

REGIONAL STRUCTURE OF MEGHALAYA

By

G. P. BHAKTA

DEPARTMENT OF GEOGRAPHY

SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENT OF
THE DEGREE OF MASTER OF PHILOSOPHY

TO

THE NORTH-EASTERN HILL UNIVERSITY
NOVEMBER, 1979

REGIONAL STRUCTURE OF
MEGHALAYA

DS
915.4164
B1A
BY

G. P. BHAKTA
DEPARTMENT OF GEOGRAPHY

MEMU Library
Acc. No. 101406
Acc. No. Suba
Class No. 13/12/02
Sub. Heading by
Data. by
Transcribed by

SUBMITTED
IN PARTIAL FULFILLMENT OF THE REQUIREMENT OF
THE DEGREE OF MASTER OF PHILOSOPHY
TO
THE NORTH-EASTERN HILL UNIVERSITY
NOVEMBER, 1979



phone :
Grams : NEHU

North-Eastern Hill University

LOWER LACHAUMIERE, SHILLONG - 793001

This is to certify that the dissertation entitled "Regional structure of Meghalaya" submitted by Mr. D. G. P. Bhakta for the partial fulfilment of the degree of Master of Philosophy is a bonafide study to the best of my knowledge. All the quotations, extracts and ideas of other studies have been duly referred.

The dissertation may be placed before the examiners for evaluation and necessary formalities.

Supervisor

Hajit Huse
30.11.79
Head,
Department of Geography
NEHU, Shillong

(111)

ACKNOWLEDGEMENT

I am highly indebted to Dr. R. C. Sharma, Ph. D. (Edinburgh), ex-Professor and Head, Department of Geography and Dean, School of Environmental Sciences, North Eastern Hill University, Shillong who has guided me in the preparation of this dissertation and has taken great pains in going through the entire manuscript.

I am much obliged to Rev. Bro. R.B. Vieyra, ex-Principal and Rev. Bro. M. G. Shannon, present Principal, St. Edmund's College, Shillong for providing the necessary research facilities in the College.

Finally, I would like to thank all the members of the Department of Geography, North Eastern Hill University and the officials of the Central and State Governments, who have helped in many ways in the completion of this work.

Shillong,
the 30th November 1979

G. P. Bhakta
(G P BHAKTA)

INTRODUCTION

The present study is an attempt to understand the regional structure of Meghalaya which was carved out of Assam as an autonomous state in April, 1970 and later on, made a full-fledged State in January 1972. It covers an area of 22,547 Km.² with a population of 10,11,699 (1971 census).

The term "regional structure" as used in the present context refers to the spatial pattern of physical, economic and demographic characteristics and the settlement structure in the study area. The study is important as it identifies Meghalaya as a regional unit and analyses its various characteristics with a view to suggest measures for the development of the region.

Sources of Data and the Map Work :

The text of the thesis is mainly based on secondary sources of data and information. For example, the "District Census Hand Books" and the "General population Tables", 1971 form the data-base for studying the demographic and social structure, the occupational structure and the settlements of the region. The data relating to land-use and the distribution of crops have been made available from the Directorate of Agriculture, Government of Meghalaya. Some data have also been taken from the Statistical Hand Book of Meghalaya, 1975.

The base map of Meghalaya has been obtained from the Census office, Ministry of Home Affairs, Shillong. The one-inch topographical sheets, published by the Survey of India have been used for

analysing the settlement structure of the region. The geological and the mineral maps are based on the map provided in the Miscellaneous Publication No. 30, 1974, Geological Survey of India. Most of the remaining maps are prepared on the basis of statistical data.

Methodology :

For the major part of analysis police station and mauza-wise data have been used. For certain aspects like land-use and the distribution of crops where police station and mauza-wise data were not available, block-wise data have been used. For the analysis of demographic and economic structure the rural and urban data have been analysed separately.

Various quantitative and cartographic techniques have been used for a better understanding of the various characteristics of the region. The quantitative technique used include weaver's crop-combination technique, Pal's step-wise combination technique, Kendall's method of weighting and the mean standard deviation method of grouping.

Scope and Plan of the Study :

The text has been divided into seven Chapters. Chapter-I deals with the physical framework of the region in which geology, physiography, climate, soils, natural vegetation and mineral resources have been discussed in detail. In Chapter-II is analysed the demographic and social structure (distribution and density of population, sex-ratio, rural-urban composition, literacy pattern, religious and linguistic structure, etc.) at length. Chapter-III deals with the economy of the region. In this Chapter the occupational

structure in the rural and urban areas have been analysed separately and more stress has been laid on the agricultural economy of the region. In Chapter-IV are discussed the transport linkages and the accessibility pattern in the region. Chapter-V deals with the settlement structure of the region. In this Chapter the evolution of settlements and their location have been analysed in detail. The rural settlements have been classified on the basis of their population size, and the growth and structure of urban settlements have been examined. In Chapter-VI an attempt has been made to identify the relatively less developed and more developed areas within the region. The last Chapter deals with the summary and conclusion derived from the study.

Location and Boundaries of Meghalaya :

Meghalaya is situated in the North-Eastern Region of India and lies between $25^{\circ}5'N$ and $26^{\circ}10'N$ latitudes and $89^{\circ}47'E$ and $92^{\circ}47'E$ longitudes. It is bounded on the north by the Assam Valley (Brahmaputra Valley), on the west partly by the Assam Valley and partly by Bangladesh and on the east by the Mikir and North Cachar Hills. The southern boundary of the State is formed by Bangladesh (Fig.1)

Administrative Divisions :

Meghalaya comprises two districts¹ which are further subdivided into police stations and mauzas (Table 1 and Fig. 2A). For

1. In February, 1972, the Jaintia Hills district was formed with its headquarters at Jowai. In October, 1976, two more districts were created : the West Khasi Hills district with its headquarters at Nongstoin, and the East Garo Hills district with its headquarters at Williamnagar.

VIII
 implementing the various developmental schemes the state is also divided into 24 Community Development Blocks (Fig. 2B).

TABLE - 1

Administrative Divisions of Meghalaya
(1971)

Districts	Police Stations/Mauzas
A. United Khasi & Jaintia Hills	1. Nongpoh P.S. 2. Shillong P.S. 3. Cherra P.S. 4. Dawki P.S.(i) 5. Dawki P.S.(ii) 6. Jowai P.S.
B. Garo Hills	1. Mauza I 2. Mauza II 3. Mauza III 4. Mauza IV 5. Mauza V 6. Mauza VI 7. Mauza VII 8. Mauza VIII 9. Mauza IX 10. Mauza X

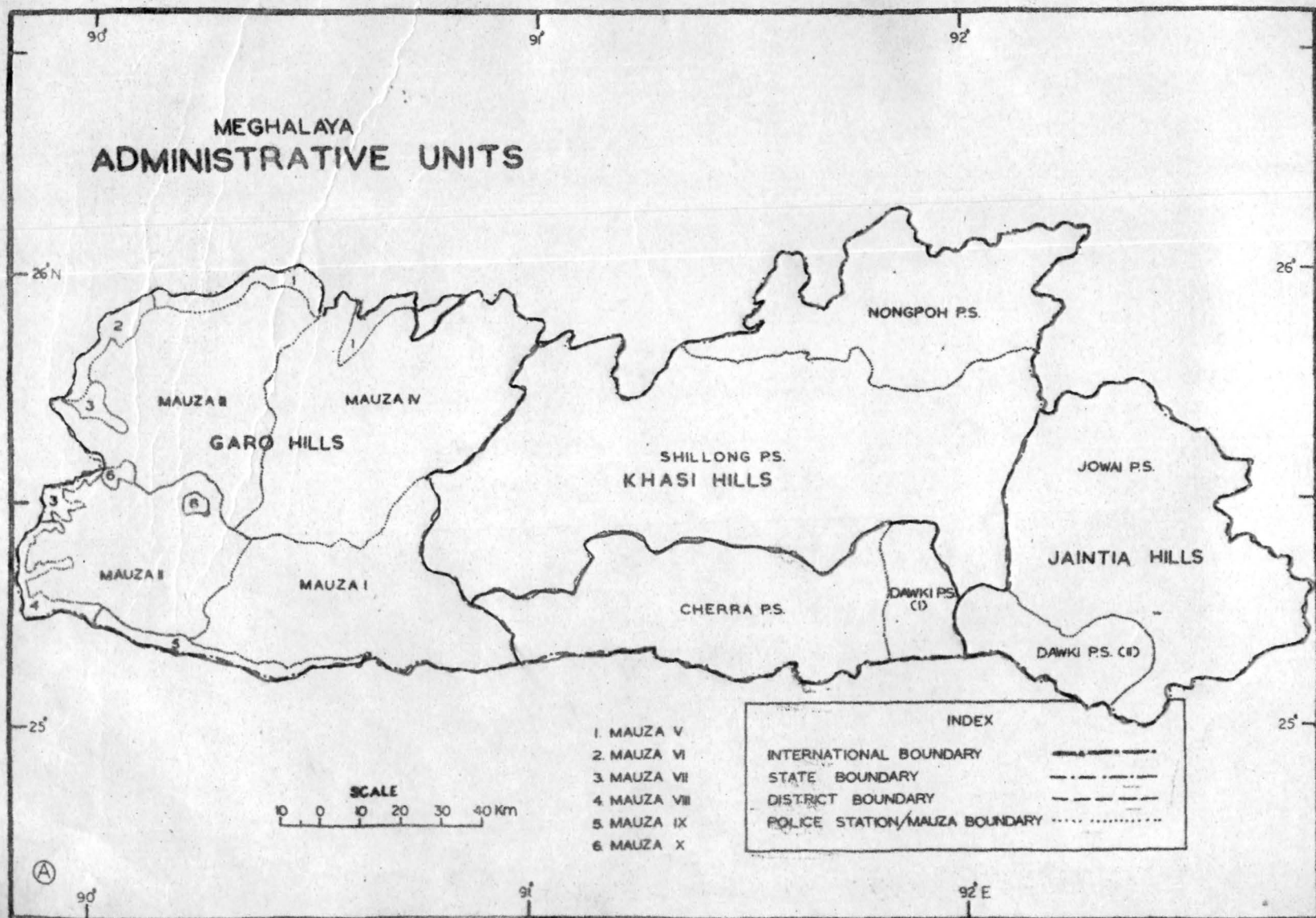
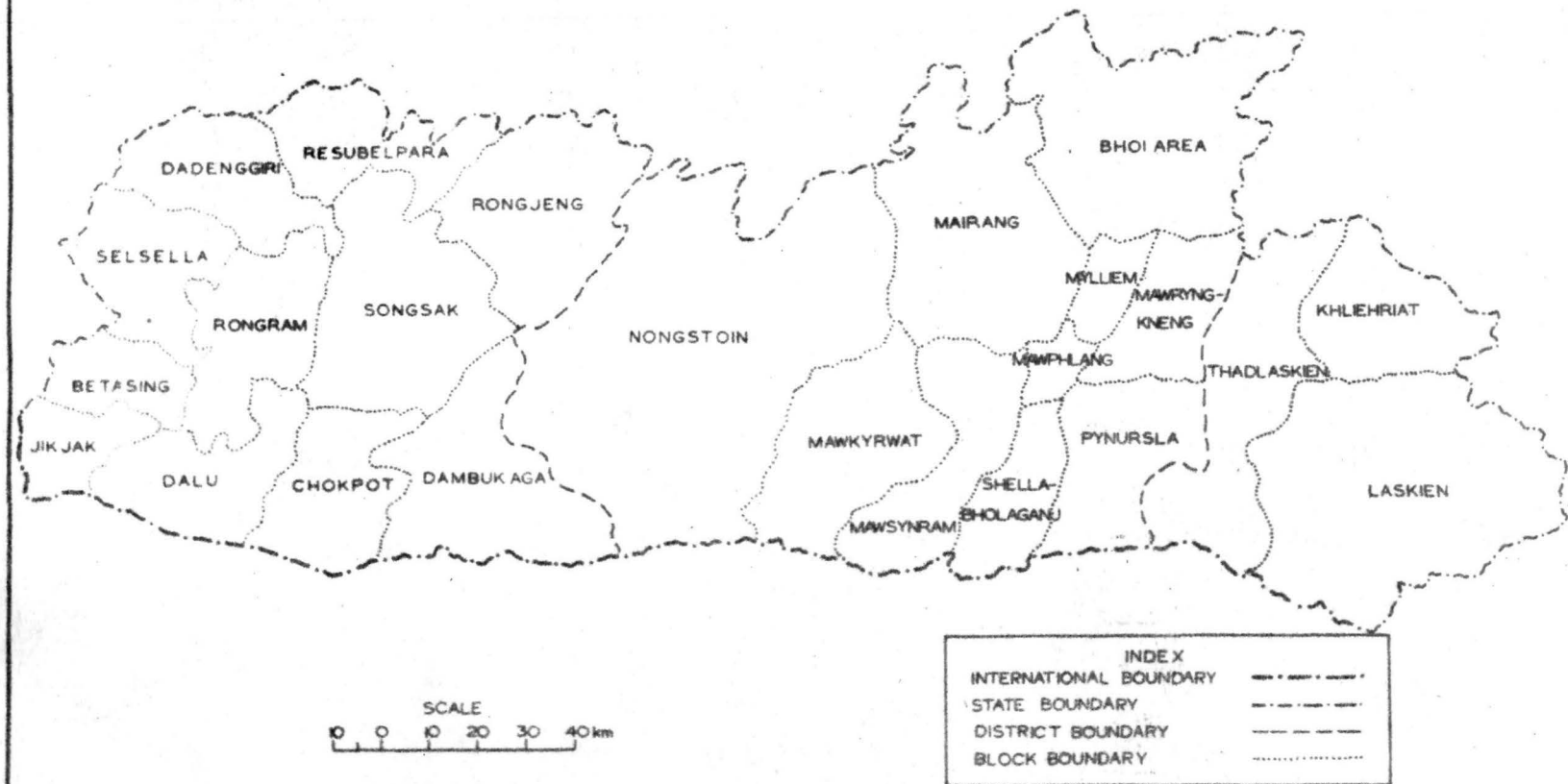


