes and tapioca 2005910 tonnes). With improved methods of cultivation and an increase in area under some crops it is expected that the total production of food crops will go up from 24.76 lakh tonnes in 1975 to 26.97 lakh tonnes by 1985. It is estimated that the production of rice will increase by 39.24%, Jowar 41%, and tapioca 87% at the end of 1985 (Table 8.15). The most important producers of rice are

the seven taluks of Chittur, Palghat, Mannarghat, Mukandapuram, Kunnathunad, Ernad, and Vaithiri-Sultan Battery. The major producers of tapioca are the six taluks of Mananthavadi, Vaithiri-Sultan Battery, Quilandy, Badagara, Ernad, and Kothamanglam, and Jowar is produced in the taluks of Peermade, Udumbanchola, Devicolam, Thodupuzha, Kunnathunad, and Mukandapuram.

Table 8.15 : Production of Major Food Crops - 1974-75 and 1985.

(Figures in Tonnes)			
Crops	Production 1974-75	Estimated Production 1985	Percentage Growth
1. Paddy	4,67,760	6,51,307	39.24
2. Jowar	2,051	2,892	41.00
3. Papioca	20,05,910	20,43,491	1.87
Total	24,75,721	26,97,689	8.97

Production of Commercial Crops: The major commercial crops of the Sub-Region are, sugarcane, arecanut, coconut, pepper, cardamum, rubber, tea, coffee, and banana. Sugarcane is grown in Devicolam, Pathanamthitta, Pathanapuram and Thodupuzha and most of cardamum is grown in Thodupuzha, Meenachil and Udambanchola taluks. Tea and coffee are produced in Peermade, Udambanchola, Devicolam, Thodupuzha and Vaithiri-Sultan Battery taluks. Coconut and rubber are produced in almost all the taluks of the Sub-Region. The actual production figures for 1974-75 and the estimated production figures for 1985 in respect of major commercial crops in the Sub-Region are

shown in Table 8.16. The cropwise percentage increase in the total estimated production over the period 1974-75 and 1985 will be sugarcane 24.81%, arecanut 31.31%, coconut 21.48%, pepper 203.65%, cardamum 147.31%, tea 59.16%, coffee 40.31% and banana 0.96%.

3.1.2 Possible Agro-Based Industries:

It has already been discussed that agro-based industries occupied the most predominant position in the industrial structure of the Sub-Region. It was found that the growth of agro-based industries has been confined mainly to rice mills, and that too in a few taluks of Palghat district of the Sub-Region. Therefore, firstly, a wider dispersal of industrial units in the Sub-Region should take place keeping in view the agricultural resource base of the area, and secondly, diversification of agro-based industries in variegated lines of production may be suggested depending upon the variety and extent of agricultural produce.

Industries Based on Food-Crops: This category includes industries based on rice, jowar, and tapioca. There are already 891 industrial units in the Sub-Region based on these crops and are mostly located in the taluks of Mannarghat, Palghat, Chittur, Neyyathinkara, Devicolum and Makkundapuram.

As the actual requirement of foodgrains production will still exceed the estimated production of food crops in 1985, a deficit of about 4 lakh tonnes will persist for some time to come. As a result, there is

hardly any scope for setting up of new units based on food crops in the Sub-Region. At the most a few starch making units may be established in sparsely populated pockets of Ernad, Badagara, Quilandy, Vaithiri, Sultan-Battery and Mananthavadi taluks of the Sub-Region.

Table 8.16 : Production of Commercial Crops in 1974-75 and 1985:

(Figures in Tonnes Except Coconut)			
Crops	Production in 1974-75	Estimated Production in 1985	Percentage Increase
1. Sugarcane	25055	31272	24.81
2. Arecanut	5225	6861	31.31
3. Coconut	922 (million nuts)	1120 (million nuts)	21.48
4. Pepper	17136	52033	203.65
5. Cardamum	2266	5604	147.31
6. Rubber	69276	134969	97.69
7. Tea	51463	81909	59.16
8. Coffee	12829	18000	40.31
9. Banana	147228	148645	0.96

Industries Based on Commercial Crops: This category includes industries based on sugarcane and plantation crops such as coconut, rubber, tea, coffee, fruits and vegetables. There are already 42 industrial units based on these crops. Future development possibilities of industries based on commercial crops are briefly described in the following paragraphs:

(i) Sugar Mills: At present, there is only one

sugar mill in the Sub-Region at Chittur. The sugarcane production in the Sub-Region will not be in a position to support even a single new sugar cane factory. Every increase in sugar cane production should continue to meet the raw material demand of the existing sugar mill at Chittur. At the most a few Khandsari units may be set up in Devicolam and Pattanamthitta taluks.

(ii) Coconut Based: Coconut being an important crop (second only to rice) of the Sub-Region, it provides good scope for the establishment of about 60 small and medium industries based on it and its products. Important industries which can be started are coir, bristle fibre units, fibre foam, oil expeller, copra processing etc. Important taluks where they can be located are Quilandy, Badagara, Ernad, Mukkundapuram, Thodupuzha, Meenachil, Pathanamthitta, Pathanapuram, Neyyatinkara, and Needumangad.

(iii) Rubber Based: As the rubber plantation is gaining importance in the Sub-Region, there is good scope for establishing about 150 small and medium industries based on it. Important taluks producing rubber are Meenachil, Kanjirapally, Pathanamthitta, Kunnamthunad, Vaithiri, Sultan Battery and Peermade. Some 150 units producing tyres and tubes, rubber ware, foamed rubber goods, M.C. Sheets, fibre brushes, tread rubber, latex rubber-goods, surgical rubber gloves, gaskets,

sports goods, rubber adhesives etc. are suggested to be located in these taluks.

- (iv) Tea and Coffee: Mananthavadi, Vaithiri, Sultan Battery, Thodupuzha, Devicolam, Udambanchola, Peermade and Pathanamthitta are important tea and coffee producing taluks of the Sub-Region. About 15 units comprising, tea and coffee processing units, coffee making units (based on tea and coffee waste) could be established in the above mentioned taluks.

Agricultural Implements and Processing of Other Agricultural Products: In addition to the agro-based industries, described in the preceding paragraphs about 100 units of other miscellaneous agro-based industries can be set up in the Sub-Region. These industries are (i) fruits and vegetable preservation and canning, (ii) confectionary and sweets, (iii) scented arecanut, (iv) papadam (v) banana-dehydrated and toasted snacks, (vi) soaps and cosmetics (vii) agricultural implements, agro-service centres etc. These units could be widely distributed in most parts of the Sub-Region. A summary list of existing and possible agro-based industries indicating their employment and probable taluks where they could be located is given in Table 8.17.

3.2 Forest-Based Industries

3.2.1 Forest Resources

Forests extending over an area of 979.06 thousand hectares constitute about 45.5% of the total geographical

Table 8.17 : List of Existing and Possible Agro-Based Industries

Industry	EXISTING			Taluku	Industry	POSSIBLE		
	No. of Units	Employment				No. of Units	Employment	Taluku
1	2	3	4	5	6	7	8	
Rice Mills	805	3115	Mannarghat, Palghat, Chittur, Neyyathinkara	-	-	-	-	
i) Rice/Flour Mills	57	102	Mannarghat, Devicolan, Neyyathinkara.	-	-	-	-	
ii) Rice/Flour and Oil Mills.	77	427	Mannarghat, Chittur, Palghat, Vaithiri, Sultan Battery, Quilandy, Mukandapuram, Devicolan, Meenachil, Kanjirapally, Pathananthitta, Neyyathinkara.	Rice/Oil and Flour Mills.	10	80	Needumangad, Pathanapuram, Udanbanchola, Thodupuzha, Kunnathunad, Ernad.	
iii) Starch Making	-	-	-	Starch Making	15	125	Ernad, Badagara, Quilandy, Vaithiri, Sultan Battery, Mananthavadi. (should be set up away from thickly populated areas)	
iv) Spinning Mills	5	1986	Palghat, Chittur, Neyyathinkara.	Khandsari Units	4	30	Devicolan, Pathananthitta.	
v) Sugar Mills	1	630	Chittur.	<u>Coconut-Based</u>				
vi) Others including Plantation Based.	27	959	Mananthavadi, Quilandy, Ernad, Mukandapuram, Thodupuzha, Meenachil, Pathananthitta.	i) Coir ii) Bristle fiber iii) Fiber foam iv) Oil Expeller v) Activated charcoal from coconut shells vi) Expansion of joint fiber from coconut pitch vii) Copra processing from coconut	60	480	Quilandy, Badagara, Ernad, Mukandapuram, Thodupuzha, Meenachil, Pathananthitta, Pathanapuram, Neyyathinkara, Needumangad.	

(Table 8.17 Contd....)

1	2	3	4	5	6	7	8
				<u>Rubber Based</u>			
				i) Tyres and tubes			
				ii) Rubber wares			
				iii) Foamed rubber goods, N.C. Sheets			
				iv) Fiber brushes			
				v) Tread rubber	150	1200	Kunnathunad, Meenachil, Kanjirappally, Pathananthitta, Pathanapuram, Peermade, Chittur, Vaithiri - Sultan Battery, Kothananglam, Neyyathinkara, Needunangad.
				vi) Latex rubber goods			
				vii) Surgical rubber gloves			
				viii) Gaskets			
				ix) Sports goods			
				x) Rubber adhesives			
				<u>Tea and Coffee</u>			
				i) Tea & Coffee processing			
				ii) Coffien from tea waste	15	120	Mananthavadi, Vaithiri, Sultan Battery, Devicolan, Thodupuzha, Uthambanchola, Peermade and Pathananthitta.
				iii) Coffien and their derivatives from coffee waste			
				<u>Cashew Based</u>	8	55	
				<u>Processing of other agricultural products.</u>			
				i) Fruit & vegetable preservation and canning.			
				ii) Confectionary and sweets.			
				iii) Scented arecanut			
				iv) Papadam making	100	1400	Can be located in almost all the taluks of the Sub-region depending on the availability of local resources and demand.
				v) Banana dehydrated and toasted snacks.			
				vi) Soaps and cosmetics			
				vii) Agricultural implements.			
				viii) Agro-service centres.			

area of the Sub-Region. The Sub-Region's forests are rich in soft and hard species of timber, teak wood and rose wood. Bamboo and etaread available in the Sub-Region are suitable for paper and allied industries. Talukwise distribution of forest area and major forest produce are given in Table 8.18. It may be seen from this table that only in six taluks viz Palghat, Thodupuzha, Devicolum, Peermade, Pathanamthitta and Pathanapuram, forests cover more than 50% of their geographical area. It is also clear from Table 8.18 that Pathanapuram alone accounted for about 49% of the industrial timber of the Sub-Region. Kunnathunad occupies the second place with about 16% of the industrial timber available in the Sub-Region, though forests cover only 18.91% of total geographical area of this taluk.

The production of bamboo wood is mainly confined to Chittur and Vaithiri-Sultan Battery taluks which accounted for more than 86% of total bamboo wood produced in the Sub-Region in 1974-75.

3.2.2 Possible Forest Based Industries:

The study of the resources of the Sub-Region suggests that forest is one of the chief sources of industrial raw materials. It has been discussed earlier that forest based industries form one of the important components of the existing industrial structure of the Sub-Region. On the basis of resource potential it can play an important role in future industrial development of the Sub-Region more so because these industries could be more employment oriented.

As mentioned earlier, out of 21 taluks of Kerala Sub-Region, only six taluks viz: Mukandapuram, Kunnathunad, Ernad, Chittur, Palghat and Neyyattinkara accounted for more than 72% of the total number of forest based industries and more than 78% of the total employment in these industries. Although these taluks are expected to maintain their present pace of development in future as well, yet there are many other taluks of the Sub-Region, (richly endowed with forest resources) which can go a long way in providing the major thrust of development in this line of production. Notable among these are Pathnanamthitta, Pathanapuram, Peermade, Devicolam, Thodupuzha, Vaithiri and Sultan Battery, Kunnathunad, Kanjirappally, Mannarghat, Chittur and Needumangad. The possible forest based industries which can go in the Sub-Region are described in the following paragraphs:

Plywood Industry: The plywood factories are facing a growing shortage of raw materials because of the difficulties connected with adequate regeneration of ever green forests. There is not much scope for expansion of quality plywood for making tea chests. Although manufacturing of quality wood has great possibilities, both for home and foreign markets, the plywood industry in the Sub-Region would be well advised to follow the example of the Kerala State Plywood Factory at Punalur which started manufacturing commercial plywood during the Fourth Plan period.

Saw Mills: There has been a tremendous growth in the number of saw mills, during the last few years, so much so that there is an excessive number of saw mills in some taluks at present and this might result in a very

Table 8.18 : Area Under Forest and Other Major Forest Produces in Kerala Sub-Region - 1974-75

Sl. No.	District/Taluk	Area Under Forest		% of Forest area to total Geographical area	Major Forest Produces			%	Bamboos (Tonnes)	%
		Hectares	%		Industrial Timber quantity in C.M.	%	Fuel wood quantity in Tonnes			
1. Wynad	1. Manantholadi	24533.03	2.51	32.82	394.61	0.01	1104.50	0.50	-	-
	2. Vaitthiri Sulvan Battery	49799.00	5.09	36.13	411252.67	0.65	26671.00	12.02	26806	7.80
2. Kozhikode	3. Quilandy	14605.40	1.49	11.18	6772.70	0.11	3131.00	1.41	-	-
	4. Badagara									
3. Malappuram	5. Ernad	104278.84	10.65	46.10	72721.01	1.15	-	-	-	-
4. Palghat	6. Marnarghat	41251.64	4.21	37.51	2318.00	0.04	-	-	4100	1.19
	7. Chittur	14010.13	1.43	19.45	8994.45	0.14	1323.00	0.60	292697	85.20
	8. Palghat	59712.18	6.10	51.69	-	-	7045.00	3.17	-	-
5. Trichur	9. Mukandapuram	50612.00	5.17	38.46	974303.00	15.37	4212.00	1.90	4980	1.45
6. Ernakulam	10. Kunnechunad	12816.00	1.31	18.91	6583.00	0.10	1649.00	0.74	-	-
7. Idukki	11. Thodupuzha	52659.19	5.38	57.59	1384.00	0.02	12230.00	5.51	-	-
	12. Deviclam	148908.00	15.21	83.93	5024463.00	79.27	1256.00	0.57	7330	2.13
	13. Udambanchola	47916.00	4.89	44.72	12031.00	0.19	-	-	-	-
	14. Perumade	79800.00	8.15	60.92	600.00	0.01	-	-	-	-
8. Kottayam	15. Moenchil	50.00	0.01	0.07	-	-	-	-	-	-
	16. Kanjirapally	6448.48	0.66	18.35	16278.00	0.26	2980.00	1.34	-	-
9. Quilon	17. Panchanambhitta	138453.00	14.11	63.72	48893.00	0.77	24320.00	10.95	3506	1.02
	18. Pathanapuram	91675.00	9.36	74.36	107486.00	1.70	129548.00	58.37	3755	1.09
10. Trivandrum	19. Nyyathinkara	5725.00	0.58	10.46	-	-	-	-	-	-
	20. Nedumangad	36138.00	3.69	38.96	14058.00	0.22	290500.00	2.92	383	0.11
		979060.89	100%	45.55	6338542.45	100%	9952324.00	100%	343557	100%

Source: Bureau of Economics and Statistics, Government of Kerala.

sharp rate cutting competition and may lead to losses. In the first place, it is important that further growth of saw mills should not be encouraged, and at the same time the existing saw mills should be encouraged to adopt side-lines of production, for example wastes materials like chips board. Wood working plants as well as seasoning and preservation plants should be set up to encourage proper utilization of wood. This is suggested particularly for those taluks, which are already having a large number of these units.

It may be difficult for individual saw millers to take to these side lines of production. It is, therefore, suggested that integrated wood working centres may be set up where a number of saw millers should form a 'cooperative' to undertake the manufacture of side products. These wood centres could produce prefabricated doors and window frames, low cost furniture, etc.

It may be noted that there is scope for setting up of a number of forest based industries in those taluks which are richly endowed with forest resources and where these industries are very poorly developed. If the rate of extraction of wood per hectare in Devicolam, Thodupuzha, Peermade, Pathanathitta, Pathanapuram, Kun-nathunad, Vaithiri, Sultan Battery, Udambanchola, Kan-jirappally and other taluks is stepped up, a large number of new industrial units such as saw mills, mechanised carpentry, wooden furniture, packing cases, wood-seasoning, wooden tools and implements, wooden boxes, wooden sleepers etc. may be set up in the above mentioned taluks. However, this would be possible only if along with special incentives to entrepreneurs, neces-

sary infrastructure facilities are made available at the door step. In order to assess the possibility of actual number of units that could go in each taluk and their employment potential, it is important to conduct-feasibility studies.

A tentative list of possible small and medium forest based industries, based on local resources indicating their employment potential and probable taluks (location) is given in Table 8.19.

3.3 Mineral Based Industries:

As revealed in Table 8.20, at present, there is not much scope for the development of mineral based industries in the Sub-Region. Minerals of industrial importance are china-clay, fire-clay, limestone and graphite.

At present, there are 52 mineral based industrial units manufacturing lime, bricks, tiles, mosaic tiles and cement products. Based on good deposits of China-clay, fire-clay and limestone some 25 additional units for lime burning, cement products, tiles manufacturing, ceramic, glass refractory and abrasives can be established in the Sub-Region. Palghat, Mannarghat, Chittur, Devicolam, Quilandy, Badagara, Neyyathinkara and Needumangad are the taluks where such units can be located. There is a possibility of locating a cement factory with a capacity of 1000 tonnes per day in Palghat taluk.

3.4 Live Stock Based Industries:

An analysis of the existing live stock based

Table 9.19: List of Existing and Possible Forest Based Industries

EXISTING				POSSIBLE			
Industry	No. of Units	Employment.	Taluk	Industry	No. of Units	Employment.	Taluk
1. Saw Mills	126	950	Ernad, Mannarghat, Palghat, Chittur, Mukandapuram, Kunnathunad, Thodupuzha, Udambanchola, Devicolan, Peermade, Kanjirappally, Pathananthitta, Pathanapuram, Needumangad, Neyyathinkara.	1. Saw Mills (carpentry nachenised)	40	145	May be located mostly in forest rich taluks of Devicolan, Pathanapuram, Pathananthitta, Peermade, Thodupuzha, Udambanchola, Needumangad, Kunnathunad, Kanjirappally, Mannarghat, Chittur, Vaithiri, Sultan Battery and Mananthodi.
2. Furniture	98	524	Except Mananthodi, Vaithiri, Sultan Battery and Kanjirappally, these units are distributed all over the Sub-Region. Ernad and Neyyathinkara are the most predominant Taluks accounting for about 50% of the total units in the Sub-Region.	2. Commercial plywood	7	50	
3. Others	100	2060	Ernad, Mukandapuram and Palghat are the most predominant taluks accounting for 60% of the total units in this category. Rest of the 40% units are distributed in 11 taluks.	3. Furniture and Handloom tools	20	100	
				4. Packing cases	20	220	
				5. Wood seasoning	5	50	
				6. Wooden tools and implements.	20	100	
				7. Wooden boxes.	20	150	
				8. Wooden sleepers	6	60	
				9. Wood turning goods bobins, furniture parts, toys.	20	120	
				10. Shutters	15	150	
				11. Standardised doors and windows.	20	180	
				12. Paper mill	1	150	
				13. Bamboo-boards	5	60	
				14. Match factory	1	10	
				15. M.A. lemon grass oil	10	80	
				16. Bus/truck body building	4	60	
				17. Radio cabinets	9	80	
				18. Wooden toys			
				19. Electrical wooden parts)			
				20. Bee keeping	300	1500	
				21. Herbs collection	-	-	
	324	3534					

Table 8.20 : Estimated Reserves of Important Minerals in the Kerala Sub-Region.

(Figures in lakh tonnes)

1. China Clay	11.70	Mananthavadi Kunnathunad
2. Fire Clay	15.20	Meenachil Mukkundapuram
3. Graphite	3.71	Kanjirapally Thodupuzha Pathanamthitta Pathanapuram Needunamgad Neyyathinkara
4. Quartz	7.80	Mananthavadi Vaithiri Sultan Battery Pathanamthitta
5. Steatite	1.20	Mananthavadi Sultan Battery Vaithiri Mannarghat
6. Iron Ore	69.00	Ernad
7. Lime-stone	230.00	Palghat
8. Kankar Lime Stone	40.40	Mannarghat Chittur Devicolam
9. Lime Shell	10.10	Quilandy Badagara

Source: Report of Mineral Resources in the
Kerala Sub-Region.

industries showed that despite good resource potential, these industries remained more or less insignificant in the over-all industrial structure of the Sub-Region. Till now the raw materials available from the livestock resources of the Sub-Region have not been properly utilised for industrial purposes and economic benefits. It was only very recently that dairies and rearing of goats and sheep are organised to utilise the commercial benefit from them.

The possible livestock based industries which can be located in the Sub-Region are listed below:-

Table 8.21 : List of Existing and Possible Live-Stock Based Industries in the Sub-Region.

Industry	EXISTING		Industry	POSSIBLE	
	Units	Employment		Units	Employment
1. Leather Tanning.	-	-	1. Leather Tanning.	'	'
2. Leather Goods.	27	59	2. Leather Goods.	'	'
3. Dairy and Milk Products.	1	6	3. Curds Ghee	'	'
			4. Flavoured Milk	'	'
			5. Milk Chilling Plants	'	140 1500
			6. Ice Cream Units	'	'
			7. Dressed Chicken	'	'
			8. Bone Meals	'	'
			9. Glue from animal waste	'	'
			10. Piggery Products	'	'
			11. Processing of wools	'	'
			12. Cattle feeds	'	'
			13. Poultry feeds	'	'

3.5 Fish Based Industries:

The Kerala Sub-Region, with its coastline of 70 kms. and a vast resources of inland waters provides good scope for the development of fishery resources. In 1979, the fish catch from the Sub-Region, was 32,493 tonnes. Out of these, the three marine taluks of Quilandy, Badagara and Neyyattinkara, accounted for 32,231 tonnes which was 98% of the total fish production in the Sub-Region. The scope for increasing fish production in maritime taluks as well as in some of the inland taluks is immense. It is expected that within next 10 to 15 years fish production from the Sub-Region, specially in the maritime taluks will go to the level of 55000 tonnes to 60,000 tonnes. This increase in production will help to boost about 15 ancillary industries like boat building, manufacture of nets, making of cans and boxes, production of ice.

3.6 Non-Resource Based Industries:

It may be possible to set up such non-resource based industries, potential demand for whose products already exists in the Sub-Region or nearby areas, and is not being fully met within the area at present.

The existance of regional demand will be an important factor in choosing such projects which result in a big 'spread effect'. Such industries can lead to the development of an integrated complex of industries meeting each other's demand as well as the demand of units out side their own group.

Apart from the above consideration of demand a regular supply of power may attract some of the power intensive and other industries. Further, programmes of industrialisation must necessarily be coordinated with shift towards a more technically based education.

Finally, the disadvantages of non-availability of heavy metallic minerals within this Sub-Region could be largely over-come if the non-resource based projects, selected are such as would require only a small proportion of materials brought in from outside but contributing a large amount of value added during the process of production. Most of the light engineering industries belong to this category. A tentative list of broad categories of non-resource-based industries which could be established and expanded in the Sub-Region is given in Table 8.22. These industries can be located near the source of demand, specially in selected growth centres.

Table 8.22 : List of Existing and Possible Non-Resource Based Industries.

Industry	Existing		Possible		
	Units	Employment	Industry	Units	Employment
1	2	3	4	5	6
1. Engineering industries.	233	1875	4. Engineering and Allied Products.		
2. Agricultural machinery.	9	405	1. Agricultural machinery.		
3. Sheet metal works.	13	411	2. Hand tools		
4. Builders hardware.	6	112	3. Sheet metal works.		
			4. Builders hardware		

Table 8.22 (Contd...)

(Table 8.22 Contd...)

1	2	3	4	5	6
5. General repairs and maintenance workshops.	-	-	5. Automobile parts.	'	
			6. Steel furniture.	'	
			7. Utencils.	'	
6. Electrical goods.	7	285	8. Steel Fabrication.	'	320 1575
			9. Black smithy (artisan)	'	
7. Others	7	37	10. General engineering including repairs and maintenance workshops.	'	
			<u>B. Chemicals and Allied.</u>		
			1. Soaps.	'	
			2. Pharmecenticals.	'	
			3. Chemicals.	'	
			4. Agarbatties.	'	
			5. Paints varnishes	'	
			6. Printing ink.	'	140 1150
			7. Match dipping	'	
			8. Plastic and plastic products.	'	
			9. Ayurvedic products.	'	
			10. Others.	'	
			<u>C. Building Materials</u>		
			1. Bricks and tiles	'	

Table 8.22 (contd...)

(Table 8.22 Contd...)

1	2	3	4	5	6
			2. Sand paper.		
			3. Cement products.	65	2500
			4. Stone works.		
			5. Others.		
			<u>D. Textiles</u>		
			1. Power looms	108	
			2. Nets.	60	
			3. Handloom weaving.	710	
			4. Production yarn (ambar charkha muslim)	460	5600
			5. Others.	40	
				1918	5600
			<u>E. Miscellaneous</u>		
			1. Repairing and servicing of automobiles.		
			2. Manufacture of electrical goods.		
			3. Printing press.		
			4. Repair and servicing of electrical goods.	315	1600
			5. Stationary.		
			6. Beedi and Tabacco (Artisans)		
			7. Aerated water.		
			8. Others.		
Grand Total				3832	21855

Note: Non-Resource Based (Demand Based) Industries may be set up in all the taluks of the Sub-Region, especially in selected (rural) growth centres.

Keeping in view the present position of natural resources, future potential of these resources based on various schemes already undertaken and sectoral development programmes as suggested for the augmentation of these resources, development of infrastructure, local as well as the State demand, and the need to minimise the regional imbalances, it is expected that during the next 15 years' period i.e. 1975 to 1991, 3283 more industrial units can be established which can provide employment to another 21,855 persons.

Types of industries, possible location and employment potential of the industries suggested, are given in Table 8.23.

Table 8.23: List of Possible Industries, and their Employment Potential.

Type of Industry	No. of Units	Employment	Taluks
1	2	3	4
<u>1. Agro-Based Industries.</u>			
(i) Rice/oil/flour mills.	10	80	Needumangad, Pathanapuram, Udambanchola, Thodupuzha, Kunnathunad, Ernad.
(ii) Starch making.	15	125	Ernad, Badagara, Quilandy, Mananthavadi, Vaithiri, Sultan Battery, (should be set up away from thickly populated areas).
(iii) Khandsari units.	4	30	Devicolam, Pathanamthitta.

Table 8.23 (Contd...)

(Table 8.23 Contd....)

1	2	3	4
(iv) Coconut based.	60	480	Quilandy, Badagara, Ernad, Mukandapuram, Thodupuzha, Meenachil, Pathanamthitta, Pathnapuram, Neyyathinkara, Needumangad.
(v) Rubber based.	150	1200	Kunnathunad, Meenachil, Kanjirappally, Pathanamthitta, Pathanapuram, Peermade, Chittur, Vaithiri, Sultan Battery, Kotamangalam, Neyyathinkara, Needumangad.
(vi) Tea and coffee processing.	15	120	Mananthavadi, Vaithiri, Sultan Battery, Devicolam, Thodupuzha, Udambanchola, Peermade, Pathanamthitta.
(vii) Cashew based.	8	55	
(viii) Processing of other agro-products.	100	1400	Can be located in almost all the taluks of the Sub-Region depending on the availability of local resources and local demand.
Sub-total	362	3490	

2. Forest-Based

Saw mills (furniture, wooden tools, paper, match factory, body building and host of other industries).	223	1765	Devicolam, Pathanapuram, Pathanamthitta, Peermade, Thodupuzha, Udambanchola, Needumangad, Kunnathunad, Kanjirappally, Mannar-ghat, Chittur, Vaithiri Sultan Battery, and Mananthavadi.
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Table 8.23 (Contd....)

(Table 8.23 Contd...)

1	2	3	4
Bee Keeping	300	1500	
Sub-total	523	3265	
3. Mineral Based			
Cement factory	1	150	Palghat
Lime, tiles, ceramic flass refractory and abrasives.	24	1000	Mannarghat, Chittur, Devicolam, Quilandy, Badagara.
Sub-total	25	1150	
4. Live Stock-Based			
(i) Leather tanning.			
(ii) Leather goods.			
(iii) Dairy and milk products.	140	1500	May be located near the resources of raw materials.
(iv) Bone meals.			
(v) Cattle and poultry feeds.			
(vi) Others.			
Sub-total	140	1500	
5. Fish Based			
Boat building, nets, cans boxes, ice, etc.	15	175	Quilandy, Badagara, Neyyathinkara.
Sub-total	15	175	

Table 8.23 (Contd...)

(Table 8.23 Contd...)

1	2	3	4
6. <u>Non-Resource Based.</u>			
(i) Engineering and allied products.	320	1575	'
(ii) Chemicals and allied.	140	1150	' May be set up in all the taluks of the Sub-Region, especially in selected rural growth centres.
(iii) Building materials.	65	2500	'
(iv) Textiles	1918	5600	'
(v) Miscellaneous.	315	1600	'
Sub-total	2758	12425	
Grand Total	3823	21855	

SECTION IX : TOURISM DEVELOPMENT:

The Sub-region is a part of the Kerala State which is aptly called "Kashmir of the South". Nature has been generous in providing bountiful endowment in the form of evergreen land, a number of rivers, lovely sea beaches and variety of flora and fauna. Besides, the pleasant climate, quiet and cool atmosphere in the high ranges of the Western Ghats adds to its attraction.

The Sub-region has thus a variety of places of tourist attraction. Kovalam Beach is internationally well-known. Wild life sanctuaries at Wynad, Periyar (Thekkady) and Parambikulam are well-known in the country, especially to the nature lovers. Ponmuddi and Munnar hill stations are popular health resorts. Modern project like Idikki Dam is of national importance, whereas Malampuzha Dam and Neyyar Dam are well-known in the area. History-minded tourists are attracted to forts at Panamaram, Balussery and Sultan Battery. For the devout, there are 47 temples of which Sabarimala is very widely known. Thus, the Sub-region is quite rich in places of tourist interest to meet their varied demands. These places are scattered all over the Sub-region with the exception of Udumbachola, Pathanapuram and Kothamangalam taluks (Figure 9.1). The detailed description and salient features of various places of tourist and religious importance are given below:

1. SALIENT FEATURES* OF CENTRES OF TOURIST IMPORTANCE:

(i) Mananthyadi Taluk:

The taluk, according to District Census Handbook has, three places of religious, historical or of

*Source: District Census Handbooks.

archeological interest. These are: (i) Vemilapettumal Vadam within the village area of Periya, (ii) Muthirari Temple at Thavinal village and (iii) Mahavishnu Temple at Tirunelli village. These places are accessible by major district roads and are connected to Mananthvadi, the taluka headquarters. Mananthvadi is connected by district roads to national highway (N.H. 17) at Cannanore Telli-cherry and Quilandy towns which are also on the railway network. A rest house is located at Mananthavadi from where these places could be covered conveniently.

(II) South Wynad Taluk*

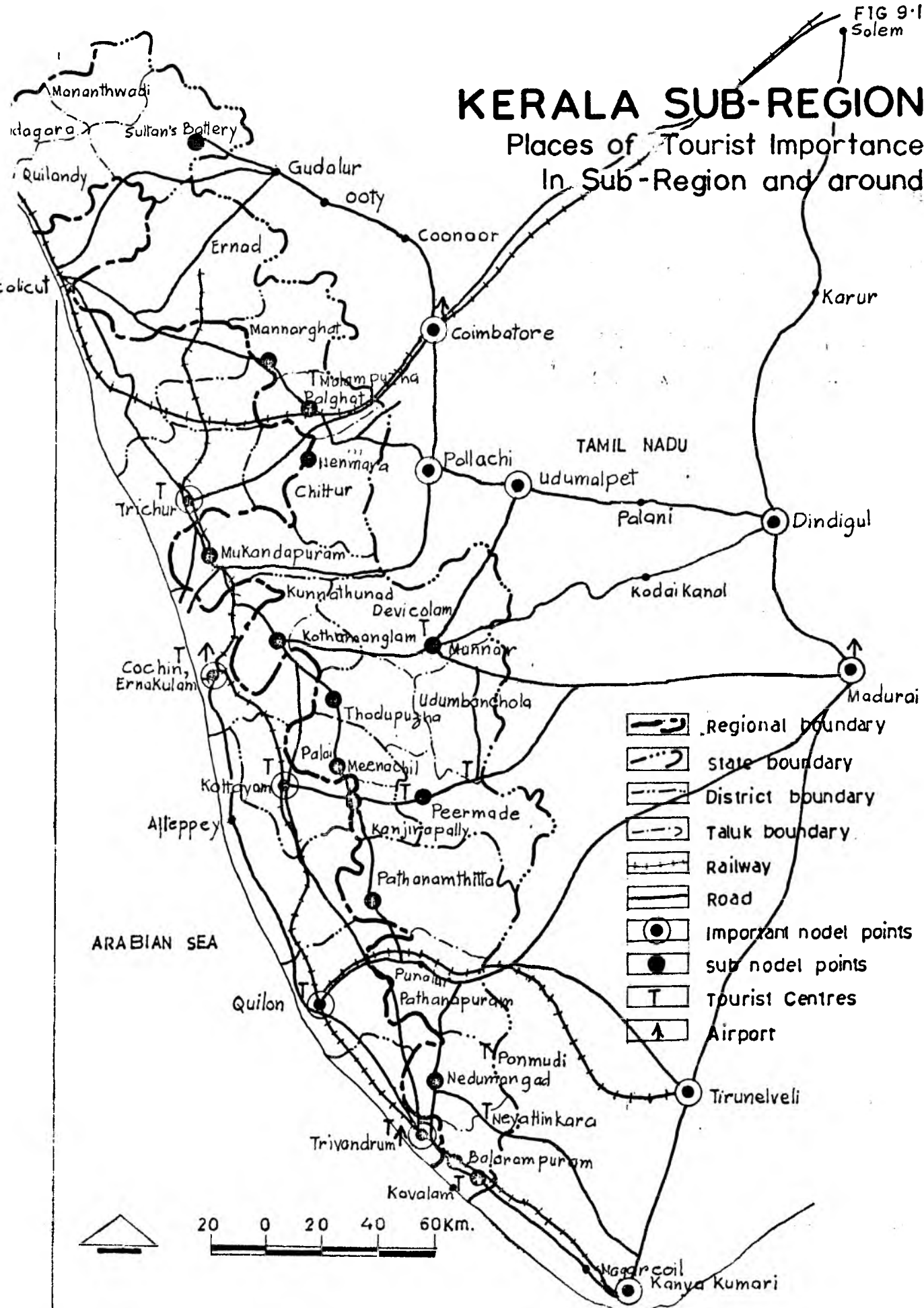
Sultan's Battery, the taluk headquarters has historical and archeological importance. Wild life sanctuary of Wynad is located north of the taluka headquarters. The Sanctuary adjoins two famous sanctuaries: (1) Bandipur of Karnataka and (2) Mudumalai of Tamil Nadu. Government of India have suggested integrated development of the three sanctuaries and the respective State Governments. (Forest Departments) have prepared a detailed scheme which is under the consideration of Government of India. Rs. 5 lakhs were provided for schemes to be implemented by the Departments of Tourism in the Fifth Five Year Plan.** The sanctuary is very rich in flora and fauna. Sultan's Battery is located on a major district road connecting Mysore (Karnataka) and the State Highway 29 leading to Calicut. There is a rest house at Sultan's Battery. There are four hotels and communications

* The taluk has been divided into two taluks (1) Vaithiri and (2) Sultan's Battery. These two along with Mananthavadi Taluk constitute newly created Wynad District.

** Information supplied by the State Government.

KERALA SUB-REGION

Places of Tourist Importance In Sub-Region and around



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facilities like telephones, Post Office and Medical facilities are available at a distance of 5 Km. From Likkiddi. Other places of interest are: (1) Panamaram Fort* which was stronghold of Pazhassi Raja who fought against the British Rule, (2) Pulpully Cave where the raja took refuge till he was captured by the British, (3) Ponkali Shri Rama Temple* at Noolpuzha located on a major district road leading to Gudalur (Karnataka). One rest house is located here. (4) St. Joseph's Shrine at Muppainad Village situated on State Highway 29, connecting Calicut to Sultan's Battery and Gudalur. Sultan's Battery is a convenient place to cover these places. On an average Indian and foreign tourists spend two and three days respectively.

(iii) Badagara Taluk:

Badagara Town is located on a national highway (N.H. 17) and on railway line connecting Mangalore (Karnataka) and Coimbatore (Tamil Nadu). According to the District Census Handbook following five places are of religious, historical or archeological importance.

- (1) Kadathanattu Kovilakam at Nadapuram, a nodal point on the district road network it is located at a distance of 16 kms. from Badagara. It has a rest house and Post and Telegraph facilities are also available.
- (2) Arrakkal Temple* at Madapully, about 6 kms. north of Badagara town, near Onchiam Village on National Highway 47.

*Source : District Census Handbook.

- (3) Siva* and Ayyappa Temples* at Chennamanagalam 9 Kms. north of Badagara town, near Chorode village located on national highway (N.H.17) Chorode has postal and telephone facilities.
- (4) Loka Malayar Kavuv* and Memunda Kavuv* at Villiapally are located on a major district road connecting Badagara and Nadapuram. It is about 5 kms. from Badagara with all the postal facilities.
- (5) Kappally Palayat Temple* at Kottapally on a major district road is at a distance of 10 kms. from Badagara town.

It will be seen that all these places are around Badagara town, a taluka headquarters and a railway station. Importance of these places for tourists and development potentials will have to be fully ascertained before forming any proposals. Badagara town is a convenient place to cover above mentioned places.

(iv) Quilandy Taluk:

Quilandy Town also known as Pantalayani is located between Badagara and Calicut towns. It is on the same national highway and the railway line that serves Badagara. Kappad, 16 kms. north of Calicut City is a place of historical importance. Vasco-de-Gama landed here in 1498 A.D. Kappad Beach is known for the delightful sea, clean beach and attracts large number of tourists and, the local people who enjoy the scenic beauty and bathing facility.

* Source: District Census Handbook.

The place, according to Tourist Department of Kerala has a good potential for developing as a tourist resort and Rupees One Lakh were provided for the development of Kappad to be undertaken by the Department of Tourism in the Fifth Five Year Plan. Kappad is accessible by the national highway. Postal facilities are available here. Utilities like water supply from private wells and electricity are available. There are no hotels or dharamshalas. Indian tourists spend about two days and foreign tourists spend about three days here.

Following four places have been indicated as important religious, historical or archeological places in the district census handbook.

- (1) Kuniyal Vishnu Temple and Whangaroth Siva Temple at Peerambra. Peerambra is connected by district roads to Badagara, Quilandy and Calicut. It is about 34 km. from Quilandy and has a rest house and postal facilities are available.
- (2) Sri Pishavari Kavu Bhagavathy Temple at Viviyur is near the national highway (N.H.17) and 4 kms. north of Quilandy. Postal and telephone facilities are available.
- (3) Arjunah Cunu Caves* at Arikulam Village which is about 18 kms. from Quilany is served by other district road from Quilandy to Peerambra.
- (4) Balusseri Fort at Balusseri is connected to Quilandy by a major district road and to Calicut by other district road. It is about 19 kms. from Quilandy and has postal facilities. These places can be conveniently covered from

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Quilandy town which is easily accessible and has accommodation in the form of a rest house.

Badagara, Quilandy, Sultan's Battery and Mananthvadi are easily accessible from Calicut (Kozhikode) a transport nodal point and hence a major distribution centre for tourist traffic.

Mananthavadi, South Wynad, Badagara and Quilandy form one tourist complex with Cannanore and Calicut towns as nodal points and Badagara, Quilandy, Mananthavadi and Sultan's Battery towns as sub-nodal points.

(V) Ernad Taluk:

The taluk, according to the District Census Handbook has 7 places of religious, historical or archeological importance. They are as under:

- (1) Omanoor Mosque at Chikade Village which is about 20 km. from Manjeri and is connected by a major district road to a state highway (S.H.24) leading to Malappuram.
- (2) Trikalayoor Siva Temple at Kizhuparamba, about 24 km. from Manjeri is directly accessible by a major district road, except for a small portion. Postal facilities are available at Kizhuparamba village.
- (3) Kondotty Thakkiyakkal Kubha at Kondotty is located on a state highway (S.H. 24) connecting Malappuram to National Highway (N.H., 17) south of Calicut town. Postal and telephone facilities are available at Kondotty.

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- (4) Mambad Cheriya Jaram at Mambad is located on State Highway 28 connecting Manjeri to Gudalur (Tamil Nadu) and is about 27 km. from Manjeri. Postal facilities are available at Mambad. Though there is no rest house at Mambad, one at Nilambur is at about 6 km. from Mambad.
- (5) Thirumandam Kunnu Temple and Porur Temple at Porur is 19 kms. from Manjeri. Porur and Wandur are connected by a major district road which is connected to State Highway-28.
- (6) Perumundasseri Subramania temple, Wandur Siva Temple and Banapuram Para Temple are located at Wandur which is 2 km. north of Porur. There is a rest house at Porur.
- (7) Pullivettikavil Thalapatti at Chembrasserri is connected by a major district road and also by a broad gauge branch railway line of Shoramur Nilambur. Cherambrasserri is 17 kms. from Manjeri.

Manjeri town is most suitable to cover all these seven places. A rest house is located at Manjeri. It is also a transport nodal point as two major district roads and two state highways converge here. Malappuram town, a taluka headquarter is close by and also has rest house facilities. As such these two towns, and especially Manjeri serve as tourist nodal points. Malappuram is located on State Highway 24 and is connected with Calicut and Palghat. Rupees 3 lakhs were provided for construction of tourist bungalow at Malappuram during the Fifth Five Year Plan.

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(vi) Mannarghat Taluk:

According to District Census Handbook, there is only one place i.e., Malliswaram Temple at Attapadi. Attapadi is located on a major district road connecting Mannarghat and Coimbatore (Tamil Nadu) which is about 50 kms. away. Potentials of this place will have to be ascertained.

(vii) Palghat Taluk :

Malampuzha Dam is 8 km. north of Palghat Town. Palghat Town is connected by a national highway (N.H. 47) and a broad gauge railway, both connecting Coimbatore (Tamil Nadu) in the east and Trichur (Kerala) in the west. The irrigation reservoir is situated in the midst of enchanting scenery. There is a well-laid garden which is illuminated at night. A tourist bungalow located at the top of the hill in the midst of Malampuzha Gardens provides accommodation. Post, telegraph and telephone and medical facilities are available. Utilities like water and electricity are also available. It is a recognised tourist centre. In addition, Tipu's Fort is located in the taluk. According to state department of tourism, foreign tourists spend three days and Indian tourists two days on an average.