Fig.2

MEGHALAYA COMMUNITY DEVELOPMENT BLOCKS



Ⓟ

Fig.2

CONTENTS

		<u>Page</u>
	ACKNOWLEDGEMENT	iii
	INTRODUCTION	iv
	LIST OF MAPS AND GRAPHS.. ...	xiii
	LIST OF TABLES	xv
CHAPTER-I	PHYSICAL FRAMEWORK <u>Geology, Physiography, Drainage,</u> <u>Climate, Soils, Natural Vegetation,</u> <u>Mineral Resources</u>	1
CHAPTER-II	DEMOGRAPHIC AND SOCIAL STRUCTURE.. Population Growth, Population Dist- ribution, Population Composition, Rural and Urban Population, Sex- Ratio, Literacy, Religious and Lin- guistic Structure, Migration of Population	28
CHAPTER-III	ECONOMIC STRUCTURE Dependency Ratio, Occupational Structure - Rural and Urban, Agri- culture, Land-use Pattern, Inten- sity of Agriculture, Cropping Pat- tern, Crop-combination Regions, Animal Husbandry and Dairy Farming, Forestry, Mineral Exploitation and the Development of Hydel Power, In- dustries, Economic Regions.	50
CHAPTER-IV	TRANSPORT LINKAGES Road Network, Characteristics of Roads, Road Patterns, Density of Roads, Passenger Traffic Flow, Accessibility Pattern.	81
CHAPTER-V	HUMAN SETTLEMENTS Rural Settlements : Evolution of Rural Settlements, Locational Ana- lysis and Density of Rural Settle- ments, Types of Rural Settlements and their Distribution, Village Monabari - A case study, Urban Settlements.	95

CHAPTER-VI	LEVELS OF DEVELOPMENT	114
	Levels of Industrial Development; Levels of Social Development, Levels of Infrastructural Development, Final Index of Development.	
CHAPTER-VII	SUMMARY AND CONCLUSION	124
	APPENDICES	
	BIBLIOGRAPHY	
	BIO-DATA OF THE AUTHOR	

LIST OF MAPS AND GRAPHS

Fig.			Page
1.	Location of Meghalaya	...	vii
2.	Administrative Divisions	...	ix & x
3.	Geology	...	4
4.	Relief	...	7
5.	Drainage	...	11
6.	Temperature	...	16
7.	Mean Annual Rainfall	...	18
8.	Soils	...	20
9.	Vegetation	...	23
10.	Minerals	...	25
11.	Growth of Population Since 1901	...	30
12.	Distribution of Population, 1971	...	35
13.	Density of population, 1971	...	37
14.	Composition of Population, 1971	...	41
15.	In-migration of population, 1971	...	49
16.	Workers in Primary, Secondary and Tertiary Sectors (Police Station/Mauza-wise), 1971	...	53
17.	Dependency Ratio, 1971	...	55
18.	Land-use (Block level), 1971-72	...	61
19.	Intensity of Agriculture (Block level), 1971-72	...	63
20.	Crop-combination Regions	...	68
21.	(a) Irrigation, (b) Livestock, (c) Power (d) Industries	...	70
22.	Economic Regions	...	79
23.	Road Net work	...	82

Fig.			Page
24.	Passenger Traffic Flow	...	91
25.	Accessibility Pattern	...	94
26.	Density of Rural Settlements, 1971...		100
27.	Types of Rural Settlements ✓	...	102
28.	Location of selected villages	...	104
29.	Monabari Morphology	...	106
30.	Growth of Urban Population	...	110
31.	Shillong : Morphology	...	113
32.	Levels of Development	...	122

LIST OF TABLES

	Page
1. Administrative Divisions of Meghalaya, 1971	viii
2. Geological Formations and Rock types in Meghalaya ...	2
3. Monthly Temperature at Different Stations in Meghalaya ...	13
4. Mean Monthly Rainfall at different stations in Meghalaya ...	14
5. Variation in Population During 70 years(1901-71)	29
6. Percentage variation of Population During 70 years (1901-71) ...	32
7. Some Aspects of Population in Meghalaya, 1971	39-40
8. Percentage Distribution of various Religious groups, 1971 ...	47
9. Percentage of workers in Primary, Secondary and Tertiary Sectors and Dependency Ratio, 1971	51-52
10. Land Utilisation (1971-72) ...	59-60
11. Livestock Population in Meghalaya, 1966 & 1972	69
12. Production of Chief Minerals in Meghalaya, 1962-74 ...	74
13. Industrial Units in Meghalaya,(1974-75)	76
14. Distribution of Different Types of Roads in Meghalaya (1971-72) ...	84
15. Classification of Roads in Meghalaya (Agency-wise) ...	85
16. Density of Roads in Meghalaya, 1971 ...	88
17. Bus Services in Meghalaya (as on 7.6.77)	90
18. Density of Rural Settlements, 1971 ...	99
19. Distribution of Small, Medium and Large size settlements, 1971 ...	105
20. Urban Centres in Meghalaya, 1971 ...	108
21. Levels of Development in Meghalaya, 1971	118
22. Frequency of Mauzas/Police Stations by classes	119
23. Levels of Development in Meghalaya, 1971 (After the size bias of units has been removed)	121

CHAPTER - I

CHAPTER - I

PHYSICAL FRAMEWORK

The physical environment plays an important role in influencing the demographic and social structure, the economic structure, the transport linkages and the settlement pattern in a region. In this Chapter an attempt has been made to present the physical personality of the area under study in which geology, physiography, climate drainage, soils, natural vegetation and mineral resources have been discussed in detail. In fact, these form the base for understanding the human, economic and cultural set-up of the region.

Geology :

Broadly speaking, the rocks in Meghalaya belong to five geological formations, viz., the Archaean Gneissic Complex, The Shillong Group of rocks, the Lower gondwana rocks, the Sylhet Traps and the Cretaceous Tertiary Sediments. (Table 2 and Fig. 3).

The Archaean Gneissic Complex occupies the central and northern parts of the Meghalaya Plateau. The rocks include gneiss, granulite, quartzite, schist, etc. They are composed mainly of gneisses, migmatites and metasedimentary bands.

The Shillong Group of rocks comprising quartzite, phyllite, schist, conglomerate and others, occur in the central and eastern parts of the plateau. The rocks of this group rest unconformably over the gneissic rocks with a thick bed of conglomerate in the western part. They are marked by sills and dykes which comprise dolerite, amphibolite and granite.

TABLE - 2

Geological Formations and Rock Types in Meghalaya

Geological Age	Group	Formation	Rock Types
Recent	Newer Alluvium (Thickness not known)	Unclassified	Sand, silt, clays
		Unconformity	
Pleistocene	Older Alluvium (Thickness not known)	Unclassified	Sand, clay, pebble gravel and boulder deposits.
		Unconformity	
Mid-Pliocene	Dupi Tila Group (1050m)	Unclassified	Mottled clays, felspathic sandstone, conglomerate.
		Unconformity	
Oligo-Miocene	Garó Group	Chengapara formation(700m)	Sand, siltstone clay, marl
		Baghmara formation (530m)	Felspathic sandstone, pebble, conglomerate, clay
		Simsang formation(1150m)	Siltstone-sandstone alternations, sand
Eocene	Jaintia Group	Kopili formation(500m)	Shale, sandstone marl.
		Shella formation(600m)	Alternation of sandstone-limestone.
		Langpar formation(100m)	Calcareous shale, sandstone, limestone.
Upper Cretaceous	Khasi Group	Mahadek formation(150m)	Arkose(glauconitic)
		Bottom conglomerate formation	Conglomerate, arkose
		Jadukata formation(140m)	sandstone-conglomerate alternations.
		Unconformity	
Jurassic(?)	Sylhet Trap (600m)		Basalt, rhyolite, acid tuff.
		Unconformity	
Pre-cambrian		Intrusives (acid & basic)	Porphyritic and coarse granites pegmatite, aplite, quartzvein, epidiorite, dolerite, basalt

Table-2 Contd..

Geological Age	Group	Formation	Rock Types
		Shillong group	Quartzite, phyllite, conglomerate
		Unconformity	
Archaean		Gneissic complex	Biotite gneiss, biotite-hornblende gneiss, granitic gneiss, migmatite, mica schist, Sillimanite-quartz Schist, biotite granulite, amphibolite, pyroxene granulite, etc.

Source: Geological Survey of India Misc. Publication
No. 30 (1974) Part-IV p.73.

The Lower Goudwana rocks are found in the western part of Garo Hills. They include pebble-beds, sandstone and shale.

The Sylhet Traps are exposed in a narrow strip, ^{80 Km. long.} and 4 km. wide and extend in a east-west direction along the southern border of the Khasi Hills. They overlie the eroded Pre-cambrian basement and are themselves overlain non-conformably by the Upper Cretaceous Eocene sediments. The Sylhet Traps include predominantly basalt, rhyolites and acid tuffs. These traps and the adjoining Archaean rocks to the north are characterised by several basalt dykes.

The Cretaceous-Tertiary Sediments which occupy the southern part of the plateau are very thick and extensive and are considered to be the continuation of the Cretaceous-Tertiary Sediments of the Bengal plains. The rocks are mainly sandstone, shale and limestone. They are divided into three groups, (a) the Khasi Group, (b) The Jaintia Group and (c) The Garo Group. The Khasi Group is further divided into the jadukata, the bottom conglomerate and the

Mahadek formations.

The jadukata formation consists of alternations of conglomerate and limestone. It overlies non-conformably the Sylhet Trap and occurs to the north of the Raibah fault. The Bottom Conglomerate formation is a thick bed of conglomerate over the pre-cambrian basement north of the Ribah fault. These two formations are overlain by the Mahadek formation which consists of a coarse arkose.

The Jaintia Group is divided into three formations - The Langpar, The Shella and the Kopili. The Langpar formation overlies the Mahadek formation and consists of calcareous shale, sandy limestone and calcareous sandstone. The Shella formation comprises sandstone and limestone. It lies over the Langpar formation. The Kopili formation overlies the Shella formation and consists of alternations of thin sandstone and shale with occasional thin fossiliferous bands of limestone.

The Garo group is also divided into three formations - The Simsang, the Baghmara and The Chengapara. The Simsang formation is the oldest member of the Garo group and consists of sand siltstone and sandstone. It overlies conformably the Kopili formation. The Bhaghmara formation conformably overlies the Simsang formation. The rocks include sand, pebble, conglomerate, and clay. The Chengapara formation consists of sand, siltstone and clay.

The Dupitila Group of rocks occur on the top of the Chengapara formation and include sandstone, pebbles and sandyclay.

The Barail formation is represented in the southern part of the Jaintia Hills. It consists of coarse-grained sandstone and shale.

The Quaternary Deposits (older Alluvium) overlies the Tertiary rocks in isolated patches along the southern, western and northern borders of Garo Hills and along the southern fringe of Khasi Hills. These deposits consist of assorted pebbles with coarse sand and brownish clay. Recent Alluvium is found in the river valleys of the northern as well as the southern foot hills of Garo and Khasi Hills and along the western border of Garo Hills. It consists of fine silty ^{sand} and light to dark greyish clay with occasional pockets and layers of coarse sand and Shingles.

Physiography :

The Meghalaya Plateau is a region of great physical diversities. The height of the plateau varies from about 150 m to 1661m (Fig. 4) The region is marked by highly dissected and irregular terrain on the western and northern side and regular and steep slope on the southern side. In the north, the boundary of the plateau is not well-defined due to the presence of broken ranges of low hills in that section.

The western part of Meghalaya i.e., The Garo Hills is a highly dissected tract of 8,164 km.² with an average elevation of about 600m. It is separated by the Moleskhola Adaguri range from the central part of the plateau. The important physiographic features in this part are the Tura range, the Moleskhola Adaguri range and the Simsang valley.

The Tura range is 50 km. long and extends in a east-west direction from Siju to Tura. The highest peak of this range is the Norkek (1,515m) which is situated 13km. South-east of Tura. The Tura range is a typical horst bounded by two faults and it is along

the northern fault that the Simsang river flows eastwards for about 45 km. Then the river turns south through a gorge and separates the Tura range from the Kylas range and ultimately comes down to the plains where it is known as the Someswari river. The Kylas range which lies east of the Someswari river rises as an abrupt hog-back mass and is higher than the hills of the surrounding area. The Arbela range and the hills lying to the north of the Tura range and running parallel to it are low but gradually increase in height and join the latter in the south. The rest of Garo Hills consists of a mass of hills which run from north to south with several low peaks between 450 - 600 m.

The central and eastern part of the plateau i.e. the Khasi and Jaintia Hills (14,375 km²) is a true plateau with its senile topography and flat skyline. On the basis of physiographic characteristics it may be divided into three district units: (a) the northern undulating hills, (b) the central upland zone, and (c) the southern precipitous face of the plateau.

The northern hills with their peaks ranging in height from 170 - 820m. gradually slope towards the Brahmaputra valley and form the submontane region of the central plateau, called the Bhoi area by the local people. In this part there are two peneplain surfaces - one extends from Nongpoh to Burnihat and the other from Jorabat to Khanpara. The northern hills are separated from the central upland by a fault. The hills from Nongholi to Burnihat run from north-east to south-west. Above 490m most of the hills are flat-topped in character.

The central upland zone running from east to west is the most important physio-graphic unit of the plateau and covers more

than one third of the Central and Eastern Meghalaya. Its outer boundary is formed by the 1500m contour. This section of the plateau consists mostly of rolling uplands intersected by river valleys and dotted with soft rounded hills. It contains remnants of seven peneplained surfaces, ranging in height from 1500m to 2,083m. The highest point of the region is the Shillong peak (1961m) which is located to the south of Shillong town. Towards the west of Shillong there is a hill range called Diengiei which rises up to 1823m.

The southern face of the plateau includes the steepest parts of the region. This part in its northern fringe has a typical granitic topography with rounded hills and shallow valleys. Further south, beyond Mylliem there lies a vast structural platform which is built of gently dipping sandstones of cretaceous age and on the edge of which is located the magnificent Mawsmai waterfalls. This structural platform stands as an escarpment and its surface has been deeply eroded due to heavy rainfall. It is divided into three platforms namely the Cherrapunji, the Lyngkyrdem and the Mawsynram. Over the Cherrapunji platform occur a number of small rounded limestone hills which contain caves with narrow underground tunnels and characteristic limestone features such as stalactites and stalagmites and pot-holes. Towards the Surma valley the abrupt slope in many places has given rise to deep precipices due to heavy rainfall.

It may be noted that although the Eastern Meghalaya plateau i.e. The Jaintia Hills forms a contiguous part of the Central Meghalaya with the same physiographic divisions as the northern hills, the central Jowai upland and the southern escarpment, is relatively lower with an average height of a little more than

1200m. The Jowai upland (1500m) with its ridges running from east to west acts as a watershed between the Surma valley and the Brahmaputra valley. The Jaintia Hills in general have more flat lands than the Khasi Hills.

Drainage :

The drainage system of Meghalaya is controlled by the Tura range and the central upland zone which act as watersheds from where the rivers flow down to the Bangladesh plain in the south and the Brahmaputra valley in the north (Fig.5). In the Garo Hills the important rivers of the northern system from west to east are the Kalu (Gohal), Ringgi, Chagua, Ajagar (Didak), Didram, Krishnai (Damring) and Dudhnai (Manda). Among these rivers only the Krishnai and the Kalu are navigable. The important rivers of the southern system from west to east are the Darong, Sanda, Baudra, Bhogai, Dereng (Nitai) and Simsang (Someswari). Of these the Simsang is the largest in the whole of the Garo Hills and is navigable for a distance of about 30 km. Its main tributaries are Pongkai, Rongdi and Chibok. The other navigable rivers of the southern system are the Nitai and the Bhupai.

In the Khasi and Jaintia Hills also there are two distinct river systems - one flowing to the north and the other to the south. The important rivers of the northern system are the Khri (Unkhri), Digaru and Umium and those of the southern system are the Kynchiang (Jadukata), Mawpa, Umiew (Umiam) or Barapani, Myngot (Maneshkhil) and Mynt-due. It may be noted here that most of the northward flowing rivers form flat embayments when they enter the plains and thus make the northern boundary of the plateau quite irregular. In

A detailed map of the drainage area of the River of the North, showing numerous tributaries and sub-drainages. The map is oriented vertically with the river mouth at the top. Key features include the main river channel, numerous tributaries, and sub-drainage areas labeled with names like 'RIVER OF THE NORTH', 'RIVER OF THE SOUTH', 'RIVER OF THE WEST', etc. A scale bar at the bottom right indicates distances in miles (0 to 100).

SCALE

Fig. 5

contrast to this the southward flowing rivers ~~from~~^{form} deep valleys on the faulted surface before descending to the plains.

An important feature of the drainage pattern of Meghalaya is the extra-ordinary straight courses of the rivers and streams which evidently flow along joints and faults produced during the uplift.¹ The deep gorges carved out by the rivers in the southern Khasi Hills are due to relatively greater uplift of this part and massive headward erosion by antecedent streams along joints in the sedimentary rocks. Further west in the Garo Hills, the streams are mostly controlled by the structures like faults and mono clines. In the northern part of the plateau the long incisive valleys are the result of headward erosion along joints in the gneisses and granites.

Climate :

The climate of the region is controlled mainly by its physiography, the alternating pressure cells of North-West India and the Bay of Bengal and the maritime air masses coming from the south.

On the basis of weather conditions the year may be divided into four distinct seasons (Table.3). The rainy season begins in May and continues till the end of September. The period of October and November may be treated as cool season since this period is neither hot nor cold. The cold season includes December, January and February when the mean minimum temperature falls as low as 3.6°C. March and April are the hot months and the highest tempera-

1. Mathur, L.P. and Evans P., "Oil in India" International Geological Congress, Twenty Second Session, New Delhi, 1964 p.26.

TABLE - 3

Monthly Temperature at Different Stations in Meghalaya (In °C)

Station		Cold Season		Hot Season		Rainy season					Cool season		
		Jan	Feb	Mar	Apr.	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Shillong	Maximum	15.5	17.1	21.5	23.8	23.7	23.7	24.1	24.1	23.6	21.8	18.9	16.4
	Minimum	3.6	6.4	10.5	14.1	15.5	17.4	18.1	17.8	16.6	12.9	7.7	4.5
	Mean	9.5	11.7	16.0	18.9	19.6	20.5	21.1	20.9	20.1	17.3	13.3	10.4
Cherra- punji	Maximum	15.8	16.9	20.5	22	22.1	22.9	22.2	22.5	20.9	22.4	19.7	17
	Minimum	7.6	10.5	12.9	15.1	16.3	17.3	18.4	18.4	18.1	15.9	11.9	8.8
	Mean	11.7	13.7	16.7	18.5	19.2	20.1	20.3	20.4	19.5	19.1	15.8	12.9
Tura	Maximum	23.6	26.4	29.9	32.5	31.0	29.3	25.9	29.3	29.5	28.9	26.5	24.7
	Minimum	12.3	14.9	18.7	22.1	22.9	22.7	23.2	23.3	22.7	20.3	16.3	13.5
	Mean	17.9	20.6	24.3	27.3	26.9	26.0	26.0	26.3	26.1	24.6	21.4	19.1

Source: Meteorological observatory Table, Government of India.

TABLE - 4

Mean Monthly Rainfall at Different Stations in Meghalaya
(in mm)

Stations	Jan.	Feb.	Mar.	Apr.	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Total annual
Shillong	15.2	28.5	59.5	136.4	325.4	544.6	396.9	334.6	314.9	220.2	34.9	6.3	2417.4
Cherrapunji	19.8	37.3	118.9	605.2	1705.1	2921.5	2456.7	1827.5	1167.7	447.4	46.7	4.9	11,418.7
Tura	11.9	7.5	72.1	131.1	402.4	708.7	709.2	558.6	461.5	249.7	17.7	1.2	3,331.6

Source: Meteorological Observatory Table, Govt. of India.

ture is recorded in April.

The Western Meghalaya which is relatively lower in height experiences a fairly high temperature for most part of the year (From February to October) with April as the warmest month having the mean maximum and mean minimum of 32.5°C and 22.1°C respectively. May is the second warmest month of the year with the mean maximum and mean minimum as 31°C and 22.9°C respectively. January is the coldest month and records the mean maximum of 23.6°C and the mean minimum of 12.3°C .

[The average annual rainfall in western Meghalaya is 3,332 mm of which more than two-thirds occur during the four months of May, June, July and August.] Winter is practically dry with a little more than 20 mm in three months i.e. December to February. The rainfall decreases from south to north because the moist south-west monsoon winds strike the southern hills first causing heavy rainfall but in the north, since the winds are obstructed by the Tura range, the rainfall is less. The average annual rainfall in the south-east is about 4000 mm, in the central part between 3000-4000 mm and in the north between 2500-3000mm. (Fig. 7).

In Central and Eastern Meghalaya, the central upland zone has a moderate climate due to higher altitude but the foot-hills of the southern slopes and the sub-montane regions in the north and east are slightly humid and warm. The Shillong region in the central upland zone experiences very cold nights in winter when the temperature goes down to 1.7°C (Fig. 6). Here the maximum temperature does not exceed 24.1°C in any part of the year. In December and January the mean minimum temperatures are 4.4°C



101406

DISTRIBUTION OF TEMPERATURE

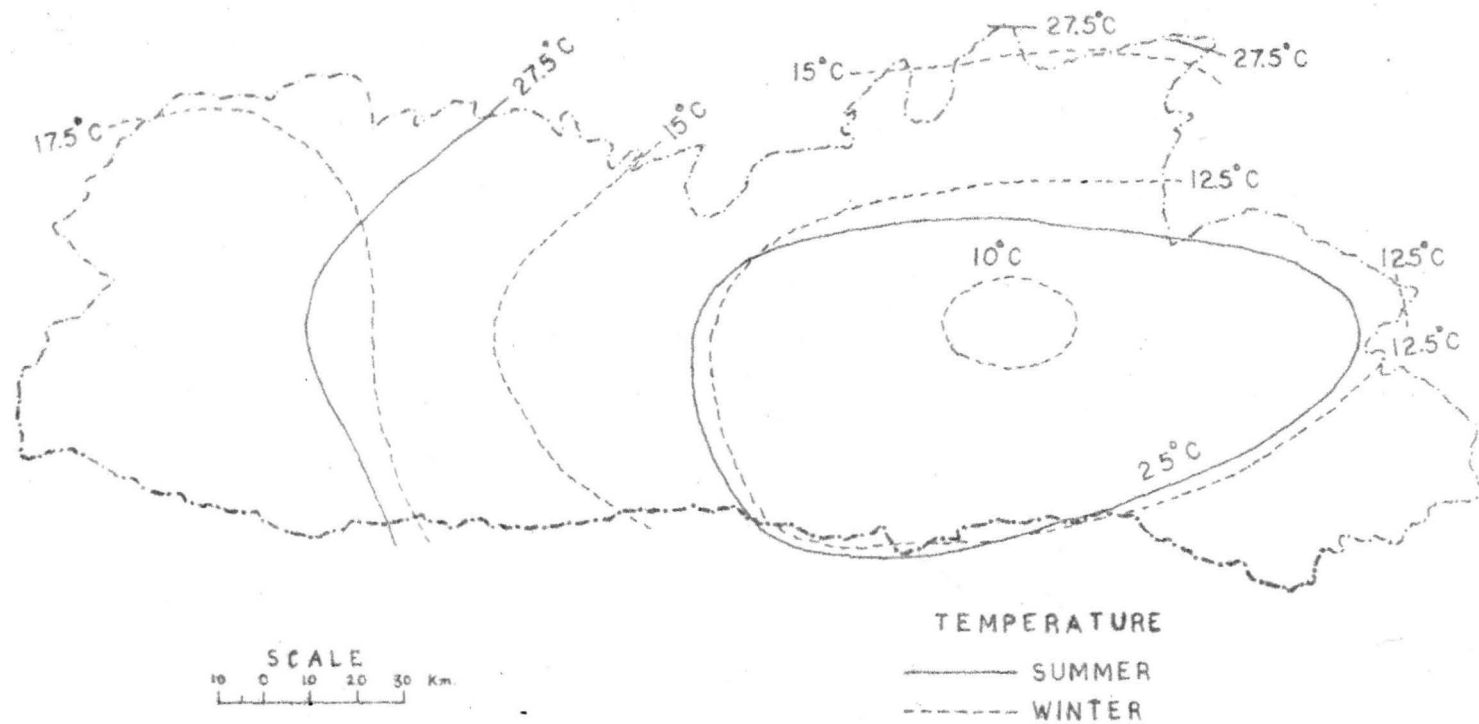


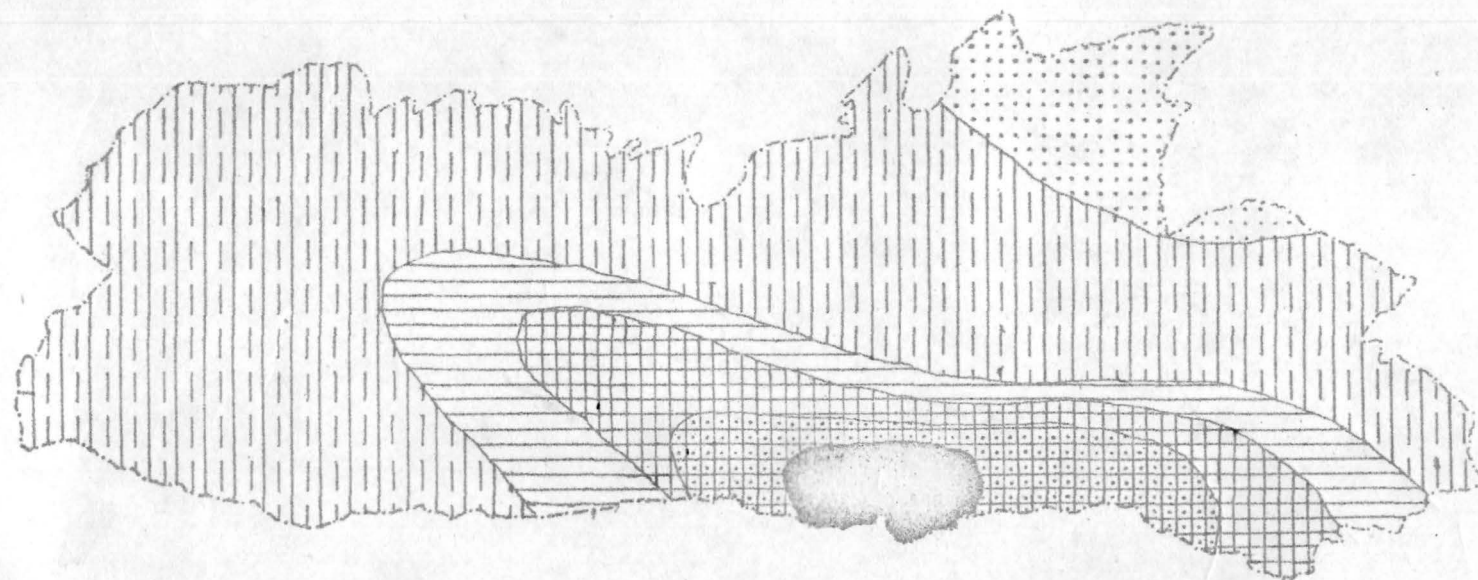
Fig.6

BASED ON SURVEY OF INDIA MAP,
GOVT. OF INDIA COPYRIGHT, 1979.

3.6°C respectively. During these months one usually experiences frost in this area. To the extreme south, in the Cherrapunji - Mawsynram region the mean maximum of 22.9°C is recorded in June and the mean minimum of 7.6°C in January. The most important climatic characteristic of this part is the very heavy rainfall with an average annual of 12,670 mm which distinguishes this area climatically from other parts of Meghalaya. (The heavy rainfall in the Cherrapunji - Mawsynram region is due to the fact that the south-west monsoon winds laden with great amount of moisture from the Bay of Bengal blow over Bangladesh and are suddenly obstructed by the steep face of the plateau in the south with deep gorges running from south to north, and as a result the monsoon winds having reached the heads of the gorges ascend vertically upwards and cause very heavy rainfall.)

(The average annual rainfall in Central and Eastern Meghalaya is 7707 mm of which more than three fourth fall during the five months, May to September, winter is almost dry with 60mm in three months, December to February.) The rainfall decreases considerably from south to north. This is because the high ranges of the central upland zone having an east-west alignment render a rain-shadow effect on the areas lying to the north. As a result, the rainfall in Cherrapunji which is located in the extreme south is as high as 11,419mm, while Shillong being located only 50 km to the north with a rain-shadow effect receives only 2,417mm. Mawsynram, a village situated about 16 km. west of Cherrapunji records the highest rainfall in the world, the amount being 13,923 mm. Jowai which is situated on a ridge in the eastern part of the central upland receives an average annual rainfall of 3,077mm, higher than that of

MEAN ANNUAL RAINFALL



SCALE
10 0 10 20 30 Km.

RAINFALL IN MM.

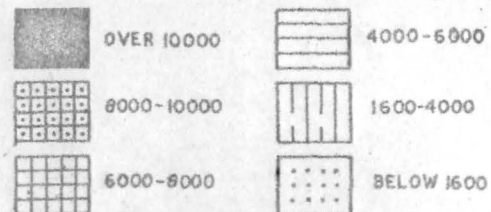


Fig.7

BASED ON SURVEY OF INDIA MAP,
GOVT. OF INDIA COPYRIGHT, 1979.

Shillong, because it does not experience a rain-shadow effect. The rainfall decreases further north due to greater rain-shadow effect and as such the northern hills receive less than 2,000 mm of rainfall. (Fig. 7).

Soils :

The soils of Meghalaya have developed under varied conditions of geology, relief, climate and vegetation. They are of four different types (Fig. 8).

The red loamy soils occupy the central part of Garo Hills and the central upland zone in Central and Eastern Meghalaya. They are derived from the weathering of rocks like granites, gneisses, diorites and others which are relatively richer in clay-forming minerals and poorer in silica. These soils are generally loamy but sometimes vary from clayey to sandy loam. The surface horizon which is about 30 cm thick has colours ranging from reddish brown to dark reddish brown. The soils are rich in organic matter and nitrogen but deficient in phosphate and potash. They are usually acidic in character and are suitable for the cultivation of rice, potato and fruits.