Besides Malampuzha, there are four religious places of importance indicated in the District Census Handbook. These are as follows:

- (1) Sharganga at Thenari south of Elepally village. It is connected by a major district road connecting national highway (N.H. 47) east of Palghat and Pollachi Town in Tamil Nadu. Palghat Town is 13 km. away and has rest house facilities. Postal facilities are available at the village.

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- (2) Chambratta Kavu at Kannadi is located on national highway 47 and is south of Palghat Town at a distance of 5 km. A post office is located at Kannadi village.
- (3) Ayarmala Temple at Parli village located on a major district road is at a distance of 14 kms. West of Palghat. All the postal facilities are available here.
- (4) Shree Ramanand Ashramam at Mannur is further west of Parli and is accessible by a major district road. Post and Telegraph facilities are available at Mannur which is 26 km. away from Palghat Town.

Palghat Town is located on the National Highway 47 and the broad gauge arterial railway line. Besides, two state highways and four district roads converge here. Thus, it is an important nodal point on the existing transportation network system. It is a recognised tourist centre and a convenient point to cover various places of tourist attraction in Mannarghat, Palghat and Chittur Taluks.

(viii) Chittur Taluk:

The District Census Handbook refers following three places as religious, historical or archeological importance:

- (1) Kottamala Temple at Kodavayur village located on State Highway 27, is approachable from Palghat and Chittur Towns. Post office is located at the village.

/...

- (2) Vamala Ayyappan Temple at Pallassena village. Pallassena is located at the junction of two major district roads. Post and Telegraph facilities are available at the village. Nemmara town is about 7 km. away where rest house facilities are available.
- (3) Shree Cherapuram Siva Temple at Elevancheri is located south of Pallassena and is directly connected to Nemmara town by a major district road. Postal facilities are available at Elevancherri.

In addition, Parambikulam Game Sanctuary is located within the Taluk. There are three hotels and facilities like post, telephone, telegraph, medical, petrol pump, auto repair shop, etc., are available. Utilities like electricity and water supply are also available. On an average Indian and foreign tourists stay here for two days and three days respectively.

Talukas of Mannarghat, Palghat and Chittur form one tourist complex with Palghat town as the main nodal centre, Mannarghat, Chittur and Nemmara serve as Sub-nodal points.

(ix) Mukundapuram Taluk:

The District Census Handbook mentions five places of religious, historical or archeological importance. These are mainly located in the Western parts of the taluk around the national highway and the broad gauge railway line. These places can be covered conveniently from Irinjalkuda and Chalakudi.

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- (1) Areswaran Temple at Mattathur village is located on a major district road off the National Highway and east of it. The route is rather circuitous from Chalakudi which is at a distance of 12 km. Postal facilities are available at the village.
- (2) Avittathur Temple at Kudappassary village is located on a pucca road and is 8 km. south of Irinjalkuda postal facilities are available at the village.
- (3) Pampumekad Mana at Vadama Village: Vadama village is directly accessible from Chalakudi and is also connected to Kudappassary by a pucca road. Postal facilities are available at the village.
- (4) Chembellur Church at Kallur Vadakkummuri:-
The place is connected to Chalakudi as well as Vadama by a pucca road. Postal facilities are available at the village.
- (5) Nedumkotta at Kuruvilassary:- It is located at the south-western end of the taluk. Road accessibility is provided by a pucca road and postal facilities are also available.

Chalakudi and Irinjalkuda towns are located off National Highway 47 and a state highway respectively. These two places are between Trichur and Alwaye Towns which are just outside the Sub-region. Both these places have rest house facilities and have good accessibility for the tourists.

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(x) Kumathunad Taluk :

Four places have been mentioned in the District Census Handbook which are located south of Perumbavur Town. These are:-

- (1) Kallil Bhagvathi Temple at Asamanoor:- Asamanoor is located on State Highway 16 connecting perumbavur and Munnar. It is 9 km. away from Perumbavur. Postal facilities are available at the village.
- (2) Kumarpuram Subramania Temple at Chemmanad:- Chemmanad Village is located on a state highway, connecting Muvathupuzha & Ernakulam. It is also connected with Perumpavur by a major district road. Ernakulam is the nearest town.
- (3) Kodama St. George Syrian Church at Alkkarnad North:- Alkkarnad is situated on a major district road linking Chernad and Perumpavur. It is also accessible from Alwaye by a major district road.
- (4) Periyara Vishnu Temple and Kolamcherry St. Peter Church at Alkkarnad South:- Alkkarnad South is located on a MDR which is connected to Chemmanad on a State Highway. It is 13 kms. from Thripunthura.

Poringal Reservoir is located north of State Highway 21, and in the eastern parts of the taluk. Potentials of this place for the development of tourism will have to be ascertained. Accommodation is available at Inspection Banglow. The place is connected to State Highway-21 by a major district road.

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(xi) Devicolam Taluk:

Munnar town is a well-known hill resort. It is 139km. from Ernakulam, and is at the junction of three state high-ways leading to Perumbavur, Udumalpet and Madurai (latter both in Tamil Nadu). It is a recognised tourist centre and has a tourist bungalow. It has also headquarters of plantations, industries and power projects of the area. The Golf Club provides additional attraction for the sports lovers. According to the information supplied by the State Government, Rupees 5 lakhs have been provided for additional accommodation at tourist bungalow and Rs. 2 lakhs for improvement of the Golf Course.

(Xii) Thodupuzha Taluk:

Thodupuzha Town is located on State Hiway 8 which connects it to Muvathupuzha in the north and Palai and Kanjirapally in the south. The district census handbook mentions three places of religious interest, which are south of the Thodupuzha Town.

- (1) Annamala Nathare Temple at Karikode:- Karikode is just on the outskirts of Thodupuzha town and is connected by a major district road.
- (2) Saramkutni Kavu Temple and Vayarkavu Temple at Kudayathoor:- Situated at a distance of 15 kms. from Thodupuzha, the village is accessible by a major district road. Postal facilities are available at the village.
- (3) Arakulan Sastha Temple is located south-east of Thodupuzha Town. A major district road from Thodupuzha terminates at Arakalum. All the postal facilities are available here.

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Importances of these three places for the development of tourism will have to be ascertained. Famous Idukki Dam and the forest area around is a recognised recreational area. On an average stay of foreign and Indian tourists is of the duration of two days and three days respectively.

(xiii) Meenachil Taluk:

(1) Subrahaniya Temple at Kidangoor Village:- The village is located on a pucca road taking off from a major district road connecting Palai Town and Ettamanur located on State Highway 13 to Kottayam. Thus, it is easily accessible from Kottayam and Palai which is about 10 Kms. from the village. All the postal facilities are available at Kidanoor village.

(2) St. Boniface Church at Pattithaman and Nithyasa-haymatha Patti at Kanakkali village:- Kanakkali village is located near the junction of State Highway-1 connecting Kottayam and Perumbavur and state highway connecting it to Ernakulam via Vaikoam. These roads provide requisite accessibility to Palai and Kottayam which is tourist centre and a major town of the State. All the postal facilities are available.

(xiv) Kanjirapally Taluk:

The District Census Handbook mentions five places which are important from religious, historical or archeological point of view. The places are as under:-

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- (1) Chirakkadavu Mahadevi Temple at Chirakkadavu. The village is located north of Ponkunnam Town, on a major district road connecting Kanjirapally in the south and a State Highway 8 leading to Palai in the north. Postal and Telephone facilities are available at the village.
- (2) Mahakalippara Temple at Kanjirappally Town which is 32 kms east of Kottayam and is situated on the junction of State Highways-8 and State Highway 23. The town has requisite accessibility and postal facilities.
- (3) Edakumam Mosque at Mundakkayam Town. The town is situated on State Highway 23 east of Kanjirapally. Postal and telephone facilities are available.
- (4) Erumely Sastha Temple at Erumely Village can be approached by a pucca road from Mundakkayam town which is at about 20 kms. distance. All postal and telephone facilities are available at the village.
- (5) Chervelly Devi Temple at Chervelly. The village is located on State Highway-8 and is 12kms. from Kanjirapally town. Postal and telephone facilities are available at the village.

Kanjirapally Town is convenient for the tourists covering above mentioned places.

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(xv) Peermade Taluk:

Periyar Wild Life Sanctuary at Thekkady, is situated in the high ranges of the Western Ghats. This finest sanctuary of the south is spread over an area of 777 sq.km. and has a beautiful Periyar Lake formed by the construction of a dam across the river Periyar originating from the Sivagiri Hills. The lake has an expanse of 26 sq. kms. The topography of the area is undulating with elevation varying between 900 to 2000 metres. Eastern part has a dense forest. The Mount Plateau is a table land at an altitude of 1400 metres. Important peaks are Sivagiri Malai, Sunder Malai, Pachai Malai and Velli-Malai the highest peak with an altitude of 2019 metres. Entire area of the sanctuary is endowed with natural scenery and provides a rich variety in animal and plant life. Common plant species are Arrtocarpus. Hirsuta, Dalbergia species, Polyalthia species and myristica species. Blossom of Terminalia and Giant Salmalia trees add colour and enhance the scenic beauty of the forest. Teek, kindal, semul, bijasal, ayani and rose-wood are some of the important trees and are of commercial value.

The sanctuary is equally rich in animal life. To name a few, the Gaur (India Bison), Wild Boar, Sambhar, spotted deer, Barking deer and mouso deer are found along the lake. Malabar Giant Squirrel and Flying squirrel are common. Nilgiri Langur, Common Langur and Bonnet Monkey abound the area. Tigers, Leopards and Sloth Bears also occur in the sanctuary, but are only occasionally seen. Major attraction is Wild elephants which are found in herds. The sanctuary presents a large variety of birds such as - Darter, Great Indian Hornbill, Grackle,

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Grey Jungle, Fowl, Rose-ringed and Blue-winged Parakeets, the Lorekeet, Jungle Myna, Barbets, Wood peckers, Orioles, King fishers, Drongos, Babblers, Bulbuls, Fly catchers, Shrikes, Mini-vets, and Thrushes. In short, the sanctuary is very rich in flora and fauna. The sanctuary is open throughout the year and period from December to May is most suitable. Four watch towers provide vantage points for viewing the wild life. There are seven picnic spots viz., Arubi creek, Crusoe Island, Marak Kavala, Mullakudy, Pavarasu, Periyar Dam, Thannikudy, Boating in Periyar lake adds to the recreational attraction of this place.

The sanctuary is accessible by road only. State Highway-13 connecting Kottayam, Kanjirapally, to Gudalur & Uthamapalayam in Tamil Nadu, touches northern fringe of the sanctuary. Thus, the sanctuary is accessible from Kottayam and Madurai in Tamil Nadu. One more access is provided by the State Highways connecting Alwaye Munnar (State Highway 16) and Kumili (State Highway 19), but the route is rather circuitous. Thekkady is connected to State Highway 13 by a major district road. Peermade, the taluk headquarter is just 43kms. away towards Kottayam. Thekkady is a recognised tourist centre. Nearest airports are Madurai (145 kms.), Cochin (185 kms.) and Trivendrum (370 kms.). Nearest railway stations are Kottayam and Teni on Madurai Bodinayakanoor a branch-line in Tamil Nadu. Regular bus service from various places in Kerala and Madurai in Tamil Nadu is available for the visitors. Postal and telephone facilities are available at Thekkadi. Petrol pump auto repair workshop and medical facilities are available at a distance of 5 kms.

As regards accommodation Periyar House (Indian style) and Aranya Niwas (Western style) situated along the side

of the Lake have 24 rooms and 26 rooms respectively. Edapalayam Palace (Lake Palace) is a forest rest house with 6 rooms (Western style). In addition three more forest rest houses are located ^{at} Manakavala, Muliakudy and Thannikudi. Periyar House has one dormitory providing cheap accommodation for economy class tourists. Kerala PWD, Peermade Wild Life Preservation Society and Tamil Nadu Government have their rest houses inspection bungalows at Thekkady. On an average Indian tourists stay here for two days and foreign tourists for three days.

A provision of Rs. 20 lakhs has been made for providing additional accommodation and facilities at Thekkady by Tourism Development Corporation*

2). Ayyappa or Sastha Temple at Sabarimala a famous and very important pilgrimage centre, situated in the middle of dense forest and high mountains is located at the southern boundary of the taluk. Sabarimala is not accessible from Peermade Taluk. The only access is in the form of a major district road taking off from the State Highway 8 north of Pathanamthitta Town. The access is rather difficult because of the terrain and major portion is not motorable. At present there is no hotel or dharamshala available. Medical facilities are available during the season. This is also true for Postal & Telephone facilities. Rs. 5 lakhs have been provided for the development of Sabarimala to be undertaken by Tourism Development Corporation.* Suitable season for visiting is from December to September. Mangaladevi Temple is also located within this taluk.

*Source: Information supplied by Government of Kerala.

XVI. Pathanamthitta Taluk:

The District Census Handbook mentions three places of religious, historical or archeological interest. These are (1) Devi Temple at Malayalpuzha village north of Pathanamthitta Town. The village is connected by a pucca road and has postal facility. It is at a distance of 32kms. from Chengannoor. (2) Omalloor Temple at village Omalloor, South of Pathanamthitta on a major district road leading to Adur Town on a state highway. It is about 20 kms. from Chengannur town. Post office is located at the village. (3) Manjikkara Church at Cehneerakara Village is at a distance of 20 km. from Chengannur. It is connected by a pucca road and has postal facilities at the village.

Potentials of these places for tourists or importance from pilgrimage point of view is not known.

xvii. Nedumangad Taluk:

1. Ponnudi Hill Station is a famous tourist spot and is a quiet little health resort. Situated at an altitude of about 1100 metres it is known for its healthy climate. The place is mountainous with grass lands all around. It offers beautiful scenic views of wild life beauty. It is about 56 km. from Trivandrum, the State Capital. A major district road connects it to State Highway 2 leading to Trivandrum via Nedumangad.

One small tourist bungalow called 'Lower Sanitorium' provided accommodation in 1977. 'Upper Sanatorium Building' is far away and is unserviceable*. In the last two years, existing tourist bungalow has been improved and a

Source: Detailed note from the State Govt. officials.

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cluster of cottages have been newly constructed to accommodate more tourists. With single accommodation in five cottages, family accommodation in two cottages and a student lodge, the accommodation has increased from four to forty. A separate canteen block has been built to cater to the needs of the visitors. A shopping centre and a post office building are in progress.

As regards accessibility, a new approach road has been recently built and 18 km. length of Trivandrum-Pommudi Road has been improved. But smoothening of hairpin bends and sharp curves on this road is yet to be carried out.

Water supply scheme catering the needs of 1,000 people at a time, has been commissioned and electrification has been done.

The department proposes to construct staff quarters, a pavilion, and garages and improvements of roads inside the complex are to be carried out. The Government has incurred an expenditure of Rs.9.15 lakhs (Rs.2.29 lakhs in 1976-77, Rs.3.43 lakhs in 1977-78 and Rs.5.43 lakhs in 1978-79) so far. It is also felt necessary to plant number of trees to beautify the area and also to act as a wind breaker and provide shade. This place is attracting foreign as well as domestic tourists who, on an average spend three days and two days respectively.

(2) Vengamala Temple at Pullampara village is situated on a major district road connecting State Highway- 1 with state highway-2, north of Nedumangad town.

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(3) Neyyar Dam across the river Neyyar offers good boating opportunities & attracts the tourists from Trivandrum which is at a short distance of 32 km. Kallipara Club near the reservoir attracts hikers and trekkers. All these facilities mostly attract the picnickers from the Capital city. Post and telephone facilities are available here. Utilities like water supply and electricity are also available but petrol pump, auto repair facilities, and medical facilities are non-existent. According to Department of Tourism a small wild life sanctuary can easily be developed here. The District Census Handbook mentions two religious places and one beautiful sea beach viz.:

- (1) Aruvipuram Temple at Perum Kadavila Village situated on a major district road connects national highway between Balarampuram and Neyyatinkara towns and State Highway 3 leading to Nedumangad. The village is 10 km. north of Neyyatinkara town. Postal facilities are available at the village
- (2) Mahadeva Temple at Kollayil Village which is located north of Neyyatinkara Town, at a distance of 3 kms. It is also accessible by a major district road connected to National Highway 47, North of Neyyatinkara Town.
- (3) Kovalam: Kovalam Beach has a shark-free safe sea pool ideal for bathing and swimming. The natural bay is free from high waves and surges. It is 13 kms. south of Trivandrum City and is mostly connected by National Highway 47 & further by a small stretch of approach road. It is one of the finest beaches in India and perhaps in the world. This famous beach is being developed

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as an international holiday resort by India Tourism Development Corporation. India Tourism Development Corporation, an autonomous body under Department of Tourism of Government of India, runs two prestigious Western style hotels viz. (i) Kovalam Palace Hotel and (ii) Kovalam Grove Beach Cottages. In addition, Hotel Beach Belair, Vizhinjam also provides accommodation for high income level tourists. According to information supplied by the State Government Rs. 5 lakhs have been allocated under the Fifth Plan, for constructing a guest house at Kovalam by ^{the} Department of Tourism. In addition Rs. 5 lakhs have been allocated for providing hotel accommodation for the home tourists.

Detailed information regarding places of tourist interest, and of local importance discussed above is given in Table - 9.1 in a summarised form.

2. Tourist Traffic:

For development of tourism good accessibility, requisite infrastructure and right type of accommodation are essential ingredients. Popularity of a tourist spot can be judged by the volume of tourist traffic it attracts.

In this respect, no data has been made available by the State Government, presumably for the reason that there is no machinery available for recording the enumeration of tourists, and relevant information like their income needs, duration of stay or expenditure thereto. This is a major handicap in deciding or assessing importance of a place and the developmental needs. Similarly, no idea could be had about the origin, destination or direction of the tourist traffic flow. However, an attempt has been made here to work out schematic flow of tourists in a logical manner. /...

TABLE 9.1 : Places of Tourist Interest and Religious Importance (Talukawise)

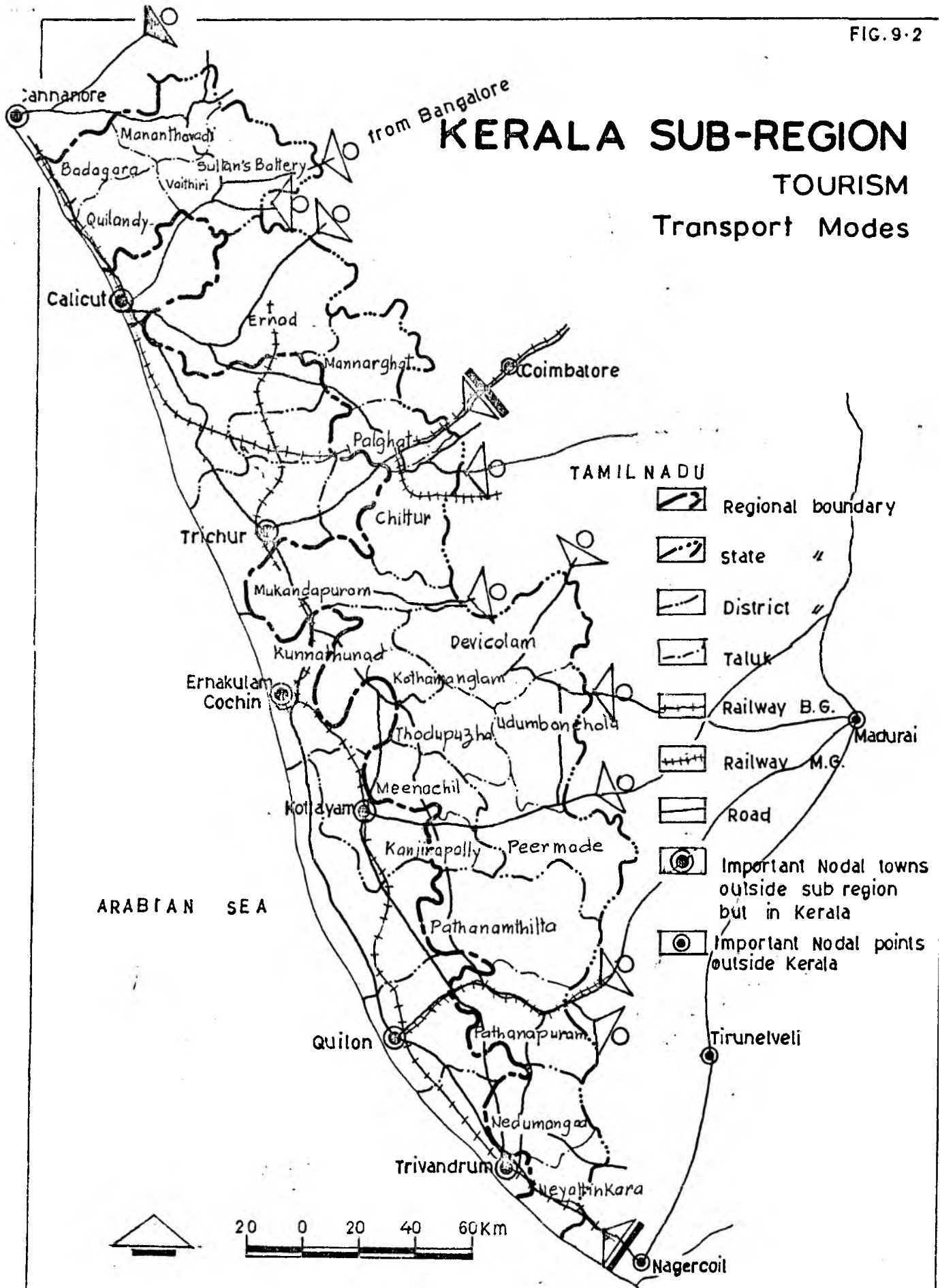
Taluks	'Places 'of Inter- 'national 'importance*	'Places 'of National 'importance*	'Local ' impor- ' tance *	' Religious**			' Historical ' Importance
				' Hindu ' Temp- ' les	' Muslim ' Mosques	' Chris- ' tian ' Church	
1. Mananthyali	-	-	-	Three	-	-	-
2. South Wynad	-	Gama Sanctuary	Tipu's Fort	One	-	One	Panamaram Fort**, Pulpuli Cave.
3. Badagara	-	-	-	Six	-	-	-
4. Quailandy	-	Kappad Beach	-	Three	-	-	Kappad Beach*, Baluserry Fort and Kummu Caves**
5. Ernad	-	-	-	Seven	One	-	-
6. Mannarghat	-	-	-	One	-	-	-
7. Palghat	-	-	Malampuzha Dam	Four	-	-	-
8. Chittur	-	-	Parambikulam Game Sanctuary	Three	-	-	-
9. Mukundapuram	-	-	-	Four	-	One	-
10. Kunnathumad	-	-	-	Three	-	One	-
11. Devicolam	-	-	Munnar Hill Station	-	-	-	-
12. Thodupuzha	-	Idikki Dam	-	Three	-	-	-
13. Meenachil	-	-	-	One	-	One	-
14. Kanjirapally	-	-	-	Four	One	-	-
15. Peermade	-	Periyar Wild Life Sanctuary	-	One*	-	-	-
16. Pathanamthitta	-	-	-	Two	One	-	Sabari Malaya Temple of national importance.
17. Nedumangad	-	-	Ponmudi Hill Station	One	-	-	-
18. Nayanarkkara	Kovalam Beach	-	Neyyar Dam	Two	-	-	-
19. Udumthanchola	-	-	-	-	-	-	-
20. Pathanapuram	-	-	-	-	-	-	-

Source: *Information supplied by the State Govt., contained in tourist information literature.

**Information given in the district census handbooks.

2.1 Tourist Flow:

In order to work out the flow, important cities and towns in and around the Sub-region were considered along with various modes of transport like airways, railways and road network. Figure 9.2 depicts these nodal points in totality. It has been seen that Cannonore, Calicut, Trichur, Cochin-Ernakulam, Kottayam and Trivandrum along the west-coast are important, as far as Kerala State is concerned. All these places are on the railway network and are located on the highway system. Moreover, these cities though outside the Sub-region, have direct impact on the Sub-region itself. As such, these are principal nodal points, which act as "Camp cities", or base towns and major distribution centres of tourist traffic. On the eastern side of the Sub-region, Coimbatore, Madurai, Tirunelveli and Nagercoil (all in Tamil Nadu) could be considered as principal nodal points. Mysore (in Karnataka) also could be categorised in the same fashion, but for the reason of low and circuitous accessibility. These nodal points feed the various points of tourist attraction either directly or through sub-nodal points depending upon spatial distribution and force of attraction. Various sub-nodal points have been identified on the basis of their linkage with the nodal points and the tourist spots around them. These are depicted in Figure 9.3 alongwith notional flows. Various sub-nodal points are, Mananthavadi, Sultan's Battery, Badagara, Quilandy, Nilambur, Manjeri, Malappuram, Mannanghat, Palghat, Chittur, Nemmara, Irinjalkuda, Chalakudi, Perumbavoor, Muvathupuzha, Thodupuzha, Palai, Kanjirapally, Pathanamthitta, Pathanapuram, Nedumangad and Neyyattinkara. /...



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These sub-nodal points are "intermediate stations" and have limited but certain role to play in the development of tourism. Tourists would look upon such places for suitable and cheap accommodation, necessary infrastructure facilities, utilities and as a centre for suitable modes of transport. The tourist flow from sub-nodal points to various places of tourist interest and to religious importance are indicated in Fig. 9.3. This notional schematic flow could be tested as and when pertinent data is available.

3. PLANNING AND IMPLEMENTING MACHINERY:

India Tourism Development Corporation an autonomous body under the Ministry of Tourism and Civil Aviation is responsible for promoting and developing tourism at national level. As far as this Sub-region is concerned, Kovalam Beach development has been undertaken by the ITDC. At the state level, Department of Tourism and Kerala Tourism Development Corporation (KTDC) undertake to develop tourist places. According to the information supplied by the State Government, paucity of funds is the main handicap in the development of tourism.

4. PROBLEM OF DEVELOPMENT:

In the absence of a quantified data, it is difficult to pin-point adequacy of the available facilities but it is ~~truism~~ ^{truisms} to say that no tourist development can take place without provision of necessary infrastructural facilities in the form of various utilities, right type of sufficient accommodation to attract and cater ^{to} the needs of the tourists, easy accessibility and mobility offered by suitable and economical mode of transport. In Kerala Sub-region hilly terrain is a constraint of

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reckoning and, road network and road transport will have to take much larger burden in the development of tourism. Therefore, it will be necessary to ascertain the adequacy of the present facilities, to assess, the development potentials to understand the nature of demand from the tourists and then provide the necessary inputs at appropriate place and time. Creation of a suitable machinery for tourist traffic census/enumeration would go a long way in ascertaining the quantum of tourist requirements,

In the absence of any data, it is not possible to know the compositional characteristics of the tourist traffic. But there are reasons to believe that a new pattern and composition of tourist traffic with predominance of middle class tourists has recently been evolved and is likely to stay for long. In that case, it will be necessary to cater to the demands of "economy tourists", or "low budget tourists". Their demands are few and therefore, they are easy to cater for. Perhaps, suitable level of services for this class would form the backbone of the new development in the sphere of tourism. During the Fifth Five Year Plan Rs. 44 lakhs have been allocated for various schemes to be implemented in the state by ^{the} Department of Tourism. Rs. ten lakhs were allocated to Kerala State Development Corporation for providing accommodation at Kovalam (Rs. 5 lakhs) and for luxury coaches (Rs. 5 lakhs).

5. STRATEGY FOR DEVELOPMENT:

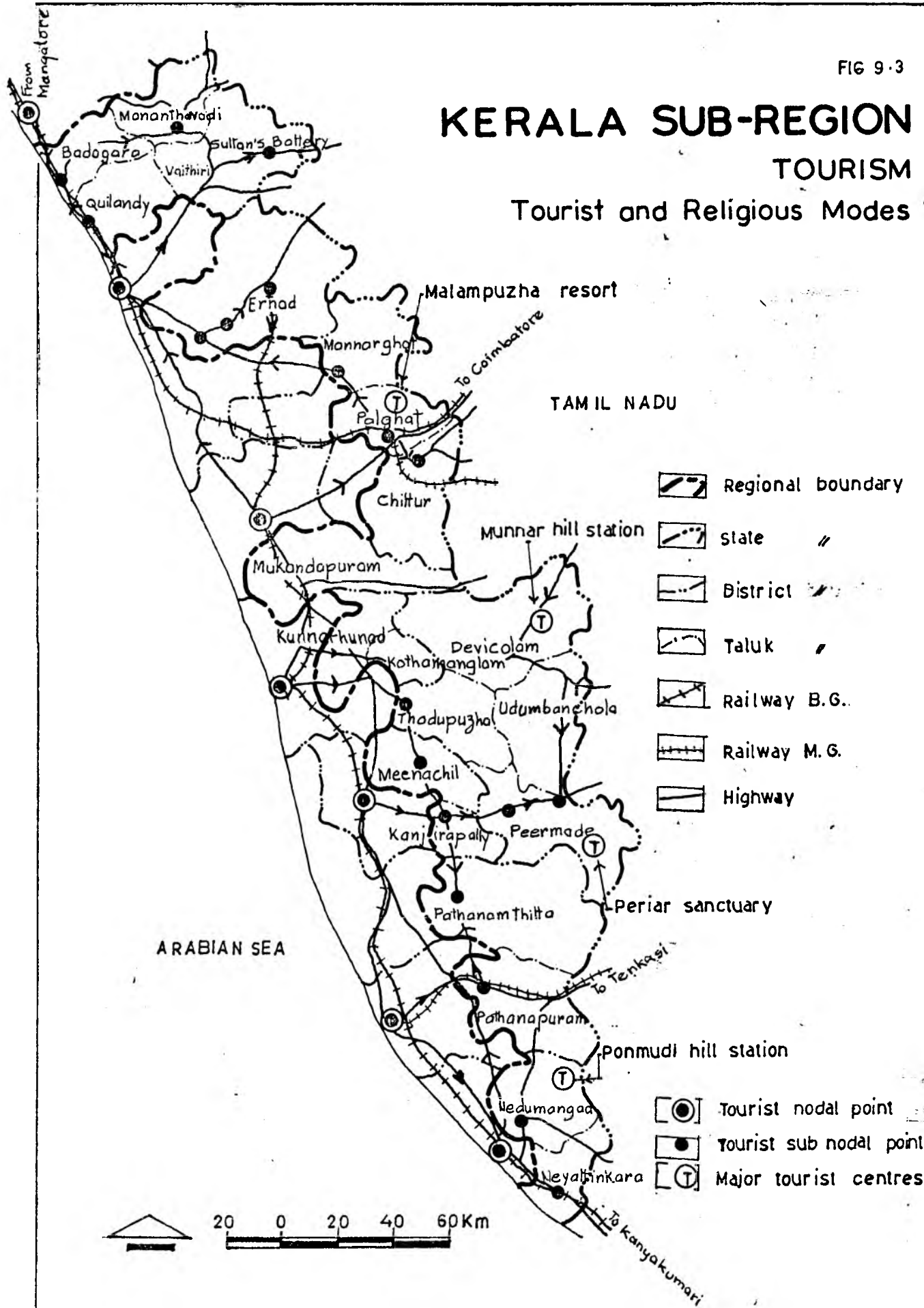
In order to promote and accelerate the development, it is necessary to link or form a "Chain" of various places of tourist interest with each other so that the tourists are in a way channelised and form sort of stream. This has many advantages. Firstly, lesser known places can be covered, and these have a better chance of further

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KERALA SUB-REGION

TOURISM

Tourist and Religious Modes



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development. Moreover, the tourists will have more variety and number. This linking could be done by providing suitable channels for movement.

Secondly, the development programme should be so evolved and implemented that it generates local employment and help boost up local economy.

Thirdly, for providing cheap accommodation, it is necessary to adopt innovative design in the form of log cabins, forest huts, etc. This may mean deviation from the traditional concepts. Maharashtra State has shown the way of developing what is popularly called "Holiday Home". These homes are fully furnished and are available for middle class tourists at reasonable rates.

Tourist development by itself has, traditionally a low priority in the developmental efforts. But once its importance as a tool to boost up local economy is recognised, there should not be any difficulty in according suitable priorities for the development of this sector. In fact, this could be a major consideration in the development of backward areas where chances of development in other sectors are not so bright.

SECTION - X - SOCIAL DEVELOPMENT

Social services and particularly education and health play crucial and important role in economic development and social modernization of a society. It is a key factor in production process, as, it supplies the requisite number and quality of persons needed for various tasks. By creating a well informed, educated and healthy society, it can ensure the effective working of those institutions on which the economic and social well-being of the people depends. The proper planning of education and health facilities, as such, can be termed as *sinqa-non* for bringing a rapid and long ranging changes. And, it is only through the effective development of social overheads that it can be possible to provide the individuals with the most effective means for their personal enrichment and social and economic development.

Kerala Sub-region, so far the social services are concerned, is well placed. As depicted in the following paragraphs, not only its literacy rate is high, it has a very sizeable number of educational and health facilities and the development of these facilities, particularly since the inception of planning, has been quite impressive.

1. LITERACY

Kerala Sub-region, like the Kerala State, has quite high literacy rate. As per 1971 Census, the literacy rate in Kerala Sub-region was

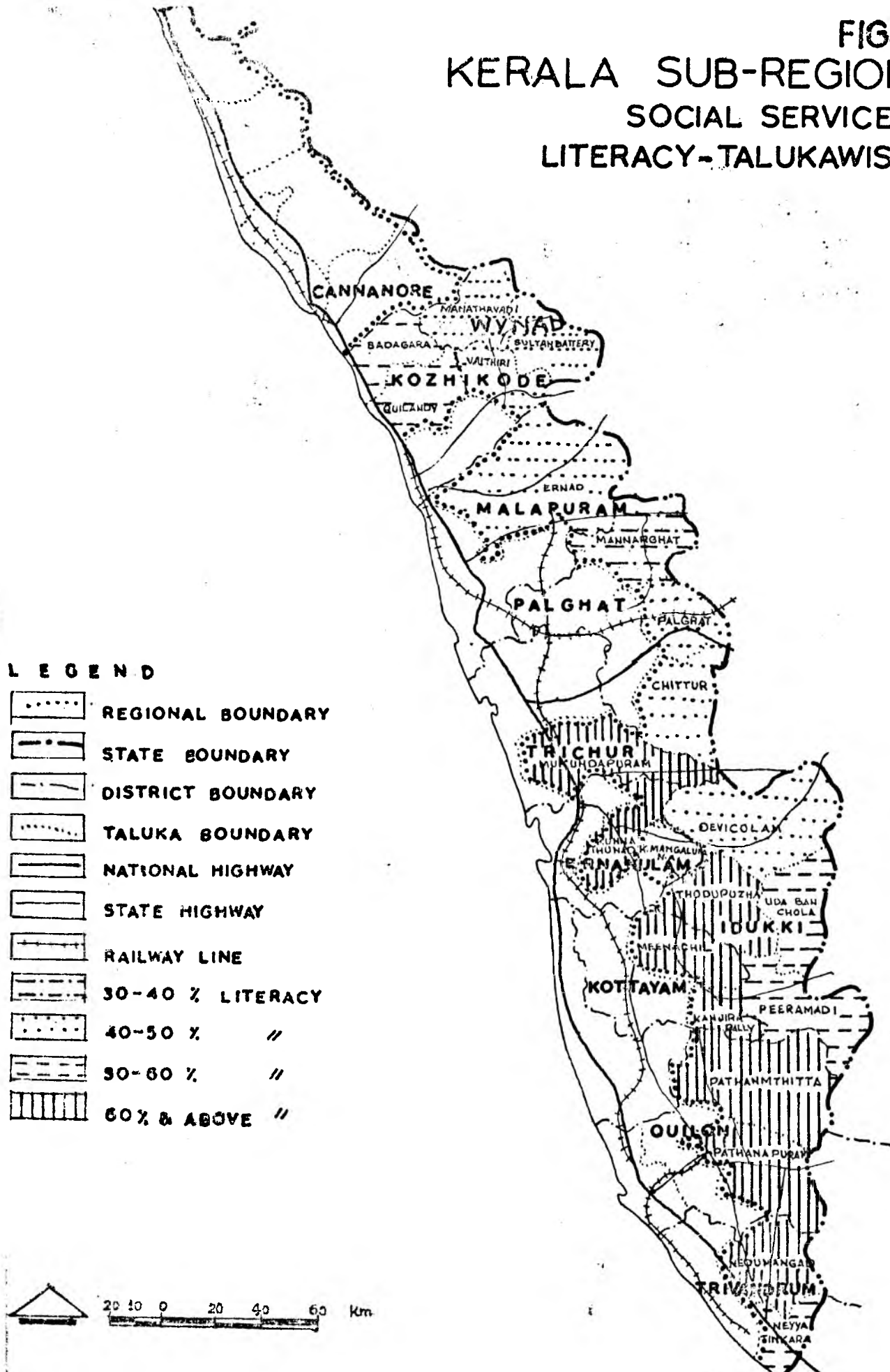
57.12%, which compared to the all India average was almost double (29.04% in case of India). The Kerala State had the distinction of having as high as 60.42% literacy rate in 1971, but as could be noticed there was not a marked difference between the State's figures and that of the Kerala Sub-region.

The literacy in case of males (63.58%) and females (50.6%) was also much higher in the Sub-region as compared to the all India ratio. The Sub-region has, however, lower literacy than recorded for Kerala State, but the difference was marginal (See Table 10.1). Another discerning feature is that even in 1961, literacy rate in the Sub-region was quite high (43.87%). This was much better than the all India average (23%). The rate of growth of literacy between 1961 and 1971 was also significant for the Sub-region.

At Taluk level, the literacy rate was higher to all India average in all the Taluks. But, wide variation was discernable with literacy rates varying from as high as 73% in case of Meenachil Taluk and comparatively lower rate of 38.47% in case of Mannarghat Taluk (Fig.10.1). The rate is lower in Taluks like Mannarghat, North Wynad, South Wynad, all these taluks as noticed in earlier Chapters, are economically and socially backward. It has higher in Taluks like Neyyattinkara, Nedumangad, which were better placed in the economic setting of the Sub-region. It is observed from Table 10.1 that the Taluks where the literacy rate is lower have conspicuously very low female literacy rates. The drag on literacy rate is

FIG:10.1

KERALA SUB-REGION SOCIAL SERVICES LITERACY - TALUKAWISE



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Table-10.1: Total and Literate Population in Kerala Sub-Region-1971.

Taluk / District	Total Population			Literate Population		
	Total	Male	Female	Total	Male	Female
<u>Cannanore District</u>						
1. North Wynad	129335	66611	62724	61198 (47.32)	36999 (55.54)	24199 (38.58)
<u>Kozhikode District</u>						
2. South Wynad	284515	148727	135788	134682 (47.34)	81328 (54.68)	53354 (32.29)
3. Quilandy	468714	232939	235775	266437 (56.84)	155529 (66.77)	110908 (47.04)
4. Badagara	409771	201291	208480	227044 (55.41)	132224 (65.69)	94820 (45.48)
<u>Malapuram District</u>						
5. Ernad	715496	356253	359243	348300 (48.68)	199672 (56.05)	148628 (41.37)
<u>Palghat District</u>						
6. Mannarghat	184579	91897	92682	71000 (38.47)	41591 (45.26)	29409 (31.73)
7. Palghat	369001	181174	187827	180094 (48.81)	104632 (57.75)	75462 (40.18)
8. Chittur	313973	154376	159597	126813 (40.39)	77935 (50.48)	48878 (30.63)
<u>Trichur District</u>						
9. Mukundapuram	590317	287881	302436	369338 (62.57)	192828 (66.98)	176510 (58.36)
<u>Ernakulam District</u>						
10. Kunathunad	292113	146968	145145	179972 (61.61)	98418 (66.97)	81554 (56.19)
11. Kothamangalam	142378	71668	70680	85576 (60.10)	47135 (65.74)	38441 (54.39)
<u>Kottayam</u>						
12. Meenachil	351879	176856	175023	256224 (72.82)	133460 (75.46)	122764 (70.14)
13. Kanjirapally	172360	87808	84552	120416 (69.86)	64182 (73.09)	56234 (66.51)
<u>Quilon District</u>						
14. Pathanamthitta	390150	195048	195102	283714 (72.72)	147202 (75.47)	136512 (69.97)
15. Bathapayram	310659	155997	154662	193518 (62.61)	105652 (67.73)	88866 (57.46)
<u>Idukki District</u>						
16. Thodupuzha	219504	113514	105990	141550 (71.19)	77846 (68.58)	63704 (60.10)
17. Dovicolam	134350	69581	64769	59661 (44.41)	37094 (53.31)	22567 (34.84)
18. Udumbanchola	264913	137488	127425	151061 (57.02)	84600 (61.55)	66421 (52.14)
19. Poormade	146841	74714	72127	79726 (54.29)	46350 (62.04)	33376 (46.27)
<u>Trivandrum District</u>						
20. Neyyattinkara	559488	281380	278108	330013 (58.98)	180750 (64.24)	149263 (53.67)
21. Nedumangad	430779	215380	215399	263222 (61.10)	145783 (67.69)	117439 (54.52)
<u>Kerala Sub-Region</u>	6881115	3447578	3433537	3930559 (57.12)	2192023 (63.58)	1738536 (50.63)
<u>Kerala State</u>	21347375	10587651	10759524	12898072 (60.42)	7054096 (66.52)	5843975 (54.31)

Figures in brackets show the percentage of literate to total population.

more pronounced because of the low female literacy in such Taluks in particular.

1.1 Schools

1.1.1 Primary Schools

Kerala State is in for-front of literacy in whole of the country and the reason for such a positive development is the abundant availability of schools. The State Government as well as the private individuals and institutions have done a commendable job in this part of the country. The Kerala Sub-region as such has a good number of schools, and, specially at the primary school level, the near cent percent coverage of the school going children (6-11 years) is a very commendable feat. It is also depicted in Table 10.2 that all the Taluks without exception recorded over 100% school attendance in this age-group. The all India coverage was put at 83.5% in 1974-75. It is also observed that between 1971 and 1975, there was an increase in the number of primary schools in all the Taluks. It points to the fact that new primary schools are even opened in small settlements to cater to the population needs at their door steps. Some distortion are observed in Taluks, viz, Devicolan, North and South Wynads, where the distance covered is higher or the utilisation of schools with fewer children point to the under utilisation of educational facilities. But, by and large, the eudcational set up and the facilities in the Sub-region were very good especially at the primary school level.

In respect of literacy and educational facilities, the Kerala Sub-region is very well served and, in fact, nothing much can be done in this respect but for planning this facility in harmony with the settlement hierarchy, where the undue waste of facilities could be avoided. In Kerala Sub-region, the near cent-percent trained teachers in all the schools is another very notable feature of the educational planning.

1.1.2 Middle Schools

At middle school level, the number and availability of schools and the population it served is given in Table 10.3. In regard to the enrolment and the distance criterion, it is again observed that in 1974-75 the Sub-region on the whole with 78.29% enrolment was well ahead of the country (35.6%). Other noteworthy features relate to the higher number of students per school (505) (Refer Table 10.5) and as high as 95% trained teachers managing the schools. At Taluk level, again the differences in enrolment, number of schools per lakh of population and utilisation aspect were noticed with low ratios in Taluks like Quilandy, North Wynad etc. Here again the fact is that these Taluks are having scattered settlement pattern due mainly to the difficult terrain and also have a sizeable number of Scheduled Tribes population. The drop-out of students is another conspicuous problem at this stage and is more pronounced in Taluks like North Wynad, South Wynad, Devicolam, Thodupuzha Kothamanglam. In these Taluks the economic and social development was at the low ebb because of the physical

Table-10.2: Talukawise Total No. of Primary Schools, Enrolment and Teachers in Kerala Sub-Region

District	Taluk	No. of Schools- 1975			Enrolment 1971-75					Teachers-1975		
		Total No. of Schools	Area Served by a School (in sq. km.)	Population served by a school	1971	1975	Percentage growth 1971-75	Percentage of Students in 6-11 age & group	1971	1975	Total No. of teachers	% of trained teachers
CASANORE KOZHIKODE	1. North Wynad	50	14.95	2819	15237	17878	16.87	92.33	97.86	249	233	93.57
	2. South Wynad	100	13.78	3101	40459	41692	3.05	111.01	103.73	635	634	99.84
	3. Quilandy	220	3.44	2322	75819	79106	4.34	126.28	119.50	1848	1717	92.91
	4. Badagara	266	2.07	1679	68383	69355	1.42	130.27	119.79	1610	1576	97.89
MALAPURAM	5. Ernad	320	7.07	2437	103373	108749	5.20	112.78	107.60	2432	2151	88.45
PALGHAT	6. Mannarghat	69	15.94	2912	23068	26237	13.74	97.56	100.75	313	454	88.50
	7. Palghat	93	7.75	4319	49988	52505	5.04	105.75	100.86	688	658	95.64
	8. Chittur	63	18.33	5426	38031	39113	2.71	94.68	88.28	509	505	99.21
TRICHUR	9. Mukundapuram	146	9.01	4404	98084	94737	-3.41	129.71	113.68	2321	2293	98.79
ERNAKULAM	10. Kunnathunad	75	9.04	4245	49897	47370	-5.06	133.34	114.80	652	634	97.24
	11. Kothamangalam	NA	-	-	NA	NA	-	-	-	NA	NA	-
IDUKKI	12. Thodupuzha	70	13.91	3420	35227	34826	-1.14	125.28	112.26	478	472	98.74
	13. Devicollam	53	33.47	2765	17224	15791	-8.85	100.66	83.15	264	254	96.21
	14. Udumbanchola	46	23.29	6280	42277	36550	-13.55	124.58	97.62	435	434	99.77
	15. Peermede	29	45.10	5522	19789	18150	-8.28	105.20	87.45	230	228	99.13
SOTTAYAM	16. Meenachil	134	5.39	28611	61403	55462	-9.68	136.22	111.64	799	791	99.00
	17. Kanjirapally	59	5.95	3183	31262	29210	-6.56	141.59	120.00	448	416	92.86
TILON	18. Pathanamthitta	154	12.83	2757	66246	56960	-14.02	132.55	103.51	996	974	97.79
	19. Pathanapuram	101	12.21	3349	53676	41732	-22.25	134.88	95.21	573	523	91.27
TRIVANBRUM	20. Neyyattinkara	166	3.44	3673	92096	83986	-8.81	128.50	106.29	1300	1280	98.46
	21. Nedumangad	123	7.53	3815	70116	60293	-14.01	127.06	99.13	889	848	95.39
Total Sub-Region		2337	9.23	3142	1051865	1009702	-4.01	121.85	106.11	17869	17075	95.56

* No. of Teachers per 100 Students.

Table-10.3: Talukwise No. of Middle Schools, Enrolment and Teachers in Kerala Sub-Region.

District	Taluka	No. of Schools- 1975			Enrolment (in middle classes(VI-VIII)1971-75				Teachers - 1975			
		Total No. of Schools	Area served by a school (in sq.kms.)	Population served by a school.	1971	1975	Percentage growth 1971-75	Percentage of students in 12-14 age group 1971-1975	Total No. of teachers	Percentage of trainees teachers	* Teacher Students Ratio.	
CANNANORE	1. North Wynad	23	32.50	6129	4245	5923	47.02	25.62	58.68	349	84.24	5.91
KOZHIKODE	2. South Wynad	31	44.46	10004	7964	12512	57.11	40.10	56.35	583	98.63	4.66
	3. Quilandy	84	9.01	6080	21279	29288	37.64	65.04	80.09	1775	90.54	6.06
	4. Badagara	63	8.73	7091	17378	22335	28.52	60.76	69.83	1157	98.70	5.18
	5. Ernad	87	26.00	8964	20580	31980	55.39	41.21	57.27	1485	82.09	4.64
PALGHAT	6. Mannarghat	15	73.31	13396	4636	6768	45.99	35.98	47.04	264	80.68	3.88
	7. Palghat	45	16.01	8926	15630	19276	23.01	60.68	66.85	948	90.51	4.93
	8. Chittur	41	28.08	8338	11947	14009	17.26	54.52	57.23	850	97.65	6.07
TRICHUR	9. Mukundapuram	55	23.93	11691	33985	41555	22.27	82.48	90.26	1333	97.37	3.21
ERNAKULAM	10. Kunmathunad	26	26.07	12245	16372	17638	7.73	80.30	77.37	488	91.80	2.77
	11. Kothamangalam	NA	-	-	NA	NA	-	-	-	NA	-	NA
IDUKKI	12. Thodupuzha	30	32.46	7979	13262	16650	25.55	86.56	97.14	443	94.36	2.67
	13. Devicollam	13	136.47	11272	3993	5634	41.10	42.58	42.18	161	95.65	2.87
	14. Udumbanchola	23	46.58	12561	10035	14601	45.50	54.27	70.59	411	98.30	2.81
	15. Peermade	15	87.19	10676	5468	7462	36.47	53.35	65.08	240	97.08	3.24
KOTTAYAM	16. Meenachil	54	13.38	7099	24835	29368	18.25	101.12	107.00	805	99.75	2.74
	17. Kanjirapally	30	11.71	8260	10340	13582	31.35	85.94	101.00	451	83.37	3.32
QUILON	18. Pathanamthitta	60	32.93	7077	30532	35600	16.60	112.12	117.10	904	94.03	2.54
	19. Pathanamthitta	32	38.55	10569	19677	23916	21.56	90.74	98.76	546	88.83	2.28
TRIVANDRUM	20. Neyyattinkara	49	11.65	12442	32997	38263	15.96	84.50	87.65	962	99.17	2.51
	21. Nedumangad	43	21.55	10914	22354	27512	23.07	74.34	81.88	851	99.18	3.09
Total Sub-Region		319	26.34	8965	327507	413822	26.36	69.63	78.29	15006	93.33	3.59

* No. of Teachers per 100 Students.

profile and population juxtaposition. The problem of drop-out of students at middle stage is also present in other Taluks as well but it was less acute there.

1.1.3 High Schools

At high/higher secondary level, the position in Kerala Sub-region vis-a-vis the country was again on the better side, though very slightly. The figures for Kerala Sub-region at 30% and for India (21.2%) give the idea that the Sub-region was better in this respect also. Difference at Taluk level followed the familiar pattern. The drop-out of students and under-utilisation of school facilities was again in often repeated Taluks of Mannarghat, North Wynad, South Wynad etc. (Refer Table 10.4).

1.1.4 Utilisation of School Facilities

The school facilities in the Sub-region are found to be very well utilised as compared to the national average. In 1974-75, on an average 432 students were studying in a primary school as against 147 students at all India level. Similarly in a middle and secondary school the average number of students studying were 505 and 316 respectively as compared to 151 and 186 students at all India level. Thus, in relation to national situation the schools in the Sub-region appeared to be overcrowded. But the higher literacy rate in the Sub-region (see Table 10.5) has much to come to the abundant availability of schools and their better utilisation.

During 1971-75, the utilisation of the school facilities in the Sub-region has shown some minor changes in case of primary and secondary schools and a substantial increase in case of middle schools. Whereas, in primary schools, the number of students enrolled in a school has decreased from 458 in 1971 to 432 in 1975, in case of secondary schools it increased from 295 to 310 students. Number of students studying per middle school has increased from 422 in 1971 to 505 in 1975 showing comparatively substantial increase in the utilisation aspect of middle schools in the sub-region.

Talukwise analysis of the utilisation of school facility shows wide variations. In case of primary schools in the year 1974-75, Udumbachola Taluk had the highest rate of utilisation i.e. 795 students per school. Other Taluks having fairly high rate of utilisation as compared to Sub-regional average were, Mukundapuram (649), Kunathunad (632) and Peermade (626). On the other hand, lowest enrolment per primary school in the Sub-region was found in Badagara (261) followed by Devicolam (298), but as compared to national average it was still quite high.

In case of middle schools, as against the Sub-regional average of 505 students per school, Neyyattinkara Taluk was found at top with 781 students per school, closely followed by Mukundapuram (756) and Pathanapuram (747). The lowest enrolment per school is found in North Wynad Taluk (257) which was about half of the Sub-regional

Table-10.4: Taluk-wise No. of High/Higer-Secondary Schools, Enrolment and Teachers in Kerala Sub-Region.

Taluk	No. of Schools-1975			Enrolment in Secondary classes (IX-XI) 1971-75					Teachers - 1975		
	Total No. of Schools	Area served by a school (in sq. km.)	Population served by a school	Total No. of students in IX-XI classes 1971	Total No. of students in IX-XI classes 1975	Percentage growth 1971-75	Percentage of students in 14-16 age group 1971	Percentage of students in 14-16 age group 1975	Total No. of teacher	Percentage of trained teachers	*Teacher students Ratio
1. North Wynad	7	106.77	20137	1208	1894	56.79	14.15	20.36	222	97.30	11.68
2. South Wynad	16	86.14	19383	2468	4060	64.51	13.14	19.83	484	100.00	11.80
3. Quilandy	19	39.84	26882	6528	8419	28.97	21.10	24.97	714	100.00	8.50
4. Badagara	22	24.99	20305	5522	6799	23.13	20.42	23.06	707	100.00	10.40
5. Ernad	38	59.52	20522	6053	9480	56.62	12.82	18.42	1117	93.82	11.76
6. Mannarghat	11	99.96	18267	1703	2611	53.32	13.90	19.69	321	96.26	12.35
7. Palghat	20	36.02	20085	8403	7415	-11.76	34.50	27.97	791	98.48	10.69
8. Chittur	15	76.74	22791	4165	5074	21.82	20.10	22.49	541	99.26	10.61
9. Mukundapuram	47	28.00	13681	13655	16597	21.55	35.05	39.11	1976	94.48	11.90
10. Kunnathunad	25	27.11	12735	6391	3342	47.71	33.15	15.90	1082	94.82	32.79
11. Kothamangalam	NA	-	-	NA	NA	-	-	-	NA	NA	-
12. Thodupuzha	24	40.57	9974	5149	6605	28.28	35.54	41.81	794	97.61	12.03
13. Devicolam	9	177.12	16282	1028	1869	81.81	11.59	19.33	249	98.39	13.11
14. Udumbanchola	11	97.40	26263	2648	4209	58.95	15.15	22.07	475	96.84	11.31
15. Peermade	10	130.78	16015	1607	2051	27.63	16.58	19.41	276	95.29	13.80
16. Meenachil	43	16.81	8915	10265	10727	4.50	44.20	42.40	1436	98.96	13.42
17. Kanjirapally	15	23.42	12521	4146	3759	-9.33	36.45	30.32	574	94.25	15.11
18. Pathanamthitta	47	42.03	9034	12991	15468	19.07	50.45	55.20	1540	97.34	9.94
19. Pathanamapuram	24	51.40	14092	7728	9224	19.36	37.69	41.32	1108	100.00	12.04
20. Neyyattinkara	41	13.93	14870	13713	16072	17.20	37.14	39.94	1674	98.21	10.40
21. Nedumangad	21	44.13	22347	6635	8292	24.97	23.34	25.77	869	95.63	10.47
Total Sub Region	465	46.39	15790	122006	143967	18.00	27.43	29.71	16950	97.19	11.77

* No. of Teachers per 100 students.

Table-10.5: Number of Students per School at Primary, Middle & Secondary Levels- Talukwise- Kerala Sub-Region (1971 and 1975).

District	Taluka	No. of students per Primary School		No. of Students per Middle School.		No. of students per secondary	
		1971	1975	1971	1975	1971	1975
<u>Cannanore</u>	1. North Wynad	312	357	193	257	201	270
<u>Kozhikodo</u>	2. South Wynad	417	417	318	404	190	254
	3. Quilandy	340	359	259	348	363	443
	4. Badagara	262	261	280	354	276	309
<u>Malapuram</u>	5. Ernad	328	340	286	367	252	249
<u>Palghat</u>	6. Mannarghat	344	380	309	451	170	237
	7. Palghat	543	564	363	427	442	371
	8. Chittur	634	621	291	342	297	338
<u>Trichur</u>	9. Mukundapuram	700	649	618	756	310	353
<u>Ernakulam</u>	10. Kunnathunad	656	632	682	678	278	134
	11. Kothamangalam	NA	NA	NA	NA	NA	NA
<u>Idukki</u>	12. Thodupuzha	510	497	457	555	245	275
	13. Devicolum	361	298	399	433	147	208
	14. Udumbanchala	1174	795	627	635	294	383
	15. Poornade	733	626	421	497	161	205
<u>Kottayam</u>	16. Moenachil	462	414	443	544	250	299
	17. Kanjirapally	548	495	356	453	276	251
<u>Quilon</u>	18. Pathanamthitta	427	370	509	593	289	329
	19. Pathanamthitta	526	413	596	747	454	384
<u>Trivandrum</u>	20. Noyyankankal	558	506	673	781	352	392
	21. Nedumangad	575	490	559	640	368	395
Total Sub-Region:		458	432	422	505	295	310
All India:		-	147	-	151	-	186

average. About half of the 21 talukas of the Sub-region had below Sub-regional average students per middle school (See Table 10.5) and most of these Taluks were having low density and because of the scattered value of the settlements, the utilisation aspect was always on the lower side.

At secondary school level, the number of students per school in different Taluks seemed to be less consistent. As compared to the Sub-regional average of 310 students per school, Quilandy Taluk had the highest number at 443 students and Kunnathunad the lowest at 134 students. It was also lower than the national average (186). As many as eleven Talukas had lesser number of students per school than the Sub-regional average. On the whole it is observed that in the Sub-region almost all the Taluks had higher number of students per school showing better utilisation of this facility in the Sub-region (Refer Table 10.5).

1.2 Higher Education

Even in regard to the higher education the Sub-region has adequate facilities in general and technical education in particular. In 1975 there were 35 Colleges, of which 32 were Degree Colleges (Arts, Science & Commerce), and 3 technical Colleges (Refer Table 10.6). It had only one Engineering Colleges and no medical college. But as compared to facility in Karnataka Sub-region, Kerala Sub-region does not fair well. The Karnataka Sub-region though having lesser population had as much as 118 college for higher education. In relation to population Kerala

Sub-region has only 0.52 college per lakh of population as compared to 2.55 colleges in Karnataka Sub-region. Total enrolment in these institutions was to the extent of 36127 students of which only 500 were in technical colleges.

Talukwise analysis shows comparatively better distribution of higher educational institutions in the Kerala Sub-region. Out of 21 Taluks only three (i.e. North Wynad, Devicolam and Peermade) Taluks did not have any such institution, whereas in Karnataka Sub-region, out of total 35 taluks as many as 14 Taluks did not have any such institutions. Amongst various Taluks, Meenachil (6) had highest number of these institutions enrolling 7552 students. Other Taluks having comparatively better facilities were, Palghat (4), Pathnapuram (4), Patnanamthitta (3) and Ernad (3). Palghat was also having the only engineering college of the Sub-region (See Table 10.6).

A fact worth mentioning here is that the location of higher educational facilities, if compared to the local needs (i.e. based on population content) has no relevance. The Taluks where the population pressure is heavy (Neyyattinkara, Nedumangad, Pathanapuram, etc.) the availability of higher educational facilities are on the meagre side. It looks rather baffling, on the face of it, but it is to be noted that all these Taluks are in vicinity of big cities of Trivandrum, Quilon, and, it immediately reflects that the students in the above mentioned Taluks must be availing the abundant facilities available in these big urban centres. This fact also points to the lop-sidedness of the

Table-10.6: Taluk-wise availability of Higher Education in Kerala Sub-Region-1974-75.

Taluk	Degree Colleges (including Research Institutions)			Medical Colleges			Engineering Colleges		
	Locations	No.	Enrolment	Locations	No.	Enrolment	Locations	No.	Enrolment
<u>Cannanore</u>									
1. North Wynad		-	-						
<u>Khozhikode</u>									
2. South Wynad	Sultan's Battery	1	667						
3. Quilandy	Quilandy	1	NA						
4. Badagara	Madappally	1	1391						
<u>Malapuram</u>									
5. Ernad	Malapuram Manjeri & Manipad	3	1536						
<u>Palghat</u>									
6. Mannarghat	Mannarghat	1	781						
7. Palghat	Palghat (2) Nommara (1)	3	4229				Palghat	1	300
8. Chittur	Chittur	1	1204						
<u>Trichur</u>									
9. Mukundapuram	Irinjalakuda	2	3071						
<u>Ernakulam</u>									
10. Kunnamthunad	Kolancherry & Perumbavoor	2	2133						
11. Kothamangalam	-	-	-						
<u>Idikki</u>									
12. Thodupuzha	Thodupuzha	1	1283						
13. Devicollam	Nil	-	-						
14. Udumbanchola	Narianpara	1	233						
15. Permade	nil	-	-						
<u>Kottayam</u>									
16. Meenachil	Palai(2) Voravilangad(1) Uzhavoor(1) Erttupottan(1)	5	7453						
<u>Kottayam</u>									
17. Kanjirappally	Kanjirappally	1	996						
<u>Quilon</u>									
18. Pathanamthitta	Pathanamthitta(1) Ranni(1)	3	5124						
19. Pathanapuram	Anchmal(1) Punalur(1) Pathanapuram(1)	3	2589						
<u>Trivandrum</u>									
20. Neyyattinkara	Dhanuvachapuram Kattskocda(1)	2	2178						
21. Nedumangad	Peringamala	1	240						
Total		32	35628					1	300

Note: Misc. Technical Institutes. Meenachil Taluk Palai 1 No. 1, Enrolment 99
Pathanapuram Taluk: Pathanapuram No. 1, Enrolment 100.

concept of the Sub-regional approach, where the linkage aspects with the surrounding areas has not been studied. In fact, the Western Ghats even as a viable region is a non-entity.

1.3 Vocational Education

Looking at the Sub-region as a whole, the facilities for vocational education are also found to be adequate. And as stated earlier, the Sub-region is not a viable entity, and, as such, the Sub-regional approach gives somewhat distorted picture. Out of total of 21 Taluks, in 6 Talukas (namely South Wynad, Quilandy, Mannarghat, Udumbanchola, Peermade and Pathanampuram), there was no institution for vocational education in 1975. In all, there were 51 schools for vocational education and out of these, 25 were teachers' training schools and 26 other schools teaching various other trades. In relation to population the Sub-region had on an average 0.69 schools per lakhs of population in 1975 which was higher than 0.56 school for the Karnataka Sub-region. Regarding enrolment in these schools, it was reported that in all of the 25 Teachers' training schools no student was admitted during two years under reference. This was due to the surplus teachers in the State. Unemployment was rife in the State and the proliferation of institution without proper planning is the root cause of the lopsided development. In the 26 schools meant for other vocations the enrolment was 3066 students (Refer Table 10.7).

TABLE-10.7: VOCATIONAL EDUCATION IN KERALA SUB-REGION-1974-75.

District/Taluka	Schools for vocational/professional education.	
	No.	Enrolment
<u>Cannanore</u>		
1. North Wynad	1	NA @
<u>Kozhikodo</u>		
2. South Wynad	-	-
3. Quilandy	-	-
4. Badagara	3	111 @
<u>Malapuram</u>		
5. Ernad	5	360 @
<u>Palghat</u>		
6. Mannarghat	-	-
7. Palghat	4	631 @
8. Chittur	3	154 @
<u>Trichur</u>		
9. Mukundapuram	4	459 @
<u>Ernakulam</u>		
10. Kunnathunad	4	32 @
11. Kothamanglam	N.A.	
<u>Idikki</u>		
12. Thodupuzha	2	16 @
13. Devicolam	1	20
14. Udumbanchola	-	-
15. Peermade	-	-
<u>Kottayam</u>		
16. Menachil	5	180
17. Kanjirapally	1	- @
<u>Quilon</u>		
18. Pathanamthitta	5	136 @
19. Pathanapuram	-	-
<u>Trivendrum</u>		
20. Neyyattinkara	11	798 @
21. Nedumangad	2	169 @
Total Sub-Region	51	3066

Note: 1. @ Enrolment data is only for 26 institutions since rest 25 were Basic Teacher Training Schools where enrolment was nil during this year due to some administrative reasons.

At Taluks level, distribution of these vocational schools is found to be uneven. Neyyattinkara Taluk had as many as 11 out of total 51 schools whereas, North Wynad, Devicolam and Kanjirapally Taluks each had only one school. Six Talukas did not have any such school. Other Taluks having comparatively better position were Ernad (5) Meenachil (5) and Pathnamthitta. (See Table 10.7). At least in the location of vocational schools, the population pressure was somewhat better appreciated as Neyyattinkara Taluk is the most densely populated Taluk in the Kerala Sub-region.

2. HEALTH SERVICES

2.1 Medical Institutions

In 1975, there were 1986 medical institutions in the Sub-region as against 1633 institutions in 1971 showing a growth of about 22 per cent over the period. (Refer Table 10.8). These institutions included 218 hospitals/dispensaries, 52 Primary Health Centres, 359 F.P.W. centres attached to P.H.C's, 181 Sub-centres, 49 Maternity and Child Welfare Centres and 1096 other institutions. At Taluk level the largest number of medical institutions were found in Quilandy (211) followed by Mukundapuram (197) and Meenachil (166), whereas, Peermade (24) Kothamanglam (25) Devicolam (35) and North Wynad (39) Taluks were having even less than 40 institutions. Percentage growth of these institutions during 1971-75 further highlights the wide disparity within Taluks. Out of the 21 Taluks,

only two, i.e. Mannarghat (51.85%) and Meenachil (48.21%) were having higher growth than the Sub-regional average of 22%. As compared to this the lowest growth was found in Kothamanglam (5%), Devicolam (6.06%), Nedumangad (7.14%) and Chittur (7.35%) (Refer Table 10.8).

Availability of these medical institutions in relation to area and population of the Sub-region, high-lights the lopsided development of health services within Taluks. In 1975 there were on an average 9 Medical Institutions per 100 sq. kms. of area as compared to 7.5 institutions in 1971. Taluk-wise analysis shows that 11 Taluks were having less number of institutions per 100 sq. kms. as compared to Sub-regional average of 9 institutions. Taluks like Quilandy and Neyyattinkara were having as high as 27.9 and 26.5 institutions per 100 sq. kms. as against only 1.83 and 1.97 in Peermade and Devicolam.

The comparison between different Taluks of the Sub-region is rather meaningless. Kerala Sub-region and for that matter Kerala State as a whole is so placed because of its peculiar shape and other physical profile that the availability or non-availability of a particular facility in the area is of no particular advantage or disadvantage. In Kerala Sub-region the settlement pattern is almost a unending phenomenon. This peculiarity is highlighted in the Chapter, viz., Settlement Pattern. For example whereas in Meenachil, Quilandy and Thodupuzha Taluks there were as many as 41 to 43 institutions per lakh of population, in case of

Table-10.8: No. of Medical Institutions Talukwise in Kerala Sub-Region(1971 and 1975).

District/ Taluk	HOSPITALS/DISPENSARIES		Primary Health Centres		FPW centres attached to P.H.C.		Maternity & Child Welfare Centres		Sub-centres including those established under FPF		Other Medical institutions		Total no. of medical institutions		Percentage ins-growth 1971 & 1975		No. of ins-titutions per 100 sq. km.		No. of Insti-tutions per lakh popula-tion.		
	RURAL	URBAN	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	
	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	1971	1975	
<u>Cannanore Dt.</u> 1. North Wynad	5	8	-	-	1	1	7	7	-	-	3	3	14	20	30	39	30.00	4.02	5.22	23.08	27.86
<u>Kozhikode Dt.</u> 2. South Wynad	6	12	-	-	2	2	17	18	-	-	6	6	48	66	79	104	31.65	5.73	7.55	28.21	33.55
3. Quilandy	5	11	-	-	4	4	26	26	-	-	12	12	143	158	190	211	11.05	25.10	27.87	40.43	41.37
4. Badagara	2	11	1	1	4	4	18	19	-	-	12	12	77	85	114	132	15.79	22.73	24.00	27.80	29.33
<u>Malapuram Dt.</u> 5. Ernad	8	20	2	3	4	4	38	45	-	-	12	12	60	77	124	161	29.84	5.48	7.12	17.22	20.64
<u>Palghat Dt.</u> 6. Mannarghat	7	10	-	-	1	1	9	9	1	1	3	3	6	17	27	41	51.85	2.46	3.73	15.00	20.50
7. Palghat	5	9	2	2	1	1	19	19	-	-	3	3	18	30	48	64	33.33	6.67	8.89	12.97	16.00
8. Chittur	10	10	1	1	2	2	21	21	-	-	8	8	26	31	68	73	7.35	5.89	6.32	21.94	21.47
<u>Trichur Dt.</u> 9. Mukundapuram	7	13	2	2	5	5	32	33	-	-	15	15	69	104	130	172	32.31	9.88	13.07	22.03	26.88
<u>Ernakulam Dt.</u> 10. Kunnathunad	4	8	1	1	2	2	13	13	6	6	-	-	64	69	90	99	10.00	13.29	14.60	31.03	30.94
11. Kothamangalam	6	6	1	1	1	1	19	9	3	3	-	-	4	5	24	25	4.17	8.57	8.93	17.14	15.63
<u>Idukki Dt.</u> 12. Thodupuzha	4	10	-	-	2	2	2	2	6	6	11	14	45	64	73	98	34.25	7.50	10.05	34.76	40.83
13. Devicoolam	5	6	-	-	1	1	1	1	3	3	6	6	17	18	33	35	6.06	1.86	1.97	25.38	23.33
14. Udumbanchola	3	15	-	-	-	-	-	-	-	-	16	16	34	34	53	65	22.64	4.95	6.07	20.38	22.41
15. Permade	4	6	-	-	1	1	1	1	3	3	12	12	1	1	22	24	9.09	1.68	1.83	14.67	16.00
<u>Kottayam Dt.</u> 16. Mccnachel	6	12	1	1	4	4	4	6	9	9	22	22	66	112	112	166	48.21	15.51	22.96	32.00	43.68
17. Kanjirapally	4	6	16	1	1	1	1	1	3	3	32	12	29	36	56	69	37.65	14.53	17.09	30.00	31.58
<u>Quilon Dt.</u> 18. Pathanam-thitta	10	19	-	-	3	3	26	26	9	9	-	1	33	38	81	96	18.52	4.17	4.86	20.77	22.86
19. Pathanam-pottam	33	39	19	1	2	2	20	20	6	6	-	2	7	9	39	49	25.64	3.16	3.97	12.58	14.41
<u>Trivandrum Dt.</u> 20. Nayyattankara	5	14	1	1	7	7	48	48	-	-	13	13	59	69	133	152	14.29	23.29	26.62	23.75	24.92
21. Nedumangad	8	14	-	-	4	4	35	35	-	-	9	9	56	58	112	120	7.14	12.08	12.94	26.05	25.53
Total Sub Region	117	229	14	15	52	52	347	359	49	49	178	181	876	1101	1633	1986	21.62	7.49	9.11	23.74	26.71

Pathanapuram and Peermade Taluks there were only 15 such institutions per lakh of population. (Refer Table 10.8). As stressed earlier, the availability or accessibility of the institutions as depicted in Table 10.9 does not truly reflect the actual position available in a particular Taluk.

* 2.2 Hospital Beds

In 1975 there were 9233 hospital beds in various Taluks of the Sub-region as against 6281 beds in 1971, showing a considerable improvement over the period (1971-75). In relation to population the number of beds per thousand persons has increased from 0.90 beds in 1971 to 1.22 beds in 1975. It is to be noted that the availability of hospital beds in the Sub-region, is considerably higher than the all India average of 0.68 beds per thousand population in 1974.

At Taluk level, there is a wide disparity in the availability of the bed strength. In 11 Taluks out of total 21 Taluks, the availability of beds per 1000 population was found to be less than the Sub-regional average of 1.22 in 1975. In most of the Taluks the ratio of bed strength during 1971-75 has remained either constant or increased marginally. The highest growth was observed in Kanjirapally Taluk, increasing from 1.20 to 4.66 beds followed by Meenachil from 0.77 to 3.16 beds. On the other hand in Chittur and Neyyattinkara Taluks the ratio of bed strength has gone down during the period 1971-75 (See Table 10.9).

In 1975 the highest number of beds per 1000 population were in Kanjirapally (4.66) followed by Kunnathunad (3.17) and Meenachil (3.16) and the lowest was in Udumbanchola (0.14) (Refer Fig.10.2).

2.3 Prevailing Diseases

In 1974-75 about 9.2 million patients were treated in various medical institutions of the Sub-region. Out of these, 6 per cent were treated for Dysentery, 3.5 per cent for other fevers and 2 per cent for respiratory diseases. It is difficult to say which are most prevalent diseases because 86% of the patients are classified under miscellaneous diseases (See Table 10.10).

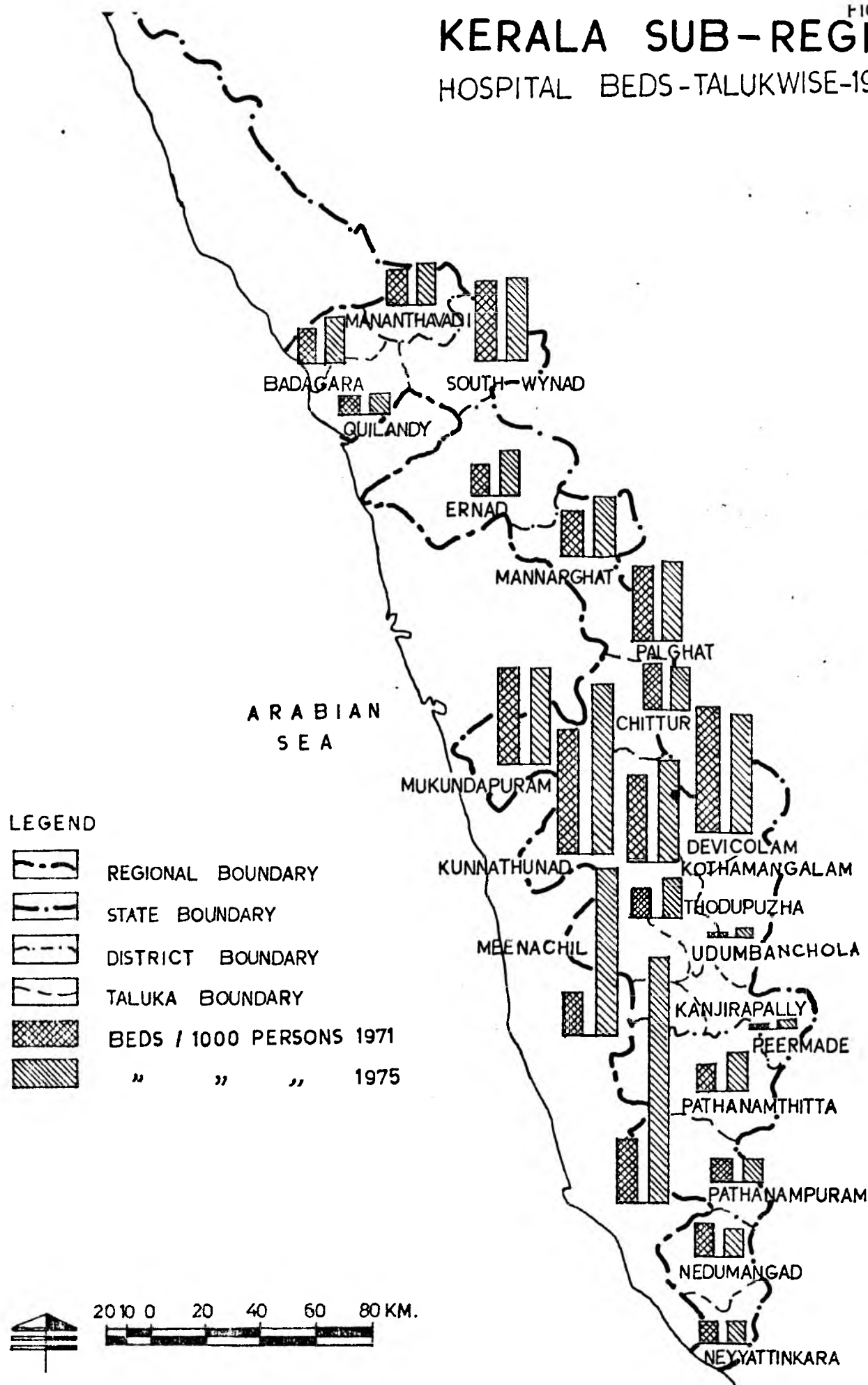
Talukwise analysis shows that Dysentery was more prevalent in Taluks like Udumbanchola (21%), Palghat (8.6%) and North Wynad (8.2%), Other diseases like Cholera, Malaria and Small Pox were negligible in the Sub-region. Regarding T.B. though the Sub-regional average was only 1.16 per cent, in Ernad (3.28%) and Pathanamthitta (2.27%) Taluks it was comparatively higher.

3. CONCLUSIONS







As depicted in the foregoing pages, the social development aspect is quite well developed in the Kerala Sub-region. The literacy rate, the availability of schools, the enrolment, the number of hospitals and the number of beds, in most of the Taluks is on a very high side. Over and above, this, progress achieved, even in a short span (1971-75 the

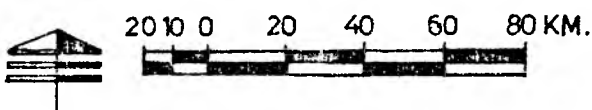
KERALA SUB-REGION

HOSPITAL BEDS - TALUKWISE - 1971 & 1975



LEGEND

-  REGIONAL BOUNDARY
-  STATE BOUNDARY
-  DISTRICT BOUNDARY
-  TALUKA BOUNDARY
-  BEDS / 1000 PERSONS 1971
-  " " " 1975



WESTERN GHATS SURVEY AND PLAN

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Table 10.9: Talukwise Total No. of Hospital Beds and Doctors in Kerala Sub-Region (1971-75).

District/Taluk	Total No. of Hospital Beds		Beds per 1000 Population		Total No. of Doctors		No. of Doctors per 1 lakh of population	
	1971	1975	1971	1975	1971	1975	1971	1975
<u>Alappuzha Dt.</u>								
Alappuzha	87	113	0.67	0.80	11	22	8.46	15.71
<u>Kannur Dt.</u>								
Kannur	499	549	1.75	1.77	53	85	18.93	27.42
<u>Kozhikode Dt.</u>								
Kozhikode	145	185	0.31	0.36	159	184	33.83	36.88
<u>Malappuram Dt.</u>								
Malappuram	270	374	0.66	0.84	98	118	23.90	26.22
<u>Palakkad Dt.</u>								
Palakkad	432	663	0.60	0.85	91	135	12.82	17.31
<u>Ponnani Dt.</u>								
Ponnani	164	217	0.89	1.08	16	36	8.89	18.00
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	520	599	1.41	1.49	57	87	15.41	21.75
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	270	282	0.86	0.82	42	53	13.55	15.59
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	1126	1219	1.91	1.90	116	154	19.66	24.06
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	699	1008	2.39	3.17	60	86	20.69	26.88
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	233	297	1.64	1.87	15	30	10.71	18.77
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	116	166	0.53	0.69	54	81	24.55	33.75
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	313	319	2.34	2.17	50	51	38.46	34.00
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	26	40	0.10	0.14	37	49	14.23	14.90
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	24	28	0.16	0.18	5	9	3.57	5.63
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	270	1211	0.77	3.16	59	133	16.86	35.00
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	207	877	1.20	4.66	35	57	20.59	30.00
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	170	333	0.44	0.78	41	65	10.51	15.48
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	152	164	0.49	0.49	16	28	5.16	8.24
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	359	384	0.66	0.63	89	108	15.89	17.70
<u>Thiruvananthapuram Dt.</u>								
Thiruvananthapuram	189	205	0.44	0.44	76	85	17.67	18.09
Sub Region	6281	9233	0.91	1.22	1180	1656	17.15	22.15

Table-10.10: Patients treated in Hospitals and Dispensaries, Kerala, Sub-Region-1974-75.

District/Taluk	Cholera	Small Pox	T.B.	Malaria	Other Feaver	Dysentary	Respiratory Diseases	Injury	All other Causes	Total Patients treated.
<u>Cannanore</u>										
1. North Wynad	-	-	508 (1.42)	-	2060 (5.74)	2952 (8.22)	1281 (3.57)	628 (1.75)	28463 (79.30)	35892
<u>Kozhikode</u>										
2. South Wynad	412 (0.11)	-	4514 (1.17)	150 (0.04)	9543 (2.47)	13081 (3.38)	13918 (3.59)	5560 (1.44)	339745 (87.80)	386923
3. Quilandy	1728 (0.29)	8 (0.00)	7902 (1.34)	2101 (0.36)	28026 (4.75)	38117 (6.46)	24105 (4.08)	8898 (1.50)	479556 (81.22)	590441
4. Badagara	259 (0.05)	8 (0.00)	7597 (1.50)	4 (0.00)	12150 (2.40)	22065 (4.37)	8423 (1.67)	6028 (1.19)	448963 (88.82)	505497
<u>Malapuram</u>										
5. Ernad	261 (0.03)	76 (0.01)	24756 (3.28)	625 (0.08)	33127 (4.39)	61243 (8.12)	21169 (2.81)	16172 (2.14)	596820 (79.14)	754249
<u>Palghat</u>										
6. Mannarghat	433 (0.17)	-	2208 (0.84)	-	10338 (3.96)	19776 (7.34)	3212 (1.23)	4853 (1.86)	221091 (84.60)	261311
7. Palghat	1 (0.00)	3 (0.00)	8561 (1.37)	2 (0.00)	11824 (1.90)	53363 (8.57)	6920 (1.11)	16029 (2.57)	526264 (84.48)	622961
8. Chittoor	32 (0.01)	-	2117 (0.51)	3 (0.00)	19801 (4.75)	17722 (4.25)	6400 (1.54)	5201 (1.25)	365396 (87.69)	416672
<u>Trichur</u>										
9. Mukundapuram	5229 (0.43)	-	14601 (1.20)	11 (0.00)	63088 (5.23)	75541 (6.26)	25083 (2.08)	11580 (0.96)	1012000 (83.84)	1207133
<u>Ernakulam</u>										
10. Kunnathunad	186 (0.05)	-	4052 (1.19)	-	13738 (4.02)	20305 (5.95)	11744 (3.44)	3546 (1.04)	287949 (84.31)	341520
11. Kothamanglam	-	-	32 (0.01)	-	28253 (10.93)	15492 (5.99)	8013 (3.10)	3714 (1.44)	203073 (78.53)	258571
<u>Idiuki</u>										
12. Thodupuzha	-	-	987 (0.29)	24 (0.01)	25438 (7.50)	15482 (4.56)	15050 (4.44)	6381 (1.88)	275835 (81.32)	339197
13. Devicoolam	-	-	796 (0.84)	-	2443 (2.58)	6030 (6.37)	788 (0.83)	217 (0.23)	84337 (89.15)	94611
14. Udumbanchola	90 (0.04)	50 (0.02)	886 (0.37)	309 (0.13)	18683 (7.90)	50000 (21.15)	6630 (2.81)	772 (0.33)	158969 (67.25)	236389
15. Poornade	12 (0.01)	-	218 (0.23)	6 (0.01)	215 (0.22)	1965 (1.75)	490 (0.51)	712 (0.74)	92279 (96.53)	96627
<u>Kottayam</u>										
16. Moonachil	18 (0.00)	-	960 (0.19)	5 (0.00)	11457 (2.30)	23149 (4.66)	7737 (1.56)	4281 (0.86)	449504 (90.43)	497111
17. Kanjirapally	-	-	2641 (0.67)	1 (0.00)	2250 (0.57)	10580 (2.68)	-	-	378695 (96.08)	394161
<u>Quilon</u>										
18. Pattanamthitta	2312 (0.50)	1 (0.00)	10593 (2.27)	15 (0.00)	13212 (2.84)	27735 (5.95)	9581 (2.06)	6388 (1.37)	396138 (85.01)	465971
19. Pathanapuram	15 (0.00)	34 (0.01)	1943 (0.42)	20 (0.00)	20015 (4.38)	21316 (4.66)	7533 (1.66)	6920 (1.52)	309160 (87.36)	357256

Table- 10.10 (Contd.)

District/Taluk.	Cholera	Small Pox	T.B.	Malaria	Other Feaver	Dysentary	Respiratory Diseases	Injury	All other causes	Total Patients treated.
<u>Yendrum</u>										
Neyyatinkara	394 (0.4)	-	7567 (0.80)	7 (0.00)	14620 (1.54)	37242 (3.92)	7569 (0.80)	21568 (2.27)	861330 (90.63)	950297
Nedumangad	902 (0.17)	1507 (0.29)	3452 (0.66)	226 (0.04)	16574 (3.17)	19041 (3.65)	9912 (1.90)	10283 (1.97)	460461 (88.15)	522358
<u>al Sub-Region</u>	12284 (0.13)	1687 (0.02)	106891 (1.13)	3509 (0.04)	356855 (3.78)	551327 (5.84)	195558 (2.07)	139731 (1.48)	8067328 (85.5)	9435170 (100.00)

Note: Figures in brackets show the percentage to total patients treated.

period of reference in the study), that is, the addition or the changes in the availabilities of the social facilities, was quite impressive. No doubt, the exceptions are there in all the cases. But, as noticed, the Kerala Sub-region is not a viable entity and since its very profile is such, that the inter-taluk differentials, as noticed from the differences in the facilities at Taluk level, do not reflect the true picture. For that matter, the whole of the Western Ghats Region is nothing but a physical entity and its very nature, size and the terrain, make the Sub-regional approach look somewhat out of place.