The laterite soils occur in a broad belt extending from west to east in the northern part of the region. They have been formed by the weathering of rocks like quartzites, schist, conglomerate, granites and gneisses which are rich in iron and alumina. These rocks are generally reddish or yellowish red in colour and have a vesicular structure. They are massive and firm and can be cut into large blocks when sufficiently moist. On exposure they

SOILS

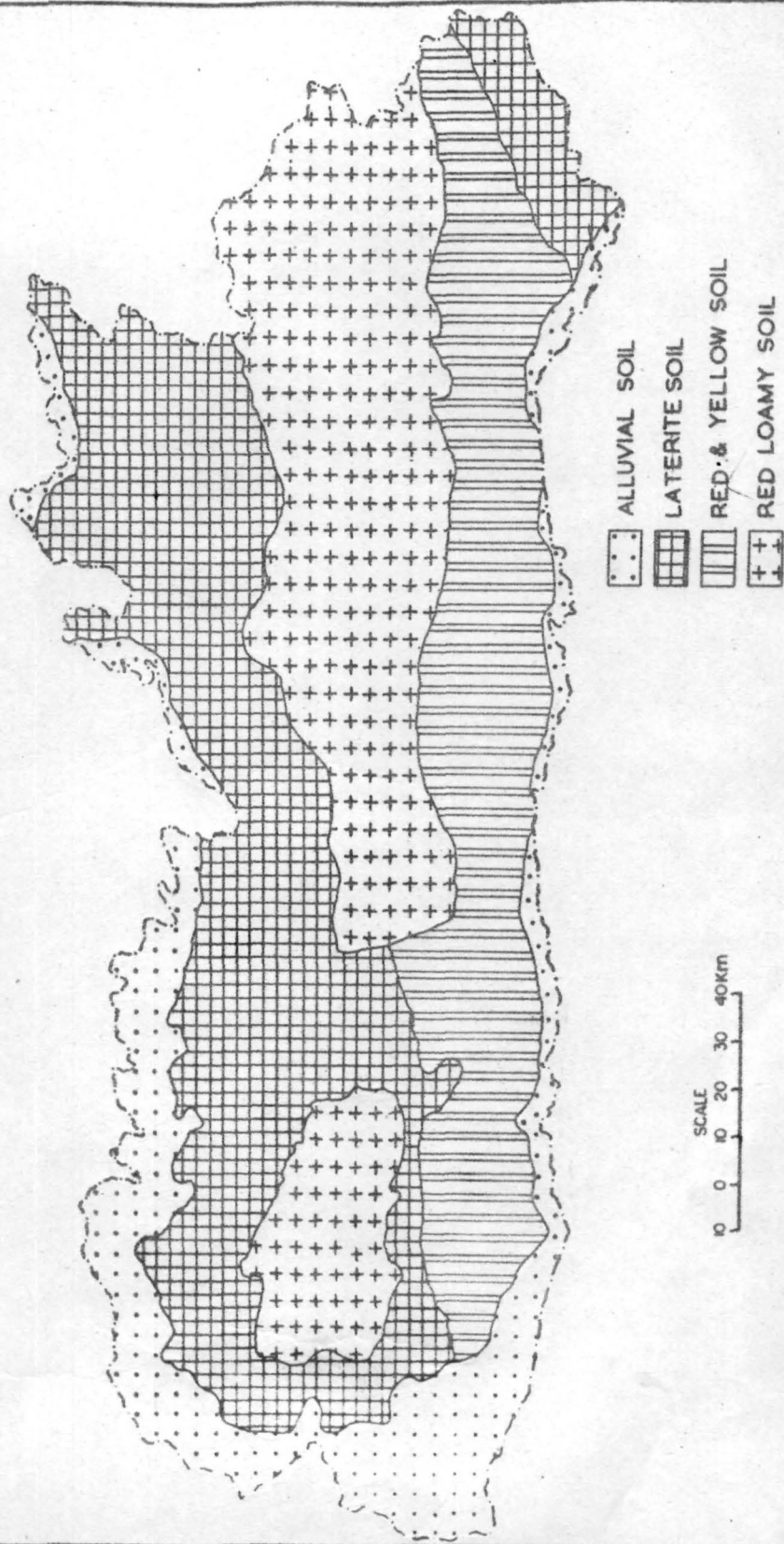


Fig. 8

dehydrate and become very hard. The laterites have been formed under the conditions of heavy rainfall as a result of which all basic constituents have been leached out from the soil and only a matrix rich in iron and aluminium oxides and hydroxides with some silica is left behind. These soils are poor in organic matter and other fertilising constituents and are acidic in reaction. From the agricultural point of view the soils are not very important but can be used for the purpose by mixing heavy amount of organic matter.

The red and yellow soils are found in a belt running from east to west in the foot-hill country. They vary in colour from yellow to red, reddish yellow and yellowish brown. The yellow colour is due to the higher degree of hydration of the ferric oxide in these soils compared to that in the red soils. The soils are usually fine-textured ranging from loam to silty loam and are suitable for rice and fruits.

The alluvial soils occur all along the northern, western and southern fringe of the region. In texture these soils vary from sandy to clayey loam with varying amount of nitrogen and are highly acidic in character. These soils are rich in potash but poor in phosphate. They are being used for the cultivation of rice, jute and fruits.

Here it may be added that the terrain has played an important part in determining the nature of the soils in Meghalaya. In general, the soils are thin, immature, light in colour less clayey and less fertile on the hill-tops and are thick, mature, deep in colour, more clayey and more fertile in the valleys and the alluvial lowlands.

Soil erosion is one of the major problems of agriculture in Meghalaya. It is mainly caused by the practice of shifting cultivation in a region which is characterized by rugged topography and heavy rainfall. It is further accentuated by the uncontrolled grazing which limits the growth of vegetation on the land surface. In some of the areas the top-soil has been completely washed away from the hill-slopes, rendering them useless for cultivation. It may be noted here that the soil erosion is maximum in the areas under cultivation and immediately during the year following the harvest.

Natural Vegetation :

The region has a variety of natural vegetation ranging from tropical mixed forests to pure stand of pine forests and thus reflects the variation in physiography, soils and climatic conditions.

In this region the natural vegetation has been adversely affected by reckless cutting, grazing and jhum cultivation. In some areas the vegetation is not only greatly altered but practically destroyed by man and his animals. Still some pockets of valuable forests lie intact in the inaccessible and protected parts of the State. In Western Meghalaya, the northern and the southern low hills with warm and humid climate have dense tropical mixed forests where sal (*Shorea robusta*) and bamboo are the most important trees. The principal bamboo species are the dalu and muli. Besides sal, other important species found in these forests are the gurga and the haldu. Canes and agaru trees are also found. In the higher parts of the Tura range where the climate is relatively cooler there occurs a small patch of temperate forest with

VEGETATION

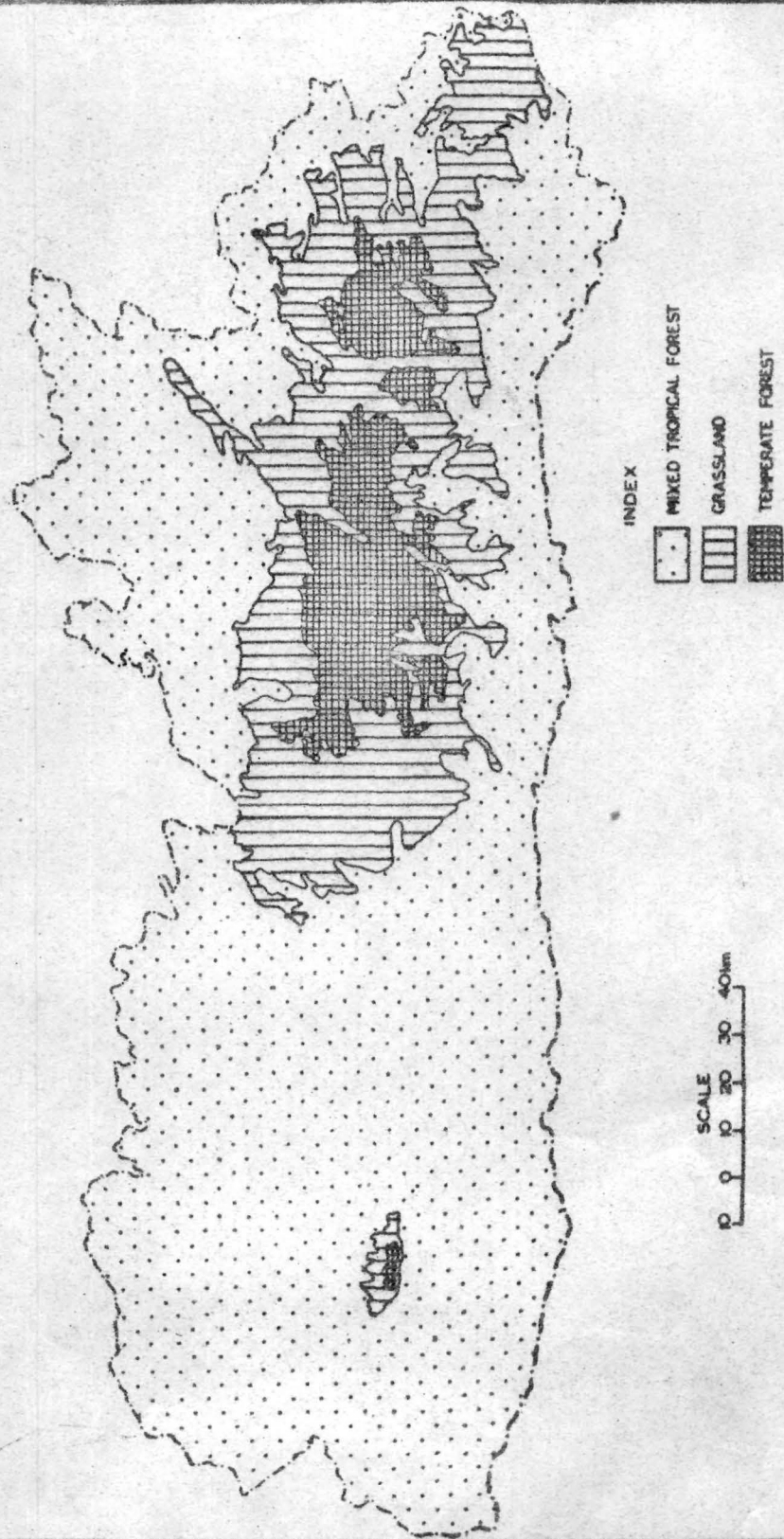


Fig.9

pinus and firs as important species.

The vegetation of the Central and Eastern Meghalaya can be broadly divided into three types (Fig. 9).

The mixed tropical evergreen hardwood forests occur in the northern and the southern parts upto an elevation of about 900m. Here the climate is a little warm throughout the year with an annual rainfall of about 180 cm. The main species include sal, sam, nahar, champa, gomari and bola. Thickets of bamboo, cane and wild banana occur on the hill-slopes. The rolling grassland occur in the lower parts of the central upland zone between the elevations of 900 - 1350m. These grasslands are dotted here and there with pine-trees. The pine forests of the central upland zone are found above 1350m elevation. In these forests the main species is pine found along with willow, birch, magnolia, oak, beech and others.

Mineral Resources :

In Meghalaya minerals are of great importance. They have been influencing the distribution of people and their economy and the growth and distribution of settlements in the region. Even in the past the occurrences and use of certain minerals were known to the local people which are evident by the existence of few sides of old quarries and smelting centres.² Coal, limestone and sillimanite are the chief minerals of the region. Others include clay, corundum, glass-sand, gold, iron-ore and copper (Fig. 10). Of these, only coal, limestone, sillimanite and clay have greater economic value.

2. In the past gold washing out of sand was prevalent at the bank of Umiew river below Pawphiang hill and the excavation of copper at Nongstoin.

MINERALS

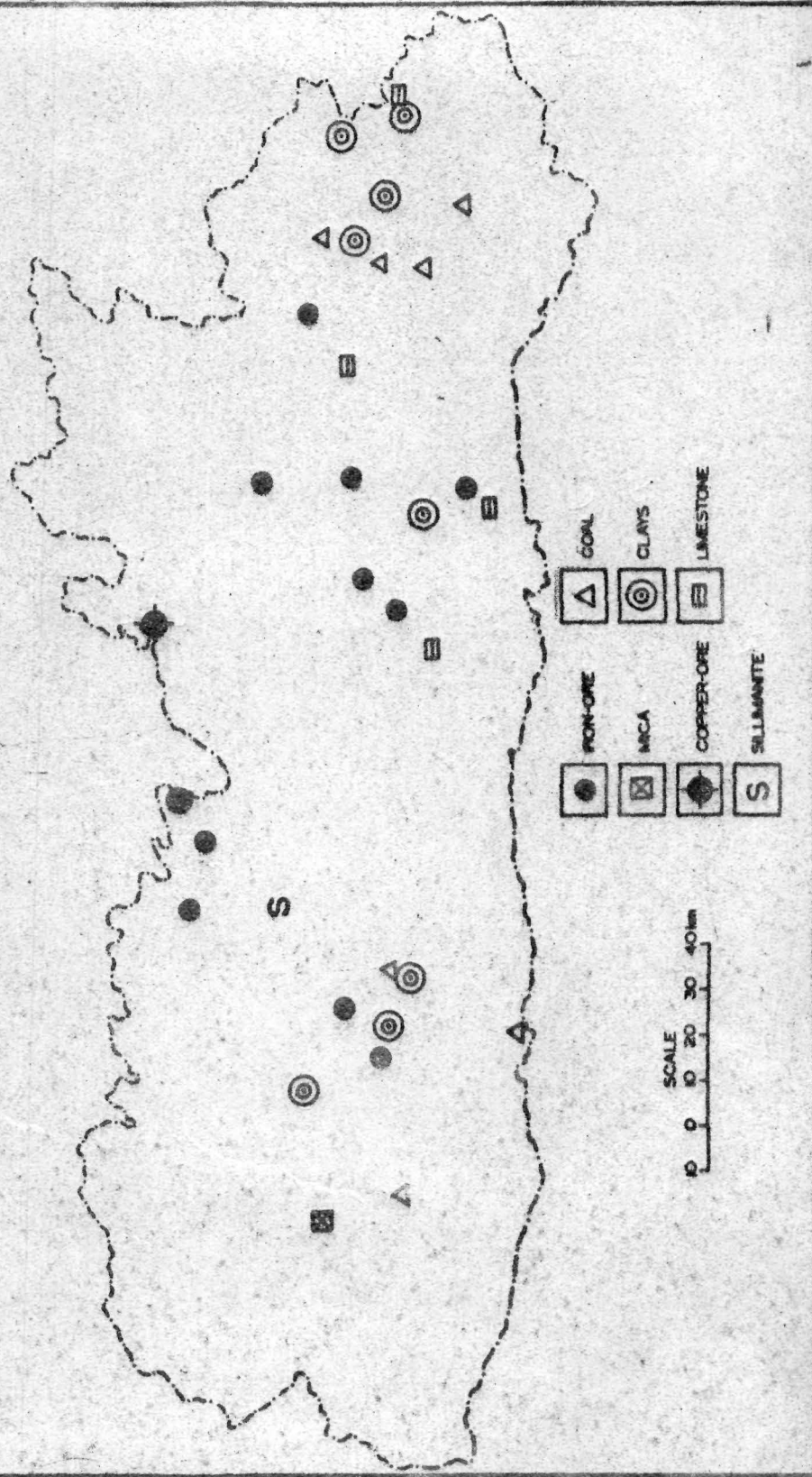


Fig.10

The minerals are associated mainly with the three important formations of the region, viz., the Archaen Gneissic complex, the Shillong Group of rocks and the Cretaceous - Tertiary Sediments. The first two formations contain iron-ore, copper, sillimanite and mica; the third one coal limestone and clay. The coal reserves of Meghalaya are approximately 1197 million tons of which more than a thousand million tons are in the Garo Hills alone. There are as many as 15 main coalfields³ in the region. The coal is characterised by its high volatility, high amount of sulphur and low ash content. Due to high sulphur content it is difficult to make use of this coal in the thermal plants. In the early sixties when it was being exported to Pakistan the annual production of coal was about 2 lakh tons but after the Indo-Pak war of 1965 it has greatly declined. Now the annual production is only 53,000 tons which comes mainly from a few coalfields.