The most important aspect, and, which is being covered in detail at Taluk level i.e. detailed Taluk Plans, is, in fact, the only way to judge, plan and provide the missing links in the whole gambit. activities in the area like the Western Ghats. At Sub-regional level, the distortions, if any, in the social development aspect, are being spotted and provided in the hierarchy of settlements. This in very specific terms, point to the facilities needed and to be provided at focal points, for serving not only the people in a particular location - specific but also for the areas around them. This aspect is dealt in Section viz., 'Urbanisation and Settlements', and the details worked out therein give the future course of action in social development, which in any case is more in nature of correcting the imbalances in spatial aspects. The Kerala Sub-region on the whole in regard to the development of social services is very well placed.

SECTION - XI : TRANSPORTATION

Development of transportation system has its own importance in the development of a region. Kerala Sub-Region is predominantly a hilly region and therefore, problems of accessibility assume more importance than usual. Transportation as an infrastructure is a basic need for any development, socio-economic as well as physical, for it provides necessary linkages for the movement of men and materials between numerous urban and rural settlements as well as areas of economic activities.

Kerala Sub-Region has two modes of transportation, viz. roads and railways. Road network system has a complete hierarchy from national highways to village roads. Railway network under the jurisdiction of Southern Railway consists of broad gauge routes viz. Mangalore-Shoranur-Palghat -Coimbatore, providing interstate broadgauge connection, Shoranur-Trivandrum-Kanya Kumari serving the coastal Kerala, and Quilon-Punalur-Shencottah Madurai/Tirunelveli a metre gauge line crossing the Sub-Region in the west-east direction. A broad gauge line has been recently constructed connecting Trivandrum and Kanya Kumari. Airports at Trivandrum and Cochin (outside the Sub-Region) have regular scheduled commercial flights operated by Indian Airlines. Airports at Coimbatore and Madurai, both in Tamil Nadu and Mangalore in Karnataka also serve the Sub-Region. The only sea port in the Sub-Region viz. Badagara, a minor sea port, has no sea-borne traffic what-so-ever. Coastal shipping has no importance at present. The two modes, their systems, the gaps and deficiencies are discussed in detail below:

1. ROADS

1.1 Road network

The Sub-Region has a total road network of 8333.92 km. consisting of National Highways, State Highways, District Roads and Village Roads maintained by the State P.W.D. In addition, 20,232 km. of rural roads are maintained by the Panchayat Department of the State. Length of national highways is 132 km. State highways measure about 1140.94 km. Length of major and other district roads is 2163.34 km. and 2225.67 km. respectively. Village roads maintained by P.W.D. are to the tune of 2672 km. Table 11.1 provides talukwise details of highways and district roads. The network is as follows.(Fig. 11.1).

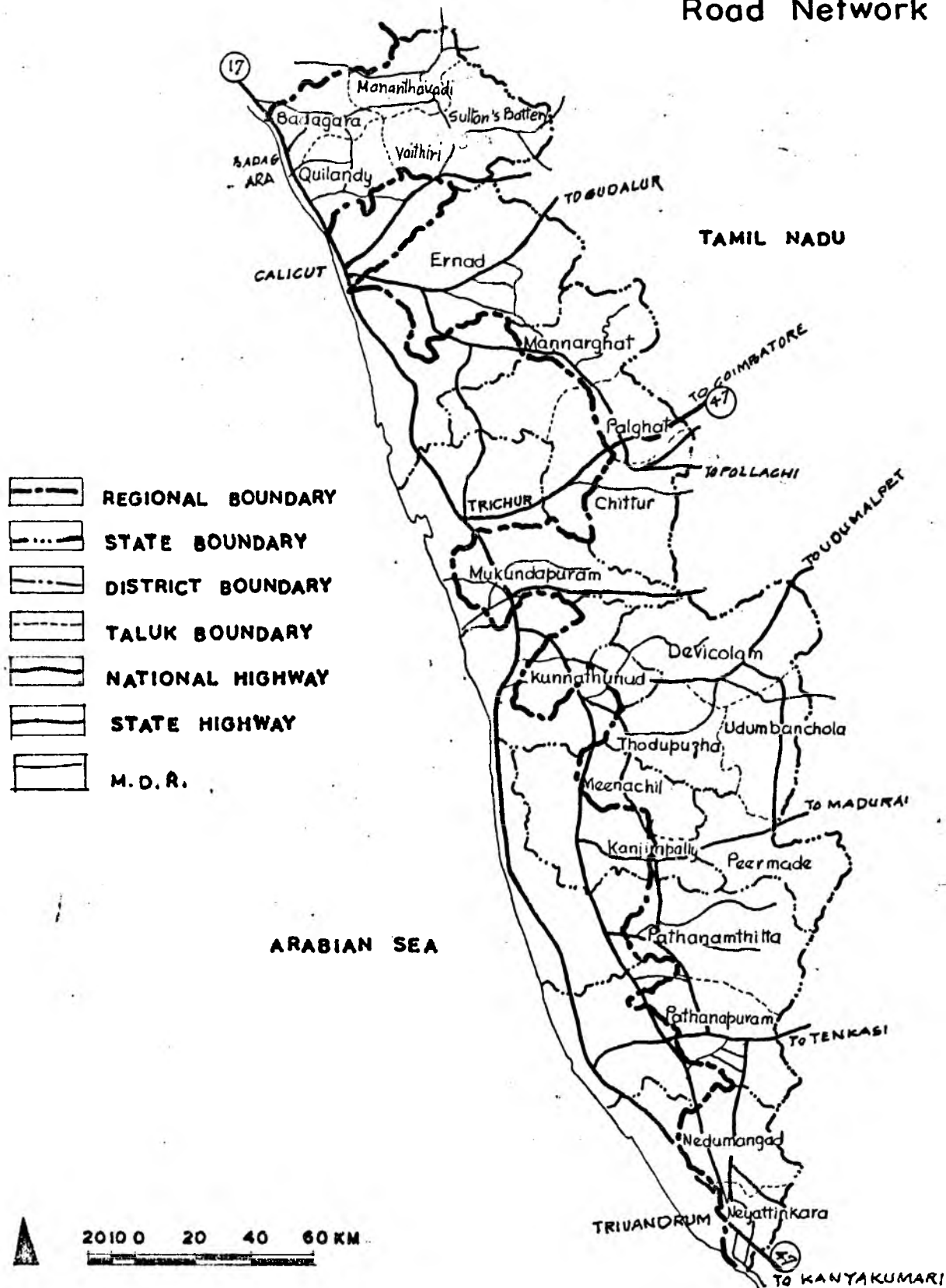
1.1.1 National Highways

The Sub-Region is served by two national highways. National Highway 17, a major constituent of 'West Coast Highway', connect -Panvel/Bombay (Maharashtra), Karwar, Mangalore (Karnataka) Cannanore, Hosdurg, Calicut and terminates at Trichur (all in Kerala) where it joins National Highway 47. It traverses through Badagara, Quilandy, and Ernad taluks of the Sub-Region, and has a length of 49.50 km.

National Highway 47 originates at Salen (Tamil Nadu) and then traverses towards west upto Trichur (Kerala) through Palghat Gap and then turns southwards connecting Cochin, Quilon and Trivandrum and terminates at Nagercoil (N.H.7) in Tamil Nadu. Except Palghat- Trichur portion of N.H.47, this highway together with N.H. 17 forms what is

KERALA SUB-REGION

Road Network



WESTERN GHATS: SURVEY & PLAN

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Table -11.1 : Existing Road Network (1974)

(Road Length in Km.)

Taluk	N.H.*	S.H.	M.D.R.	O.D.R.	Total
1. Mananthvadi**	-	-	128.07	-	128.07
2. South Wynad**	-	52.07	77.61	137.53	267.21
3. Quilandy	27.00	-	86.31	79.72	193.03
4. Badagara	17.50	-	95.81	54.06	167.37
5. Ernad	5.00	101.20	187.27	114.40	407.87
6. Mannarghat	-	37.00	76.49	75.65	189.14
7. Palghat	30.00	27.08	113.14	6.00	176.22
8. Chittur	-	51.06	175.68	75.16	301.90
9. Mukandapuram	27.50	88.40	15.38	19.63	150.91
10. Kunnathunad	-	55.71	169.96	163.80	389.47
11. Kothamangalam	-	34.80	87.65	77.99	200.44
12. Thodupuzha	-	14.40	108.55	114.52	237.47
13. Devicolam	-	147.52	95.84	94.45	337.81
14. Udumbanchola	-	96.71	41.92	101.68	240.31
15. Peermade	-	76.90	61.30	78.61	216.81
16. Meenachil	-	76.65	98.13	300.60	475.38
17. Kanjirapally	-	49.69	51.55	124.12	225.36
18. Pathanamthitta	-	57.02	150.78	178.43	386.23
19. Pathanapuram	-	82.50	172.95	145.93	401.38
20. Neyyatinkara	-	17.80	94.35	204.40	316.55
21. Nedumangad	25.00	74.43	74.60	78.99	253.03
Sub- region	132.00	1140.94	2163.34	2225.67	5661.96

Source : The State Government.

* Length of National Highways as measured from the maps.

** North Wynad taluk has been renamed as Mananthavadi and South Wynad has been splitup into two taluks viz. Sultan's Battery and Vaithiri. These three taluks together constitute newly created Wynad District.

commonly known as West Coast Highway. The highway traverses through Palghat, Mukandapuram and Neyyatinkara taluks of the Sub-Region and has a total length of 82.5 km.

1.1.2 State Highways :

There are number of state highways which serve the Sub-Region. Total length of state highways is 1140.94 Km. The highways and places they connect are given in Table - 11.2.

a) Accessibility

It will be seen that the state highways network serves 18 taluks out of 21 taluks of the Sub-Region. These are Mananthvadi, Quilandy and Badagara. Mananthvadi does not have any national highway either, whereas Quilandy and Badagara taluks which have advantage of NH 17 passing through them.

Meenachil and Pathanapuram taluks have four state highways passing through them. Udumbanchola, Devicolam, Kunnathunad, Pathanamthitta and Nedumangad taluks are served by three state highways. In case of Ernad, Palghat, Chittur, Kothamangalam, Kanjirapally, Mukandapuram and Pathanamthitta these taluks are served by two highways. Rest of the five taluks viz. South Wynaad, Mannarghat, Peermade, Thodupuzha and Neyyatinkara have only one state highway traversing through them. Besides there are two short stretches off SH 19, connecting Kallar (SH 19) Rankalmettu and Madurai (Tamil Nadu) and Poopara (SH 19) to Bodinettu - Bodinayakanur (Tamil Nadu).

Table - 11.2 : State Highways Network

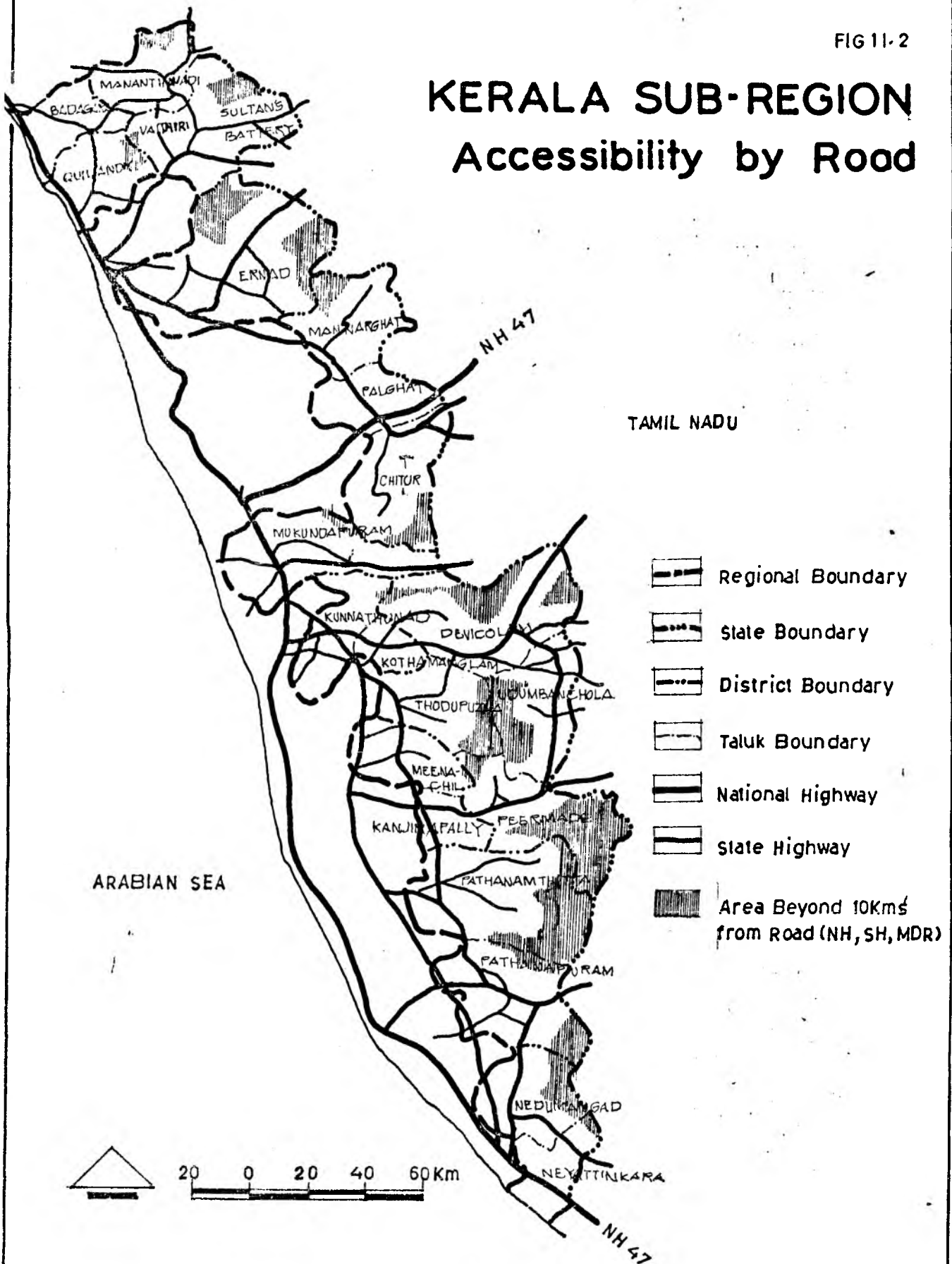
Sl. No.	State Highway	Taluku Served	Places connected
1.	2.	3.	4.
1.	S.H. 1 (M.C. Road)	Kunnathunad Meenachil Pathanapuram Nedumangad	Trivandrum (NH 47)- Kotaayam (SH 13) - Muvathupuzha (SH 20)- Angamal (NH 47) near Alwaye.
2.	S.H. 2 (T.S. Road)	Pathanapuram Nedumangad	Trivandrum (NH 47)- Thenimal (SH 4)
3.*	S.H. 3* (N.S. Road)	Nedumangad Neyyatinkara	Nedumangad, Neyyatinkara, Aramboli (TN)
4.	S.H. 4 (Q.S. Road)	Pathanapuram	Katharakara, Quilon-Punalur, Shencottan (TN)
5.	S.H. 7	Pathanamthitta	Thiruvella (SH 1) Pathanamthitta (SH 8)
6.	S.H. 8 (P.M. Road)	Thodupuzha Meenachil Kanjirapally Pathanamthitta, Pathanapuram	(SH 1), Thodupuzha Muvathupuzha - Punalur (SH 8) Pathanamthitta (SH 7) Pathanapuram
7.	S.H. 10	Pathanamthitta	Connects SH 1 and SH 7 small length of this short stretch road is within the taluk.
8.	S.H. 13* (K.K. Road)	Peermade Kanjirapally	Kottayam (SH 1) Kanjirapally, Peermade, Kumily (SH 19), Madurai (TN)
9.	S.H. 14	Meenachil	Erattupetta- Peermade (Partial)
10.	S.H. 15 (Etamanur- Vaikom)	Meenachil	Ernakulam
11.	S.H. 16 (Alwaye- Munnar Road)	Kunnathunad Kothamangalam Devicolum	Peerambavoor (SH 1) Kothamangalam (SH 20)- Mannar (SH 19)

Table - 11.2 Contd..

1.	2.	3.	4.
12.	S.H. 17 * (Northern outlet Road)	Devicolam	Munnar (SH 16) - Udumalpet (TN)
13.	S.H. 19 (M.K.Road)	Devicolam Udubanchola Peermade	Mannar-(SH 16) - Udubanchola Kumily (SH 13)
14.	S.H. 20.	Kothamangalam Kunnathunad	Ernakulam (NH 47)- Muvathupuzha (SH 1) Kothamangalam (SH 16)
15.	S.H. 21*	Mukundapuram Coimbatore	Chalakkudi (NH 47)- Pollachi (TN)
16.	S.H. 23	Mukundapuram	Trichur, Cochin
17.	S.H. 24	Ernad Mannarghat Palghat	South of Calicut (NH 17) Malappuram, Mannarghat- Palghat (NH 47)
18.	S.H. 25	Chittur	Thathamangalam, Natukal
19.	S.H. 26*	Chittur	Natukal, Velamthavalam (T.N.)
20.	S.H. 27*	Palghat Chittur	Palghat- Pollachi
21.	S.H. 28	Ernad	Velluvambaram (SH 24) Nilambur Eduvana -Gudalur (T.N.)
22.	S.H. 29*	Vaithiri (S.Wynad)	Calicut (NH 17) - Gudalur (TN)

* Inter State Links. In addition there are two interstate Highways in Udubanchola Taluk.

KERALA SUB-REGION Accessibility by Road



In short, two taluks do not have any highways, two are served by national highways only, four are served by national as well as state highways and the rest are served by state highways only. Thus the Sub-Region has a good highway network. Fig. 11.2 indicates areas accessible by highways system as well as major district roads. In general it can be said that high hill ranges along the state boundary are inaccessible. By and large these are forest areas and the land is undulating.

b) Deficiencies and Gaps

Level of service largely depends upon quality of road network that exists in a region. Any deficiencies and gaps are bound to affect the level of service adversely. The major gaps obtained are in the form of missing links and missing bridges. The deficiencies are narrow bridges, weak bridges and un-motorable bad surfaces. National highways within the Sub-Region do not have any unsurfaced stretches. As regards the state highways, 8 kms. are on state Highway 17 in Devicolam Taluk, 10.9 kms. in Udubanchola Taluk (SH 19) and 11.6 Kms. on state Highway 3 in Nedumangad Taluk. Thus only 30.5 kms. of road length needs attention out of a total length of 1106.4 kms. Though this length is very small, percentage wise, it needs to be accorded top priority for removing the serious lacuna. Talukwise assessment is spelt out in Table 11.3. It will be seen that major problem is in the form of 66 narrow and 50 weak bridges. There are no missing links or bridges on state highways. Figure 11.3 indicates deficiencies in the state highways system.

It will be seen that all the state highways except SH 14 and SH 15 are suffering from gaps and defects in

Table 11.3 : Gaps and Defects : State Highways

State Highway				Total	Total				
SH 1	Neenachil	WB-1 NB-1	Kunnathunad	WB-1 NB-Nil	WB-2 NB-1	3			
SH 2	Nedumangad	WB-Nil NB-5			WB-Nil NB-5	5			
SH 3	Nedumangad	WB-Nil NB-1	Neyyatinkara	WB-1 NB-1	WB-1 NB-2	3			
SH 4	Pathana- puram	WB-7 NB-1			WB-7 NB-1	8			
SH 7	Pathanam- thitta	WB-Nil NB-2			WB-Nil NB-2	2			
SH 8	Pathanam- thitta	WB-1 NB-2	Kanjirapa- lly	WB-Nil NB-3	Meenach- il	WB-2 NB-3	Pathana- puram	WB-5 NB-8	13
SH 10	Pathanam- thitta	WB-Nil			WB-2 NB-Nil	WB-Nil NB-1	1		
SH 13	Kanjirapa- lly	WB-Nil NB-1	Peermade	WB-Nil NB-2		WB-Nil NB-3	3		
SH 16	Devicolam	WB-3 NB-4	Kunnathunad	WB-1 NB-Nil		WB-4 NB-4	8		
SH 17	Devicolam	WB-9 NB-6				WB-9 NB-6	15		
SH 19	Devicolam	WB-Nil NB-1	Udumbanchola	WB-1 NB-6		WB-1 NB-7	8		
SH 20	Kothananga- lam	WB-2 NB-2	Kunnathunad	WB-2 NB-2		WB-4 NB-4	8		
SH 21	Mukandapur- am	WB-3 NB-9				WB-3 NB-9	12		

Table - 11.3 : Contd...

State Highway				Total	Total
SH 24 Mannarghat	WB-5 NB-5	Ernad	WB-Nil NB-4	WB-5 NB-9	14
SH 26 Chittur	WB-1 NB-Nil			WB-1 NB-Nil	1
SH 27 Chittur	WB-Nil NB-1			WB-Nil NB-1	1
SH 28 Ernad	WB-2 NB-3			WB-2 NB-3	5
SH 29 South Wynad	WB-6 NB-Nil			WB-6 NB-Nil	6
				<u>Total</u>	<u>116</u>
				WB-50 NB-66	

Note : WB = Weak bridge
NB = Narrow bridge

the form of narrow and weak bridges. The state highways 14 and 15 are small-stretch roads and have limited significance. State Highway 17 in the Devicolan Taluk has as many as 15 defective bridges followed by State Highway 24 and State Highway 8 having 14 and 13 defective bridges respectively. As much, state highways in the Sub-Region need special attention for removing above mentioned defects and deficiencies. Most of the highways pass through the towns and cities and would require a detailed study either to realign them or provide bye-passes, wherever possible. This would ensure safety and free flow of traffic.

1.1.3 District Roads

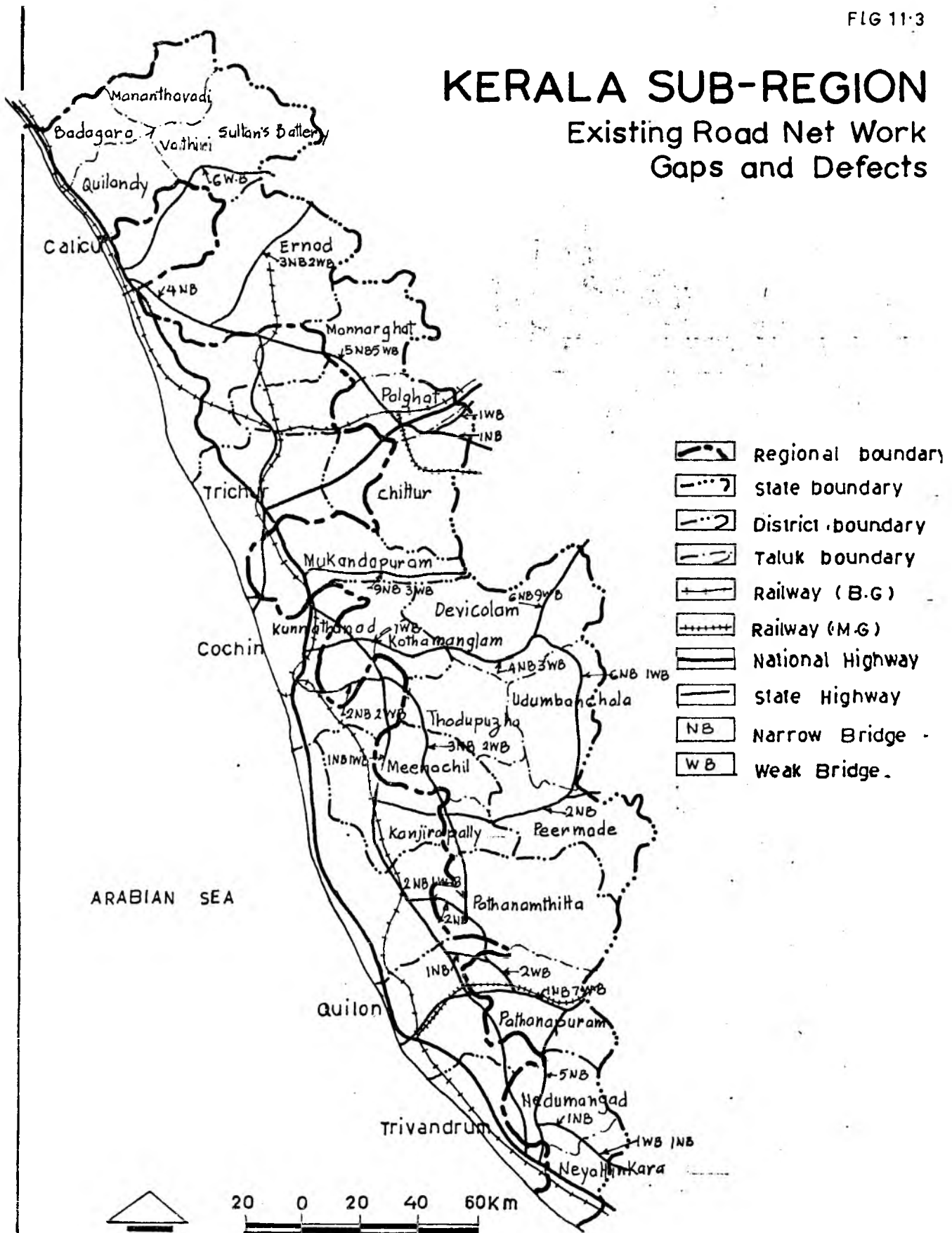
District roads are an intermediate link between highway and rural roads in the hierarchical system of road network. Total length of district roads in the Sub-Region is 4389.01 kms. of which major district roads have a length of 2163.34 kms. and the rest i.e. 2225.67 kms. are under other district roads category. Other district roads serve all the taluks except Mananthvadi. Details of road length in each of the two categories may be seen in Table -11.1.

1.2 Road Surfaces

About 145.41 kms. i.e. about 6.72% of major district roads are unsurfaced which are distributed over 13 taluks. Under other district roads category 804.19 kms. i.e. about 36.31% of the total length are unsurfaced. All taluks except Mananthvadi and Idukki have unsurfaced O.D. roads. Distribution of surfaced and unsurfaced roads in the two categories may be seen at Table 11.4. Out of 21 taluks only 8 taluks are having surfaced major district roads, 3 taluks of Idukki

KERALA SUB-REGION

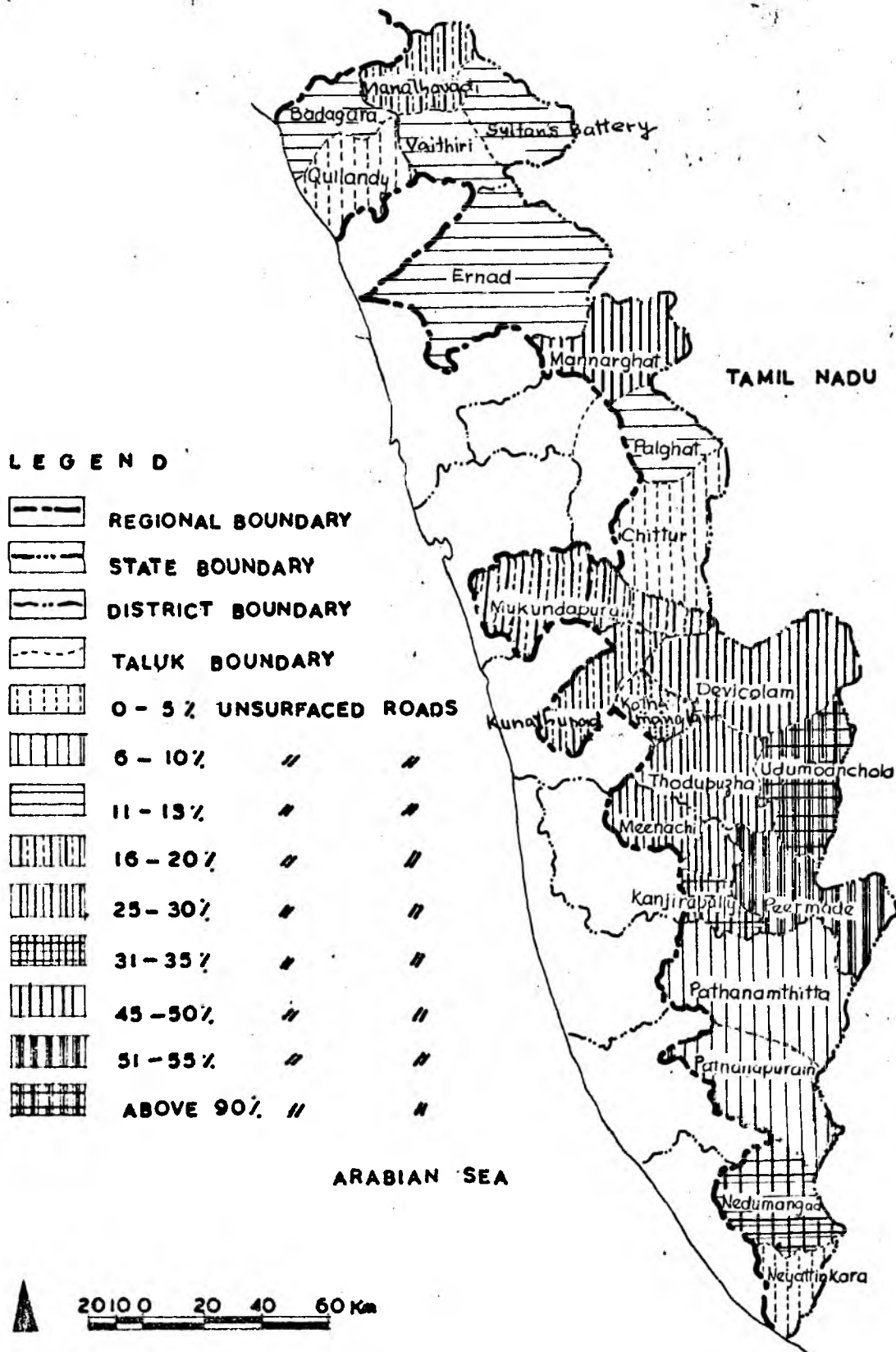
Existing Road Net Work Gaps and Defects



WESTERN GHATS : SURVEY & PLAN

TOWN & COUNTRY PLANNING ORGN, MIN OF WORKS & HOUSING; GOVERNMENT OF INDIA.

KERALA SUB-REGION ROAD SURFACES (Distt. roads)



WESTERN GHATS : SURVEY & PLAN

TOWN & COUNTRY PLANNING ORGN., MIN. OF WORKS & HOUSING, GOVT. OF INDIA.

Table : 11.4 District Roads by Surface (1974)

Taluku	M. D. R.			O. D. R.			Total unsur- faced roads.	Grand Total
	Surfaced	Unsurfaced	Total	Surfaced	Unsurfaced	Total		
1. Mananthvadi	106.46	21.61	128.07	-	-	-	21.61 (16.87)	128.07
2. S. Wynad	77.61	-	77.61	115.73	21.80	137.53	21.80 (10.13)	215.14
3. Quilandy	86.31	-	86.31	74.77	4.95	79.72	4.95 (2.98)	166.03
4. Badagara	95.81	-	95.81	36.67	17.89	54.06	17.39 (11.60)	150.37
5. Ernad	187.27	-	187.27	69.30	45.10	114.40	45.10 (14.95)	301.67
6. Mannarghat	76.49	-	76.49	1.20	74.45	75.65	74.45 (48.94)	152.14
7. Palghat	103.96	9.18	118.14	-	6.00	6.00	15.18 (12.74)	119.14
8. Chittur	173.85	1.85	175.68	72.10	3.00	75.16	4.83 (1.93)	250.78
9. Mukandapuram	15.38	-	15.38	19.83	-	19.63	-	35.21
10. Kunnathunad	158.67	11.29	169.96	111.52	52.28	163.80	63.57 (12.05)	333.76
11. Kothamangalam	78.05	9.60	87.65	69.44	8.50	77.94	18.10 (10.93)	-
12. Thodupuzha	106.30	2.25	108.55	56.45	58.07	114.52	60.38 (27.04)	223.07
13. Devikolan	91.60	4.24	95.84	4.41	90.04	94.45	94.28 (49.55)	190.29
14. Uthupanchola	5.63	36.29	11.02	-	101.68	101.68	137.97 (96.08)	143.60
15. Peernade	48.30	13.00	61.30	16.25	62.36	78.61	75.36 (53.86)	139.91
16. Meenachil	98.15	-	98.15	188.98	111.62	300.60	111.62	398.73
17. Kanjirapally.	45.45	6.10	51.55	67.80	56.82	124.62	27.99	
18. Pathangapuram	153.05	19.90	172.95	130.90	15.03	145.93	62.42 (35.53) (10.95)	175.67 318.88
19. Pathanamthitta	142.66	8.12	150.78	139.06	27.50	166.56	35.62 (11.22)	317.34
20. Neyyatinkara	94.75	-	94.35	202.00	2.40	204.40	2.40 (0.80)	298.75
21. Nedunangad	78.60	2.00	74.60	34.29	44.70	78.99	46.70 (30.41)	153.59
Sub-Region	2017.93 (93.28)	145.41 (6.72)	2163.34 (100%)	1410.70 (63.69)	804.19 (36.31)	2214.89 (100%)	949.60 (21.69)	4378.23 (100%)

Note : Figures in bracket indicate percentages.

Table- 11.5: Missing Links and Bridges - District Roads (Summary)

SL.NO.	Taluk	Missing Links			Bridges			Weak Numbers	Category of road	Total defects (Total of col. 6,8 & 10)	
		Number	Length (KM)	Category of road	Missing (Number)	Category of road	Narrow (Number)				
1	2	3	4	5	6	7	8	9	10	11	
1.	Mananthavadi	3	11.20	MDR	3	MDR	6	MDR	4	MDR	MDR=13 ODR=NIL
2.	South Wynaad	NIL	NIL	-	NIL	-	4	MDR	NIL	MDR	MDR=4 ODR=7
3.	Quilandy	3	6.00	ODR	1	ODR	NIL	-	NIL	-	MDR=NIL ODR=1
4.	Badagara	1	3.5	MDR	NIL	ODR	1	MDR	NIL	-	MDR=1 ODR=NIL
5.	Ernad	NIL	NIL	-	-	MDR ODR	2	MDR ODR	NIL	-	MDR=7 ODR=2
6.	Mannarghat	NIL	NIL	-	-	ODR	2	MDR	2	MDR	MDR=4 ODR=NIL
7.	Palghat	NIL	NIL	-	NIL	-	NIL	Nil	NIL	-	MDR=NIL ODR=NIL
8.	Chittur	NIL	NIL	-	-	MDR ODR	15	MDR	5	MDR	MDR=20 ODR=1
9.	Mukundapuram	NIL	NIL	-	NIL	NIL	1	MDR ODR	1	MDR	MDR=2 ODR=4
10.	Kunnathunad	2 5	4 15.86	MDR ODR	-	MDR	2 6	ODR MDR	1 6	MDR ODR	MDR=10 ODR=4
11.	Kothamangalam	-	-	-	-	-	4 5	ODR	3 1	MDR ODR	MDR=7 ODR=1
12.	Devicoolam	NIL	NIL	-	NIL	-	NIL	-	NIL	-	MDR=NIL ODR=NIL
13.	Udubanchola	NIL	NIL	-	NIL	-	NIL	-	NIL	-	MDR=NIL ODR=NIL
14.	Peermade	NIL	NIL	-	NIL	-	2 5	MDR ODR	2 2	MDR ODR	MDR=4 ODR=7
15.	Thodupuzha	NIL	NIL	-	NIL	-	2	MDR	1	MDR	MDR=3 ODR=NIL
16.	Meenachil	1	1.0 2.4	MDR ODR	1	MDR ODR	11 9	MDR ODR	8 -	MDR ODR	MDR=20 ODR=9
17.	Kanjirappally	1	5.4	ODR	1	ODR	5 5	MDR ODR	3 1	MDR ODR	MDR=8 ODR=7
18.	Rathanamthitta	4	3,10	ODR	3	ODR	1 1	MDR ODR	2	ODR	MDR=1 ODR=6
19.	Pathanapuram	2 5	21.7 66.9	MDR ODR	1 1	MDR ODR	8 5	MDR MDR	5 2	MDR ODR	MDR=14 ODR=8
20.	Neyyatinkara	1 2	1 1	MDR ODR	1 -	MDR ODR	2 4	MDR ODR	2 3	MDR ODR	MDR=5 ODR=7
21.	Nedumangala	-	1	-	-	-	8 8	MDR ODR	-	NIL	MDR=8 ODR=8
Sub-region MDR		8	42.2	-	6	-	85	-	40	-	131
ODR		21	100.66	-	6	-	52	-	15	-	73
Total		29	142.86	-	12	-	137	-	55	-	204

District have about half of the unsurfaced length of MDR's of the Sub-Region. Problem of unsurfaced major district roads is not formidable one, but mostly persists in the hilly areas of the Sub-Region. As regards other district roads, except Mukandapuram and Pathanamthitta taluk all have unsurfaced O.D. roads. About one third length of unsurfaced ODR vis located in the taluk of Idukki District. Udumbanchola Taluk of the same district has entire length of ODR unsurfaced. This problem is formidable in Meenachil, Mannarghat, kunnathumad, Ernad, Kanjirapally, Nedumangad and Thodupuzha taluks.

In addition there are in all 29 missing links or stretches of roads with a total length of 142.86 kms. (Refer Table 11.5 and Table 11.6) On major district roads there are 8 missing links totalling to 42.2 kms. On other district roads there are as many as 21 missing links totalling to 100.66 kms. Neyyatinkura Taluk has 67 kms. of missing links on O.D. roads. The problem of missing links is rather serious one and needs to be tackled with appropriate priority. There are no missing links in S.Wynad, Ernad, Mannarghat, Palghat, Chittur, Mukandapuram, Kothamangalam, Devicoolam, Udumbanchola, Peermade, Thodupuzha and Nedumangad taluks i.e. in 12 out of total of 21 taluks.

There are as many as 192 defective or substandard bridges on the district road network. On M.D. Road and network there are 85 narrow bridges and 40 weak bridges. On O.D. road network there are 52 narrow and 15 weak bridges. There are 6 missing bridges each on M.D. Road and O.D. Road systems. Problems of missing bridges is quite serious in Mananthvadi and Pathanamthitta taluks (5 bridges each).

There are six more taluks facing this problem in varying degree. As regards narrow bridges, Meenachil, Chittur, Nedumangad, Pathanapuramam, Kanjirapally, Kunnathunad and S.Wynad together have 85 out of a total of 137 narrow bridges. Only four taluks are free of this problem. As regards weak bridges only four taluks are free of this problem, and among the rest of taluks Meenachil and Pathanapuram have this problem in large proportions. Talukwise assessment of gaps, deficiencies is given in the following paragraphs.

Problem of communication is further made difficult by 33 missing bridges of which 14 are on M.D. Roads and 19 on O.D. Roads.

Talukwise position about gaps and deficiencies may be seen at Table 11.5. Table 11.6 provides details about the same. Talukwise picture regarding gaps and deficiencies on highways and district roads is given in the following.

1.1.4: Rural Roads

As mentioned earlier, there are two State Govt. agencies responsible for constructing and maintaining village roads. These are, Public Works Department and the Panchayat Department. Total length of rural roads within the Sub-region is 22903 km., of which 2672 km. are under the jurisdiction of P.W.D. Broadly speaking, P.W.D. roads provide access to the main villages and important sizeable settlements whereas Panchayat Roads provide linkage to numerous scattered villages, settlements and hamlets. In this regard an explanation is rather necessary here. Census data and information on rural accessibility i.e., villages linked or otherwise, pertain to census villages and does not include any other such as 'desons' Karas or muris settlements.

Table : 11.6 - Missing Links and Bridges (Details).

Sl. No.	Name of Road having missing links	MDR/ODR	Details of missing links		Length of missing links	Missing bridges (name of Place)	Remarks
			Name of starting point	Name of ending point			
1.	2.	3.	4.	5.	6.	7.	8.
1. Mananthvadi Taluk							
(i)	Peria Korome Road	MDR	Peria	Kunhome	11.00	Kunhome	Including Bridge
(ii)	Manantody-Pakramthalam Road	MDR			0.10	Niravilpuzha	Bridge
(iii)	-do-	MDR			0.10	Walanthodu	Bridge
2. Quilandy Taluk							
(i)	Perambra-Cheruvannoor Badagara Road	ODR	Maypoth	Cheniankadavu	1.50	Cheniankadavu	Including Bridge
(ii)	Quilandy -Muthambi road	ODR	Quilandy	Muthambi	3.00		
(iii)	Koorachundu-Kollanode Road	ODR	Kollanode	Kollanore Mukku	1.50		
3. Badagara Taluk							
	Kavil-Mayamunda-Ayancheri Theekunni-Kuttiyadi Road	MDR	Ayancherry	Kuttiyadi	10.00		(6.5 kms. under execution)
4. Kunnathunad Taluk							
(i)	Pulluvazhi-Mazhuvannoor Road	MDR	Kilikulam	Thattamangalam	2.00		
(ii)	Keezhillam-Kurichilacode road	MDR	Akanad	Kurichilacode	2.00		
(iii)	Alapra-Thattammugal road.	ODR	Valayamchirangara	Thattamangalam	7.36		
(iv)	Vattakattupady-Pulluvazi road via Fengola	ODR	Vattakattupady	Pulluvazhi	2.00		
(v)	Pralayakad-Kodamad Road.	ODR	Mudakuzha	Kodanad	1.00		
(vi)	Paneli-Muvattupuzhard.	ODR	Paneli	Mekkapala	4.00		
(vii)	Cherukunnam-Killil Road.	ODR	Cherukunnam	Vaikara	1.50		

1.	2.	3.	4.	5.	6.	7.	8.
5.	<u>Meenachil Taluk</u>						
(i)	Ampara-Mancombu road	MDR	Narimattom	Mancombu	1.00	Mancombu	Including Bridge
(ii)	Shastibapoorthi-Memorial Road.	ODR	Thottuva	Chayamackal	2.415		
6.	<u>Kanjirappally Taluk</u>						
(i)	Poonjar-Koottikkal road-Link road from Parthanam to Mundakayam	ODR	Mundakayam	Parathanam	5.40		
(ii)	Valakayam-Chenapodi road	ODR			0.50	Valakayam	Bridge
7.	<u>Pathanamthitta Taluk</u>						
(i)	Anakutty-Kummannoor-Kokkathodu road	ODR	Kummannoor	Kokkathodu	0.10	Kokkathodu	Bridge
(ii)	Ranni-Kumbalathanam road	ODR	Ranni	Kumbalathanam	1.00		(The road is completed and there is no missing link at present).
(iii)	Puthukada-Chittar road	ODR	Puthukada	Chittar	1.00	Manakayam	Bridge
(iv)	Anchukuzhi-Mukkom road	CDL	Mukkom	Mukkom	1.00	Mukkom	Bridge
8.	<u>Pathanapuram Taluk</u>						
(i)	Yerroor-Edamon Road	MDR	Vilakkupara	Ayiranallur Ferry	5.70	Ayiranallur	Including Bridge
(ii)	Elambal-Thadicadu road	ODR	Kokkadu	Thadicadu	3.00		
(iii)	Chemmanthoor-Thadicadu road	ODR	Nariokal	Venchambu	2.90		
(iv)	Kizhakketheruvu-Pathanapuram	ODR	Pazhanjikadavu	Pathanapuram	3.00	Pazhanjikada	Including Bridge
(v)	Alinukku-Achencoil road	ODR	Karavoor	Achencoil	40.00		
(vi)	Punalur-Kalthuruthy	MDR	Shaliakara	Kalthuruthy	16.00		
(vii)	Ariencavu-Achencoil road	ODR	Ariencavu	Achencoil			
9.	<u>Neyyattinkara Taluk</u>						
(i)	Poovar-Sankurutty Road	MDR	Poovar	Attupuram	0.80	Attupuram	(Bridge including approach)
(ii)	Pongumood-Anapad road	ODR	Anapad	Anapad	0.60		
(iii)	Malayinkil-Kuzhakad road	ODR	Kuzhakad	Kuzhakad	0.35		
10.	<u>Nedumangad Taluk</u>						
	Aryanad-Kottakkakom road		O/600 of A.I. Road	Parantode			The link road is recently completed and there is no missing link at present.

Importance of P.W.D. Roads can not be underestimated by the fact, that they constitute only 11.6 percent of the total village roads length for they provide linkages between important villages, taluk headquarters and urban centres. Nevertheless the fact remains that Panchayat Roads are most important as these provide connection to the numerous scattered villages and settlements at grass root level.

Good road surfaces and cross drainage are important for providing accessibility all the year round. This is especially true in case of Kerala Sub-region where rainfall is rather exceptionally heavy and more so in the Ghats. Only 12.5% of the total rural road length within the Sub-region has metalled surface. The percentage of metalled roads is much higher (32.6%) in case of P.W.D. Roads. But in case of Panchayat Roads, percentage of metalled roads is awfully low at 9.9 percent. Of the total rural road length of 22903 km. 20,030 km. are unsurfaced. Of these 18230 km. are Panchayat roads. One taluka namely, Kanjirapally has no metalled rural roads at all. Ten talukas out of twenty one, do not have any P.W.D. roads.

Table 11.7 indicates talukawise and agencywise percentage of metalled and un-metalled rural roads in the Sub-region. (Fig.11.5). As mentioned earlier, sub-regional average of metalled rural roads is 12.5%. Though this is certainly not an ideal norm or parameter but even then when used so, provides startling revelations. Only five talukas out of 20* are above sub-regional average. Palghat, Chittur and Neyyatinkara are comparatively better developed with percentages ranging between 33 to 42%. South Wynad and Mukandapuram talukas are in the second range having percentages of 18 and 17 respectively. Four talukas namely

* Data for rural roads in Kothanangalam Taluk not covered for the time being due to non-availability.

Mananthvadi, Mannarghat, Nedumangad and Thodupuzha are marginally below the Sub-regional average. Ernad had only 8.6% of the total length having metalled surface roads. Percentage of the ~~most~~ ten talukas are miserably low and hence noteworthy. These are Quilandy, Badagara, Kunnathunad, Devicolam, Udumbanchola, Peernade, Meenachil, Kanjirapally, Pathananthitta and Pathanapuram.

Since percentage of unmetalled surface by itself is not sufficiently indicative, it is necessary to consider the length of the unmetalled rural roads in a taluk. Table 11.7 depicts the picture clearly in this respect. It will be seen that Mukandapuram Taluk has maximum length i.e. 3159 km. of unsurfaced rural roads, seven taluks viz. Badagara, Ernad, Kunnathunad, Udumbanchola, Meenachil, Pathananthitta, Pathanapuram and Nedumangad each has more than 1000 km. of unsurfaced rural roads. These eight taluks account for 68% of the total unsurfaced rural roads length.

Table 11.8 depicts level of development in terms of road density or average road length per unit area and population. It is found that five taluks namely: Chittur, Mukandapuram, Kunnathunad, Pathanapuram and Udumbanchola are above the average road density in relation to area and population Mukandapuram is the best developed among all the talukas of the Sub-region. There are seven talukas namely: Quilandy, Badagara, Palghat, Meenachil, Kanjirapally, Neyyattinkara and Nedumangad, which satisfy area criteria and could be placed in the next category. Mananthvadi, Mannarghat, Pathananthitta and Thodupuzha could be placed in the third category as they satisfy population criterion, i.e. the Sub-regional average. The problem taluks are South Wynad, Ernad, Devicolam and Peernade. These taluks are below the Sub-regional averages pertaining to both the criteria and hence could be termed as poorly developed. Peernade is at the lowest rung and naturally deserves top most attention.

KERALA SUB-REGION ROAD SURFACES (P.W.D.&P.D.) [RURAL ROADS]

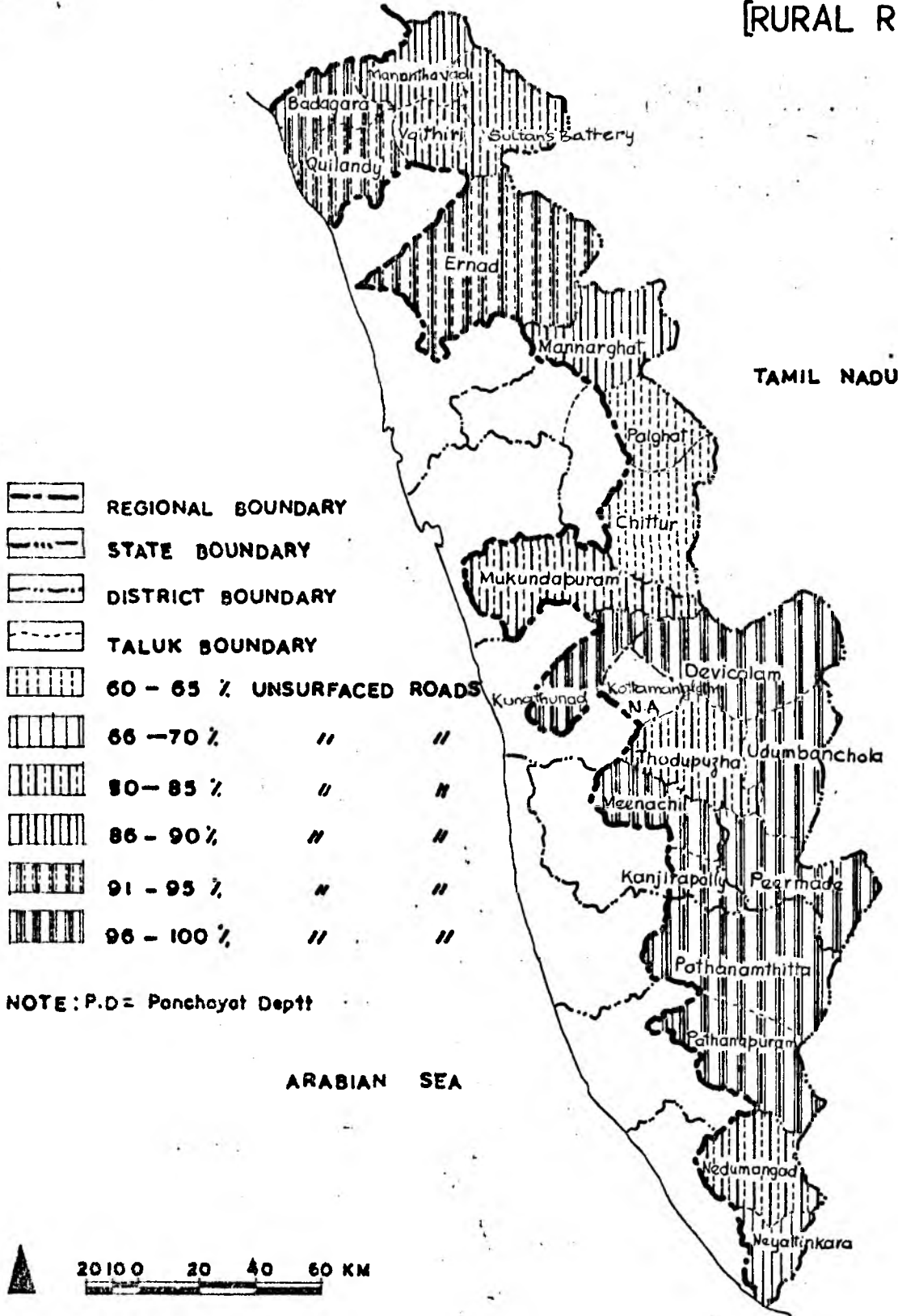


Table-11.7: Village Roads by surface and agency (Taluk-wise).

Taluk	Roads maintained by Panchayat Deptt.			Roads maintained by P.W.D.			Total Village Roads		
	Unmetalled	Metalled	Total	Unmetalled	Metalled	Total	Unmetalled	Metalled	Total
Mannanthavadi	480.55	46.77	527.32	49.04	21.93	70.97	529.59	68.70 (11.48)	598.29
South Wynad	409.44	77.47	486.91	184.00	51.00	235.00	593.44	128.47 (17.80)	721.91
Quilandy	787.38	54.99	842.37	112.00	-	112.00	799.38	54.92 (6.44)	854.37
Badagara	891.76	34.01	925.77	111.69	10.00	121.69	1003.45	44.01 (4.20)	1047.46
Ernad	1522.00	128.00	1650.00	119.20	26.50	145.70	1641.20	154.50 (8.60)	1795.70
Mannarghat	342.20	51.40	393.60	283.30	30.00	313.30	625.50	81.40 (11.52)	706.90
Palghat	503.30	175.90	679.20	67.00	205.00	272.00	570.30	380.90 (40.04)	951.20
Chittur	413.10	317.20	730.30	364.80	240.20	605.00	777.90	557.40 (41.74)	1335.30
Mukundapuram	2559.20	412.10	2971.30	600.00	216.00	816.00	3159.20	628.10 (16.58)	3787.30
Kunnathumad	1116.40	34.50	1150.90	-	-	-	1116.40	34.50 (3.00)	1150.90
Kothamangalam	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thodupuzha	802.20	102.60	904.80	-	-	-	802.20	102.60 (11.34)	904.80
Devicolar	271.70	7.20	278.90	-	-	-	271.70	7.20 (2.58)	278.90
Udumbanchola	1761.00	22.00	1783.00	-	-	-	1761.00	22.00 (1.23)	1783.00
Peermade	151.70	7.10	158.80	-	-	-	151.70	7.10 (4.47)	158.80
Meenachil	1077.00	11.40	1088.40	-	-	-	1077.00	11.40 (1.05)	1088.40
Kanjirapally	455.80	-	455.80	-	-	-	455.80	-	455.80
Pathanamthitta	1501.00	8.50	1509.50	9.20	71.10	80.30	1510.20	19.60 (5.00)	1589.80
Pathanapuram	1495.20	28.10	1523.30	-	-	-	1495.20	28.10 (1.84)	1523.30
Neyyatinkara	689.10	347.00	1036.10	-	-	-	689.10	347.00 (33.49)	1036.10
Nedumangad	1000.10	135.30	1135.40	-	-	-	1000.10	135.30 (13.52)	1135.40
Sub-Region	18230.13 (90.11%)	2001.54 (9.89%)	20231.67 (100%)	1800.23 (67.37%)	871.73 (32.63%)	2671.96 (100%)	20030.36 (87.45%)	2873.27 (12.55%)	22903.63 (100%)

Source: Data Supplied by the State Government.

Table-11.8: Rural Road Density

Taluka	Total Rural	Total Rural	Total Rural	Average Road length	
	Area (Sq. Km.)	Population (1971)	Road length	Related to Area (100 sq. km.)	Related to Population (1 lakh pop.)
1. Mananthavadi	747.4	129335	598.29	80.09	463.79
2. S. Wynad	1378.2	284515	721.91	52.39	254.19
3. Quilandy	744.2	440184	854.37	114.83	194.18
4. Badagara	528.5	355833	1047.46	198.38	295.06
5. Ernad	2215.0	667760	1795.70	81.07	269.22
6. Mannarghat	1092.0	171999	706.90	64.73	413.39
7. Palghat	689.7	266181	951.20	138.06	357.59
8. Chittur	1124.5	272566	1335.30	118.80	490.92
9. Mukundapuram	1279.5	527350	3787.3	296.11	718.65
10. Kunnathunad	664.1	271225	1150.9	173.33	424.69
11. Kothamangalam	NA	NA	NA	NA	NA
12. Thodupuzha	951.8	198624	904.8	95.14	456.97
13. Devicolan	176.2	129968	278.90	15.77	216.20
14. Udubanchola	1071.4	264913	1783.00	166.48	675.38
15. Peermade	1307.3	146841	158.80	12.15	108.77
16. Meenachil	706.8	331606	1088.4	154.16	328.82
17. Kanjirapally	305.8	127859	455.8	149.44	358.90
18. Pathananthitta	1975.6	390150	1589.80	80.50	407.64
19. Pathanapuram	1229.6	297097	1523.	123.95	512.90
20. Neyyatinkara	548.9	504122	1036.10	189.07	205.58
21. Nedumangad	919.0	416316	1135.4	123.55	272.93
Sub-Region	21248.0	6194444	22903.63	107.79	369.77

a) Gaps and deficiencies in Rural Roads

Problems of rural roads are further compounded by missing links to the tune of 4973 km, 609 missing bridges and 3962 missing culverts. As far as P.W.D. Roads are concerned missing links are 77.7km. only, and 36 bridges and 744 culverts are required to be constructed. It will be clear that major bulk of gaps and deficiencies are on Panchayat Department Roads. Details are given in Table-11.9. In this respect, as far as P.W.D. Roads are concerned, the department need to concentrate their efforts only on six taluks. As regards Panchayat Department Road all the taluks have their share in gaps and deficiencies. Udumbenchola and Mukandapuram taluks are notable for 828 km. and 761.6 Km. of missing links, respectively. Neyyattinkara Taluk has maximum number of i.e. 79 missing bridges and Mukandapuram has 463 a maximum number of missing culverts. In short considerable efforts would be required to provide proper infrastructure at grass root level.

2. Settlements and accessibility

2.1 Sizable settlements including urban for the knowledge of whether urban settlements are capable of performing various functions they are expected of, it is necessary to assess the existing level of accessibility and take note of the future urban pattern. Chapter on "Urbanisation and Settlement System" deals in detail the settlement system, in the Sub-region. A scoring system has been adopted on basis of functions performed, services rendered and amenities available in a settlement. Settlements are categorised to indicate levels of development. This categorisation transcends the census classification for urban areas. As such accessibility study of settlements is based on this categorisation.

Table -11.9 : Missing Links, bridges & Culverts - Rural Roads

	Roads maintained by P.W.D			Roads maintained by Panchayat Deptt.			Total		
	Road in kms.	No. of bridges	No. of culverts	Road in kms.	No. of Bridges	No. of Culverts	Road in kms.	No. of bridges	No. of culverts
	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Mananthvadi	45.00	12	129	71.00	31	99	116.00	43	228
2. South Wynad	-	5	13	385.29	37	60	385.29	42	73
3. Quilandy	12.00	-	26	235.67	25	280	247.67	25	306
4. Badagara	-	6	300	226.76	10	180	226.76	16	480
5. Ernad	20.70	5	239	209.10	37	286	229.80	42	525
6. Mannarghat	-	8	37	216.05	13	55	216.05	21	92
7. Palghat	-	-	-	298.05	57	191	298.05	57	191
8. Chittur	-	-	-	230.07	9	173	230.07	9	173
9. Mukandapuram	-	-	-	761.58	50	463	761.58	50	463
10. Kunnathunad	-	-	-	129.30	24	171	129.30	24	171
11. Kothanangalam	-	-	-	-	-	-	-	-	-
12. Thodupuzha	-	-	-	248.64	43	279	248.64	43	279
13. Devicolan	-	-	-	39.60	3	11	39.60	3	11
14. Vudanchela	-	-	-	828.00	41	282	828.00	41	282
15. Peermade	-	-	-	37.50	4	16	37.50	4	16
16. Meenachil	-	-	-	356.12	33	228	356.12	33	228
17. Kanjirapally	-	-	-	343.05	26	124	343.05	26	124
18. Pathanamthitta	-	-	-	28.00	8	53	28.00	8	53
19. Pathanapuram	-	-	-	45.00	5	3	45.00	5	3
20. Nayyatinkara	-	-	-	146.50	79	107	146.50	79	107
21. Nedunangad	-	-	-	60.00	38	157	60.00	38	157
Total	77.70	36	744	4895.28	573	3218	4972.98	609	3962

The Sub-region does not have any First Order settlement and there are ten settlements of Second Order. Of these one is Class II town, eight are class III towns and one is class IV town. Out of the ten settlements

of the Second Order, three are located on National highways and six are on state highways. Only one settlement viz. Manjeri in Ernad Taluk is located on a major district road, but it is very close to a state highway. As such all the ten Second Order settlements are located on the existing highway system.

There are twenty four settlements of the Third Order and only ten of these have been classified as towns in 1971 Census. There is one class II town, three class III towns and the rest six are class IV towns. Of the twenty four settlements, twenty two are directly served by highways and district roads. Only two settlements viz. Chungathara in Ernad Taluk and Kizhakkethara in Chittur Taluk are located on village road and panchayat road respectively. But these are within a short distance from a state highway and a major district road.

In all one hundred forty six settlements have been categorised as the Fourth Order settlements. One hundred of these are directly served by the existing highways and district roads. Twelve settlements are indirectly served by highways eleven by major district roads and four by other district roads. One settlement in Ernad Taluk of Malappuram District is located on a Panchayat Road. Of the remaining 18 settlements eight are located in forest ranges. Of the ten inaccessible settlements three are located in the Quilandy Taluk.

2.2 Rural Settlements

As mentioned earlier data on rural settlements pertains to census villages only and as such do not reflect or provide

any information about the numerous settlements scattered within the jurisdiction of a census village. This is due to typical settlement pattern obtained in the Kerala State. As such rural accessibility discussed here is in terms of census villages only. Table 11.10 provides details regarding village accessibility.

Table-11.10: Census Village Accessibility

S.N. #	Taluk	Total	No. of Census Villages)			
			Conne- cted	Unconne- cted	Connected by	
					Meta- lled	Unmeta- lled.
1.	Mananthavadi	11	11	-	11	-
2.	S. Wynad	20	20	-	20	-
3.	Quilandy	34	34	-	17	17
4.	Badagara	23	23	-	15	8
5.	Ernad	45	45	-	26	19
6.	Mannarghat	19	19	-	17	2
7.	Palghat	26	26	-	26	-
8.	Chittur	33	33	-	33	-
9.	Mukandapuram	53	53	-	53	-
10.	Kunnathunad	15	15	-	15	-
11.	Kothamangalam					
12.	Thodupuzha	16	16	-	8	8
13.	Devicolam	9	9	-	6	3
14.	Udumbanchola	12	11	1*	10	1
15.	Peermade	6	6	-	5	1
16.	Meenachil	22	22	-	22	-
17.	Kanjirapally	6	6	-	6	-
18.	Pathanamthitta	19	19	-	15	4
19.	Pathanapuram	16	16	-	16	-
20.	Neyyattinkara	20	19	1*	18	1
21.	Nedumangad	20	20	-	20	-
Sub-region		434	432	2	368	64

Note * Unconnected villages in Udumbanchola and Neyyattinkara taluks are within 5 kms. from a metalled road.

It will be seen from the above table that eleven taluks viz. Mananthavadi, S. Wynad, Palghat, Mannarghat, Chittur, Mukandapuram, Kunnathunad, Kothamangalam, Meenachil, Kanjirapally, Pathanapuram and Nedumangad have all the villages connected by metalled roads. Bulk of villages connected by unmetalled roads is in Ernad (19) Quilandy (17); Badagara (8) & Thodupuzha (8). Thus out of 64 villages connected by unmetalled roads, 52 villages are in these four taluks.

3. Road Density

The most suitable measure to assess the level of road development is obtained by relating road length to unit population and unit area. Both the criteria are meaningful provided they are used in the right context. For the purpose of right selection, average Sub-regional population density has been chosen to decide relatively high and low density areas. In case of taluks which have higher population density, road length related to area is significant. Similarly, in case of low population density area, road development related to population will be more significant. Kerala Sub-region, has an average population density of 314 persons per sq. km. Eleven taluks out of 21 viz. Quilandy, Badagara, Ernad, Mukandapuram, Kunnathunad, Palghat, Meenachil, Kothamangalam, Kanjirapally, Neyyattinkara and Nedumangad taluks are relatively overpopulated. Rest of the ten taluks are below the sub-regional average population density. After the application of appropriate criterion to each taluk, three taluks namely Quilandy, Ernad and Nedumangad are found below the criterion of unit area density. All the three taluks are more or less at the same level of backwardness in road development as they have around 24 km. of road length per 100 sq. km. as against 35.5 km. the sub-regional average of Mukandapuram is best-developed with an average of 71.4 km. unit area. Meenachil and Kanjirapally taluks have an

average around 65 km. Rest of the four i.e., Badagara, Palghat, Kunnathunad and Neyyattinkara are in the range of 50 to 60 km. This clearly sets out level of priority for the road development in these taluks.

The taluks namely Mananthavadi, South Wynad, Mannarghat, Chittur, Pathanamthitta, Pathanapuram, Thodupuzha, Devicolam, Udumbanchola and Peermade have population density below the Sub-regional average. Therefore, criterion of road density related to population ^{is} relevant for them. Average road length per lakh population is about 114 km. Judging from this criteria, it is found that Pathanamthitta, Pathanapuram, Udumbanchola, Thodupuzha are backward in road development. Pathanamthitta and Pathanapuram have less than 74 km. of road length per unit population. Udumbanchola which is somewhat better has 91 km. of roads per unit population. Thodupuzha has 108 km. of roads. Obviously, these four taluks deserve better attention from road development point of view. Chittur is best developed with 290 km. followed by Mannarghat with 273 km. and Devicolam with 252 km. of roads per unit population. Peermade, Mananthavadi and South Wynad are above the criterion only marginally.

It can be concluded that Quilandy, Ernad and Nedumangad as well as Pathanamthitta, Pathanapuram and Udumbanchola i.e., 6 taluks out of 21 deserve top priority. Two taluks namely Thodupuzha and Badagara could be given second priority as they are below applicable criteria for road development. Five taluks namely Mananthavadi, Palghat, Neyyattinkara, Devicolam, and Peermade can claim the third priority. Seven taluks viz. South Wynad, Mannarghat, Chittur, Mukundapuram, Meenachil, Kunnathunad and Kanjirapally are above both the averages and details are set in Table 11.11 (Fig.11.6)

KERALA SUB-REGION ROAD DENSITY

(Road length / unit area & population)

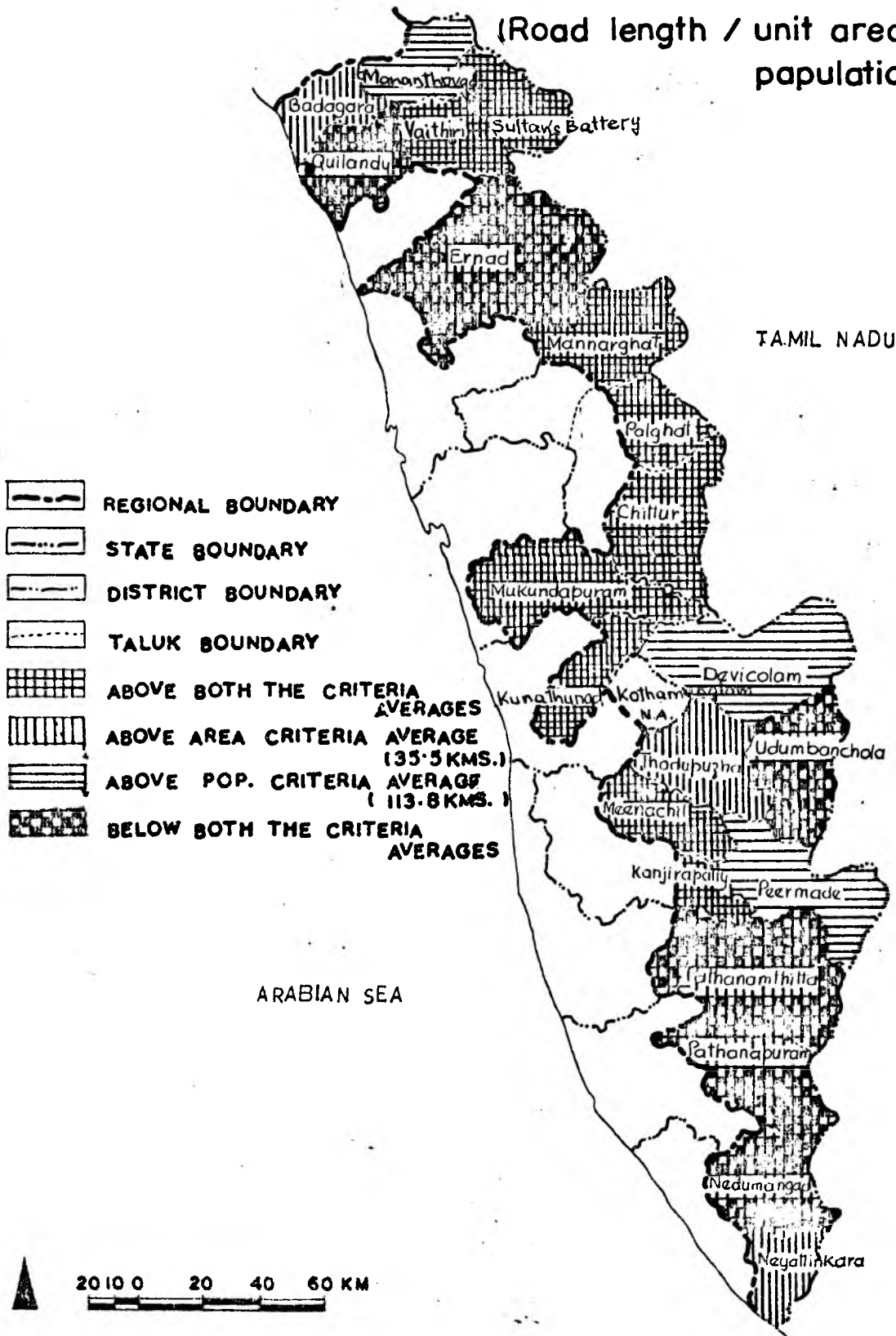


Table-11.11: Road Density-Level of Road Development

Taluks	Population Criterion				Area Criterion			
	Taluks below Sub-Regional Average		Taluks above Sub-Regional Average		Taluks below sub-Regional average		Taluks above sub-regional average	
	Population (1971)	Rd. Density (KMS)	Population (1971)	Rd. Density (KMS)	Area (Sq. Kms)	Rd. Density (KMS)	Area	Road Density (KMS)
1. Mananthavadi	-	-	129335	154.29	747.4	26.65	-	-
2. South Wynaad	-	-	284515	176.83	-	-	1378.2	36.44
3. Quilandy *	468714	38.04	-	-	756.9	23.52	-	-
4. Badagara	409771	70.67	-	-	-	-	549.8	52.57
5. Ernad	715496	77.40	-	-	2261.9	24.49	-	-
6. Mannarghat	-	-	184579	273.07	-	-	1099.6	45.69
7. Palghat	369001	113.34	-	-	-	-	720.3	58.06
8. Chittur	-	-	313973	289.74	-	-	1155.1	78.51
9. Mukandapuram*	-	-	590317	159.22	-	-	1316.8	71.38
10. Kunnathunad*	-	-	292113	133.38	-	-	677.7	57.47
11. Kothamangalam	NA	NA	NA	NA	NA	NA	NA	NA
12. Thodupuzha	219504	108.43	-	-	-	-	973.7	86.76
13. Dovicolam	-	-	134350	252.10	1774.1	12.04	-	-
14. Udubanchola	264913	91.03	-	-	1071.4	22.43	-	-
15. Poormado	-	-	146841	149.50	1307.8	16.58	-	-
16. Moonaohil*	-	-	351879	135.44	-	-	722.7	65.78
17. Kanjirapally*	-	-	172360	131.02	-	-	351.3	64.15
18. Pathanamthitta	390150	73.88	-	-	1975.6	22.59	-	-
19. Pathangulam	310659	73.69	-	-	1233.7	18.52	-	-
20. Noyattinkara*	559488	56.63	-	-	-	-	571.0	55.40
21. Nedumangad*	430779	53.03	-	-	926.8	24.60	-	-
Sub-region	4138475	-	2600262	-	12055.6	-	9479.4	-

* Taluks having population density above the Sub-regional average

Note: Subregional average for unit population = 113.8 km. of road length
Subregional average for unit area = 35.5 km.

Conclusion:

In short, it can be said that the Sub-region has 12 missing bridges of which 6 are on M.D. Roads and 6 on O.D. Roads (Table 11.12). There are as many as 320 narrow missing or weak bridges of which 116 are on state highways. In this respect, M.D. Roads do not lag behind as there are in all 131 defective bridges in the categories. O.D. Roads have 73 defective bridges. Major District Roads also suffer on account of bad road surfaces. About 145 kms. of length requires proper surfacing. The length is distributed over 13 taluks, 80 km. of unsurfaced O.D. Roads are distributed over all but two taluks. There are as many as 8 taluks which have more than 22% of its length unsurfaced. Regarding rural roads, there are 15 taluks having less than 12% of metalled road surfaces. Ten of these have less than 6% of metalled rural roads. Missing links, no doubt, add to the circuitry in terms of travel distance wherever alternatives are available. There are as many as 29 missing links of these 8 with a total length of 42 km. are on M.D. Roads and 21 with a total length of 100 km. are on O.D. Roads. In addition to this, 20030 kms. of unsurfaced rural roads add to the problem at the smallest settlement level.

4. RECOMMENDATIONS

Analytical studies presented in this chapter and based on factual data supplied by the State Government clearly bring out several lacunae gaps deficiencies in the road network system. Obviously it is necessary to remove them to the possible extent so that the network becomes capable of discharging functional requirements expected of this vital infrastructure. Since the task is stupendous especially at the grass root level, it calls for matching efforts and financial inputs within a given time frame and in synchronised manner keeping in view developmental requirements of other socio-economic sectors. This nece-

Table-11.12: Defects & Gaps in the Sub-Regional Road Network

Category	! Bad ! Surface ! (in Km.)	! Missing ! Links ! (in kms.)	! Missing ! bridges	! Weak ! bridges	! Narrow ! bridges	! Total ! (col. 4,5 & 6)
State Highway	30.5	-	-	50	66	116
M.D.R.	145	42.00	6	40	85	131
O.D.R.	804.19	100.66	6	15	52	73
Total	980.20	142.66	12	105	203	320

ssiteates full co-ordination which can be achieved through fully synthesised development perspective. Nevertheless, it will be useful to indicate priorities based on the needs of the sector itself. These priorities may have to be modified in the perspective plan and thus are subject to alterations or modifications.

While considering these factors it is necessary to consider a proposal formulated by the State Government namely the Hill Highway.

4.1 The Hill Highway *

Public Works Department of Govt. of Kerala has proposed a hill highway passing through the high ranges of the Western Ghats. This will mitigate the need of a through artery traversing from the northern boundary to southern boundary of the State. The scheme has been included in the Sixth Five Year Plan.

In order to achieve the above objective, the scheme envisages the hill highway of 893.5 km length at an estimated cost of Rs.105 crores. This is to be realised by upgrading i) district roads of 163.00 km. length and ii) village roads to the tune of 322.30 km. About 209.0 km. of existing state highways are to be improved to conform: accepted highway standards. In order to provide missing links new construction of 194.4 km. of road has been envisaged.

The project envisaged construction of reconstruction and improvement of bridges also.

The Hill Highway as it passes through difficult mountainous terrain will have to be 894 km. long to connect a distance of 500 km. This involves heavy cutting and

* Information supplied by the State Government.

filling requiring huge volume of earth to be moved and also blasting of hard rocks.

The scheme, as has been formulated, passes through high ranges which have a less population density, and spares economic activities. As such it is difficult to justify the scheme without carrying out proper cost-benefit analysis which again can not be done without having traffic volume projections prepared on scientific basis. It is, therefore absolutely necessary to examine the scheme in all details and taking all the care to ensure that it does not disturb the ecological balance of the region. Perhaps it may be advisable to restrict the scheme to upgradation of existing roads and construction of new roads to the minimum to complete circuits in the network. This will ensure against any disturbance to ecological balance as well as make the network functionally satisfactory.

4.2 Proposed upgradation.

Apart from upgradation involved in the implementation of the Hill Highway, it is recommended to upgrade a major district road connecting Mananthavadi, Thirunelli and Virajpet in Karnataka. This will ensure north-south continuation of the Hill Highway and also complete the regional highway network. Another major district road also in Mananthavadi Taluk connecting Mananthavadi and H.D. Kote in Karnataka should be upgraded to a state highway level to provide an eastern outlet to complete the high way network ^{by} providing the missing link.

4.2.1 State Highways

As mentioned earlier, there are 116 defective bridges - Weak and narrow bridges in the Sub-region. These respectiv

limit the loading capacity and affect the volume of traffic that has to be catered to. In the absence of any volumetric data or traffic census, it is not possible to judge the insufficiency of the width of a bridge for the purpose of setting out priorities. But it is true that ideally and for practical purposes, the bridges should conform to the set standards so that they do not cause any hindrance to the free flow of traffic on the State highways which are of regional importance and are next only to national highways. As such, it is felt that interstate highways should be given priority. From this point of view State Highway 17(15 bridges), State Highway 16(8 bridges) and State Highway 19(8 bridges) should be given top priority. SH 8 is the longest east-west link as well as feeds traffic to SH 17. State Highway 17 is an interstate route. State Highway 19 is the only highway in the backward taluk of Udumbanchola and also it links to SH 17. State Highway 21 an interstate link has as many as 12 defective bridges. State highway 29 has 6 defective bridges leading to Gudalur in Karnataka. State Highway 4 and State Highway 28 are two other interstate east-west links. These regional links should be given high priority. State Highway 8 an important north-south link traversing through five taluks of the Sub-region has 13 defective bridges. The construction or reconstruction of these 99 bridges would increase capabilities of ten state highway stretches located in 12 taluks. Rest of the bridges on state highways could be taken in the next phase. Again the objective in selection of bridges should be to make important state highways of handling the existing and future traffic and efforts should be to free a particular artery in all respects. An integrated approach is a must if the results are to be achieved in short span of time. It is absolutely necessary that the system should be according to the accepted standards so as to make it fully functionally capable and effective.

4.2.2 District Roads

i. Major District Roads

The network suffers on three counts i.e., unsurfaced length to the tune of 145 km., missing links with an aggregate length of 42 km. and 131 bridges, of which six are missing, forty weak bridges and 85 narrow bridges. As regards unsurfaced length, 13 taluks have this problem but none of them have unsurfaced length more than 36 kms. Thus the problem of bad surfaces, missing links and bridges is rather of smaller dimensions and therefore be accorded high priority in the development of district roads. Phasing if necessary could be done on the basis of importance of the link but in a concerted manner to free it from all the gaps and deficiencies. This also applies to weak and narrow bridges. Judging from the importance of major district roads it is necessary to accord priorities along with the State Highways.

ii. Other District Roads

Unsurfaced road length is considerable as compared to State highways and major district roads. About 800 km. of unsurfaced length is scattered over all the taluks except two. Eight taluks viz., Mannarghat, Kunnathunad, Thodupuzha, Devicolam, Udumbanchola, Peermade, Meenachil and Kanjirapally have unsurfaced lengths, ranging between 50 km. and 112 km. As such emphasis will have to be given to programmes for providing good surfaces on roads under this category. Seven taluks viz. Quilandy,

Badagara, Palghat, Chittur, Kothamangalam, Pathanapuram, and Neyyattinkara together have aggregate unsurfaced length less than 60 km. The problem needs some efforts and investments and hence can be mitigated on priority basis. Problem of missing links is formidable in one taluk viz. Pathanapuram which has 2/3 (67 km) of the total missing length of the Sub-region (100.6 km.). While the programmes for removing this defect in Pathanapuram taluk can be best tackled under the taluk development plan to be prepared missing links in other taluks being of small lengths could be tackled immediately. Problem of bridges is less formidable in this category, as compared to state highways and major district roads. Again some policy viz. concentrating efforts on important links to free them from various lacunae should be adopted, so that efforts and financial inputs are best utilised and are not frittered away. The selection has to be on functional importance of a link.

4.2.3 Rural Roads

Problems of rural road surfaces needs urgent attention and all the possible emphasis for the problem is of high magnitude. No doubt rural road development will be looked after under the Minimum Needs Programmes of the current Five Year Plans for which norms and standards have been well laid out. But in order to achieve coordinated development, it will be necessary to plan the development of rural roads under the respective Taluks Development Plans. But in order to set the priorities for taluks the outcome of the studies made in this Chapter could be beneficially utilised. First priority group could be

of ten taluks viz. Mukandapuram, Meenachil, Udumbanchola, Pathanamthitta, Devicolam, Kunnathunad, Badagara, Pathanapuram, Ernad and Nedumangad. This group consists of taluks having more than 1000km. of unsurfaced rural roads which are also more than 85% of the total length. Second group priority consists of five taluks viz., Peermade, Quilandy, Mananthavadi, Mannarghat, and Thodupuzha. Rest of the taluks could form third priority group for providing surfaced rural roads. As regards missing links, S.Wynad, Mukandapuram (761 km), banchola (828 km), Meenachil and Kanjirapally have more than 300 km of mission roads. As such these need more emphasis in terms of efforts and financial inputs. These together form more than half of the missing links in the Sub-region. Four taluks viz. Devicolam, Peermade, Pathanamthitta and Pathanapuram each have less than 50 km. of missing links and hence could be given priority for that purpose. Problems of missing bridges and missing culverts are too large in dimensions. Moreover no defects, deficiencies of rural roads should be removed in an isolated manner. As such, improvement of rural roads should be within the framework of a Taluka Development Plan and again the development should be in an integrated manner, so as to realise benefits in shorter span of time. Selection and phasing will have to be in accordance with the activities in agricultural sector and other contemplated socio-economic inputs.

5. RAILWAYS

5.1 Existing Network

Southern Railway serves the entire states of Kerala and Tamil Nadu, parts of Karnataka and Andhra Pradesh. Clavakkot and Madurai Divisions of this railway, cover the entire state of Kerala. The main axis of Broad gauge Railway network is in the form of one north-south artery connecting Mangalore/Panambur of Karnataka in the north and Nagercoil in Tamil Nadu in the South. Major eastern outlet is Shoranur-Coimbatore-Salem-Jolarpettai-Madras: a broad gauge line. It runs through the Palghat Gap. This important major inter-state route provides connection with the up-country as well. There is a metre gauge connection between Quilon in Kerala to Tenkasi and further to Madurai/Tirunelveli in Tamilnadu. This link throws open the entire metre gauge network mostly serving the southern portion of Tamil Nadu east of the Western Ghats. Three branch lines - i) Shoranur-Nilambur and (BG) ii) Ernakulam Junction-Cochin Harbour Terminus (BG) and iii) Clavakkot-Palghat-Pollachi-Dindigul (MG) constitute the network. (Fig. 11.7).

The north-south artery is mostly all along the highways. National Highway 17 runs close to the rail route connecting Mangalore and Shoranur. National Highway 47 runs along Coimbatore-Shoranur section and further southwards along Shoranur-Trivandrum-Nagercoil-Kanya Kumari rail route. Thus, both the national highways run close to the rail

network. The railway network, as it runs along the coast, is rather away from the Ghat areas of the State.

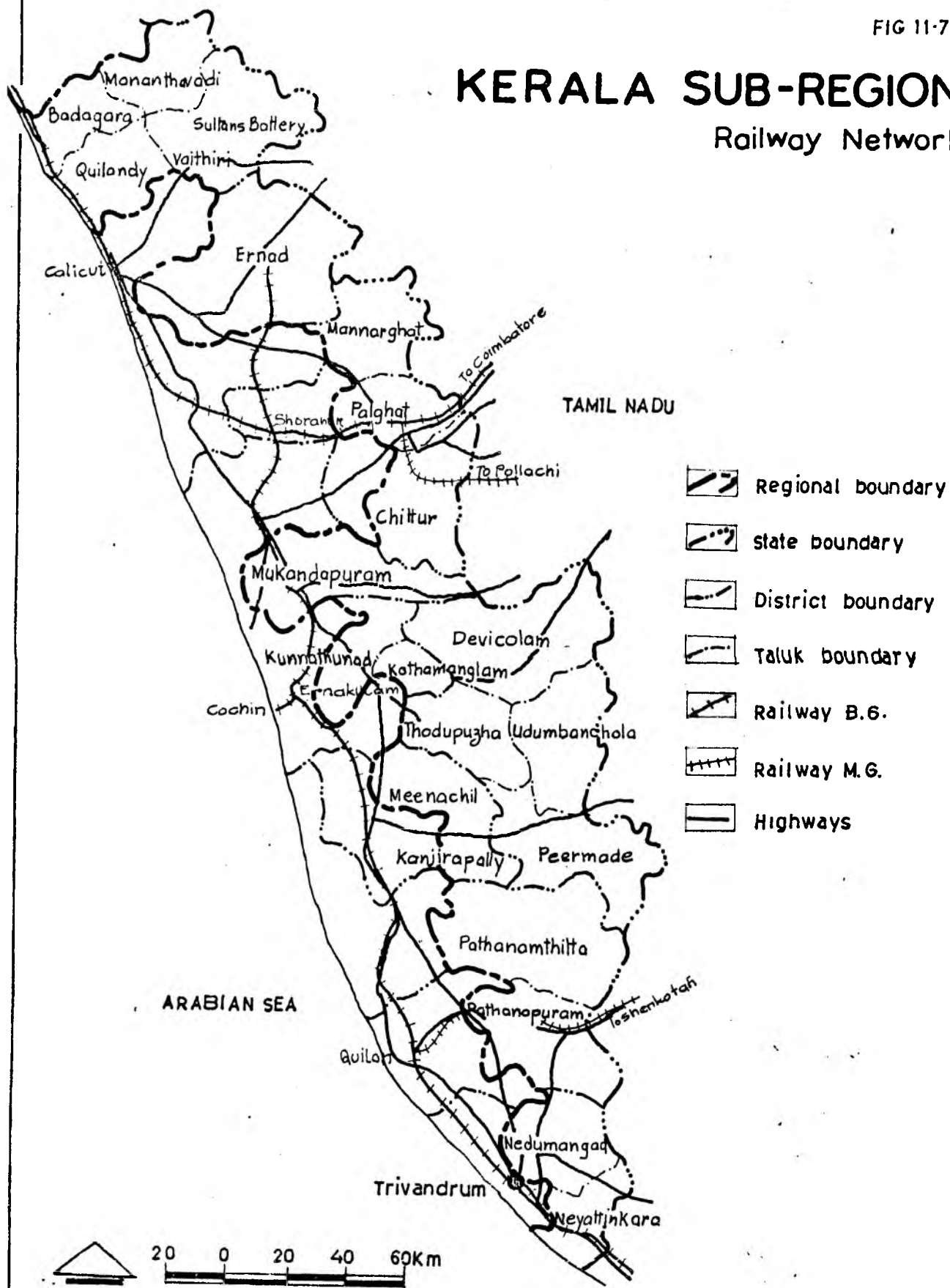
With the recent construction of a link, Mangalore has been connected with Hassan by a metre gauge line. This link is rather circuitous and involves break of gauge at Mangalore. Most important recent addition is a broad gauge link between Trivandrum and Kanya Kumari (Tamil Nadu) via Nagercoil. This is being extended northwards upto Tirunelveli. This will provide additional north-south link. Mangalore-Hassan link has limited importance as far as Kerala Sub-region is concerned.