Large deposits of limestone occur in a narrow belt along the southern slopes of the Tura range. The largest deposits lie near Siju Arteka and Siju Songmong in the Simsang valley. Limestone deposits are found near Pongrenggiri and Jarkhre Songthak along the Simsang and also near Darang Era Aning in the west Darranggiri coalfield. In the Khasi Hills the deposits occur in the south within a belt from Langaon westwards through Therriaghat, Shella and Mawsynram, from Shella to Bholaganj and in the Mawmluh-Mawmai Hills. Small deposits are found at Lynkerdem Pynursla and Nongtalang. In the Jaintia Hills, the deposits occur in Lakadong

3. The coalfields are Um Rilang, Shymang, Bepung, Mawsynram, Shella-Mawlong, Cherrapunji-Laitryngew, Pynursla, Lakadong, Lumshong, Tengleh, East Darranggiri, Pendengru, Langrim (Umblei) West Darranggiri and Siju.

plateau and the Lumshong, Mynkre and Khaddum areas. They also occur near Syndai, Sutnga and Nongkhlieh.

The total estimated reserves of limestone in Meghalaya are 2100 million tons and the annual production about 1,45,000 tons. Most of the limestone is of very high grade (calcium content 98.5 percent) and is suitable for the manufacture of cement. It is also suitable for use in blast furnaces and iron-smelting works, and for the manufacture of chemical grade lime.

The sillimanite-corundum deposits of Sonapahar in the Khasi Hills are well known and are reputed to contain the best quality sillimanite in the world. It is an interesting fact that Sonapahar accounts for nearly 90 per cent of the total production of Sillimanite in the country. There are altogether 27 deposits in the area. These deposits are massive and can be sawn into blocks ready for use without any further treatment. As a refractory material these blocks are considered to be the best in the world. The reserves of Sillimanite are estimated at 25,000 tons and the annual production is 2100 tons.

Large deposits of white clay are found at Tura, Khara and Nongalbibra in the Garo Hills and near Mawphiang, Thadlaskein and Laitlyngkot in the Khasi Hills. Clay suitable for pottery occurs near Sohrarim and around Sutnga and Shangpung. Fire clay is found near Jowai and Larnai. The annual production of clay in Meghalaya is 7794 tons. Copper deposits occur at Umpyrtha and glass-sand at Cherrapunji and Laitryngew. The reserves of glass-sand at Laitryngew alone are estimated at 40,6,400 tons.

CHAPTER - II

CHAPTER - II

DEMOGRAPHIC AND SOCIAL STRUCTURE

Human resources play a very important role in the economic development of a region. Man is not only the creator of all kinds of national wealth but also the ultimate beneficiary of all economic social and political activities. He occupies a central position from which other resources of a region derive significance and meaning. In the present Chapter an analysis of the growth, distribution and density of population in the region is being focussed at length along with the population composition, the sex-ratio, literacy, religious and linguistic structure and the migration pattern.

Population Growth :

During the period 1901-1971 the population of Meghalaya has gone up from 340,525 to 10,11,699, recording a population growth of 197.10 percent (Table 5 and Fig. 11). The average decennial growth during this period has been 17.12 percent. But there have been marked fluctuations, particularly between the decades 1901-11 and 1911-21 from +15.71 percent to +7.21 percent. This was due to high incidence of malaria and kala-azar which took a heavy toll of life, resulting in high death rate. Another significant fall has occurred between the decades 1931-41 and 1941-51 from +15.59 percent to +8.97 percent. This was due to a large densely populated tract of the United Khasi and Jaintia Hills District being awarded to East Pakistan in 1947. Jaintiapur area which was till then part of the aforesaid district was brought under East Pakistan. It was

TABLE - 5

Variation in Population During 70 Years (1901-1971)

District/State	1901	1911	1921	1931	1941	1951	1961	1971	Percentage variation 1901-71
United Khasi & Jaintia Hills	T 202,250	235,069	243,263	289,926	332,251	363,599	462,152	605,084	199.18
	P	+16.23	+ 3.49	+19.18	+14.60	+ 9.44	+27.10	+30.93	
Caro Hills	T 138,274	158,936	179,140	190,911	223,569	242,075	307,228	406,615	
	P	+14.94	+12.71	+ 6.57	+17.11	+ 8.28	+26.91	+32.35	194.06
Meghalaya	T 340,524	394,005	422,403	480,837	555,820	605,674	769,380	1,011,699	
	P	+15.71	+ 7.21	+13.83	+15.59	+ 8.97	+27.03	+31.50	197.10

Based on census of India Series 13-Meghalaya, Part-II-A,
Table A-II p.43

T = Total Population;
P = Percentage variation;
+ = Increase

also due to high incidence of malaria and the movement of troops to other parts during the second world war. However, after 1951 the growth rate has been continuously rising with +24.03 percent in 1951-61 and +31.50 percent in 1961-71. The growth in the last decade being much higher than the all India average of 24.80 percent. The high growth rate has been due to improvement in medical facilities and consequent high natural increase. Further the large-scale in migration of population from East Pakistan (now Bangladesh) and from other states of India accelerated the growth of population in the region. In 1961-71 decade Jaintia Hills recorded a population growth of 38.6 percent, Garo Hills 32.4 percent and Khasi Hills 29.3 percent against the regional average of 31.5 percent.

The similar trend in the growth rate is also observed in the rural areas with minor variations. The growth has always been low (6.5 to 19.1 percent), except in the decade 1961-71, when it recorded 32.6 percent, even higher than the growth of urban population. This may be attributed to the various developmental activities such as opening and extension of roads, opening of mining industries, hydel projects, construction of bridges and buildings, and establishment of air force and army centres in the neighbourhood of Shillong (specially after Indo-China and Indo-Pak wars), acting as primary magnets for in-migration in Meghalaya.

The growth rate of population in urban areas has been much higher than in the rural areas till 1961 (Table-6). In the decade 1941-51 Shillong with the cantonment was the only urban centre in the region but in 1961 four new "Census" towns were added

TABLE - 6

Percentage variation of Population During 70 years (1901-71)

District/State	1901 to 1911	1911 to 1921	1921 to 1931	1931 to 1941	1941 to 1951	1951 to 1961	1961 to 1971
United Khasi & Jaintia Hills	T +16.23 R +14.95 U +41.76	+3.49 +2.09 +26.13	+19.18 +16.51 +54.25	+14.60 +11.64 +43.92	+ 9.44 + 3.75 +53.20	+27.10 +15.89 +85.59	+30.93 +33.90 +21.26
							+199.18 +145.76 +1268.68
Caro Hills	T +14.94 R +14.94 U =	+12.71 +12.71 -	+ 6.57 + 6.57 -	+17.11 +17.11 -	+ 8.28 + 8.28 -	+26.91 +23.24 -	+32.35 +31.10 +74.27
							+194.06 +182.86 -
Meghalaya	T +15.71 R +14.95 U +41.76	+ 7.21 + 6.53 +26.13	+13.83 +12.12 +54.25	+15.59 +13.94 +43.93	+ 8.97 + 5.71 +93.20	+27.03 +19.14 +100.78	+31.50 +32.62 +25.27
							+197.10 +161.26 +142.67

Based on Census of India, 1971, Series 13 - Meghalaya, Part-II-A,
Table A-II statement I, p. 42.T = Total
R = Rural
U = Urban
+ = Increase

and as a result the urban population increased. Besides, there was large-scale in-migration of people from other states of India, Nepal and East Pakistan who were drawn towards the urban centres. In addition, a considerable number of people moved from rural areas to the towns within the state itself. Due to all these factors the urban population growth increased from 53.20 percent in 1941-51 to 100.78 percent in 1951-61. In 1961-71 decade, the growth of urban population was only 25.27 percent. During this decade the growth of urban population in the United K & J Hills District has been very slow (21.26 percent) but in the case of Garo Hills District it has been remarkably high (74.27 percent). This was due to the influx of refugees from the then East Pakistan into the town of Tura which was the chief centre of attraction. In the case of United K & J Hills the slow growth rate may be due to the shifting of several government offices to Dispur in Assam when Meghalaya was granted its autonomous status.

The decennial growth of tribal population in the region was 27.4 percent. It was 23.5 percent in Garo Hills, 28.5 percent in Khasi Hills and 35.8 percent in Jaintia Hills. The decennial growth of non-tribal population in the region was 61.6 percent. It was 82.6 percent in Garo Hills, 32 percent in Khasi Hills and 206.8 percent in Jaintia Hills. The high growth of non-tribal population indicates that there has been large scale in-migration of non-tribal population from other parts of India during this decade.

The growth of total, tribal and non-tribal population at mauza/police station and urban level in the decade 1961-71 gives some idea of in-migration of population. High growth of population

has been recorded in mauzas V, VI and VII and in Tura town. The northern part of Khasi Hills experienced a growth of more than 40 percent. The southern parts of Meghalaya recorded a growth of less than 20 percent. This is because the inflow of immigrants has been mostly from the north. The growth of tribal population was very high in Mauzas VI, VII and VIII of Garo Hills. This seems to be due to outward migration of the Garos from the interior parts of the district. High growth of non-tribal population in mauzas II, IV, V and VI of Garo Hills, in the rural areas of police stations Shillong, Cherrapunji and Dawki of Khasi Hills and in Jowai police station of Jaintia Hills is due to in-migration of population from Bangladesh in case of Garo Hills and from other states of India in case of Khasi and Jaintia Hills.

Population Distribution :

The total population of Meghalaya, as has been stated earlier, is 10,11,699, 520,967 males and 490,732 females (1971). The population is very unevenly distributed in the region. The distribution is governed mainly by topography, soil, availability of water, mineral resources and accessibility to the areas. Since the economy of the region is primarily agricultural, The topography and soil have profound influence on the regional distribution of population. The population map (Fig. 12) shows that the population of the region is mainly concentrated in

- (i) the areas around Shillong and Jowai;
- (ii) the neighbourhood of Cherrapunji and Dawki and;
- (iii) the northern, western and southern fringe areas of the Garo Hills.

Around Shillong have grown many large villages whose inhabitants find ready market for their agricultural produce and

also the opportunities for employment. In Cherrapunji area, the concentration of population is due to the exploitation of minerals like coal and limestone and the establishment of the cement factory at Mawmluh. Flat land, fertile soil and better communication account for the high density of population in the border areas of Garo Hills. Another factor for the dense population in this part is the influx of refugees from Bangladesh.

The sparsely populated areas of the region are the northern and south-western parts of Khasi Hills, most parts of Jaintia Hills and the interiors of Garo Hills. Rugged topography, rocky soil and poor accessibility have caused low density of population in these areas.

The overall density of population in the region is 45 persons per sq. km. It is much less than the density of 77 persons per sq. km. in the North-eastern region and 182 persons of per sq. km. in India (1971). The low density of population reflects the rugged topography and the poor resources of the region, resulting in poor economy. The regional density pattern shows marked variations (Fig. 13).

- (a) Areas of very sparse population with less than 30 persons per sq. km. include northern part of Khasi Hills, Jaintia Hills excluding Dawki P.S. and the south-eastern part of Garo Hills. In these areas the low population density is due to rugged topography, dense forest cover and poor means of communication.
- (b) Areas of sparse population, between 30 to 40 persons per sq. km., occupy central and southern Khasi Hills, and mauzas II, III and IV of Garo Hills. The highest density of 40 persons per sq. km. is found in mauza II.

- (c) Areas of dense population with above 180 persons per sq. km consist of the northern, western and southern fringe mauzas of Garo Hills. As already pointed out earlier, the high population density in these areas is due to flat land, fertile soil and better communication. Another factor for dense population is the influx of refugees from Bangladesh. The highest density of 343 persons per sq. km. is found in mauza V.

Thus, it is found that areas with a population density of more than 180 persons per sq. km. cover only 2.2 per cent of the total area but having about 25 percent of the total population. About 98 percent area of the region has a density of less than 40 persons per sq. km. but has 75 percent of the total population.

Population Composition :

The population of Meghalaya has two major groups - Tribal¹ and non-tribal. According to 1971 census, the tribal population of Meghalaya is 814,230 which accounts for about 80 per cent of the total population of the region. In the interior mauzas of Garo Hill the percentage of tribal population is 97.3, in Khasi Hills 77.4 and in Jaintia Hills 95.1. The highest percentage (97.9 percent) of tribal population is found in mauza-I of Garo Hills. In the fringe mauzas of Garo Hills the percentage of tribals ranges between 17.3 and 65.2 with the lowest in mauza VI (Table 7 and Fig. 14). Further, it may be added that 91.8 percent of the tribal population live in rural areas and only 8.24 percent in the urban areas.

1. The main tribes of Meghalaya are Khasi in the Khasi Hills, Garo in the Garo Hills and Jaintia in the Jaintia Hills. Dimasas, Hajong, Hmar, Kuki, Lakher, Man, Mikir, Rabha etc. are the minor tribes of the region.

TABLE - 7

Some Aspects of Population in Meghalaya, 1971

Mauza/Police Station	Area in sq.km.	Total Pop.	Density per sq.km.	Percent- age of Tribal Pop.	Percent- age of Rural & Urban	No. of fe- males '000 ma- les	Percentage of Literacy
1	2	3	4	5	6	7	8
Mauza I R	1620.3	44,353	27	97.93	100	956	28.07
Mauza II R	1,850.0	73,559	40	97.89	100	968	16.49
Mauza III R	1,998.7	74,113	37	96.53	100	988	14.50
Mauza IV R	2,228.2	78,858	35	97.17	100	952	28.01
Mauza V R	92.5	31,743	343	57.54	100	914	28.37
Mauza VI R	100.5	26,595	285	17.29	100	935	16.76
Mauza VII R	107.5	19,859	185	57.38	100	959	20.01
Mauza VIII R	75.4	19,117	254	38.03	100	951	20.35
Mauza IX R	70.7	17,811	252	65.20	100	953	32.66
Mauza X T	19.9	18,607	935	47.17		797	58.71
R	10.8	3,118	289	10.23	16.76	891	22.19
U	9.1	15,489	1704	54.60	83.24	779	66.06
Nongpoh P.S.	1,985.6	52,733	27	80.23	100	893	24.79

Table contd..