The railway network runs in north-south direction along the length of the State. But as it runs close to the coast, it confers limited benefits for the Sub-region especially the middle high ranges of the Ghats. Table 11.13 indicates pertinent rail sections, their route kilometreage and taluks traversed. Important towns connected by the network are Cannanore, Kozhikode (Calicut), Shoranur, Palghat, Trichur, Alwaye, Ernakulam/Cochin Port, Kottayam, Quilon and Trivandrum. Shoranur, Quilon and Palghat are three junctions. Shoranur-Nilambur branch line is an uneconomical one. Cochin is one of the eight major ports of the country and the only major port of the State.

It will be seen from Table 11.13 that only 8 taluks out of 21 within the Sub-region have an advantage of railway line traversing through; seven more taluks have fair railway accessibility though

KERALA SUB-REGION

Railway Network



WESTERN GHATS: SURVEY & PLAN

TOWN & COUNTRY PLANNING ORGN. MIN OF WORKS & HOUSING, GOVERNMENT OF INDIA.

Table No. 11.13 Sectional Route length and talukas traversed

Section	Route Km.		Talukas Traversed	Remarks
	B.C.	M.G.		
1	2	3	4	5
1. Canannore-Calicut	89	-	Quilandi, Badagara	Along the Western fringe of the taluks
2. Calicut-Shoranur	86	-	Nil	Touches Ernad Taluk
3. Shoranur-Ernakulam	115	-	Mukundapuram	
4. Ernakulam-Quilon	156	-		Touches Kunnathunad & Meenachil.
5. Shoranur-Clavakkot	44	-	Palghat	Arterial route
6. Clavakkot-Podanur/Coimbatore	25	-	Palghat	Interstate arterial route
7. Clavakkot-Palghat	4	-	Palghat	Operational branch line
8. Palghat-Pollachi	-	27	Palghat-Chittur	Interstate link
9. Shoranur-Nilambur	66	-	Ernad	Uneconomical branch line
10. Clavakkot-Palghat	-	4	Palghat	Operational branch line
11. Punalur-Shenkottah	49	49	Pathanapuram	Interstate arterial route
12. Trivandrum-Nagercoil	87	-	Neyyattinkara	
Total	720	80		

the railway lies outside the taluk boundary. Thus, only 15 taluks are benefitted by the existing network in varying degrees. Three taluks have partial accessibility and three taluks viz. Devicolam, Udumbanchola and Peermade in high ranges are wholly inaccessible.

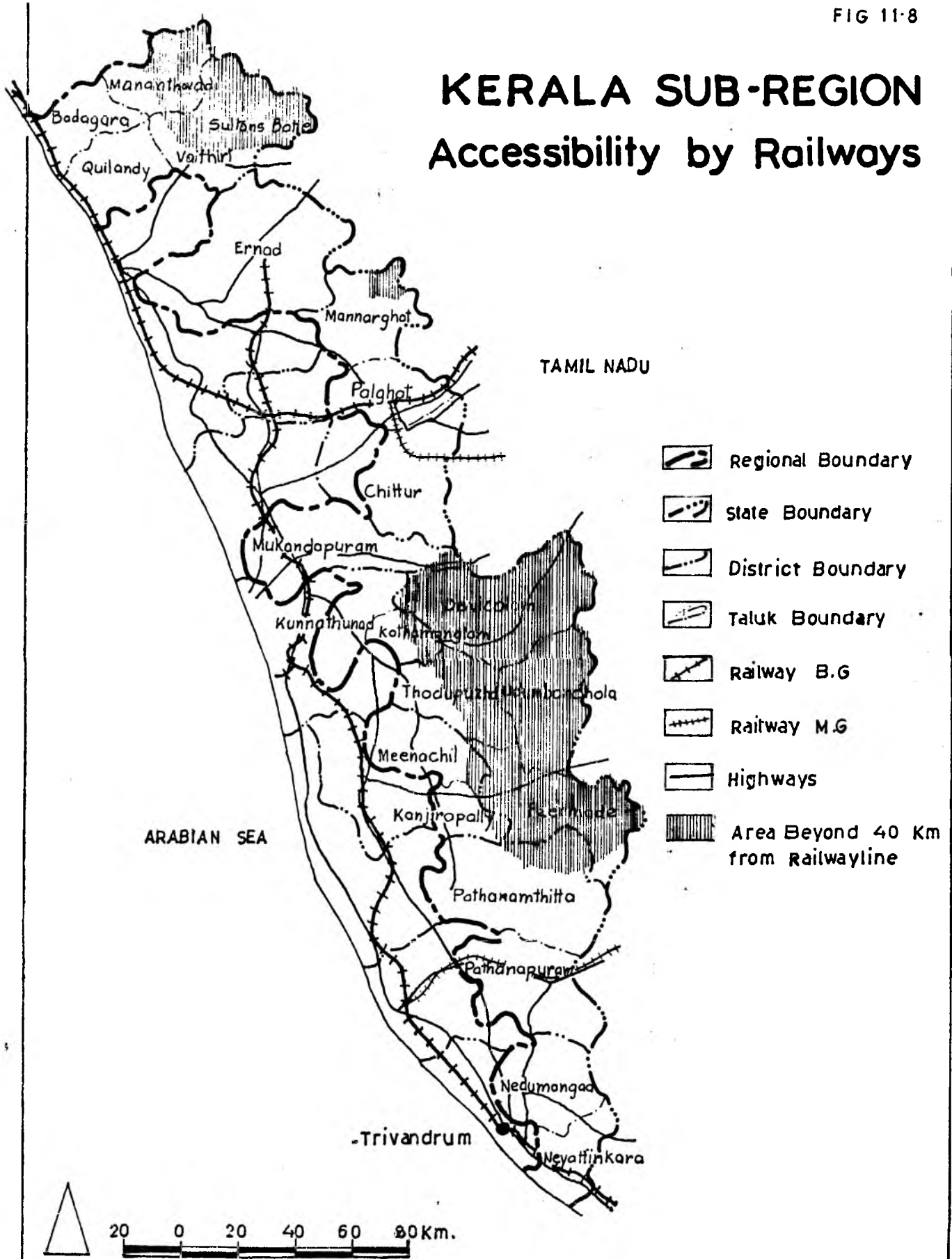
5.2 Area Accessibility

Assuming the 40 km. distance as a parameter for accessibility, it is found that eight taluks are wholly inaccessible by railways and incidentally, also by national highways. Six taluks are partially accessible by railways, i.e., they are indirectly accessible and remaining eight taluks are wholly accessible. It is notable that areas which are inaccessible wholly or partly are generally hilly areas. Table 11.14 indicates area not served by railways or served directly or indirectly (Fig.11.8).

It will be seen from Table 11.14 that area wholly accessible by railways is 48.23%. Area fairly accessible is 18.59% and area partially accessible is 14.18%. Thus 19% of the area, located in the high ranges, is wholly inaccessible. This percentage is not much high especially when we consider the geographical facts that i) the state and the Sub-region has a linear form, ii) railway line traverses in the same direction along the coast and the Sub-region is a predominantly hilly one.

Kerala is a thickly populated state. Most of its population is in the plains along the coast. Further analysis indicates that only 18 per cent

KERALA SUB-REGION Accessibility by Railways



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Table 11.14 Area Accessibility by Railways - Talukwise (Area in sq. km.)

S.No.	Taluka	Wholly accessible	Fairly accessible	Partially accessible	Wholly inaccessible
1	2	3	4	5	6
1.	Mananthavadi			747.4	
2.	S.Wynad			1378.2	
3.	Badagara	549.8			
4.	Coilandy	756.9			
5.	Ernad	2261.9			
6.	Mannarghat		1099.6		
7.	Palghat	720.3			
8.	Chittur	1155.1			
9.	Mukundapuram	1316.0			
10.	Kunnathunad		677.7		
11.	Kothamangalam		285.0		
12.	Thodupuzha			973.7	
13.	Devicoolam				1774.1
14.	Udumbanchola				1071.4
15.	Peermade				1307.8
16.	Meenachil		722.7		
17.	Kanjirapally		351.3		
18.	Pathanamthitta	1975.6			
19.	Rathanapuram	1233.7			
20.	Neyyattinkara	571.0			
21.	Nedumangad		926.8		
TOTAL		10540.3	4063.1	3099.3	4153.3
		(48.23%)	(18.59%)	(14.18%)	(19.00%)

population does not have much of benefit from the existing rail lines. Rest of the population share equally the benefits of railways directly and indirectly.

5.3 Development Proposals by Railways*

The Railways have have formulated a comprehensive development plan called "Corporate Plan" which covers period upto 1988-89. Important features of the plan having direct bearing on the Sub-region are as follows:

The Railways propose Jolarpettai in Karnataka as a Central Marshalling Yard. As far as Kerala Sub-region is concerned Ernakulam (outside the Sub-region) and Shoranur would function as satellite yards. Other existing yards would loose their importance gradually and some existing facilities are proposed to be curtailed.

Shoranur would be developed to handle traffic for Shoranur-Mangalore and Shoranur-Ernakulam-Trivandrum sections.

Ernakulam Yard would function as an 'area yard' for traffic to the Cochin Port and industrial establishments in Cochin area, as also for traffic for Ernakulam-Trivandrum section and residual traffic

* Corporate Plan of Southern Railway (1974-75 - 1988-89)

for Jolarpettai and beyond. These improvements are for efficient transportation of goods. In terms of accessibility no improvement is expected soon.

5.4 Traffic Estimates

Railways have anticipated track utilisation and line capacities of the existing as well as proposed rail network. Table 11.15 provides these estimates. It will be observed from this table that Trivandrum - Nagercoil section will have ample spare capacity even at the end of the Seventh Five Year Plan period. On Shoranur-Nilambur Section, no changes are expected and as such position will be static all throughout. It is noteworthy that there is no goods traffic on this section.

It will be seen from the table that line capacities are expected to be adequate during the Fifth Five Year Plan period. During the Sixth Five Year Plan shortfall in line capacity is expected on Clavakkot-Podanur/Coimbatore section. It may be noted that this section already has a double line. During the Seventh Five Year Plan, this line will face serious shortfall and Cochin-Shoranur Section also would need augmentation of line capacity during this period. Incidentally, this line will have the highest capacity utilisation in this Sub-region at the end of the Seventh Plan. Rest of the sections do not pose any problem as far as line capacities are concerned.

Table 11.15 Line Capacity Assessment and Utilisation/day (Planwise)

Section	Line capacity 1975-76	1978-79			Excess or short	1983-84				1988-89			
		P	C	Total		P	C	Total	Excess or short	P	C	Total	Excess or short
1	2	3	4	5	6	7	8	9	10	11	12	13	14
<u>I. CLAVAKKOT DIVISION</u>													
1. Shoranur- Olavakkot	32	10.5	8.0	22	+10	12.0	9.0	25	+7	13.5	11.0	29	+3
2. Cochin- Shoranur	33	10.5	15.5	31	+2	11.0	16.5	33	Nil	12.0	18.0	36	-3
3. Shoranur- Calicut	21	10.5	4.5	15	+3	9.0	5.5	17	+4	9.5	6.0	19	+2
4. Calicut- Canannore	18	7.0	4.0	13	+5	8.0	5.0	15	+3	8.5	5.0	16	+2
5. Canannore- Mangalore	18	8.5	2.5	13	+5	9.0	3.0	14	+4	9.5	3.0	15	+3
6. Nilambur- Shoranur	7	2.0	-	5	+2	2.0	-	5	+2	2.0	-	5	+2
7. Olvakkot- Podnur	32	13.0	10.5	28	+4	14.5	11.0	33	-1	16.0	13.0	38	-6
<u>II. MADURAI DIVISION</u>													
1. Ernakulam- Quilon	16	8	3.0	13	+3	8.0	3.5	14	+2	9.5	4.0	16	-
2. Quilon- Trivandrum	17	9	2.0	13	+4	9.0	2.5	14	+3	10.5	3.0	16	+1
3. Trivandrum- Nagarcoil	13	4	2.0	7	+6	4.0	2.0	7	+6	4	2.0	7	+6

1	2	3	4	5	6	7	8	9	10	11	12	13	14
4. Nagarcoil- Tirunelveli	13	3	2.0	6	+ 7	3.0	2.0	6	+7	3.0	2.0	6	+7
5. Quilon- Shencottah	17	6	5.0	13	+ 4	6.5	5.5	14	+3	7.0	5.5	15	+2
6. Palghat- Pollachi	14	4.0	1.5	7.0	+ 7	4.0	2.0	7	+7	4.0	2.0	7	+7

Note: P = Passenger trains, G = Goods trains, (+) = Excess, (-) Shortfall

Source : Corporate Plan for Southern Railway 1974-75 To 1988-89.

In view of these projections, Railways have proposed appropriate inputs during the three Plan periods. Details of inputs and estimated costs are detailed below:-

1) Shoranur-Ernakulam Junction

Fifth Plan - Doubling of Shoranur-Mullucarai, Wadacharai-Mulangunnathu kave, Trichur-Pudukad/Chalakkudi-Angamali-

Route Length = 44.5 km.

Cost = Rs.590.83 lakhs

Sixth Plan Nil

Seventh Plan Completing doubling of balance sections

Route Length = 24.5 km.

Cost = Rs.323.00 lakhs

2) Shoranur-Calicut

Fifth Plan a) Extension at 3 stations

cost = Rs.11.60 lakhs (1976-77)

b) Extension at 3 stations

Cost = Rs.19.70 lakhs.

Sixth Plan

Extension at 4 stations

Cost = Rs.22.00 lakhs

Seventh Plan Nil

3) Calicut - Cannanore
Mangalore

Fifth Plan Extension at 6 stations

Cost = Rs.35.40 lakhs

Sixth Plan	Extension at 7 stations
	Cost = Rs.42.60 lakhs
Seventh Plan	Extension at 4 stations
	Cost = Rs.25.10 lakhs

5.5 Conclusions

Thus total inputs for augmenting line capacities would be to the tune of Rs.1070.23 lakhs till 1988-89. During the Fifth Plan expenditure was expected to be Rs.657.53 lakhs, and, Rs.64.60 lakhs and Rs.348.10 lakhs during the Sixth and Seventh Plan periods. Of the total expenditure, Rs.1070.23 lakhs, Rs.913.83 lakhs would be spent on doubling of Shoranur - Ernakulam Section and the rest being on provision of extension of line at 26 stations on Shoranur-Calicut-Canannore-Mangalore Section. Thus Cochin-Shoranur section has been well taken care of. But it is not clear as to why no inputs have been proposed for Podanur-Calavakkot Section which will face shortage in line capacity to the tune of 6 trains/day.

The Corporate Plan has obviously not considered one important aspect i.e., construction of north-south rail link connecting Bombay-Mangalore popularly known as Konakan Railway for the reason that it was a distance possibility when the plan was formulated. As such traffic estimates may warrant suitable revision.

6. AIRWAYS

Speedy transportation, irrespective of the nature of geographical terrain is one of the significant characteristics of air transportation. As such it acquires special significance in the hilly terrain of Western Ghats. No doubt, air transportation is yet to be fully developed but it is developing at much faster rate than before. At present there are 85 airports in the country scattered through its length and breadth. There are 12 major airports, 40 intermediate level airports and the rest have been categorised as minor airports. Delhi, Bombay, Calcutta and Madras have been declared as international airports.

The Sub-region itself does not have any airport within its jurisdiction. But considering the nature of this mode of transport it is necessary to consider it in wider frame of space and airports of Mangalore, Cochin, Trivandrum, Coimbatore and Madurai have bearing and relevance for the Sub-region.

Air linkages in the form of scheduled commercial flights are provided by Indian Airlines, an autonomous corporation of Government of India. Considering the elongated shape of the Sub-region with the Ghats acting as a great barrier in the east spatial distribution of the existing airports is quite satisfactory.

In order to know the importance of these airports number of flights concerning the Western Ghats Region and its surrounding area have been considered and the ranking is as follows:

(1) Bombay = 128; (2) Madras = 98, (3) Bangalore = 90,
(4) Cochin = 70, (5) Trivendrum = 52, (6) Coimbatore = 42,
(7) Mangalore = 28, (8) Madurai = 16, (9) Pune = Kolhapur,
Ratnagiri, Dabolim = 14 each, (10) Belgam = 8.

Thus out of total 198 commercial scheduled flights, the airports around the Sub-region have 111 daily flights.

Trivandrum airport has connecting flights to two neighbouring countries viz. to Maldives (Male) and Sri Lanka (Colombo).

At present, there are three types of aircrafts operated by Indian Airlines viz. Airbus Boeing 737 and HS 748 having varying seat capacity. At present Airbus links - Trivandrum with Bombay by 7 flights in a week. It is linked by Boeing 737 (7 flights) Cochin is also linked with Bombay (7 flights) by the same type of aircraft. Rest of the flights are by HS 748. The five airports around the Sub-region are directly connected with five other airports viz. Madras, Bombay, Male, Colombo and Bangalore (Table 11.16).

Since no intermodal tickets viz. air and train or air and road transport, etc., are sold there is no way of knowing origin and destination of passengers and hence it is not possible to ascertain the role of air traffic vis-a-vis Kerala Sub-region.

Table: 11.16 Origin and Destination of Airtrips
(No. of incoming/outcoming/flights/week)

Origin	Destination	Type of Aircraft	No. of Operational days	No. of Weekly flights
Trivandrum	Madras	B	7	7
	Madurai	H	1	1
	Bombay	A	7	7
	Male (Maldives)	H+B	1+1	2
	Cochin	H	7	7
	Colombo (Srilanka)	B	2	2
Cochin	Bombay	H+B	7+7	14
	Madras	H	7	7
	Trivandrum	H	7	7
	Coimbatore	H	7	7
Mangalore	Bombay	B	7	7
	Bangalore	H	7	7
Madurai	Madras	H	7	7
	Trivandrum	H	1	1
Coimbatore	Bangalore	H	14	14
	Cochin	H	7	7
	Madras		7	7

7. TRANSPORT NETWORK AND FUTURE URBAN PATTERN

In all, forty two settlements have been chosen and accorded certain hierarchical status for future development on the basis of functions which they are expected to perform. Two of these are proposed as growth centres, five as growth points, eleven as market towns, and twenty four as service towns. The proposed growth centres viz. Palghat and Badagara are served by national highways as well as railways. Of the five growth points, Neyyattinkara is located on a national highway. Pathanapuram and Perumbavoor are located on State highways. Sultan Battery and Kalpetta are on major district road which may have to be upgraded to state highway standard.

Of the eleven market towns, Pantalayani (Quilandy) is situated on national highway and also has a railway station. In addition nine more viz. Manjeri, Mannarghat, Chittur, Chalakudy, Palai, Kanjirapally, Pathanamthitta, Punalur and Nedumangad lie on state highways. Punalur also has an advantages of having railway station. Only one proposed market town viz. Mananthavadi is situated on major district road. In short, all the proposed growth centres, growth points and market towns are very well served by the existing road network.

Twenty four settlements have been identified and proposed as service towns. Of these three centres are located on national highways, twelve are

located on the existing state highways, eight are on MDRs and one on other district road. Thus all the settlements proposed for service town status are on transport routes specified for the status in the functional hierarchy (Fig.11.9)

The proposed urban pattern and the existing and the corresponding desirable transport facility are indicated in Table 11.17.

Table: 11.17 Proposed Urban Pattern and Transport facility.

<u>Growth Centre</u>	<u>Existing</u>	<u>Desirable Minimum</u>
1. Palghat	NH, Pail	SH or NH + Railhead
2. Badagara	NH, Rail	"
<u>Growth Point</u>		
3. Sultan Battery	MDR	SH or NH
4. Kalpetta	MDR	"
5. Perumbavoor	SH	"
6. Pathanapuram	SH	"
7. Neyyattinkara	NH + CDR	"
<u>Market Centres</u>		
8. Mananthavadi	MDR	SH
9. Pantalayani	NH + Rail	"
10. Manjeri	SH + MDR	"
11. Mannarghat	"	"
12. Chittur	SH	"
13. Chalakuḍy	SH + MDR	"
14. Palai	SH + MDR	"
15. Kanjirapally	"	"
16. Pathanamthitta	"	"

17. Punalur	SH + MDR	SH
18. Neēumangād	SH + ODR	"

Service towns

19. Edacheri	NH + Rail	DR
20. Kuttiadi	MDR	"
21. Balusseri	MDR	"
22. Panamaram	MDR	"
23. Malapuram	SH + MDR	"
24. Edavanra	"	"
25. Edakkara	SH	"
26. Nilambur Road	SH	"
27. Alanallur	MDR	"
28. Konkād	MDR	"
29. Hemambikanagar	NH	"
30. Nemmara	MDR	"
31. Kollencōde	"	"
32. Irinjalakuda	SH + MDR	"
33. Kothamangalam	"	"
34. Munnar	"	"
35. Iōmbanchola	SH	"
36. Theōdupuzha	SH + MDR + CDR	"
37. Ponkunnam	SH	"
38. Mundakkayam	SH	"
39. Thekkady	CDR	"
40. Rani	SH	"
41. Balaramapuram	NH	"
42. Kovalam	MDR	"

Kerala is singularly diversified in her physical features. Succeeding the narrow but long stretch of sandy sea board are the unequal rough slopes. These fast steeping slopes swell into mountainous 'wall' that bounds the State on its east. These highlands, by and large, constitute that part of the State under study in the Western Ghats region. This linear eastern stretch of the State is broken by long spurs, extensive and luxuriant greenaries of both plantation and tangled jungles.

Typical of Kerala, the human habitats are scattered in the form of farmsteads in the midst of exuberant gardens in a picturesque disorder. This is particularly the case in the Sub-region spread over 22 ghat taluks falling in ten districts. As per 1971 Census, the total area of the Sub-region is 2185807 sq. km. with a total population of 68.81 lakhs distributed over 24 towns and 432 villages. There is no uninhabited village in the Sub-region. It may be noted that as far as the Kerala Sub-region is concerned, village does not represent the smallest level of settlement. A village represents cluster of settlements known as 'desoms' or 'muris' or 'karas'. Therefore, for analytical purposes the lowest level settlement in Kerala is 'desom' or 'muri' or 'kara'.

1. DENSITY OF POPULATION

The density of population of the Sub-region (1971 Census) works out to 314 persons per sq. km. which

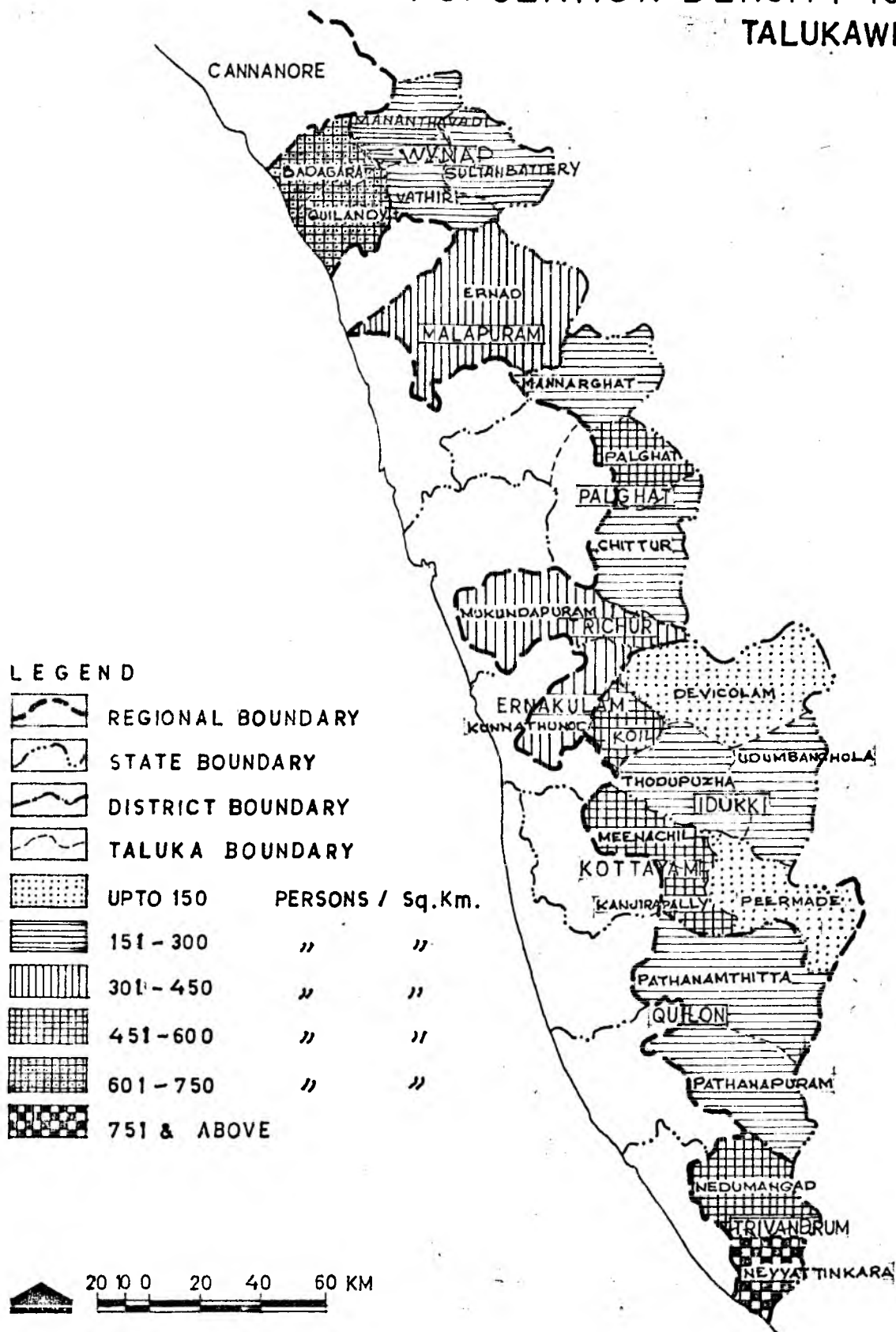
is significantly lower than the State's density of 549. This is but natural in view of the uncomfortable terrains of the Ghats for habitation besides the backwardness of the area in development when compared to the plains of the State. The taluks of Neyyattinkara, Quilandy and Badagara have higher densities than that of the State, and incidentally these are coastal tracts. The highest density of population is noticed in Neyyattinkara taluk and, the least in Devicolam taluk. Neyyattinkara taluk lies very near to Trivandrum, the State's capital and the taluk includes an important tourist centre, i.e., Kovalam. The taluks of the Sub-region can be classified as follows on the basis of their densities

<u>Group</u>	<u>No. of Taluks</u>
1. Very Low concentration (Below 150)	2
2. Low concentration (151-300)	9
3. Moderately Medium concentration (301-450)	3
4. Medium concentration (451-600)	5
5. High concentration (601-750)	2
6. Very High concentration (Above 750)	1
Total	22

The talukawise distribution of area, population, number of towns, villages, and density can be seen in Table 12.1 and Fig.12.1.

It is evident from the Table that the taluks of Wumbanchola, Permade, Pathanamthitta, Vaithiri S. Battery and Mananthavadi are entirely rural. The taluks

FIG: 12.1
KERALA SUB-REGION
POPULATION DENSITY-1971
TALUKAWISE



WESTERN GHATS : SURVEY & PLAN

TOWN & COUNTRY PLANNING ORGN. MIN.OF WORKS & HOUSING GOVERNMENT OF INDIA

Table 12.1 Talukawise Area, Towns, Villages, Population and Density - 1971

Taluka	Area in sq. km.	No. of Towns	No. of Villages	Total Population	Density (Population per sq. km.)
1	2	3	4	5	6
1. Kunnathunad	677.7	1	15	292113	431
2. Mukundapuram	1316.0	2	53	590317	449
3. Thodupuzha	973.7	1	14	219504	225
4. Devicollam	1774.1	1	9	134350	76
5. Udumbanchola	1071.4	Nil	12	264913	247
6. Peermade	1307.8	Nil	6	146841	112
7. Mannarghat	1099.6	1	19	184579	168
8. Palghat	720.3	2	26	369001	512
9. Chittur	1155.1	2	33	313973	272
10. Neyyattinkara	571.0	3	20	559488	980
11. Nedumangad	926.8	1	20	430779	465
12. Pathanamthitta	1975.6	Nil	19	390150	197

1	2	3	4	5	6
13. Pathanapuram	1233.7	1	16	310656	252
14. Meenachil	722.7	1	22	351879	487
15. Kanjirappally	351.3	3	6	172360	491
16. Ernad	2261.9	2	45	715496	316
17. Vaithiri	1378.2	Nil	20	284515	206
18. S. Battery					
19. Quilandy	756.9	1	34	468714	619
20. Badagara	549.8	1	23	409771	745
21. Mananthavadi	747.4	Nil	11	129335	173
22. Kothamangalam	287.7	1	9	142378	496
Sub-region	21858.7	24	432	6881115	314

- Source: 1. Census 1971 - "General Population Tables", Part IIA, Kerala.
2. District Census Handbook of Idukki - 1971

of Neyyattinkara and Kanjirappally have the maximum number of towns. The highest number of rural settlements (villages) is found in Mukundapuram taluk and is followed by Ernad taluk.

2. URBANISATION

The degree of urbanisation is one of the positive indicators of development of an area. The Sub-region is lagging far behind in urbanisation compared to the State as a whole. This provides an indication of the backwardness of the Sub-region. The proportion of urban component of the Sub-region's population is only about 8 per cent which is just half of the State's urbanisation level of about 16 per cent.

The talukwise picture of the level of urbanisation is set out in Table 12.2. The proportion of urban population to the total varies from nil to 27.9 per cent. It may be seen that six out of twenty two taluks are entirely rural as per 1971 Census. There are only two taluks, viz., Palghat and Kanjirappally, where the urbanites form a proportion more than that of the State's. On the basis of the existing proportion of urban population, the taluks of the Sub-region can be hypothetically classified into four groups as follows:

Table-12.2: Level of Urbanisation-Talukwise: 1971

Taluk	Total Population	Urban Component	Percentage to total Population.
1. Mananthavadi	129335	Nil	Nil
2. Vaithiri	284515	Nil	Nil
3. S. Battery			
4. Quilandy	468714	28530	6.1
5. Badagara	409771	53938	13.2
6. Ernad	715496	47736	6.7
7. Mannarghat	184579	12580	6.8
8. Palghat	369001	102820	27.9
9. Chittur	313973	41407	13.2
10. Mukundapuram	590317	62967	10.7
11. Kunnathunad	292113	20888	7.2
12. Meenachil	351879	20273	5.8
13. Kanjirappally	172360	44501	25.8
14. Pathanamthitta	390150	Nil	Nil
15. Pathanapuram	310659	13562	4.4
16. Neyyattinkara	559488	55366	9.9
17. Nedumangad	430779	14643	3.4
18. Thodupuzha	219504	20880	9.5
19. Devicolam	134350	4382	3.3
20. Udumbanchola	264913	Nil	Nil
21. Peermade	146841	Nil	Nil
22. Kothamangalam	142378	6534	4.6
Sub-region	6881115	551007	8.0
Kerala State	21347375	3466449	16.2

Source: Census 1971.

The number of urbanites over a unit area (one sq. km.) varies significantly from one urban centre to another. The density of population of towns varies from 743 in Munnar to 3601 in Palghat. The wide variation in density can be attributed, in addition to the physiographic conditions, the supporting capacity of the hinterland, the employment opportunities and the importance of functions the towns perform.

The overall urban density of the Sub-region is much less than that of the State. This can, however, be mainly attributed to the hilly character of the terrains. But some ghat towns such as Palghat, Punalur and Kovalam are comparatively over-crowded. The density of population is very low in the towns of Malappuram, Nemmara, Ponkunnam, Kanjirappally, Thodupuzha and Munnar.

On the basis of the density of population, the towns of the Sub-region can be classified as follows:

<u>Groups</u>	<u>No. of Towns</u>
1. Very low-density towns (less than 1000)	6
2. Low-density towns (1000-1499)	4
3. Medium-density towns (1500-1999)	6
4. High-density towns (2000-2499)	4
5. Very high-density towns (2500 & above)	4
Total	24

<u>Group</u>	<u>No. of Talukas</u>
1) No. of Urbanisation	6
2) Low level of Urbanisation (less than 10%)	11
3) Medium level of Urbanisation (10-20%)	3
4) High level of Urbanisation (Above 20%)	2
Total	22

2.1 Urban Centres and their Distribution

The urban population of the Sub-region is distributed over 24 towns. Of these, 2 are Class II, 10 are Class III, 9 are Class IV, 2 are Class V and one is Class VI town*. There is no Class I city in the Sub-region. It is evident that medium-size urban centres dominate the urban scene in the Sub-region.

The talukawise distribution of urban centres, their areas, population and densities may be seen in Table 12.3 (Fig. 12.2).

* Class I	1 lakh and above
Class II	50,000 to less than 1 lakh
Class III	20,000 to less than 50,000
Class IV	10,000 to less than 20,000
Class V	5,000 to less than 10,000
Class VI	less than 5,000

FIG:12.2
**KERALA SUB-REGION
 SETTLEMENT PATTERN
 URBAN SYSTEM -1971**

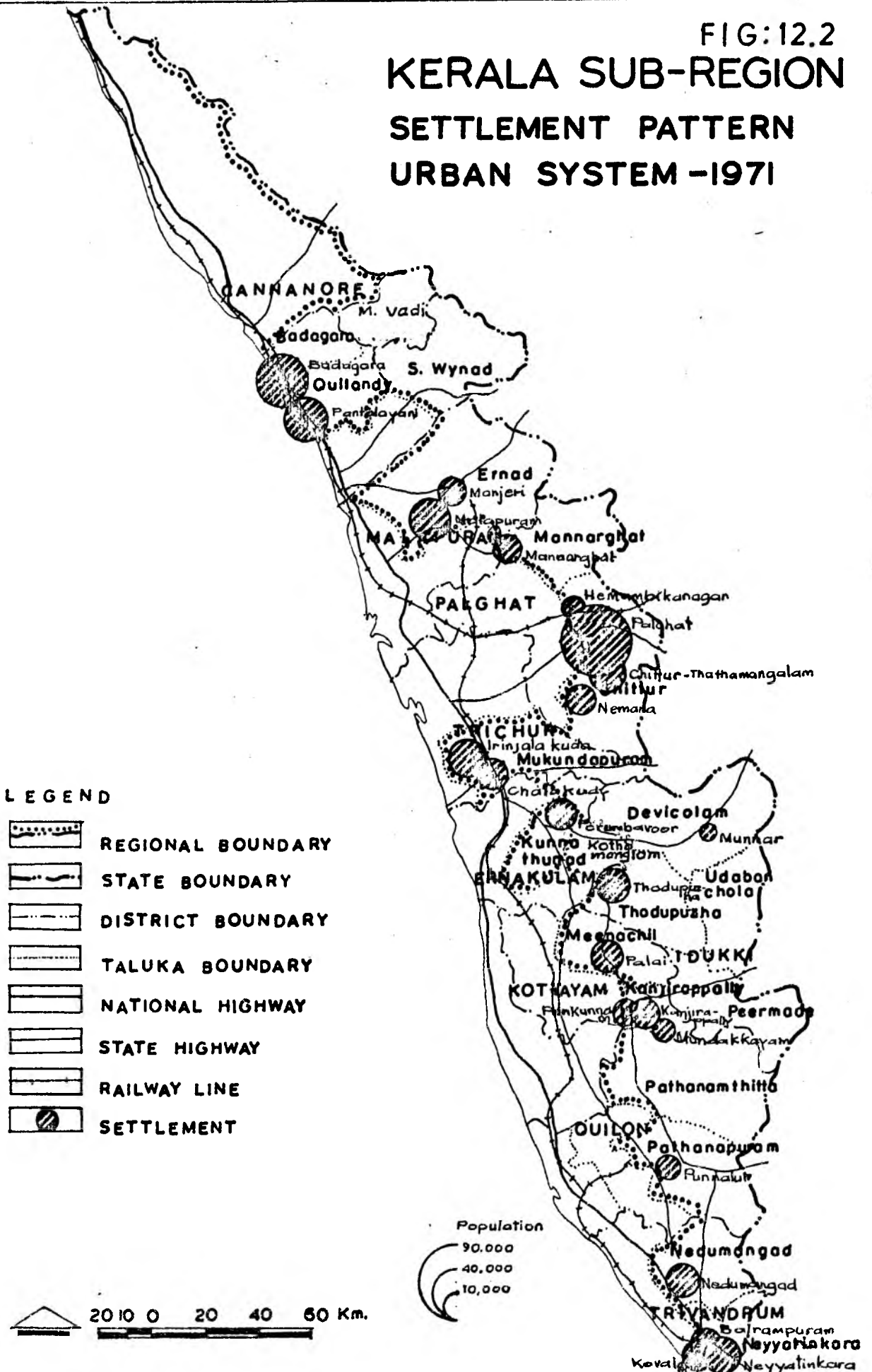


Table-12-3: Area, Population and density of Urban Population-Talukwise.

District/Taluk/Town	Class of town	Area in Sq. km. (1971)	Population (1971)	Density
1	2	3	4	5
<u>Wynad District</u>				
Mananthavadi Taluk	Nil	Nil	Nil	Nil
Vaithiri Taluk				
Battery Taluk	Nil	Nil	Nil	Nil
<u>(B) Kozhikode District</u>				
<u>Quilandy Taluk</u>				
1) Pantalayani	III	12.74 (6.71)	28530	2239
2) Badagara	II	21.34 (21.34)	53938	2528
<u>Malappuram District</u>				
<u>Ernad Taluk</u>				
3) Malappuram	III	33.60	32002	952
4) Manjeri	IV	13.27 (13.26)	15734	1186
<u>Palghat District</u>				
<u>Mannarghat Taluk</u>				
5) Mannarghat	IV	7.62	12580	1651
<u>Palghat Taluk</u>				
6) Hemambikanagar	V	3.99	7032	1762
7) Palghat	II	26.60 (26.60)	95788	3601
<u>Chittur Taluk</u>				
8) Chittur-Thathamangalam	III	14.71 (14.71)	28510	1938
9) Nemmara	IV	15.90 (15.90)	12897	811
<u>Trichur District</u>				
<u>Mukundapuram Taluk</u>				
10) Irinjalakuda	III	11.24 (12.10)	25405	2260
11) Chalakudy	III	25.23 (8.91)	37562	1489

1	2	3	4	5
<u>Ernakulam District</u>				
<u>Kunnathunad Taluk</u>				
12. Perumbavoor	III	13.59 (11.50)	20888	1537
<u>Kottayam District</u>				
<u>Kothamangalam Taluk</u>				
* 13. Kothamangalam	V	5.77	6534	1132
<u>Meenachil Taluk</u>				
14. Palai	III	15.93 (14.56)	20272	1273
<u>Kanjirappally Taluk</u>				
15. Mundakkayam	IV	5.25 (5.62)	10142	1932
+ 16. Pondunnam	IV	13.80	13672	991
17. Kanjirappally	III	26.42 (30.48)	20687	783
<u>Quilon District</u>				
<u>Pathanamthitta Taluk</u>				
<u>Pathanapuram Taluk</u>				
	Nil	Nil	Nil	Nil
+ 18. Punalur	IV	4.05	13562	3349
<u>Trivandrum District</u>				
<u>Neyyattinkara Taluk</u>				
19. Balaramapuram	IV	8.31 (13.03)	17384 (26883)	2092
20. Neyyattinkara	III	9.70 (10.00)	23983	2472
21. Kovalam	IV	4.11 (1.86)	13999	3406
<u>Nedumankad Taluk</u>				
+ 22. Nedumankad	IV	7.76	14643	1887
<u>Idikli District</u>				
<u>Thodopuzha Taluk</u>				
+ 23. Thodopuzha Devicolam Taluk	III	21.85	20880	956
+ 24. Munnar	VI	5.90	4382	743
<u>Umbanchola Taluk</u>				
	Nil	Nil	Nil	Nil
<u>Peermade Taluk</u>				
	Nil	Nil	Nil	Nil
<u>Kerala Sub-Region</u>		328.68	551007	1676
<u>Kerala State</u>		1341.6	3466449	2585

Source: Census 1971

* New Towns in 1971

+ Declassified in 1961

2.2 Growth of Population of Towns

Among the 24 towns, 4 towns, viz., Irinjalakuda, Palghat, Chittur-Thatha-Mangalam and Badagara are the oldest towns, as these have been there as towns since the beginning of this century. The new towns, i.e. those which have been declared as such for the first time in 1971 Census, are Mannarghat, Hemambikanagar and Malappuram (Table 12.4).