Table contd.7..

Shillong P.S.	T	5858.5	326,571	56	71.40	912	41.46
	R	5837.2	203,819	35	89.42	947	26.61
	U	21.3	122,752	5771	41.47	855	66.11
Cherra P.S.	R	2224.7	83,987	38	92.05	945	31.09
Dawki P.S. (+Shillong portion)	R	1099.3*	27,918	39	97.73	1,043	18.67
Jowai P.S.	T	3295.5	99,191	30	95.84	998	19.14
	R	3287.7	90,262	27	96.72	1,002	15.93
	U	7.8	8,929	1149	86.90	955	51.58
Dawki P.S. (Jowai Portion)	R	-	14,684	-	90.09	1,008	25.33
Meghalaya	T	22,489	1,011,699	45	80.48	942	29.49
	R	22,450.8	864,529	39	86.42	958	23.40
	U	38.2	147,170	3852	45.60	853	65.22

Based on Census of India, 1971, Series 13-Meghalaya, Part-II A, Primary Census Abstract (state) p.90

*This figure represents the area of both the portions of Dawki P.S. and the density has been calculated by taking into account the pop. of both the portions.

T = Total
R = Rural
U = Urban

Out of the total non-tribal population of 197,469, 40.54 per cent live in the urban centres and the rest in the rural areas. In Shillong urban Agglomeration and Tura town the percentage of non-tribal population is 45.4 and 58.5, respectively but Jowai is still pre-dominantly tribal (Tribal population 86.9 per cent). The high percentage of non-tribal population in Shillong and Tura is because of their position as administrative headquarters for several years which attracted people from outside the region. The non-tribal population consists of in-migrants from other states of India, Nepal and East Pakistan.

The scheduled castes constitute only 0.38 percent of the total population of the region. These are Bansphor, Mali, Dhobi, Brittiel-Bania, Dugla, Hira, Jalkeot, Jhalo-malo, Jaliya, Lalbegi, Mohara, Bhengi, Mochi, Namasudra, Patni and Sutradhar. They belong to either Sikh or Hindu community and are confined to Nongpoh, Shillong and Cherra police stations of Khasi Hills, Jowai police station of Jaintia Hills and the outer mauzas of Garo Hills. In the interior mauzas of Garo Hills and in Dawki police station they are absent. The percentage of scheduled caste population to the population of respective units varies from 0.17 per cent in Cherra Police Station of Khasi Hills to 4.57 per cent in mauza VIII of Garo Hills. In urban areas the percentage is : Shillong U.A. 1.21, Tura 4.69 and Jowai 0.05.

Rural and Urban Population :

The region is essentially rural in character with 85.45 per cent of its population as rural and only 14.55 per cent as urban (1971). The percentage of rural population is lower than 99.57 percent for the North Eastern Region but higher than 80.09 per cent

for India. On the other hand, the percentage of urban population is higher than 9.53 percent for the North Eastern Region, but lower than 19.91 per cent for India. The total rural population of the region is 864,529 and is distributed in 4583 villages. The average rural density is 39 persons per sq. km. It is 33 persons per sq.km in Khasi Hills, 32 in Jaintia Hills and 48 in Garo Hills. The total urban population of 147,170 is concentrated in the three urban centres of the region, viz., Shillong Urban Agglomeration (Shillong Municipality, Shillong cantonment, Nongthymmai and Mawlai), Tura and Jowai. Shillong U.A. with a population of 122,752 persons shares 83.4 per cent of the total urban population of the region, Tura 10.5 per cent and Jowai 6 percent. The average density of urban population is 3852 persons per sq. km. The density of population is 5771 persons per sq. km. in Shillong UA., 1704 in Tura and 1149 in Jowai. The density in Shillong is surprisingly much higher considering the hilly nature than the population densities of very developed cities of India like Kanpur Urban Agglomeration (4265 persons per sq. km) and Poona Urban Agglomeration (3498 persons per sq. km). The high density of population has resulted in housing problems, shortage of public utility services and marginal living conditions in congested parts of the towns.

Sex-Ratio :

The sex-ratio may be defined as the number of females per 1,000 males in the population. According to 1971 census, the sex-ratio for the region as a whole is 942. It is slightly higher than the all India average of 932. At district level, it is 909 in Khasi Hills, 950 in Garo Hills and 999 in Jaintia Hills. Within the various mauzas and police stations the variation in sex ratio

is small. The general trend for sex-ratio is to decrease from south to north. The lower ratio in the latter areas may be due to a greater percentage of male migration from other parts of the region as well as from other states of India. The highest sex-ratio has been recorded in Dawki P.S. (1043) and the lowest in Shillong P.S. (912). In Garo Hills, the lowest sex-ratio (914) is to be found in Mauza V. The towns of Meghalaya, like other urban centres of India, have lower sex-ratio compared to the rural areas. It is 779 in Tura and 855 in Shillong UA. The Sex-ratio is low due to the fact that a large number of people are residing in these towns without their families.

The sex-ratio is very high in the tribal population of the region - 1008 in Khasi Hills, 1031 in Jaintia Hills and 972 in Garo Hills. Among the non-tribals, the sex ratio is quite low in the Khasi and Jaintia Hills (679 and 536 respectively) and in the interior parts of Garo Hills (500). This indicates that a large number of non-tribals live without their families in these areas also. The high sex-ratio (875) among the non-tribal population in the fringe areas of Garo Hills is an indication that they have settled there more or less permanently.

Literacy :

According to the census of India, 1971 a person who can both read and write with understanding in any language is to be taken as literate. A person who can merely read but cannot write is not a literate.² The percentage of literate persons in the

2. Census of India, 1971, Series 13, - Meghalaya Part-II-A, p.61.

region as a whole is 29.49 as against 26.91 in 1961. It is slightly higher than the national average of 29.46 per cent. At district level, it is 42.50 percent in Khasi Hills, 23.57 percent in Garo Hills and 19.94 per cent in Jaintia Hills. The percentage of literacy is higher in the urban areas than in the rural areas - 65.22 per cent in urban and 23.40 per cent in rural. It is high among the males (32.12 per cent) and very low among the females (24.56 per cent), particularly in Garo and Jaintia Hills. The literacy is lower in mauza II, III, VI, VII and VIII of Garo Hills in Dawki P.S. of Khasi Hills and in Jowai P.S. of Jaintia Hills compared to other parts of the region (Table - 7). This seems to be due to lack of communication and poor economic condition of the people. The literacy is higher in mauza X of Garo Hills and in Shillong P.S. of Khasi Hills. This is due to the existence of large number of educational institutions established mainly by the missionaries and the impact of the towns of Shillong and Tura. The urban centres of the region show a higher percentage of literacy, Shillong U.A. 66.1 per cent, Tura 66.06 per cent and Jowai 51.58 percent.

The female literacy in the region is 24.56 per cent which is higher than the all India average of 18.72 per cent. In the rural areas of the region only 18.94 per cent of the female population is literate. In the urban areas the position is better, the percentage of literacy being 59.69. The regional trend of female literacy in the rural areas is the same as for the total population of males and females, and the percentage of literacy varies between 8.74 and 27.29 percent. The highest female literacy is to be found in Shillong U.A. (60.1 percent) followed by Tura (60.07 percent) and Jowai (47.05 percent).

Religious and Linguistic Structure :

Christianity is the most dominant religion of the region which is followed by 46.98 per cent of the total population. The followers of other religions are Hinduism 18.50 percent, Islam 2.60 percent, Buddhism 0.19 percent, Sikhism 0.03 percent and Jainism only 0.12 percent. At district level, the percentage of Christians is 50.65 percent in Khasi Hills, 53.35 percent in Jaintia Hills and 40.75 percent in Garo Hills. Hindus account for 20.91 percent in Khasi Hills and 19.20 percent in Garo Hills, their percentage is only 5.60 percent in Jaintia Hills. Muslims constitute about 5.4 percent of the total population of Garo Hills and are mostly concentrated in the western fringe of the district. Followers of Buddhism and Jainism are found mostly in the Khasi Hills. About 31.5 percent of the regional population belongs to other religious persuasion (Table 8).

There are 105 languages and dialects spoken within the region which show the extent of in-migration of people from other parts of India as well as from foreign countries. The most dominant languages of the region are Khasi in the Khasi Hills, Garo in the Garo Hills and Jaintia in the Jaintia Hills. They account for 36.84, 32.68 and 8.90 per cent of the total population respectively. The other languages are Bengali, constituting 6.8 per cent of the total, Assamese 3.40 percent, Nepali 4.20 percent and Hindi 1.24 per cent.

Migration of Population :

Since data on outward movement of population is not available, it is not possible to say how many and to where the people of this region have migrated. From general observation it

TABLE - 8

Percentage Distribution of various Religious Groups(1971)

District/state	Christians	Hindus	Muslims	Buddhist	Sikh	Jain	Other Religious persons	Religion not stated
Khasi Hills	50.65	20.91	0.87	0.19	0.24	0.04	27.01	0.09
Jaintia Hills	53.35	5.60	0.12	0.05	0.02	0.01	40.78	0.12
Garo Hills	40.75	19.20	5.39	0.22	0.01	0.02	34.22	0.19
Meghalaya	46.98	18.50	2.60	0.19	0.03	0.12	31.45	0.13

Based on statistical Handbook Meghalaya, 1975 Table 1.6 p.8

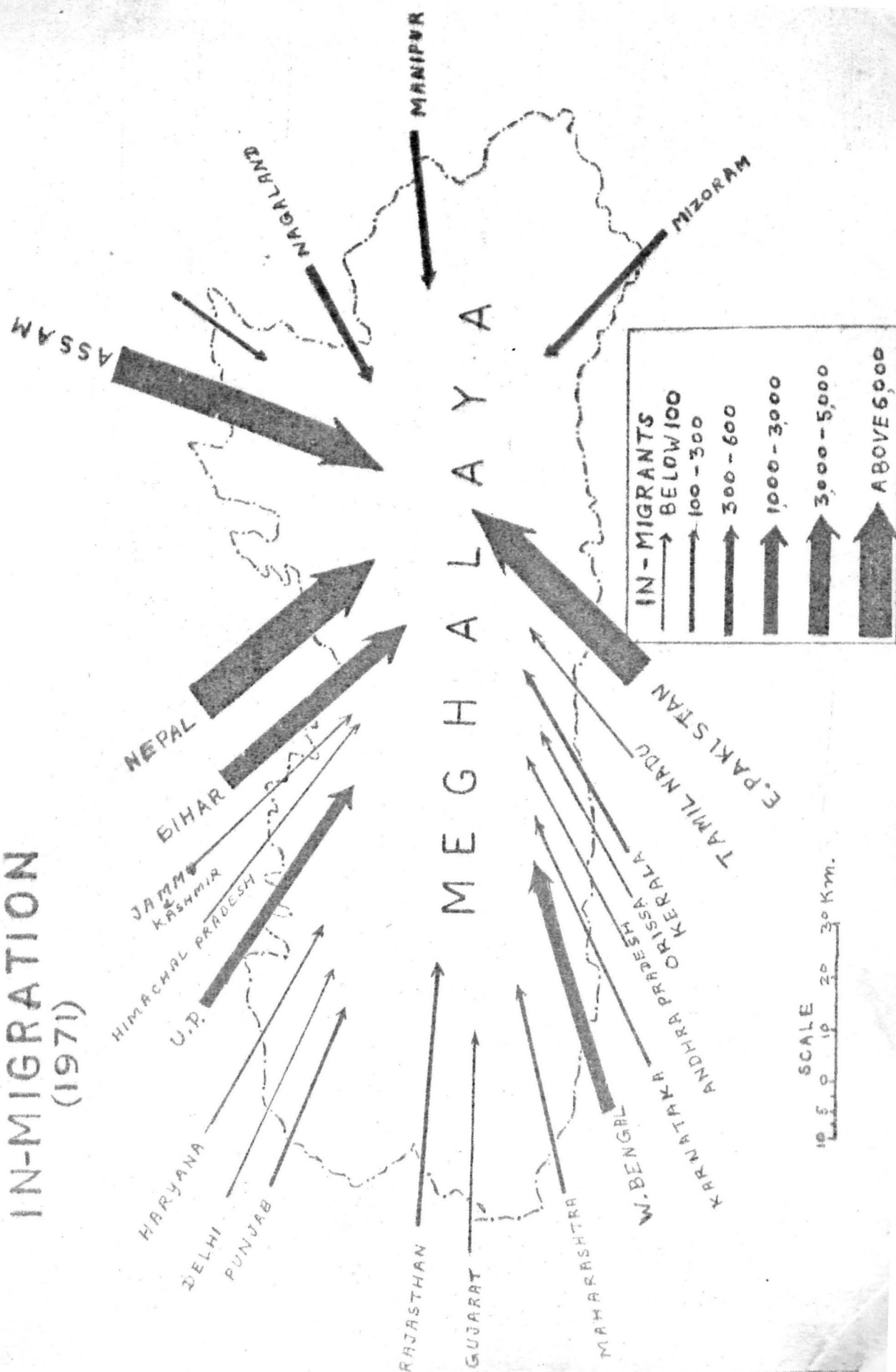
Percentages are percentages to total population of individual districts.

appears that very small number of people have gone outside the region. The inward movement, however, has been recorded. According to 1971 census, from other states of India 53,171 persons have come who constitute 5.3 percent of the total population of the region. They are mostly from Assam, Bihar, West Bengal, Punjab, Uttar Pradesh, Kerala and Tamil Nadu though others have also contributed (Fig. 15). Most of the migrants are in government or semi-government services and others in trade and commerce. Out of the total migrants from other states of India, about 75 percent are in Khasi and Jaintia Hills and the rest in Garo Hills. The region has also received persons from Nepal numbering 12,557 and displaced persons from East Pakistan numbering 24,966.

The in-migration of population has affected the social and economic life of the region by bringing changes in sex and age structure, dependency ratio, occupational structure, employment and in social and cultural set-up. On the whole, migration has resulted in improving the economic conditions and in general it has led to a broader social outlook and more education. In the urban centres, the tempo of life has gone up; new colonies and market places have developed.

The Nepali immigrants have played an important role in the agricultural economy of the region and practically the entire business of milk and milk products is in the hands of these immigrants. The Bengali Muslims who migrated to the western parts of Garo Hills have engaged themselves as cultivators or agricultural labourers and thus have contributed to the agricultural economy of the area. The Marwaris have generally settled in the urban centres and in their hands lies most of the wholesale business of the region.