Among the 24 towns, three are 'new' towns and six are those that were "declassified" towns in 1961 Census and declared urban in 1971. Among the rest of the 15 towns, population of eleven towns have been continuously on the increase since they were declared as such. These towns can, therefore, rightly be called as 'growing' towns and they are:

1. Perumbavoor
2. Chalakudy
3. Irinjalakuda
4. Palghat
5. Chittur-Thathamangalam
6. Kovalam
7. Neyyattinkara
8. Palai
9. Kanjirappally
10. Manjeri
11. Badagara

The urban population of the Sub-region went up by about 61 per cent during the decade 1961-71, which is much higher than the State's

Table-12.4: Growth of Population of Towns- 1901-71.

Sl. No.	Town	Population and Decadal Percentage Variation at								
		1901	1911	1921	1931	1941	1951	1961	1971	
1	2	3	4	5	6	7	8	9	10	
1.	Perumbavoor	-	-	-	5863	7764 (32.42)	8022 (3.32)	16147 (101.28)	20888 (29.36)	
2.	Chalakydy	-	-	-	5886	7429 (26.21)	10847 (46.01)	16864 (55.47)	37562 (122.73)	
3.	Irinjalakuda	8420	8699 (3.31)	9457 (8.71)	11047 (16.81)	17330 (56.88)	19804 (14.28)	22335 (12.78)	25405 (13.75)	
4.	Theodupuzha	-	-	-	3455	4172 (20.75)	5141 (23.23)	Declassified	20880	
5.	Munnar	-	-	-	-	-	2938	Declassified	4382	
6.	Mannarghat	Notified as new town for the first time in 1971 consus.								12580
7.	Palghat	44177	44319 (0.32)	45487 (2.64)	49064 (7.86)	55160 (12.42)	69504 (26.00)	77620 (11.68)	95788 (23.41)	
8.	Homambikana gar	Notified as new town for the first time in 1971 consus.							-	7032
9.	Chittur-Thattamangalam	14317	14706 (2.72)	18150 (23.42)	18915 (4.21)	21105 (11.58)	23746 (12.51)	26457 (11.42)	28510 (7.76)	
10.	Nommara	-	4958	4698 (-5.24)	5513 (17.35)	6291 (14.11)	6135 (-2.48)	11938 (94.59)	12897 (8.03)	
11.	Balaramapuram	-	-	3082	5362 (73.98)	5240 (-2.28)	6250 (19.27)	26883 (330.13)	17384 (-35.33)	
12.	Kovalam	-	-	-	-	-	9441	10877 (15.21)	13999 (28.70)	

contd.....

Table-12.4: Contd.....

1	2	3	4	5	6	7	8	9	10
13. Noyyattinkara	-	-	-	8033	9264 (15.32)	13830 (49.29)	16376 (18.41)	20268 (23.77)	23983 (18.33)
14. Nedumangad	-	-	-	1833	2231 (21.71)	2538 (13.76)	3098 (22.06)	Declassi- fied.	14643
15. Punalur	-	-	-	6475	8442 (31.05)	12249 (45.10)	18995 (55.07)	Declassi- fied	13562
16. Palai	-	-	-	2204	2628 (19.24)	3035 (15.49)	13421 (342.21)	15457 (15.17)	20273 (31.16)
17. Kanjirappally	-	-	-	-	-	-	8362	19038 (127.67)	20687 (8.66)
18. Mukundakkayam	-	-	-	-	4939	5967 (20.81)	10762 (80.36)	5606 (-47.91)	10142 (80.91)
19. Ponkunnam	-	-	-	-	-	-	4402	Declassi- fied.	13672
20. Malappuram	Notified as new town for the first time in 1971 census.								32002
21. Manjeri	-	-	-	-	-	5547	10357 (86.71)	12276 (18.53)	15734 (28.17)
22. Pantalayani	-	-	-	-	-	12713	29001 (128.12)	17356 (-40.15)	28530 (64.38)
23. Badagara	11319	11149 (-1.50)	9804 (-12.06)	11259 (14.84)	17924 (59.20)	20964 (16.96)	43908 (109.44)	53938 (22.84)	
24. Kothamangalam	-	-	-	-	-	-	7657	Declassi- fied	6534
Sub-Region	-	-	-	-	-	-	-	343030	551007 (60.62)
No. of Towns	4	4	10	14	16	21	16	24	

figure of 35.72 per cent during the same period. The higher growth rate in case of the Sub-region is due to the new additions to its town-list (including those that were declassified in 1961) in 1971 and also partly due to extensions of limits of some urban centres. Save the new towns, the growth rate during the decade 1961-71 works out to about 46 per cent.

In 1961, there were 15 towns in the Sub-region. Among these, three towns, viz., Chalakudy, Mundakkayam and Pantalayani registered significantly higher growth rates than that of the State. Chalakudy by 1971 added nearly one and quarter times its 1961 population mostly due to an increase in area as much as thrice that in 1961. The area increased from about 9 sq. km. to 25 sq. km. Pantalayani swelled by 60 per cent in its population over 1961-71 mainly due to inclusion of adjoining rural areas to an extent of 6 sq. km. during this period. But this had lost over 1951-61, 40 per cent of its 1951 population. The population of Mundakkayam town increased by 80 per cent during 1961-71 whereas during 1951-61 it lost as much as 48 per cent of its 1951 population.

On the other hand while Chittur-Thathamangalam, Nemmara and Kanjirappally recorded a growth of less than 100 per cent in their population count, over 1961-71, Bialaramapuram has lost to an extent of 35 per cent both in its area and population. The tourist town Kovalam expanded almost two and quarter times but added only one fourth of its 1961 Census population over 1961-71.

It would be useful to analyse the density of towns and growth rates together. This would indicate whether the growth rate that has taken place in a town was desirable or not.

The density of population of towns for 1961 and the growth rates of towns for the decade 1961-71 are given in Table 12.5. The Table gives figures for only those towns that existed in 1961.

It is evident from Table 12.5 that the three towns, viz., Pantalayani, Mundakkayam and Chalakudy, which registered very high growth rates in population during 1961-71, had lower densities in 1961. This means that the high growth rate of population in these towns was not undesirable. Balaramapuram had the highest density of population in 1961. Though the area and population of Balaramapuram had registered a decline of about 50 and 35 per cent respectively during 1961-71, the density however, has very marginally increased from 2070 in 1961 to 2092 in 1971.

There are some towns which had very low growth rates in their population during the decade 1961-71 and also had very low densities in 1961. Notable among these are Nemmara and Kanjirappally. It is, therefore, clear that such towns can sustain additional growth of population. This means that developmental activities should be encouraged in low and medium density towns so that high density towns do not continue to get overcrowded.

Table-12.5: Densities (1961) and Growth Rates of Population of Towns.

Name of Town	Density *	Growth Rate (1961-71)
1. Balaramapuram	3235	-35.33
2. Palghat	2918	23.41
3. Kovalam	2646	28.70
4. Neyyattinkara	2089	18.33
5. Badagara	2058	22.84
6. Irinjalakuda	1987	13.75
7. Chittur-Thathamangalam	1799	7.76
8. Pantalayani	1362	64.38
9. Perumbavoor	1188	29.36
10. Mundakkayam	1068	80.91
11- Palai	970	31.16
12. Manjeri	925	28.17
13. Nemmara	751	8.05
14. Kanjirappally	721	8.66
15. Chalukudy	668	122.73

* Density has been calculated on the basis of area of 1971.

2.3 Functional Category of Towns

The Census has divided the working population into nine categories. For the purpose of functional classification of towns, the nine categories of workers have been regrouped into five classes of economic activities, Industries, Trade and Commerce, Transport, and Service. Primary activities comprise cultivators, agricultural labourers, and workers engaged in live-stock, forestry, fishing, hunting, plantation, orchards and allied activities. In industrial activities, mining and quarrying, household industry, manufacturing other than household industry, and construction industry are included.

In order to find out the functional character of the towns, the ratios of workers under such of the five classes of economic activity to its total workers are calculated for each town. If the working force in one of the classes forms 40 per cent or more, the town is said to belong to that particular class. If the percentage is less than 40 per cent, the next predominant occupation is taken into account, so that the total of the two is 60 per cent or above. In that case, the town is said to belong to both the classes of functions (i.e. the town is bi-functional). If the total is still less than 60 per cent, the third predominant activity is considered, so that the total of the three is 60 per cent or above, and such a town is designated as multi-functional.

On the basis of the aforesaid criteria, the

functional character of all the towns of the Sub-region have been determined and are indicated in Table 12.6. and illustrated in Fig.12.3.

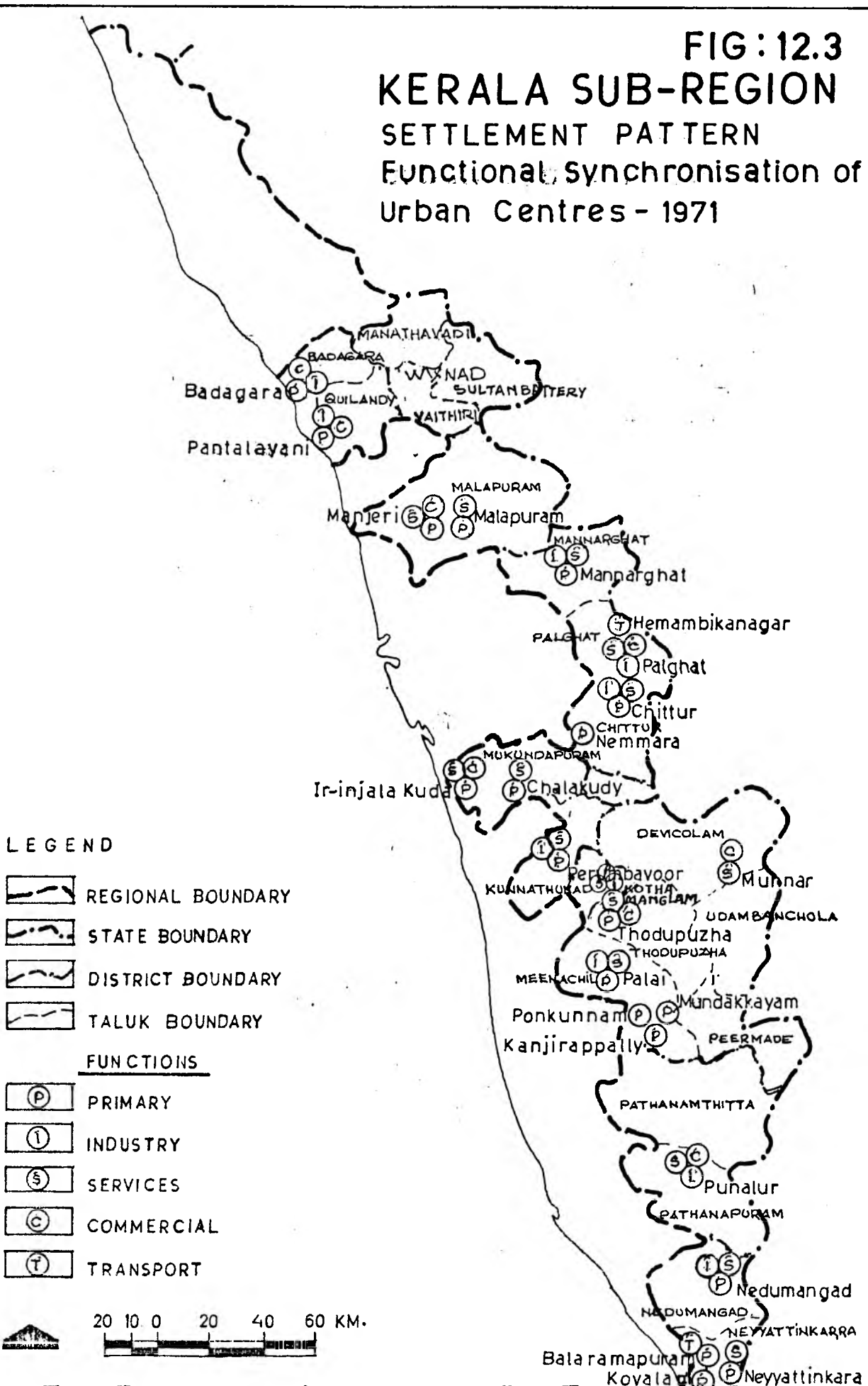
Among the 24 towns, 5 are entirely 'primary' towns, which means that 19 towns exhibit urban characteristics. However, among these 19 towns, 14 towns have primary activities as one of the main functions where 9 of them have primary activity as the dominant function. It is, therefore, clear that only 5 towns (i.e. the remaining towns) have non-primary activities as their main functions. These towns are:

- 1) Munnar
- 2) Palghat
- 3) Hemambikanagar
- 4) Punalur
- 5) Kothamangalam





2.3.1 Change in Functional Character

Judging from the change of functions over 1961 to 1971, the intensity of overall urban character has become rather diluted. Nemmara and Kovalam remained with primary activities as the only dominant occupation in both the Census points. Mundakkayam and Ponkunnam became primary functional in 1971 from service functions in 1961, whereas Kanjirappally a bi-functional town of 1961 with services function dominant changed to mono-function with primary activities in 1971. Chalakudy a monofunctional town with services functions in 1961 gave in to bi-functional of primary

FIG : 12.3
KERALA SUB-REGION
SETTLEMENT PATTERN
Functional Synchronisation of
Urban Centres - 1971



LEGEND

-  REGIONAL BOUNDARY
-  STATE BOUNDARY
-  DISTRICT BOUNDARY
-  TALUK BOUNDARY

FUNCTIONS






-  PRIMARY
-  INDUSTRY
-  SERVICES
-  COMMERCIAL
-  TRANSPORT



Table-12.6: Functional Classification of Towns
1961-1971.

Town	Function-1961	Function-1971
1. Perumbavoor	Service-cum-Industrial	Industrial-cum-service-cum-Primary.
2. Chalakudy	Service	Primary activity-cum-Industrial.
3. Irinjalakuda	Service	Service-cum-commercial-cum-primary.
4. Thodupuzha	-	Primary-service-cum-commercial.
5. Munnar	-	Service-cum-industrial
6. Mannarghat	-	Primary-cum-service-cum-industrial.
7. Palghat	Service	Service-cum-commercial-cum-industrial.
8. Hemambikanagar	-	Transport
9. Chittur-Thathamangalam.	Industrial-cum-primary.	Primary-cum-industrial-cum-service.
10. Nemmara	Primary activity	Primary activity.
11. Balaramapuram	Industrial-cum-service.	Industrial-cum-primary
12. Kovalam	Primary activity	Primary activity
13. Neyyattinkara	Service	Primary-cum-service
14. Nedumangad	-	Primary-cum-industrial-cum-service.
15. Punalur	-	Industrial-cum-service-cum-commercial.
16. Palai	Service-cum-primary	Primary-cum-service-cum-commercial
17. Kanjirappally	Service-cum-primary	Primary activity.

Table.....contd.

1	2	3
18. Mundakkayam	Service	Primary activity.
19. Ponkunnam	Service	Primary activity.
20. Malappuram	-	Service-cum-Primary
21. Manjeri	Service	Primary-cum-service-cum-commercial
22. Pantalayani	Primary-cum-service-cum-industrial.	Primary-cum-industrial-cum-commercial.
23. Badagara	Service-cum-industrial	Industrial-cum-commercial-cum-primary.
24. Kothamangalam	-	Service-cum-Primary-cum-industrial activities.

Source: Census, 1971.

(dominant) and industrial activities. Irinjalkuda added to its monoservice function: Commercial and primary occupation over the decade 1961-1971. Palghat shows a strong tendency of becoming a non-primary urban centre with added functions of commerce and industry in 1971 to its services in 1961. Primary functions overtook other functions in Chittur-Tathamangalam, Balaramapuram, Palai and Kanjirapally over the decade. Of the new towns which are declared urban in 1971, Munnar, Hemambikanagar and Punalur have entirely non-primary occupations and here Hemambikanagar is predominantly a transport node. Thus analysing the functional changes of the 15 towns in the Sub-region in 1961 2 were 'primary', 4 were 'partly - primary' and 9 were 'non-primary' towns.

During 1961 and 1971, the two 'primary' towns did not show any change. Among the 4 'partly-primary' towns, three remained unchanged and one became primary. It is, thus clear that among the six primary/partly-primary towns, no town became a non-primary town during 1961-1971. Among the 9 'non-primary' towns, 7 became 'partly-primary', one became 'primary' and one remain unchanged (Fig.12.3).

It is clear from the above analysis that growth of industrial activities in the Sub-region has been very poor. There has been shift from non-primary to primary/partly-primary character of towns, but the reverse process has been totally absent. This is indicative of the additional pressure of population on agriculture and allied activities. A large proportion of the increase in population has been engaged in primary activities because of relatively slower growth of industrial and tertiary activities.

3. DISTRIBUTION OF RURAL SETTLEMENTS

It has been already mentioned that as far as Kerala is concerned, a census village does not represent the smallest unit of settlement. A village represents cluster of settlements known as 'desoms' or 'muris' or 'karas'. Thus the smallest unit of settlement in Kerala is a 'desom' or 'muri' or 'kara'.

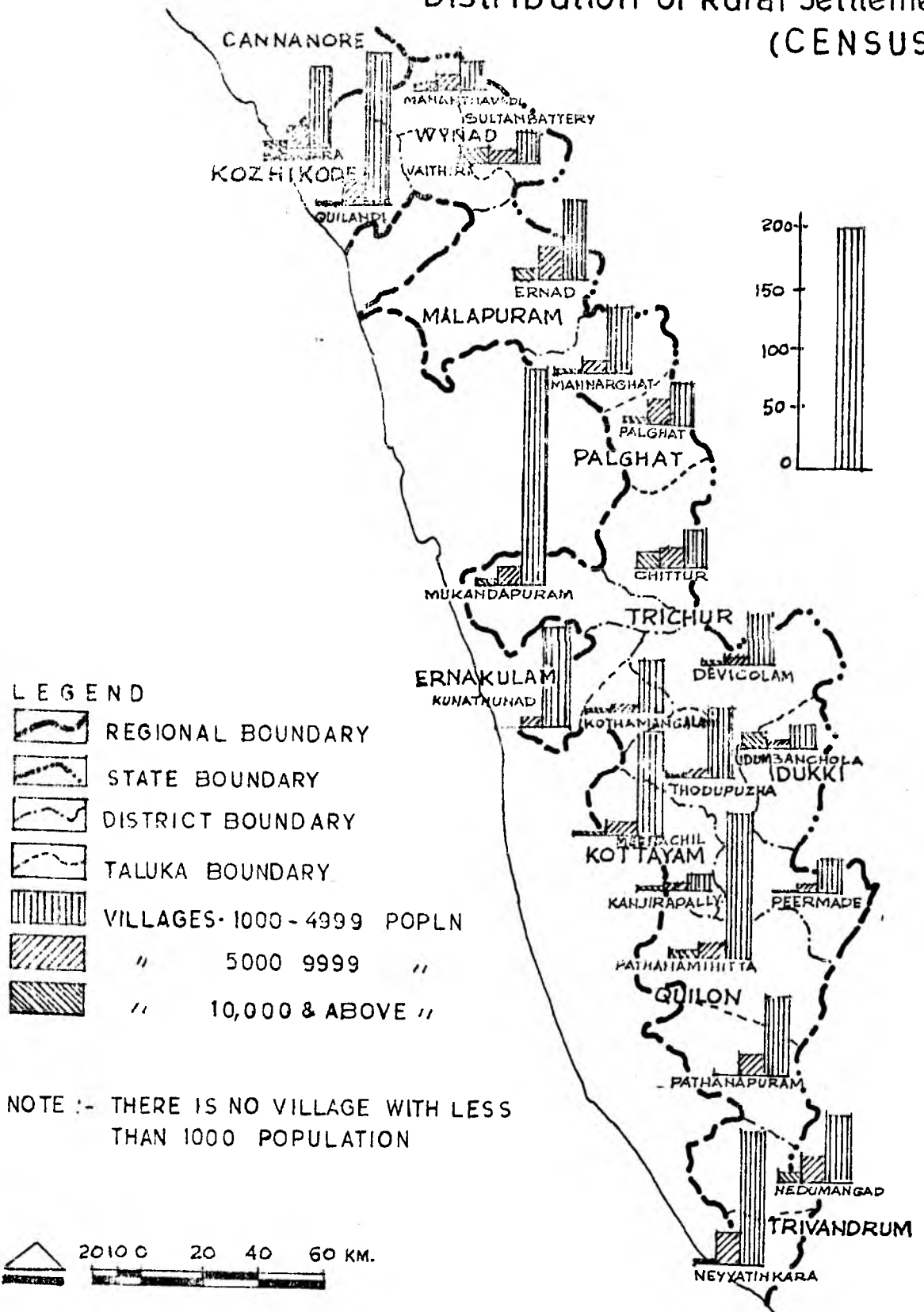
It may, therefore, be noted that in the case of Kerala Sub-region study of rural settlements refers to study of 'desoms' (or 'muris' or 'karas').

According to 1971 Census, there are 1999 desoms in the Kerala Sub-region. The talukawise distribution (percentage) of desoms by size of population is set out in Table 12.7. (Fig. 12.4)

It is evident from Table 12.7 that medium-sized settlements (population range 1000 - 5000) are predominant in the Sub-region. They account for about 63 per cent of the total inhabited rural settlements (i.e. desoms). Large-sized settlements (population range above 5000) account for only about 16 per cent. About 20 per cent of the settlements are of small-size.

Talukawise analysis shows that medium-sized settlements are predominant in all except four taluks. These four talukas are Vaithiri, Sultan Battery, Kanjirappally and Udumbanchola. In Vaithiri, Sultan Battery and Kanjirappally, the predominant settlements are of medium size. Small-sized settlements are dominant only in Udumbanchola Taluk.

KERALA SUB-REGION SETTLEMENT PATTERN Distribution of Rural Settlements (CENSUS)



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Table-12.7: Desoms Classified By Population Talukawise - 1971 - Kerala Sub-Region.

Sl. No.	Taluk.	Total no. of inhabited Desoms	Less than 500			500 - 999			1000 - 1999					
			No.	Percentage (Desoms)	Population	Percentage (Population)	No.	Percentage (Desoms)	Population	Percentage (population)	No.	Percentage (Desoms)	Population	Percentage (Population)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Mananthavadi	22	-	-	-	-	2	6.3	1497	1.2	6	18.8	9453	7.3
2.	Vaithiri	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	S. Battery	29	1	3.4	4225	0.1	-	-	-	-	2	6.9	3594	1.3
4.	Quilandy	196	12	6.6	4123	0.9	44	22.4	34326	7.8	56	28.6	79514	18.1
5.	Badagara	136	6	4.4	1948	0.5	-	13.2	13153	3.7	41	30.1	62043	17.4
6.	Ernad	164	-	-	-	-	14	8.5	11221	1.7	49	29.9	74129	11.1
7.	Mannarghat	36	1	2.8	414	0.2	3	8.3	2986	1.7	6	16.7	8248	4.8
8.	Palghat	65	1	1.5	461	0.2	4	6.2	2929	4.1	14	21.5	22049	8.2
9.	Chittur	39	-	-	-	-	-	-	-	-	2	5.1	2969	1.1
10.	Mukundapuram	236	19	8.1	5257	1.0	31	13.1	24045	4.6	75	31.8	108269	20.5
11.	Kannathunad	126	14	11.1	5155	1.9	20	15.9	14393	5.3	51	40.5	71253	26.3
12.	Meenachil	129	8	6.2	2016	0.6	19	14.7	13571	4.1	37	28.7	52409	15.8
13.	Kanjirappally	17	-	-	-	-	-	-	-	-	2	11.8	2552	2.0
14.	Pathanamthitta	110	9	8.2	3486	0.9	14	12.7	10831	2.8	18	16.4	24408	6.3
15.	Pathanapuram	100	3	3.0	1129	0.4	15	15.0	11781	4.0	24	24.0	36339	12.2
16.	Neyyattinkara	185	20	10.8	5625	1.1	30	16.2	21872	4.3	43	23.2	63681	12.6
17.	Nedumangad	85	2	2.4	408	0.1	1	1.2	590	0.1	8	9.4	13562	3.3
18.	Thodupuzha	106	18	17.0	3890	2.0	23	21.7	15965	8.0	20	28.3	43140	21.7
19.	Devicoolam	61	12	19.7	3555	2.7	7	11.5	5101	3.9	22	36.1	33905	26.1
20.	Udumbanchola	46	15	32.6	3614	1.4	6	13.0	4439	1.7	6	13.0	9030	3.4
21.	Peermade	35	2	5.7	271	0.2	2	5.7	1678	1.1	4	11.4	7066	4.8
22.	Kothamangalam	66	6	11.8	2088	1.6	14	20.6	10809	7.9	20	29.4	30698	22.6
Total Sub-Region		1599	150	7.6	43655	0.7	267	13.3	201187	8.2	516	25.8	758102	12.2

S.No.	2000-4999				5000-9999				10000 and above				Total Population of desoms	Population of forest Ranges.	Total Rural Popu
	No.	Percentage (Desoms)	Population	Percentage (population)	No.	Percentage (Desoms)	Population	Percentage (population)	No.	Percentage (Desoms)	Population	Percentage (population)			
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1.	17	53.1	49679	38.4	5	15.6	36075	27.9	2	6.3	31818	24.6	128522	813	129335
2.	13	20.7	22700	8.0	9	31.0	66055	23.2	11	37.9	189903	66.7	282477	2038	284515
3.	67	34.2	211384	48.0	15	7.7	97031	22.0	1	0.5	13771	3.1	440149	35	440184
4.	57	41.9	183389	51.5	12	8.8	74494	20.9	2	1.5	20806	5.8	355833	Nil	355833
5.	66	40.2	204211	30.6	23	14.0	142110	21.3	12	7.3	235861	35.3	667532	228	667760
6.	13	36.1	42135	24.5	9	25.0	64855	37.7	4	11.1	53314	31.0	175952	47	171995
7.	25	38.5	80815	30.4	19	29.2	135974	51.1	2	3.1	23886	9.0	265905	276	266181
8.	10	46.2	61791	22.7	10	25.6	71349	26.2	9	23.1	124363	45.6	260472	12094	272566
9.	102	43.2	320327	60.7	9	3.8	55419	10.5	-	-	-	-	513317	14033	527350
10.	31	24.6	92936	34.3	8	6.3	49444	18.2	2	1.6	38035	14.0	271216	9	271225
11.	52	40.3	161966	48.8	11	8.5	74498	22.5	2	1.6	27146	8.2	331606	Nil	331606
12.	6	35.3	19271	15.1	5	29.4	35854	28.0	4	23.5	62242	48.7	119919	7940	127859
13.	48	43.6	159227	40.8	11	10.0	70655	18.1	10	9.1	112790	28.9	381397	8753	390150
14.	40	40.0	121608	40.9	17	17.0	108366	36.5	1	1.0	15678	5.3	294901	2196	297097
15.	63	34.1	193774	38.4	26	14.1	177043	35.1	3	1.6	41481	8.2	503476	646	504122
16.	44	51.8	148786	35.8	23	27.1	153022	36.8	7	8.2	92052	22.1	408420	7716	416136
17.	30	28.3	81673	41.1	4	3.8	23688	11.9	1	0.9	10710	5.4	179066	19558	198624
18.	15	24.6	39532	30.7	3	4.9	17660	13.6	2	3.3	23207	17.9	123360	6608	129968
19.	6	13.0	19438	7.3	3	6.5	25986	9.8	10	21.7	202406	76.4	264913	Nil	264913
20.	20	57.1	70117	47.8	4	11.4	26052	17.7	3	8.6	38217	26.0	143401	3440	146841
21.	22	32.3	62451	46.0	3	4.4	19731	14.5	1	1.5	10067	7.4	135844	368	135844
748	37.4	2347610	37.6	229	11.4	1525361	24.4	89	4.4	1367753	21.9	6243678	86798	6330108	

Source: Compiled from the data obtained from the following:

- (1) Census 1971- General Population Tables", Part II A- Kerala
- (2) "District Census Handbook" of Idikki- 1971.

As far as rural population of the Sub-region is concerned, it is seen that most of the rural inhabitants live in medium and large-sized settlements. Medium-sized settlements are dominant not only in numerical terms, but also in terms of population count. About 49 per cent of the rural inhabitants live in medium-sized settlements. Large-sized settlements account for about 46 per cent in terms of population.

Medium-sized settlements are predominant both in terms of number and population in twelve talukas. These are Quilandy, Badagara, Mukundapuram, Kunnathunad, Meenachil, Pathanamthitta, Pathanapuram, Neyyattinkara, Thodupuzha, Devicolam, Permade and Kothamangalam.

Large-sized settlements are predominant both in terms of number and population in three talukas, namely, Vaithiri, Sultan Battery and Kanjirappally.

Medium-sized settlements are predominant in terms of number and large-sized settlements are dominant in terms of population in six talukas, namely, Mananthavadi, Ernad, Mannarghat, Palghat, Chittur and Nedumangad.

In case of Udumbanchola taluk, it is seen that the large-size settlements are dominant in terms of population and small-sized settlements in terms of number.

The dominance of medium-sized settlements in the Sub-region can be attributed to the area and topography of the Sub-region. The area being comparatively small and the topography being highly undulating the population concentration has been confined to a fewer settlements, resulting in large and medium-sized settlements. Had the area been large and plainy, the population would have been comparatively much more scattered resulting in large number of smaller settlements.

3.1 Population of Forest Areas

The rural population of the Sub-region is distributed not only over 'desoms' but also over forest areas. Population of forest areas account for about 1.4 per cent of the total rural population. There are 46 forest ranges in the Sub-region of which only one is uninhabited. The names of forest ranges falling in the Sub-region and their population are presented in Table 12.8.

Thodupuzha taluk in (Idukki district) has significant population (about 10 per cent) in its forest areas. The talukas of Chittur, Kanjirappally and Devicolam also have fairly high population in their forest ranges.

Table-12.8: Forest Ranges and their Population (1971)-
Kerala Sub-Region.

Taluka	Forest range	Population
1. Mananthavadi	1. Kannothe range (Periya)	25
	- Kannothe range	Unihabited
2. Vythiri	2. Begur range (Thirunelly)	754
	- Begur (Vemom)	Unihabited
	- Kannothe (Thondernad)	-do-
2. Vythiri 3. S. Battery	3. Chethalath (Pulpatti village)	249
	- Chethalath (Poothadi village)	89
	- Chethalath (Kidanganad village)	421
	4. Sultans's Battery (Kidanganad village)	99
	- Sultan's Battery (Noolpuzha)	1175
	- Chethalath (Thariyode village)	5
	5. Kuttiyadi range (Perembra village)	35
4. Quilandy	- (Kuttiyadi range (Kayanna village)	Unihabited
		Un -
5. Badagara		Un -
6. Ernad	b) Nilambur (Kizhuparamba) village	Unihabited
	- Nilambur range (Nilambur village)	20
	- Nilambur (Chungathara)	Unihabited
	Nilambur (Edakkara)	26

1	2	3
	7. Karulai (Edakkara)	Uninhabited
	Karulaiba (Anaramlam)	174
	- Nilambur (Mambad)	2
	8. Mannarghat range	5
7. Mannarghat	- Mannarghat Territorial range (Kottopadam I village)	Uninhabited
	- Mannarghat Territorial range (Kottopadam III)	Uninhabited
	- Mannarghat Territorial range (Outside village boundary)	695
	9. Olavakkode Territorial range (Kongad I)	47 Uninhabited
	- Palghat Private forest range (Mundur I)	Uninhabited Uninhabited
	- Palghat Private D.C. range (Mundur II)	Uninhabited
	- Palghat Private forest range (Pudu-PPariyaram I)	-do-
	Palghat private forest range (Puduppariyaram II)	208
	- Palghat Private forest range (Akathethara)	Uninhabited -do-
	- Palghat private forest range (Malampuzha I)	Uninhabited
	- Palghat private forest range (Malampuzha II)	-do-
	- Palghat private forest range (Pudusseri West)	-do-
	-do- (Pudusseri Central)	-do-
	-do-	

1	2	3
	Pudusseri east)	-do-
	(Parli I)	-do-
	-do-	
	(Parli II)	-do-
	Palghat private forest range (Manakara)	Uninhabited
	-do-	
	(Keralesseri)	-do-
	- Olavakkode territorial range outside village boundary	12
	- Palghat private forest range	56
9. Chittur	11 Sungam range outside village boundary	537
	12 Parambikulam range outside village boundary	1021
	13 Nellyyampathy range outside village boundary.	7611
	14. Nemmara range outside village boundary	2925
10. Mukundapuram	15. Palappilly range (Kallur village)	Uninhabited
	- Palappilly range (Varandarappilly)	Uninhabited
	- Palappilly (Mupliyam) Village	61
	- Palappilly range (Mattathur village)	39
	16 Periyaram (Kodassery)	8

1	2	3
	- Periyaram (Periyaram village)	
	- Palappilly range	9279
	- Pariyaram range	270
17	Vazhachal range	Outside village 789
18	Sholayur range	boundary 3587
11. Kunnathunad	19 Kodanad range (Cheranalloor village)	Uninhabited
	20 Thundathil range	9
	21 Kothamangalam range (Mazhuvannoor village)	Uninhabited
12. Kothamangalam	22 Thundathil Kothamangalam (Pindimana)	Uninhabited -do-
	- Kothamangalam (Keerampara)	359
	- Kothamangalam (Kuttamangalam)	Uninhabited
	23 Adimalai	9
	- Kothamangalam (Kadavoor)	Uninhabited
13. Thodupuzha	24 Thodupuzha range (Kumaramangalam)	Uninhabited
	- Kothamangalam (Kodikulam)	1839
	- Thodupuzha range (Kodikulam)	Uninhabited
	- Thodupuzha (Karimannoor)	10
	- Thodupuzha (Udumbannoor)	2555
	25 Nagerampara Udumbanchola)	Uninhabited
	Thodupuzha (Velliamattom village)	3060
	- Thodupuzha (Alakode)	Uninhabited
	- Thodupuzha (Karikode)	-do-

1	2	3
	- Thodupuzha (Manakkad)	-do-
	- Thodupuzha range (Pura Puzha)	-do-
	- Thodupuzha (Karinkunnam)	-do-
	- Thodupuzha range Arakulam	1132
	- Nagarampara range village	Uninhabited
	- Adimalai range	
	- Nagarampura Idikki	751
26	Ayyappancoil village	8331 1880
14. Devicolam	- Kodanad Mannamkandam	476
	- Adimalai	2789
	- Thundathi	572
	- Kothamangalam	Uninhabited
	27 Devicolam range (Vellathoo Val village)	Uninhabited
	- Devicolam range (Pallivasal village)	Uninhabited
	- Devicolam range (K.D. Hills)	1117
	28. Marayoor (Marayoor)	674
	- Marayoor (Kanthalloor)	247
	- Marayoor (Kottakamboor)	398
	- Marayoor (Vattavada) village	Uninhabited
15. Udumbanchola	29 Vandanmettu (Parathode)	-do-
	- Ayyappancoil (Kalkoonthral)	-do-
	- Vandanmettu range (Vandanmethu)	-do-

1	2	3
	- Vandanmettu (Chakkupallam) village	Uninhabited
16. Peermade	- Ayyappancoil range (Pasuppara village)	-do-
	30 Erumely (Peruvanthanam)	395
	- Ayyappancoil (Peermade village)	Uninhabited
	- Erumely (Peermade)	158
	31 Vallakadavu (Peermade)	1925
	- Vallakadavu Periyar 32 Thekkady village	74 841
	- Vallakadavu Mlappara	38
	- Thekkady	9
17. Pathanamthitta	33 Ranni range (Angadi)	Uninhabited
	- Ranni (Pazhavangadi)	Uninhabited
	- Ranni range (Chethakkal)	4317
	- Ranni range Perunadu Vadasserikara Village Goodrical	862 Uninhabited 1784
	Ranni Vadasserikara Vadasserikara village Goodrical	170 1341 Uninhabited
	36 Konni Konni-	Uninhabited
	37 Naduvathumuzhi thazham village	
	Konni Naduvathumuzhi Iravon	7 55
	38 Monnarapara	30
	Konni Konni Naduvathumuzhi village	3 Uninhabited
	Konni (Pramadam)	184

1	2	3
18. Pathanapuram	39 Pathanapuram (Pathanapuram village)	34
	Naduvathumuzhi Piravanthoor 37 Mannarapara Village 763 Pathanapuram 24	
	40 Pathanapuram Edamon 42 Thenwala village Uninhabited	
	41 Ariencavu 49	
	42 Achencoil Ariencavu 9	
	43 Kallar Village 23	
	44 Anchal Kulathupuzha 734 Thenmala Village 429	
	45 Kulathupuzha 12	
	Anchal(Eroor village) 1	
	Anchal (Punalur portion) Uninhabited	
	Anchal (Alayamon) 39	
19. Meenachil	Erumely range Uninhabited (Ramapuram)	
20. Kanjirappally	Erumely range 7840 (Erumely)	
	Erumely range Uninhabited (Manimala village)	
21. Neyyattinkara	46 Paruthipally range 278 (Ottassekharamangalam)	
	Paruthipally range 368 Outside village boundaries	
22. Nedumangad	Palode range 531 (Vamanapuram B)	
	Palode 145 (Anad B)	

1	2	3
	Palode range (Palode A)	1079
	Palode range (Palode B)	233
	Palode range (Aryanad B)	593
	Paruthipally (Uzhamalackal A)	1948
	Paruthipally (Nedumangal portion)	Uninhabited
	Paruthipally range (Uzhamalackal B)	Uninhabited
	Paruthipally range (Aryanad A)	-do-
	Kulathu-puzha Outside	562
	Palode Village	1953
	Paruthipally Boundary	672

4. ORDER OF SETTLEMENTS BY CENTRALITY INDEX

In order to evolve a settlement system for any area study of the hierarchy of the existing settlements is an essential pre requisite. Hierarchy is in terms of the importance of functions the settlement performs as well as quantitative level of facilities and amenities available in the settlement. Importance of function is by and large a qualitative estimate of degree of economy .. energy the function wields while the level of facilities is a quantitative assessment that implies the role the settlement plays in the system.

In this analysis especially the hierarchy of settlements is determined on the basis of somewhat a synthesis of both facilities and amenities available as well as the organisational and developmental functions the settlement performs. Depending upon the range of each of the services available; the weightages are assigned and based on the aggregates of weightages scored, the position of the settlement in the hierarchy is determined. When the number of settlements is very large, it would neither be easy nor desirable to analyse all the settlements to arrive at the hierarchy of settlements. In the case of Kerala Sub-region, there are 24 towns and 1999 rural settlements which are desoms. It would not, therefore, be necessary to consider all these settlements particularly in view of the purpose of this analysis where the main objective is to draw a functionally synchronised settlement system that too of urban status. The analysis has, therefore, been confined, in addition to the 1971 Census towns, to those rural settlements (desoms) which have a population of 7000 or more. This figure has been arbitrarily fixed to facilitate a manageable quantum for analysis.