IN-MIGRATION (1971)



CHAPTER - I I I

CHAPTER - III

ECONOMIC STRUCTURE

Within the given set up of physical conditions and the social and demographic structure, the economic structure of Meghalaya is top-sided.

Meghalaya is an under-developed region of the country where the proportion of working population is 44.17 per cent of the total population, showing high dependency. In the rural areas the ratio is slightly higher, 46.18 per cent workers and 53.82 per cent non-workers. Compared to this, in the urban areas the percentage of workers is 32.34 and non-workers 67.66.

Regional variations in the ratio between workers and non-workers are quite significant. (Appendix-I). The percentage of workers to the total population varies from 29.39 per cent in Mauza VII of Garo Hills to 54.48 per cent in Dawki P.S. of Khasi Hills. It is observed that the ratio of workers is higher in those police stations and mauzas where the proportion of tribal population is high. This is because in the tribal communities a larger number of children and women take active part in different economic activities. In the urban areas the percentage of workers compared to non-workers is very low. It is 32.84 per cent in Shillong, 33.31 per cent in Jowai and 27.81 per cent in Tura. Of the total working population, 62.03 per cent is male and 37.96 per cent female. It is further noted that 53.21 per cent of the total male population and 34.57 per cent of the total female population is engaged in some economic activities.

TABLE - 9

Percentage of Workers in Primary, Secondary and Tertiary Sectors and
Dependency Ratio (In Percentage)

1 9 7 1

Mauzas/Police stations		Primary sector	Secondary Sector	Tertiary Sector	Dependency Ratio
1		2	3	4	5
Mauza I	R	94.57	0.33	5.10	109.77
Mauza II	R	97.22	0.40	2.39	97.65
Mauza III	R	93.78	2.11	4.11	112.01
Mauza IV	R	95.52	0.42	4.06	142.93
Mauza V	R	88.88	1.77	9.35	225.34
Mauza VI	R	85.15	3.18	11.67	236.85
Mauza VII	R	92.29	1.30	6.41	240.28
Mauza VIII	R	87.63	4.17	8.20	190.75
Mauza IX	R	74.90	4.34	20.76	187.51
Mauza X	T	20.51	9.26	70.23	236.60
	R	74.53	4.67	20.80	155.36
	U	5.20	10.56	84.24	259.62

Contd....

Table contd.

1	2	3	4	5
Nongpoh	R	91.77	0.74	7.99
				113.01
Shillong	T	65.16	5.93	28.91
				130.14
	R	88.45	2.13	9.42
				100.63
	U	6.46	15.51	78.03
				204.48
Cherrapunji	R	84.95	3.82	11.23
				101.64
Dawki(1)	U	92.73	2.52	4.74
				83.56
Jowai	T	87.71	2.82	9.47
				106.67
	R	92.87	1.17	5.96
				100.49
	U	9.58	27.78	62.64
				200.24
Dawki (11)	R	87.17	2.35	10.48
				105.26
Region	T	81.84	3.30	14.86
				126.42
	R	90.81	1.81	7.38
				116.55
	U	6.55	15.82	77.63
				209.21

Based on Appendix-I.

WORKERS IN PRIMARY, SECONDARY AND TERTIARY SECTORS (IN PERCENTAGE)

1971

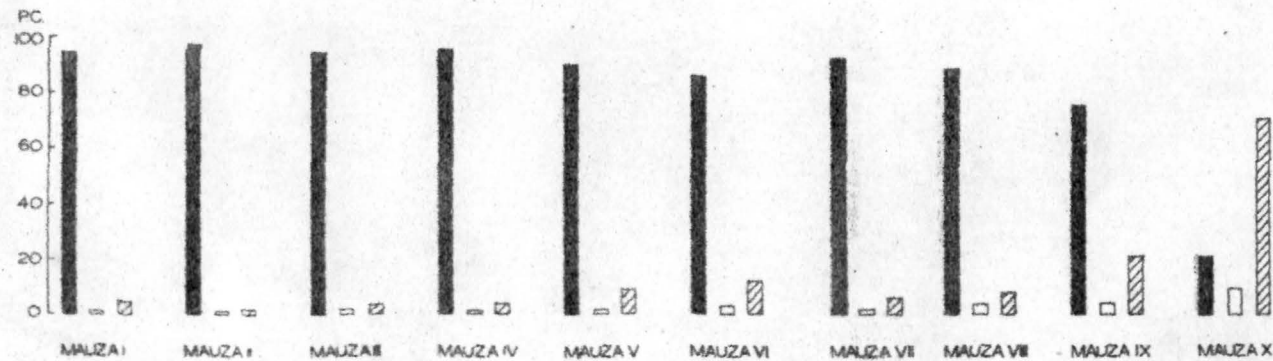
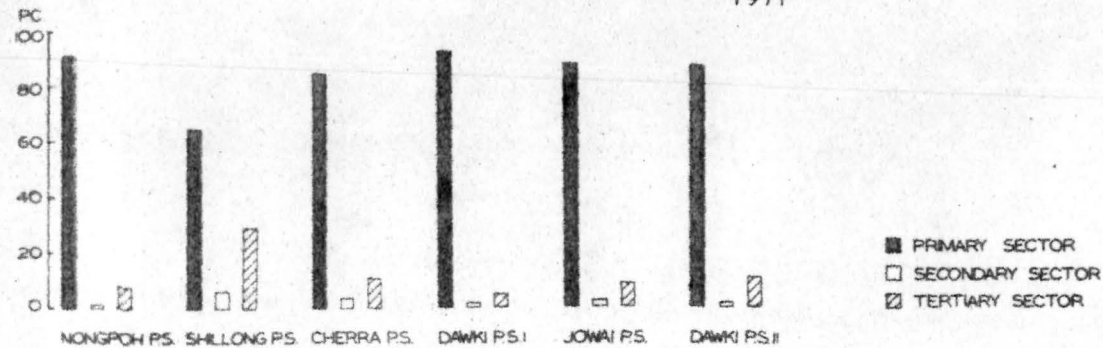


Fig.16

According to 1971 census workers are divided into nine categories.¹ These categories may be grouped into three broad divisions :-

1. Primary Sector (i - iv)
2. Secondary Sector (v - vi)
3. Tertiary Sector (vii - ix)

Table-9 and Fig. 16 reveal that 81.84 per cent of the total working population is engaged in primary sector, 3.30 per cent in secondary and 14.86 per cent in tertiary, with variations at mauza/police station level. In the rural areas majority of the population (90.81 per cent) is dependant on primary activities, followed by tertiary (3.42 per cent) and secondary sectors (1.81 per cent) whereas in the urban areas most of the people (77.63 per cent) are engaged in tertiary sector and small proportion in secondary and primary sectors (15.82 and 6.55 per cent respectively. This reflects on the nature of urban development which has taken place here and this could not be regarded as healthy one. The industrial activities have developed in Shillong, Jowai, Tura and Cherrapunji. The region is an agricultural one where 79 per cent of the total working population is engaged in agriculture.

Dependency Ratio :

The dependency ratio has been worked out as the percentage of non-workers to workers in the region. Table 9 and Fig. 17 reveal that dependency is higher in the outer mauzas of Garo Hills than in

-
1. The nine categories are (i) workers as cultivators, (ii) workers as agricultural labourers, (iii) workers in live-stock, forestry, fishing, hunting and plantations, orchards and allied activities, (iv) workers in mining and quarrying, (v) workers in manufacturing, processing, servicing and repairs, (vi) workers in construction, (vii) workers in trade and commerce, (viii) workers in transport storage and communication, and (ix) workers in other services.

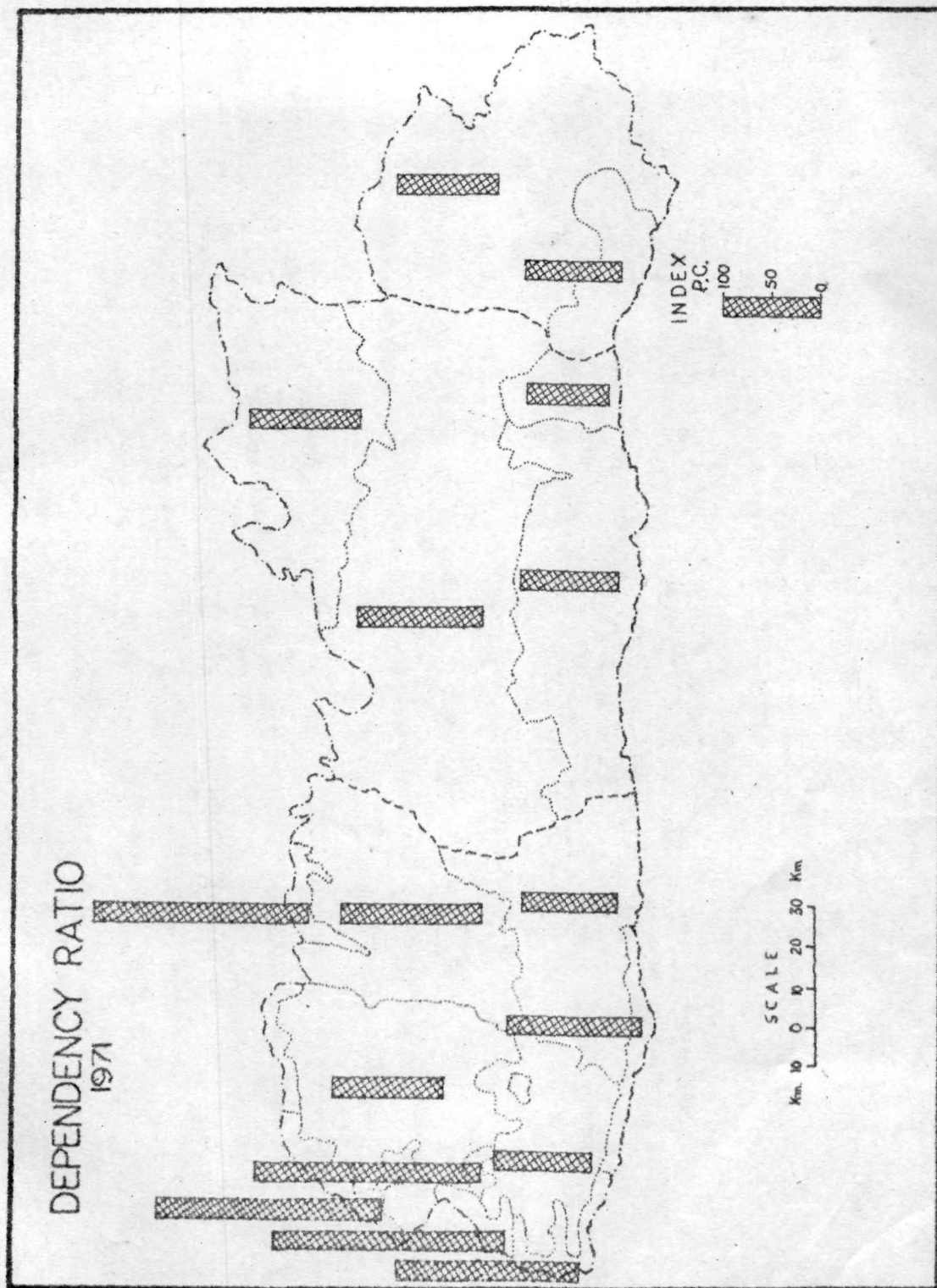


Fig. 17

the rest of Meghalaya. Further it may be observed that it is higher in the urban areas than in the rural areas. The police stations and mauzas having urban centres have higher dependency ratio than those having no urban centres. The maximum dependency ratio is in mauza VII (240.28 per cent) and minimum in Dawki I (83.56 per cent). The highest dependency ratio is in Tura (259.62 per cent) followed by Shillong (204.48 per cent) and Jowai (200.24 per cent).

Occupational Structure in Rural Areas :

(a) Primary Sector : The rural economy in Meghalaya is based on its primary sector which engages 90.81 per cent of the rural working population of the region. Among primary activities agriculture occupies the most important place and engages 87.88 per cent of its rural working population, leaving 2.77 per cent for livestock, forestry, etc. and 0.16 per cent for mining and quarrying. In mauzas I, II, III, IV and VII and Nongpoh, Dawki (1) and Jowai police stations the primary sector engages more than 90 per cent of the workers, the highest being 97.22 per cent in Mauza II.

(b) Secondary Sector : The Secondary sector engages only 1.81 per cent of the rural working population of the region. The shares of manufacturing, processing etc. and construction in the total working population are 1.36 and 0.45 per cent, respectively. This indicates the extent of industrial development which has taken place. The highest percentage of secondary workers is in Mauza X (4.67 per cent) and the lowest in Mauza I (0.33 per cent). The next highest percentage of secondary workers is found in Mauza IX (4.34 per cent) and Mauza VIII (4.17 per cent).

(c) Tertiary Sector : In rural areas this sector employs 7.36 per cent of the working force with a maximum of 20.80 per cent

in Mauza X. In Mauzas II, III and IV and Dawki P.S. less than 5 per cent of the workers are engaged in tertiary sector. Of the total tertiary workers 1.26 per cent are engaged in trade and commerce, 0.52 per cent in transport and storage and 5.60 per cent in other services.

Occupational Structure in Urban Areas :

The urban economy in Meghalaya is based on its tertiary sector which engages 77.63 per cent of the urban working force, leaving 15.82 per cent for secondary and 6.55 per cent for primary sectors. Majority of the total tertiary workers are occupied in other services (52.77 per cent) followed by trade and commerce (17.43 per cent) and transport and storage (7.43 per cent). The same pattern in occupational structure is observed in the individual towns also (Appendix I).

Agriculture :

Meghalaya is pre-dominantly an agricultural region where 85.45 per cent of the population live in rural areas and depend on agriculture for their livelihood. Although agriculture occupies a very important place in the economy of the region, only 8.2 per cent of the total geographical area is available for cultivation and only 13 per cent of the cultivated land produces more than one crop. The rainfall in the region is adequate for agriculture but due to rugged topography and less productive soils it has not been able to give a satisfactory result, except in valleys and in border areas which form part of the Brahmaputra valley.

Land Use Pattern :

Climate, soil and slope are the main factors which broadly

determine the land-use pattern in Meghalaya. According to 1971-72 statistics the net sown area is 13.14 per cent of the total geographical area of the region. Current and old fallows account for 13.61 per cent while land put to non-agricultural uses comes to only 4.35 per cent. The single largest category of land is cultivable waste which occupies 31.47 per cent of the total surface. This is the class of land which may be used for the extension of agriculture in future. The rest is either barren land (13.73 per cent) or permanent pastures (10.72 per cent) or forest (12.98 per cent).