As far as the Kerala Sub-region is concerned, the following facilities, services and functions have been considered to evaluate the hierarchical status of settlement. These items are chosen in specific reference to the particular area under study. The weightages assigned to the facilities, services and functions are shown against them :

I.	<u>Revenue and General Administration</u>	
		<u>Weightage</u>
(i)	District headquarters	4
(ii)	Sub-divisional headquarters or B.D.C.	3
(iii)	Taluka headquarters	2
(iv)	Police station	1
II.	<u>Working Force in Manufacturing Industries</u>	
(i)	500 and above	4
(ii)	250 - 500	3
(iii)	50 - 250	2
(iv)	5 - 50	1
III.	<u>Marketing and Banking</u>	
(i)	Banking	4
(ii)	Daily Market	3
(iii)	Agricultural Cooperative Credit Society	2
(iv)	Weekly or Bi-weekly Market	1

		<u>Weightage</u>
IV.	<u>Educational Facilities</u>	
	(i) College, Commercial College, Agricultural College, etc.	4
	(ii) Higher Secondary School, ITI, Shorthand Type Institute	3
	(iii) Middle School	2
	(iv) Primary School	1
V.	<u>Medical Facilities</u>	
	(i) Hospital	4
	(ii) Primary Health Centre	3
	(iii) EPC, MCW, NH, VH, etc.	2
	(iv) Dispensary	1
VI.	<u>Roads</u>	
	(i) National highway	4
	(ii) State highway	3
	(iii) Pucca road	2
	(iv) Kuchha road	1
VII.	<u>Railways</u>	
	(i) Railway junction/BG	4
	(ii) Railway junction/MG	3
	(iii) Railway station/BG	2
	(iv) Railway station/MG	1
VIII.	<u>Other Civic Amenities</u>	
	(i) Tapped Water Supply	2
	(ii) Well	1
	(iii) Electricity	1
	(iv) Cinema	1

		<u>Weightage</u>
(v)	Temple/Church	1
(vi)	Post Office	1
(vii)	Telegraph Office	1
IX.	<u>Population</u>	
(i)	20,000 - 50,000	4
(ii)	10,000 - 20,000	3
(iii)	5,000 - 10,000	2
(iv)	2,000 - 5,000	1

With the allotment of weightages this gives the maximum number of points a settlement can score works out to 67. In order to assess the level and number of functions the settlements perform, the settlements have been graded into four categories, namely, First Order settlements, Second Order settlements, Third order settlements and Fourth order settlements. The number of points a settlement scores is indicative of the order the settlement belongs to. In the present analysis, the settlement scoring 80 per cent and above of the maximum number of points are categorised as First Order Settlements. 60 to 80 per cent of the maximum points as Second Order settlements, 40 to 60 per cent as Third Order settlements and 20 to 40 per cent of the maximum points as Fourth Order settlements. The order of settlements is as follows:

Order of Settlement

a) First order settlement - 54 and above points. No settlement qualifies to the first order of settlement.

b) Second order settlement - 40 to 53 Points

<u>S.No.</u>	<u>Settlement</u>	<u>Taluk</u>	<u>Score</u>
1.	Palghat (Town)	Palghat	49
2.	Malapuram (Town)	Ernad	46
3.	Manjeri (Town)	Ernad	45
4.	Chittur-Thathamangalam (Town)	Chittur	45
5.	Chalakyudy (Town)	Mukundapuram	43
6.	Irinjalakunda (Town)	Mukundapuram	43
7.	Kanjirappally (Town)	Kanjirappally	43
8.	Palai (Town)	Meenachil	40
9.	Thodupuzha (Town)	Thodupuzha	40
10.	Neyyattinkara (Town)	Neyyattinkara	40

c) Third Order Settlements - 27 to 39 Points

<u>Sl.No.</u>	<u>Settlement</u>	<u>Taluk</u>	<u>Score</u>
1.	Pantalayani (Town)	Quilandy	39
2.	Badagara (Town)	Badagara	38
3.	Mannarghat (Town)	Mannarghat	37
4.	Perumbavoor (Town)	Kunnathunad	36
5.	Sultan's Battery	South Wynad	36
6.	Ponkunnam (Town)	Kanjirappally	35
7.	Punalur (Town)	Pathanapuram	35
8.	Nedumangad (Town)	Nedumangad	33
9.	Nemmara (Town)	Chittur	32
10.	Kongad	Palghat	31
11.	Nallepilly	Chittur	31

12.	Kizhakkethara	Chittur	31
13.	Vengola	Kunnathunad	30
14.	Mundakkayam (Town)	Kanjirapally	30
15.	Kalpetta	South Wynad	29
16.	Kendotty	Ernad	29
17.	Pattancheri	Chittur	29
18.	Chungathara	Ernad	28
19.	Elappully	Falghat	28
20.	Kozhinjampara	Chittur	28
21.	Ayilur	Chittur	27
22.	Peringamala-North	Nedumangad	27
23.	Balarampuram (Town)	Neyyattinkara	27
24.	Ambalavayal	South Wynad	27

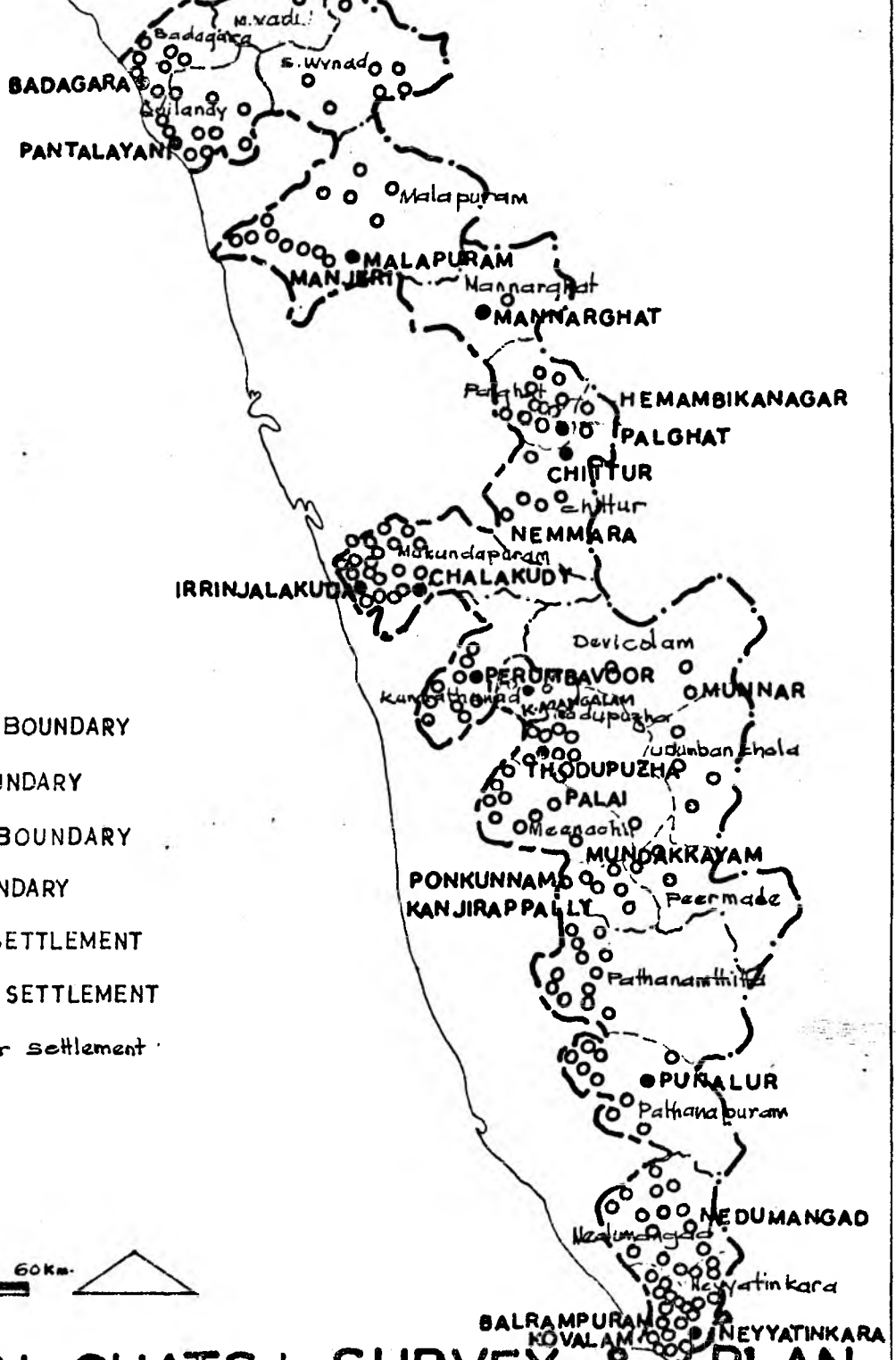
Upto the Third order, the settlements are shown in Fig. 12.5.

d) Fourth Order Settlements - (14 to 26 Points)

<u>Sl.No.</u>	<u>Settlement</u>	<u>Taluk</u>	<u>Score</u>
1.	Kottakkal	Ernad	26
2.	Pirayiri	Falghat	26
3.	Edathara	Falghat	26
4.	Vadakarapatty	Chittur	26
5.	Munnar (Town)	Devicolem	25
6.	Agali	Mannarghat	25
7.	Erumely	Kanjirappally	25
8.	Angadi	Pathanamthitta	25
9.	Thariyode	South Wynad	24
10.	Kunnathidaveka	South Wynad	24
11.	Alanallur - I	Mannarghat	24
12.	Akathethara (Portion)	Falghat	24
13.	Kurisumuttam	Neyyattinkara	24
14.	Kothamangalam (Town)	Kothamangalam	24
15.	Kulathupuzha	Pathanapuram	23

FIG:12.5

KERALA SUB-REGION SETTLEMENT PATTERN ORDER OF SETTLEMENTS (UPTO 3rd ORDER).



16.	Kovalam (Town)	Neyyattinkara	23
17.	Nemmeni	South Wynad	23
18.	Muppainad	South Wynad	23
19.	Thiruvangoor	Quilandy	23
20.	Chelembra	Ernad	23
21.	Pudusseri (Central)	Palghat	23
22.	Vadavannur	Chittur	23
23.	Karumkulam	Neyyattinkara	23
24.	Neyyassery	Thodupuzha	22
25.	Vemom	North Wynad	22
26.	Muttill	South Wynad	22
27.	Kattekad	Palghat	
28.	Kadanad	Meenachil	22
29.	Karikkattoor	Kanjirappally	22
30.	Cheruvarakonnam	Neyyattinkara	22
31.	Kottukal (West)	Neyyattinkara	22
32.	Naranganam	Pathanamthitta	21
33.	Arecode	Ernad	21
34.	Edakkara	Ernad	21
35.	Vaniyambalam	Ernad	21
36.	Thrikunnasseri	Ernad	21
37.	Edathanattukara	Mannarghat	21
38.	Puduppariyaram (Portion)	Palghat	21
39.	Mullor	Neyyattinkara	21
40.	Chitturvedu North	Medumangad	21
41.	Punalurikizhakkekara	Peermade	20
42.	Udumbanoor Area	Thodupuzha	20
43.	Perunadu	Pathanamthitta	20
44.	Kottayam	Pathanamthitta	20
45.	Irigal	Quilandy	20
46.	Pallickal	Ernad	20
47.	Mambad	Ernad	20
48.	Mundur	Palghat	20

49.	Muthalamada II	Chittur	20
50.	Koduvayur	Chittur	20
51.	Pallassena	Chittur	20
52.	Edacode	Neyyattinkara	20
53.	Valvilakom	Neyyattinkara	20
54.	Manickal-East	Nedumangad	20
55.	Perayam	Nedumangad	20
56.	Chethakkal	Pathanamthitta	20
57.	Payyoli	Quilandy	20
58.	Pottankad	Udumbanchola	19
59.	Kumbazha	Pathanamthitta	19
60.	Hemambikanagar (Town)	Palghat	19
61.	Kottappadi	South Wynad	19
62.	Edacheri	Badagara	19
63.	Azhiyur	Badagara	19
64.	Pudursseri (West)	Palghat	19
65.	Airmuri	Kunnathunad	19
66.	Vengoor	Kunnathunad	19
67.	Nadakkal	Meenachil	19
68.	Thidanad	Meenachil	19
69.	Bharathanoor	Nedumangad	19
70.	Vettam Palli South	Nedumangad	19
71.	Kalthotty	Udumbanchola	19
72.	Eroor	Pathanapuram	18
73.	Nagarampara range	Thodupuzha	18
74.	Rajakad	Udumbanchola	18
75.	Konnithazham	Pathanamthitta	18
76.	Kottathara	South Wynad	18
77.	Thiruvallur	Badagara	18
78.	Nediyiruppu	Ernad	18
79.	Nilambur	Ernad	18
80.	Thuvvur	Ernad	18
81.	Thachanttukara	Mannarghat	18
82.	Pattasseri	Mannarghat	18

83.	Kavungal	Neyyattinkara	18
84.	Mabickal	Nedumangad	18
85.	Karipur	Nedumangad	18
86.	Kottackakom South	Nedumangad	18
87.	Attupara	Udumbanchola	17
88.	Vettipram	Pathanamthitta	17
89.	Cherupuram	Quilandy	17
90.	Amarambalam	Ernad	17
91.	Elankur	Ernad	17
92.	Veli Vallampally	Chittur	17
93.	Perumatty	Chittur	17
94.	Muthalamada I	Chittur	17.
95.	Thekkumkara	Mukundapuram	17
96.	Pallipram	Kunnathunad	17
97.	Thekkekara	Meenachil	17
98.	Vedicode B	Neyyattinkara	17
99.	Thitteveli	Neyyattinkara	17
100.	Anad South	Nedumangad	17
101.	Chellamgode	Nedumangad	17
102.	Pazhavangadi	Pathanamthitta	17
103.	Velam	Quilandy	17
104.	Anakara	Udumbanchola	16
105.	Elappara	Peermade	16
106.	Kodanemitta	Pathanamthitta	16
107.	Mangaram	Pathanamthitta	16
108.	Peruvanna	Quilandy	16
109.	Kanthalac	Quilandy	16
110.	Pandalur	Ernad	16
111.	Karimba	Mannarghat	16
112.	Peruvenba	Palghat	16
113.	Vallanghy	Chittur	16
114.	Thalappallam	Meenachil	16
115.	Edakunnam (Portion)	Kanjirappally	16
116.	Mundakkayam (Portion)	Kanjirappally	16
117.	Thumbode	Nedumangad	16

118.	Pampadumpara	Udumbanchola	15
119.	Kundalamara	Udumbanchola	15
120.	Peruvantham North	Peermade	15
121.	Moongode	Pathanapuram	15
122.	Adimali	Devicolum	15
123.	Sallayampara	Devicolum	15
124.	Kumaramperoor North	Pathanamthitta	15
125.	Prakkanam	Pathanamthitta	15
126.	Kavilumpara	Badagara	15
127.	Cheremba	Ernad	15
128.	Thenkara	Mannarghat	15
129.	Sholayur	Mannarghat	15
130.	Channappady	Kanjireppaly	15
131.	Mennoorkara	Nedumangad	15
132.	Pindimani	Kothamangalam	15
133.	Cumbanmety	Udumbanchola	14
134.	Peruvantham South	Peermade	14
135.	Aranackal-Manchumbala	Peermade	14
136.	Chinnakanal	Udumbanchola	14
137.	Food Production Area	Pathanamthitta	14
138.	Aruvapalem	Pathanamthitta	14
139.	Thondernad	North Wynaad	14
140.	Purakkadi	South Wynaad	14
141.	Puoinharethara	South Wynaad	14
142.	Thampalakkad	Kanjirappally	14
143.	Erumely Range	Kanjirappally	14
144.	Vanganoor	Neyyattinkara	14
145.	Pachu	Nedumangad	14
146.	Keerampara	Kothamangalam	14

It is evident from the foregoing list that higher order settlements are only a few in number. This clearly shows that the services and amenities available in the Sub-region are highly inadequate. What is therefore needed, is to evolve a proper settlement pattern by which the services and amenities could be properly distributed over the entire Sub-region so that every settlement enjoys adequate facilities and amenities within a reasonable distance, and also every settlement could strengthen its economic base.

5. IDENTIFICATION OF GAPS IN THE SETTLEMENT SYSTEM

According to 1971 Census, the urbanisation level of Sub-region works out to about 8 per cent, which is less than the State's average of 16.2 per cent and Country's average of about 20 per cent. To bring in an improvement in the economic development of the Sub-region comparable with at least the State, the growth of urbanisation in the Sub-region must be much faster.

In the projection of total population for 1981, the Registrar General of India (Census has assumed a growth of 30 per cent for Kerala. On the basis of this assumption, the State's total population is estimated to be 277.51 lakhs in 1981. Since people are becoming increasingly conscious of the need to have a small family due to spread of education and emphasis on family planning, the growth rate of population is anticipated to show a marked decline in the future. Hence, for the decade 1981-91, the growth rate has been assumed at 25 per cent, and on the basis

of this assumption, the total population of the state works out to be about 347 lakhs for 1991. Assuming that the proportion of total population of the State in 1981 and 1991, would be the same that existed in 1971, the total population of the sub-region in 1981 and 1991 works out to 87.3 lakhs and 105.7 lakhs respectively.

As far as urban population is concerned, it has been assumed that the Sub-region will attain an urbanisation level of 16 per cent by 1981 and 24 per cent by 1991. On this basis, the urban population of the Sub-region is estimated to be 13.9 lakhs in 1981 and 25.3 lakhs in 1991.

In 1971, the average population size of an urban centre was about 34,900 for the country as a whole, and about 34,460 for Kerala State. Taking an average size of 35,000 for an urban centre, the Sub-region's projected urban population may be distributed in about 40 towns in 1981 and 70 towns in 1991.

The land use pattern of the Sub-region reveals that forests occupy a large area (43 per cent) in the Sub-region. This means that the scope for

According to 1981 Census, in the Census publication of II series, only 15 urban centres including one new town are given pertaining to the Sub-regional area against 24 towns in 1971. Whether the 10 towns not included in the urban list of 1981 are declassified or not is not clearly known. The urban population of the Sub-region in 1981 is 6.16 lakhs for 15 towns against 5.51 lakhs spread over 24 towns in 1971. The urban list of the Sub-region for 1971 and 1981 is given in the Appendix.

developing a large number of settlements into urban centres is limited. The number of towns, therefore, is unlikely to reach a figure of 70 by 1991. What seems to be more probable is that the number of towns may be around the figure envisaged for 1981, and thereafter, the towns may have to grow larger to accommodate the increase in urban population. Thus, there may be 40-50 towns in 1991. This would incidentally meet the requirement of spatial distribution of urban centres also. If the number of towns increases to 45 by 1991, it would mean that there would be, on an average, one urban centre for a radius of 10 to 15 km of inhabited land portion of the Sub-region.

6.

PROPOSALS FOR FUTURE URBAN PATTERN

Human activity requires an organisational framework for its effective functioning, and the framework may be social or/and economic. Economic organisation enables inflow and outflow of goods and services whereas social organisation helps in establishing nodes of social conduct and behaviour. It is this organisational frame, on its translation in space manifests itself into a system of settlements in a hierarchy encompassing from a hamlet to trading centres, transport nodes, industrial centres and a metropolitan complex. These settlements of selective functions arranged in order of their functional importance and sequence serve as vehicles and regulators in space to transmit the effect of impact of development energy in a regulated manner to their surroundings. These central places, in a natural evolutionary pattern may stem from a key village primarily of agrarian economy

to swell to a highly industrial centre through a channel of service and trading centres. Conversely, if industrial activities of innovative and propulsive nature are concentrated at a centre, the strong-economy energy impulses of such points filter down to the agrarian rural centre again via trading centres and service towns. Thus the settlement of hierarchical functional importance evolve either by "building up" from an agrarian point to an industrial centre or from a point of secondary activity dominance to a primary functional node.

In a developing region, the locational pattern of economic activity has to be not one of concentration, for, it has the disadvantage of increasing the regional disparity in development, or scatter, for the developmental impacts would so thinly be distributed that it becomes difficult to feel.

The dominant secondary functional centres can be said to transmit the developmental impulses through growth poles, growth centres and growth points whereas the nodes of the primary sector that pass on the impact of development to ultimately reach every individual in all corners could be market centres, service centres and service villages.

To briefly define these nodal points in a settlement hierarchy:

- A Service village is essentially a large village which will provide the population in its catchment area with all day-to-day basic requirements of goods

and services. It will have hardly any productive activity in itself.

- A service town normally a small town serving mainly the primary sector population with all the basic requirements. It will have certain permanent institutional facilities for middle, higher and secondary education, vocational services and professional skills and provide its catchment area with daily necessities. It may also accommodate processing of agricultural produce in small scale mainly to meet the daily and essential requirements.

- A market town will have a large scale agricultural markets with necessary warehouse and storage facilities. It may also provide for processing of agricultural products in the form of rice mills, cotton ginning etc. A market town can function as a service town as well but the converse may not be the case. Predominantly forest areas and the mining belts will be taken care of by service towns.

- A growth point has basically industrial activities of innovative and generative character. In addition, the normal service functions necessary in a town will also exist. The industrial activities may be resource based intermediate or even the consumer type that can generate secondary, tertiary activities in the town and to reinforce its growth potential. The economic activity at a growth point has to be endogenous and must be capable of generating development impulses over an area.

- A growth centre is larger than a growth point and will have in addition to secondary activities, well developed services and administrative functions. The composition of manufacturing activities will be such as to give the centre a predominantly industrial base with a diversified industrial structure in terms of type as well as size. Much of its dynamism is derived from its role as industrial centre, a place where either spontaneously or as a matter of deliberate policy, industries are located and can diffuse activities to an catchment area in a marked way.

- A growth pole will be identified as a growth centre performing functions for a large area compared to the growth centre, and marked by highly specialised secondary, tertiary and quaternary activities which would be performed by other centres. Typically, a growth pole will have advanced industrial development connected with the scientific research and concentration of administrative and superior service functions of such importance which exert increasingly dynamic influence on regional policies and programmes. Roughly the services and facilities at these various functional nodes will be as set out in the Statement.

With this background, in addition to the choice of centres from amongst the potential nodes, the trends and tendencies of development in terms of functions over a period and the latent capacity of the respective hinterlands to support as well as to sustain the functional status of centrality of the nodes need to be considered.

Statement: Facilities and Services at different functional centres.

Sl. No.	States in hierarchy	Distributary services	Collection marketing & banking	Rural Development (Extension work) agricultural credit institutions	Industrial Development Corporation	Social Services (Educational)	Social Services (Health)	Law, Revenue & Judicial (Govt. Deptt.)	Transport & Communications	Specialised services & skills	Remarks
1.	Village	One or two shops	-	-	-	Primary School	Mobile units	-	V.R.	-	-
2.	Service village.	Shops & a co-op. Store	Weekly/Biweekly/markets.	V.L.W.	Rural craft shed	Middle school	Dispensary	Village Outpost	D.R. D.R.	-	-
3.	Service Town.	Retail shopping + consumer cooperative.	Banks Town/market mainly to local consumption, dairy products, vegetables etc.	Rural Credit Society.	Rural Industrial Estate.	Secondary school	Primary Health Centre.	Police thana	D.R.	General workshop	Cooperative stores or Agricultural credit Corporation.
4.	Market Town	Wholesale distributors and retail shops.	Banks, wholesale market, Regulated market.	Block H.Q. Rural Credit Society.	-	Inter College	Hospital with 50 beds.	Sub-Division H.Q.	S.H. S.H.	General Workshop Eye, Dental, Clinics, Bar Association.	Land development Bank or Agricultural Finance Corporation.
5.	Growth Point	-do-	Several Banks	-	Industrial Estate (Industrial Service Institute)	I.T.I., Inter College	District hospital	District H.Q.	S.H. or N.H.	-do-	-do-
6.	Growth Centre	Specialised/retails shopping and wholesale distribution.	Several banks.	District H.Q.	Industrial area.	Degree College, Polytechnic.	State hospital/specialised hospital.	District/Divisional Police H.Q.	Railhead N.H. or S.H.	Specialised workshops	-
7.	Growth Pole.	Metropolitan shopping centre.	Several banks	-	Industrial complex	University & Technical College.	Medical college specialised hospitals.	State, HQ/Divisional H.Q.	-	All skills available.	-
8.	Growth Cluster	-	Banks	-	-	-	-	-	-	-	-

V.L.W. = Village level workers
 V.R. = Village Road
 D.R. = District Road

S.H. = State Highway
 N.H. = National Highway
 H.Q. = Headquarters.

The present position and future possibilities of development of the 1971 Census urban centres in terms of potentials in their respective catchment areas are briefly indicated in Table 12.9.

On the basis of potentials for future development and keeping in view organisational needs for the stability, sustenance and growth of the settlement system by a constant transmission of developmental and administrative impulses through a channel of regulated hierarchical nodes, a future urban pattern is attempted as set out in Table 12.10 and indicated in Figure 12.6. In arriving at this pattern the adjoining zones of the study area extending from the coast line on the west to the Western Ghats regional boundary in Karnataka as well as Tamil Nadu on the east have been studied of their important settlements in so far their functions and their likely status in the foreseeable future are concerned. (Fig. 12.7 on functions)

The coastal plains on the west of the Sub-region is of intensive human habitation with most of the magnets on the sea coast such as Cannanore, Calicut, Ernakulam, Alleppey, Quilon and Trivandrum as well as Trichur and Kottayam, the inland ones.

On the eastern side of the Sub-region, the high altitude ghats though loose their elevation gradually extends over 50 to 70 km length in Karnataka and Tamil Nadu. Some of the important urban centres that have significant influence over the organisatioal structure of the urban pattern of the Sub-region are Cotacamund, Coimbatore, Pollachi, Udumalpet, Palani,

Table- 12.9: Development Prospects of Urban Hinterlands

Taluk Towns	Topography		Land Use %	Agriculture			Forest Product	Industry	Functions	Remarks
	%	Plains Hills		Principal Crops %	Irrigation 1974	future				
1	2	3	4	5	6	7	8	9	10	11
<u>Badagara</u>										
1. Badagara	70	30	NAS 67 cul-waste-2	Coconut Rice Pepper Rubber	50 15 8 6	1665 6940	Maj.Tim- ber, P.wood, Charcoal Min.Drugs, honey,wax	1974:Unit 14 Emp:68	1971 Indu-comm- Primary Future: Indu-Comm. Service	Intensity of cultivation is high (70%) Nearly one fourth of the NAS will benefit from irrigation Taluk may attract more agro-based and plantat- ion based industries and trade and commerce activities.
<u>Quilandy</u>										
2. Pantalayani	60	40	NAS 75 Cul-waste-2	Coconut Rice Pepper Rubber	48 24 10 5	2095 8213	Maj.Tim- or Firewood Charcoal Min:Drugs, Cane,Honey, Wax.	Units-19 Emp. 206	Primary Ind Commercial Future Ind Commercial Service.	Intensity of cultivation is 28% one fifth of NAS can be brought under irrigation. Shift from primary to secondary activities is visible Chances of more agro- based industrial acti- vities are bright. Trade and commerce as well as services can pick up momentum.
<u>Ernad</u>										
3. Malapuram	60	40	NAS 41 Cul-Waste 8	Rice Coconut Tapioca Arecan- ut	30 19 13 8	3133 75308	Maj.Tim= ber Min. Drugs Honey, Wax, Cane	Unit:64	71.Sr.Pri- mary, 71-Primary- sor-comm-r- cial Future: Pri-Commer- ce-Indu	Present irrigation is - poor (3% of NAS).Potcn- tial exist to benefit 90% of NAS by irrigat- ion.Primary activity will dominate. A gro- based industries may

1	2	3	4	5	6	7	8	9	10	11
<u>Mukundapuram</u>										
10. Ininjala- kuda	59	41	NAS 36 Cul- waste 1	Rice 43 Coconut 13 Rubber 5 Arecanut 5	18060	2000	Maj: Timber F. Wood, Charcoal, Bamboo.	Units: 139 Emp: 3211	71-Scr- Comm-Pri 71-Pri- Ind- Future-Scr- Comm-Ind- Future-Ind- Ser-Comm.	Irrigation now is 3% potential exists to irrigate 4% of NAS. Agro-based industries may come up in future, Towns are well conn- ected by roads and railways.
11. Chalakudy										
<u>Kunnathunad</u>										
12. Porumba- voor	80	20	NAS 74 Cul- waste 1	Rice Rubber Coconut Jowar	24159	900	Maj: Timber F. Wood, Charcoal	Units: 108 Emp: 838	71-Ind- Ser-Pri- Future: Ind- Ser-Comm.	Well served by trans- port facilities. Town is amidst fertile agricultural lands. 50% of NAS will get irrigation. Small Scale industries may come up. Potentials for commercial and industrial activities exist.
<u>Moonachil</u>										
13. Palai	65	35	NAS 73 Cul- waste 3	Rubber Jowar Coconut Pepper	1892	965	Maj: Nil Min: Nil	Units: 23 Emp: 237	71-Pri-Ser- Ind- Future: Pri- Ind. Servico	Irrigation is poor. Not much potentials of irrigation in future. Plantation crops domi- nate. Industrial future is not so bri- ght. May confirm to be primary dominant centres.

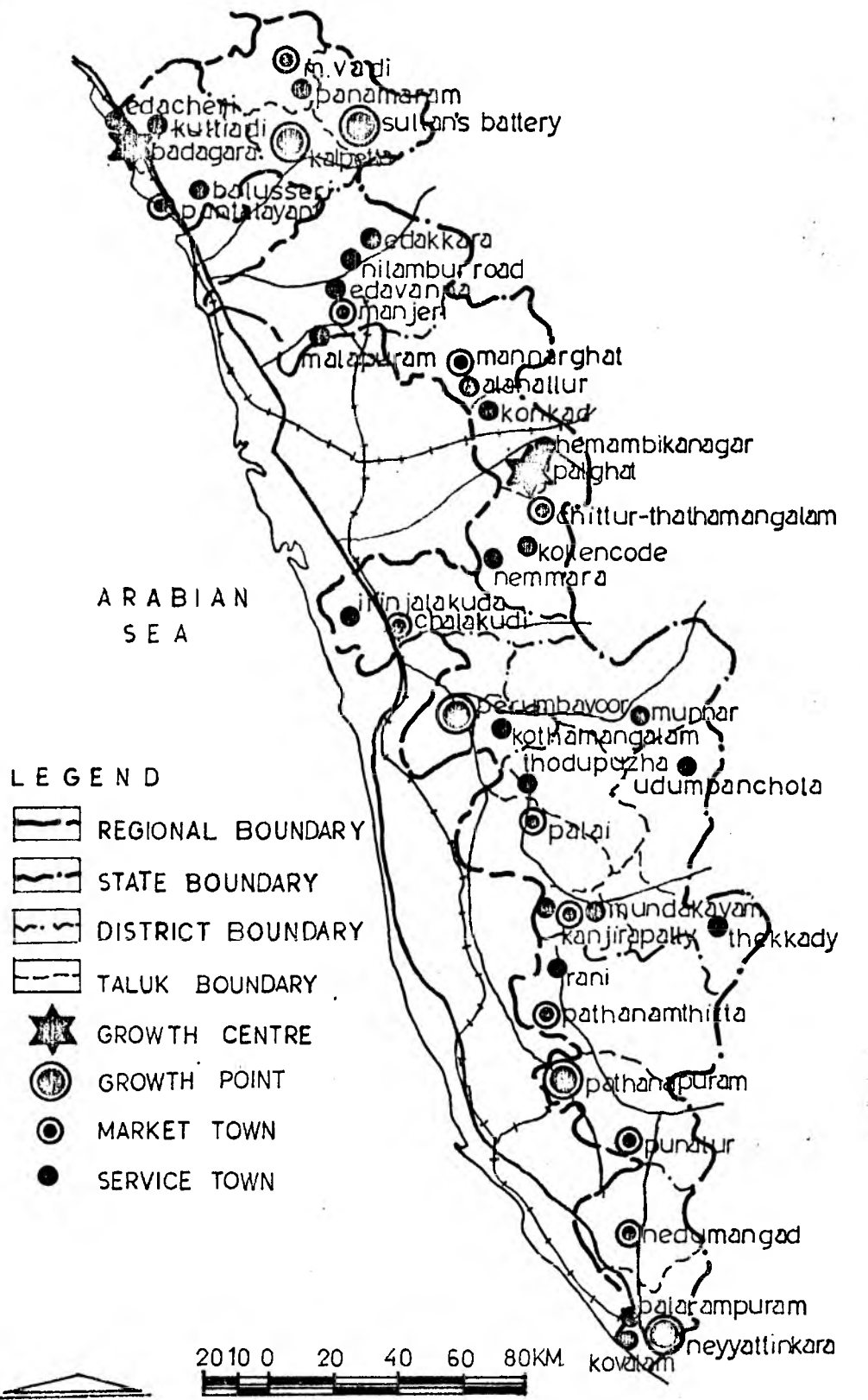
1	2	3	4	5	6	7	8	9	10	11
<u>Kanjirappally</u>										
14. Mundakkayam	50	50	NAS 23	Rubber	19	1	F. Wood,	Units:21	71-Pri.	Agriculturally as well as industrially lags behind. No irrigation potential. Towns will continue primary dominant.
15. Pakunna			Cul-	Jowar			Timber,	Emp:79	Future-	
16. Kanjirappally			Waste	Pepper			Charcoal		Primary	
<u>Pathanapuram</u>										
17. Punalur	35	65	NAS 23	Rice,	2790	1345	Timber,	Units:17	71-Ind-Comm.	Forest products more important than that of agriculture. Irrigation potentials not much. Towns may continue with present functions.
			Cul-	Jowar			F. wood,	Emp. 149	Scr.	
			waste	Rubber,			Charcoal,		Future:Ind-	
			0.3	Coconut			Bamboo.		Comm.	
									S-orvice	
<u>Neyyattinkara</u>										
18. Balaramapuram	89	11	NAS 81	Jowar	4099	5300	Maj:Nil	Units:82	71-Ind-Pri-	All these towns are coastal plains and served by roads and railways. Balaramapuram may agglomerate with Trivandrum. Potentials for irrigation upto 25% of NAS. Kovalam may pick up in tourist industry.
19. Neyyattinkara			Cul-	Rice			Min:Nil	Emp:1320	71-Primary-	
20. Kovalam			waste	Rubber					Future-Ind-	
			0.2	Coconut					Scr-	
									Future-Scr-	
									Commercial	
<u>Nedumangad</u>										
21. Nedumangad	69	31	NAS 57	Jowar,	3274	6000	Timber,	Units:11	71-Pri-Ind-	Well served by roads, Potentials for 20% of NAS to become irrigable. Forest based industry may come up. Function- may not change.
			Cul-	Rice,			F. wood,	Emp:51	Scr.	
			waste	Rubber,			Charcoal		Future-Pri-	
			0.2	Arecanut			Bamboo.		Ind-Service	

1	2	3	4	5	6	7	8	9	10	11
<u>Thodupuzha</u>										
22.Thodupuzha	20	80	NAS 37 Cul- Waste 0.2	Coconut, Rice, Rubber, Pepper.	835	-	Timber, F.wood Charcoal	Units:12 Emp:147	Pri- Ser- Commercial Future-Ind Ser- Commercial	Mostly hilly. Poor irrigation Taluk. HQ on S. May serve as service centre.
<u>Devicolam</u>										
23.Munnar	Nil	100	NAS-22 Cul- Waste	Tea Rice Coconut Rubber	900	21337	Timber Fire- wood Charcoal Bamboo	Units:35 Emp:137	71-Ser-Ind. Future-Ind- Primary Service 71-Service- Pri- Industry	Entirely hilly Irrigation potentials to an extent of 75% of NAS exist. Forest based industries exist. Agriculture may pick up.

Abbreviations :

NAS : Net Area Sown
 Cul-waste: Culturable Waste
 Pri : Primary
 Ind: Industry
 Ser: Service
 Com.: Commercial

KERALA SUB-REGION FUTURE URBAN PATTERN



WESTERN GHATS : SURVEY AND PLAN

TOWN & COUNTRY PLANNING ORN., MINISTRY OF WORKS & HOUSING, GOVT. OF INDIA.

FIG : 12.7
KERALA SUB-REGION
FUNCTIONAL MIX OF URBAN CENTRES
IN AND AROUND THE SUB-REGION

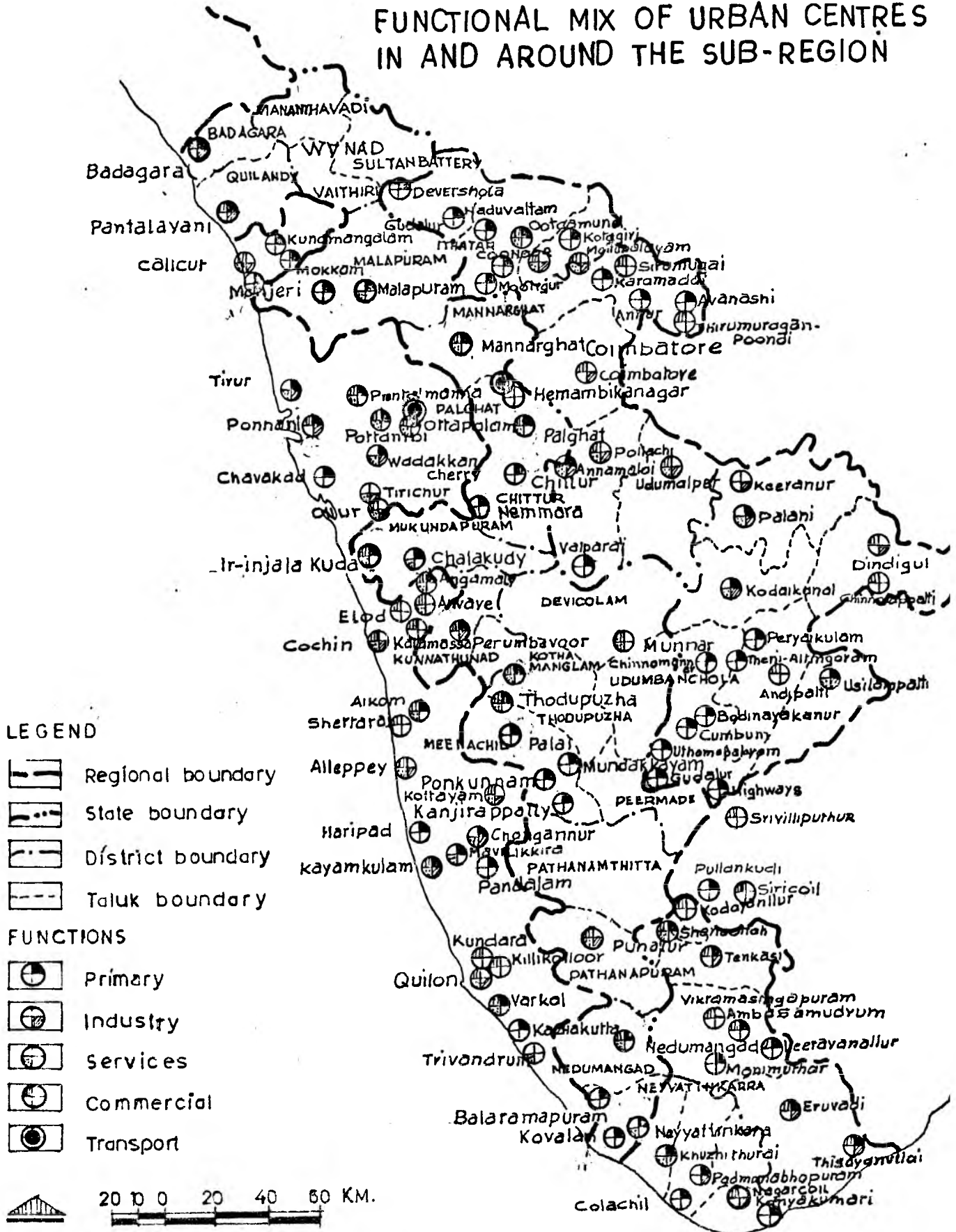


Table 12.10 Proposed Urban Pattern in the Sub-region

S.No.	<u>Functional Hierarchy</u>	Settlement	Location (Taluk)
1	2		3
	<u>Growth Centre</u>		
1.	Palghat		Palghat
2.	Badagara		Badagara
	<u>Growth Point</u>		
3.	Sultan Battery		Sultan Battery
4.	Kalpetta		Vaithiri
5.	Perumbavoor		Kannathunad
6.	Pathanapuram		Pathanapuram
7.	Neyyattinkara		Neyyattinkara
	<u>Market Towns</u>		
8.	Mananthavadi		Mananthavadi
9.	Pantalayani		Quilandy
10.	Manjeri		Ernad
11.	Mannarghat		Mannarghat
12.	Chittur-Thathamangalan		Chittur
13.	Chalakyudy		Mukundapuram
14.	Palai		Meenachil
15.	Kanjirapally		Kanjirapally
16.	Pathanamthitta		Pathanamthitta
17.	Punalur		Pathanapuram
18.	Nedumangad		Nedumangad
	<u>Service Town</u>		
19.	Edacheri		Badagara
20.	Kuttiadi		Badagara
21.	Bulusseri		Quilandy
22.	Panamaram		Mananthavadi

1	2	3
23.	Malappuram	Ernad
24.	Edavanna	Ernad
25.	Edakkara	Ernad
26.	Nilambur Road	Ernad
27.	Alanallur	Mannarghat
28.	Konkad	Palghat
29.	Hemambikanagar	Palghat
30.	Nemmara	Chittur
31.	Kollencode	Chittur
32.	Irinjalakuda	Mukundapuram
33.	Kothamangalam	Kothamangalam
34.	Munnar	Devicolum
35.	Udumbanchola	Udumbanchola
36.	Thedupuzha	Thedupuzha
37.	Ponkunnam	Kanjirapally
38.	Mundakayam	Kanjirapally
39.	Thekkady	Peermade
40.	Rani	Pathanamthitta
41.	Balaramapuram	Neyyattinkara
42.	Kovalam	Neyyattinkara

Madurai, Virudunagar, Tirunelveli, Palayakottah, and Nagercoil., It may be noted that the tall mountainous ghats offer formidable conditions for any easy and economic penetration by way of roads and railways, and it is primarily the Palghat pass and the narrow coastal plains that provide for most of the existing physical linkages of the Sub-region with the eastern side.

As seen earlier, the forests cover nearly 43 per cent of the Sub-regional area, and the rest also is of rugged and mountainous terrains. Despite the undulating nature of the ghats high lands, plantation crops are cultivated to a significant level. Small scale and agro-forest based industries flourish all over the inhabited ghats portion. Centres such as Sultan Battery, Palghat, Chittur, and Neyyattinkara having been located near the state border play a special role as interstate collection and disposing points for many goods and services.

In addition, there are a number of large irrigation and hydro electric power projects that are existing as well as contemplated within the Sub-region. Accrual of the benefits of assured irrigation over a large area is bound to alter the economy scape of the respective pockets. The centrality forces of some centres in the command areas of the projects will attract added importance and strength and thus may have to play relatively more important roles in the economic and organisational fronts. It is also of developmental necessity to deliberately instal certain functional dominance and significance to some centres

with the consideration to fill in the spatial void in the chain of the carriers of developmental organisational impacts. The suggested future urban pattern is the result of such of these exercises.

It may however be pointed out that the urban centres proposed for the Sub-region may, on the full assessment of, particularly, the secondary activities slightly change in the order of the predominant functions.

7. STRATEGY OF DEVELOPMENT

In the development of urban pattern in the Sub-region, accordance of priority to the improvement of villages selected for the future urban status is justified as it will help activising the hitherto hesitant economic activities of the respective catchment areas, for, the creation of facilities and amenities of urban character in the selected centres will facilitate such activities more remunerative and profitable than before. It will also provide proper outlets to the excess goods and services of the hinterlands and sustain continuance of such occupations without any fear of non-availability of market and demand. Provision of socio-economic overheads and urban organisation will also encourage and attract entrepreneurs to start all possible, especially, small scale industrial activities using the local raw materials of agro-forest and mineral bases. As may be seen from the selections for future urban system, most of such villages will have to be developed only as service towns.

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The second phase of development includes improvement of status of urban places in the Ghats with the provision of required facilities as indicated in the earlier statement. While developing those centres that are to be upgraded to market town status because they particularly happen to lie in the likely command areas of the contemplated large irrigation schemes, the provision of especially the wholesale marketing and warehousing facilities may be phased out in instalments commensurate with the stages of completion of the irrigation project.

Special attention may have to be paid in the development of centres of tourism importance such as Kovalam, Thekkady and Idukki so as to attract increasing number of foreign and intourists. For any economic loss due to delay in effecting adequate improvement to the tourist places is not retrievable.

Interstate border towns on the Ghats perhaps need equal if not more, special attention as that of tourist places, for, it will otherwise affect the interstate transactions and trades of economic importance.

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Appendix - Population and decadal variation of
Towns in Kerala Sub-region - 1971-81

S.No.	Town	1971	1981	Decadal Variation
1	2	3	4	5
1.	Perumbavoor	20888	23187	11.01
2.	Chalakyudi	37562	41881	11.50
3.	Irinjalakuda	25405	26093	2.71
4.	Thodupuzha	20880	35742	71.18
5.	Munnar	4382	-	
6.	Mannarghat	12580	-	
7.	Palghat	95788	117961	23.11
8.	Hemambikanagar	7032	-	
9.	Chittur - Thathamangalam	28510	30407	6.65
10.	Nemmara	12897	-	
11.	Balaramapuram	17384	-	
12.	Kovalam	13999	-	
13.	Neyyattinkara	23983	27987	16.70
14.	Nedumargad	14643	43987	200.40
15.	Punalur	13562	43040	217.36
16.	Palai	20273	21618	5.63
17.	Kanjirappally	20687	-	
18.	Mundakkayam	10112	-	
19.	Ponkunnam	13672	-	
20.	Malapuram	32002	39786	24.32
21.	Manjeri	15734	53963	242.97
22.	Pantalayani	28530	-	
23.	Badagara	53938	64173	18.98
24.	Kothamangalam	6534	33111	19.07
25.	Vilvattom	(was created as new town in 1981)	13704	-
Total		551007	618640	11.91

Note: Munnar, Mannarghat, Hemambikanagar, Nemmara, Balaramapuram, Kovalam, Kanjirappally, Mundakkayam, Ponkunnam and Pantalayani towns are either declassified or have been left out for some reason or the other in 1981 Census.