Table 10 and Fig. 18 show the regional variation in land-use pattern in Meghalaya. In the northern and western community development blocks of Garo Hills the amount of net sown area is greater than in other parts of the region. This is due to flat land and fertile soils. The lowest percentage of net sown area is found in Nongstoin block of Khasi Hills because of low density of population (24 persons per sq. km) and poor means of communication. Forests occupy considerable areas in the sub-montane tract of Bhoi, Mairang and Nongstoin blocks and in most parts of Garo and Jaintia Hills. The forest cover is significant in Mawsynram block also. It may be noted that in Khasi Hills, the proportion of cultivable waste land is quite high, ranging from 30.09 per cent in Mawsynram to 66.12 per cent in Mawphlang. Permanent pastures account for 14.96 to 38.32 per cent of the land surface in Jaintia Hills and 0.21 to 36.53 per cent in Garo Hills but insignificant in Khasi Hills.

Intensity of Agriculture :

By intensity of agriculture is meant the percentage of area sown more than once to the net area sown. It shows the extent

TABLE - 10

Land Utilisation, 1971-72

(Total Area in hectares and other figures in Percentage)

Development Blocks	Total Area	Net area sown	Current & old Fallows	Cultivable waste	Non-agricul- tural uses	Barren land	Permanent Pastures	Forest
1	2	3	4	5	6	7	8	9
Resubelpara	148,560	5.88	3.58	21.62	19.00	19.36	17.86	14.71
Dalu	46,620	15.07	50.71	1.48	0.61	3.77	10.52	17.84
Songsak	133,586	13.51	77.33	0.07	2.41	0.83	1.38	4.47
Rongram	68,840	24.11	45.32	13.29	0.91	1.50	14.33	0.54
Selsella	50,453	21.66	10.20	2.37	11.24	20.47	13.82	20.24
Betasing	37,530	24.99	14.87	3.06	1.59	1.88	36.53	17.09
Dambuk Aga	69,872	9.36	32.00	17.69	1.45	27.34	8.21	12.00
Jikjak	52,735	33.66	18.84	0.88	1.92	12.72	14.26	24.72
Rongjing	71,528	35.22	11.54	9.53	4.65	22.91	13.79	2.38
Dadenggiri	59,120	19.71	17.46	42.42	2.57	4.41	6.68	7.02
Chokpot	63,556	12.93	33.94	9.87	5.92	2.51	24.39	10.44
Mylliem	28,740	13.41	21.87	38.84	10.92	3.20	5.16	7.41
Mawphlang	40,323	13.31	4.78	66.12	5.23	4.32	3.82	2.42

Table contd..

Table contd..

1	2	3	4	5	6	7	8	9
Mairang	168,221	13.43	5.22	49.75	1.22	2.00	1.57	26.81
Mawsynram	95,664	16.27	0.66	30.09	1.63	12.77	17.08	21.50
Mawkyrat	111,395	8.91	4.18	56.10	1.79	16.52	4.78	7.72
Mawryngkneng	57,346	25.14	7.57	35.12	4.06	5.63	4.31	18.17
Nongstoin	263,315	2.47	1.56	58.01	0.40	17.14	2.20	18.22
Pynursla	86,942	9.21	1.56	56.79	1.48	24.77	4.15	2.06
Shella- Pholaganj	79,220	13.37	0.99	45.80	1.58	25.87	5.14	7.25
Phol Area	185,634	5.01	0.76	44.17	1.43	15.53	3.17	29.93
Thadlaskein	91,800	13.54	8.96	11.66	6.35	14.84	31.68	12.97
Laskein	90,134	13.64	16.45	7.02	15.94	5.42	38.32	3.21
Phlilehriat	147,256	13.00	0.51	21.96	7.13	27.25	14.96	15.19
Meghalaya	2,224,390	13.14	13.61	31.47	4.35	13.73	10.72	12.98

Based on data collected from the office of the Director of Statistics,
Govt. of Meghalaya, Shillong.

LAND USE

1971-72

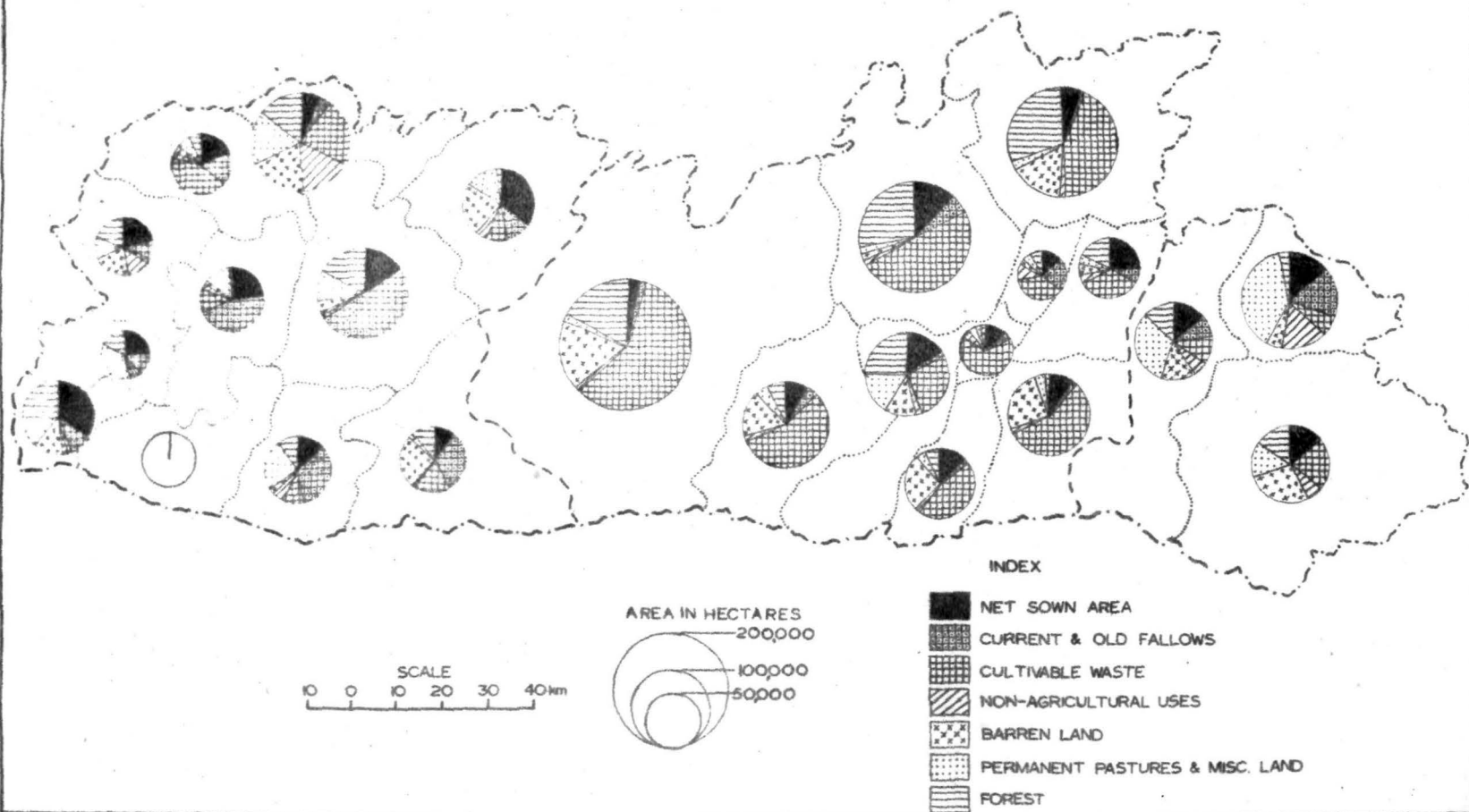


Fig. 18

to which the soil is utilized for agriculture in the region.

Fig. 19 shows that the intensity of agriculture² is very high in Dadenggiri block of Garo Hills and Mawphlang, Mylliem, Bhoi area and Mawryngkneng blocks of Khasi Hills. These blocks have high intensity due to the fact that they have fertile soil and favourable topography. The high intensity in the area around Shillong can be accounted for by the presence of Shillong market which encourages the cultivation of various crops like potato, pineapple, banana and vegetables. The lowest intensity occurs in Shella-Bholaganj and Thadlaskien blocks of Khasi and Jaintia Hills (0.19 and 10.89 per cent, respectively). The rest of the units have intensity ranging from 2 to 20.

Agricultural land includes net sown area, fallows and cultivable waste lands. Together they cover 58.22 per cent of the total geographical area of the region. Of the total agricultural land (1,291,464 hectares), net sown area is 22.57 per cent, fallow land 23.38 per cent and cultivable waste 54.05 per cent. The high proportion of fallow land in the region is due to sparse population and low fertility of the soil. At present the per capita cultivated area (net sown area and fallow lands) in the region is about 0.59 hectares.

Cropping Pattern :

Meghalaya produces a large variety of crops.³ Of the gross

-
2. The intensity of agriculture has been worked out by using the formula $IA = \frac{A \times 100}{A'}$, where IA is the intensity of agriculture, A is the area shown more than once and A' is the net area sown.
3. Food Grains - Rice, Maize, wheat, Millets, Pulses (Gram, Tur)
 Commercial Crops - Oilseeds (Rape and Mustard, Castor, Sesamum, Soyabean), Cotton, Jute, Mesta, Potato, Arcanut.
 Horticultural Crops - Banana, Pineapple, Citrus fruits, Temperate, Fruits, Misc. Fruits.
 Other Crops - Sugarcane, Tobacco, Turmeric, Sweet Potato, Chillies, Tapioca, Papaya.

cropped area as much as 61.68 per cent is provided to food crops, 24.67 per cent to cash crops, 9.25 per cent to horticultural crops and the rest 4.40 per cent to other crops.

Among food crops rice is the most important and is grown in 51.55 per cent of the total cropped area. It is cultivated throughout the region but the best variety comes from the Sung valley of Jaintia Hills. In 1976-77 the area under rice cultivation in Meghalaya was 1,06,133 hectares and the production was 1,26,363 tons. The region produces three varieties of rice - autumn rice, winter rice and Spring rice. The autumn rice is sown in the months of October and November and is harvested in February and March. Among the three varieties of rice, winter rice occupies more than 66 per cent of the total rice area. The average ~~of~~ yield per hectare of winter rice is about 1200 kg. In contrast to this the yield of spring rice is 3500 kg per hectare. One of the causes of low average yield is the fact that 30 to 40 per cent of rice area is still under jhum cultivation.

Maize is the next important food crops of the region and is grown in 7.61 per cent of the cropped area. It is cultivated mainly in the plain portion of Garo Hills, Mairang, Mylliem and Mawphlang blocks of Khasi Hills and Laskien block of Jaintia Hills. The area under maize cultivation in 1976-77 was 15,676 hectares and the production was 10,973 tons. In many areas it is grown as a mixed crop as a result of which the average yield is low.

Wheat is relatively a new crop in the region. Its cultivation is confined to the plain areas of Garo Hills. Recent experiments show that this crop can be grown in higher areas upto

1200 meters. As such, more areas may be brought under wheat cultivation in future.

Pulses which include gram, tur and few others are of less importance in the agricultural economy of the region. Together they occupy only 0.72 per cent of the cropped area. In 1976-77 the area under pulses was 1487 hectares and the production was 962 tons. Their cultivation is restricted to the plain areas of Garo Hills.

Among commercial crops, the most important is potato which covers 8.54 per cent of the total cropped area in the region. This crop was first introduced in the Khasi Hills by David Scott in the early part of the nineteenth century. It is grown mainly in the high altitude areas of Khasi Hills. The area under potato cultivation in the state is about 17,500 hectares and the annual production 80,700 tons.

Of the oilseeds, rape and mustard are comparatively more important and occupy 88.51 per cent of the total area under oilseeds in the region. Castor, sesamum and Soyabeans are the other oilseeds grown in the state. All these oilseeds are grown mostly in the plain areas of Garo Hills.

Cotton, jute and mesta are the chief fibre crops of Meghalaya. They are grown in the Garo Hills. The cotton grown here is short staple variety which has the capacity to withstand a long rainy season. Ginger is another commercial crop of the region which is grown mainly in the Jaintia Hills and the war, Lyngngam and Bhoi areas of Khasi Hills. This crop occupies an area of about 3,000 hectares with an annual production of 10,000 tons.

Tapioca is one of the subsidiary food crops of Meghalaya and is grown largely in the western part of Khasi Hills, specially in the Ri war area. It is becoming popular in the Ri Bhoi area also. The turmeric of Meghalaya is famous for its quality and has a great demand in the neighbouring state of Assam. It is widely grown in the Jaintia Hills. Sugarcane is a minor crop and is cultivated in the plain areas of the region.

The soil and climatic conditions in Meghalaya are suitable for the cultivation of different types of fruits, ranging from tropical to temperate in different altitudinal zones. The chief horticultural crops are orange, pineapple and banana. Oranges are grown extensively in the War area of Khasi Hills. Among the different varieties of orange, the Khasi Mandarin is the most important. The best type of oranges are grown in the Shella and Cherrapunji areas.

The pineapple grown in Meghalaya is considered to be the best in India. The bulk of the pineapple production comes from the southern part of Khasi Hills. It is also grown in the northern part, particularly along the Shillong - Gauhati road. The warm and humid climate and good drainage are the favourable conditions for the growth of this crop in these areas. Both varieties of pineapple the Kew and the Queen, are raised.

Many varieties of banana are produced in this region of which the best ones are cavendish, Malbhog and Chenichampa. Fruits like lichi, guava, mango and jackfruit are grown at lower altitudes. Temperate fruits such as plums, peaches and pears are grown in the higher altitudes.

Crop-Combination Regions :

Here an attempt has been made to identify the combination of crops having significant share in the total cropped land of a unit area. Applying the technique as suggested by weaver,⁴ as many as seven crop-combination regions have been identified in Meghalaya (Fig. 20).

Monoculture is prevalent in the eastern part of Garo Hills where rice is the only dominant crop. Mairang block of Khasi Hills, with rice and cereals is an area of two-crop combination. The three crop region includes the Rongram and Chokpot blocks of Garo Hills and the Nongstoin block of Khasi Hills. In both the areas rice is the most dominant crop but in the first case it is followed by cotton and mesta and in the second case by cereals and potato. In the western blocks of Garo Hills, the northern part of Jaintia Hills and the Bhoi area of Khasi Hills crop-associations of seven to eight crops are found.

Animal Husbandry and Dairy Farming:

Animal husbandry and dairy farming occupies an important place in the economy of Meghalaya. According to the livestock census of 1972, the region has approximately 4.7 lakh cattle, 0.46 lakh buffaloes, 0.18 lakh sheep, 0.96 lakh goats, 0.05 lakh horses and ponies and 1.3 lakh pigs. The livestock wealth derives its importance from the predominant agrarian economy, suitable climate and grazing

4. Weaver, J.C. "Crop-combination Region in the Middle West", Geographical Review Vol. XLIV No. 2, April 1954, pp. 173-200. He has used the formula $O^2 = \frac{Ed^2}{n}$, where O is the weaver's index, d is the difference between observed and theoretical values and n is the number of crops in a given combination.

CROP COMBINATION REGIONS 1971-72

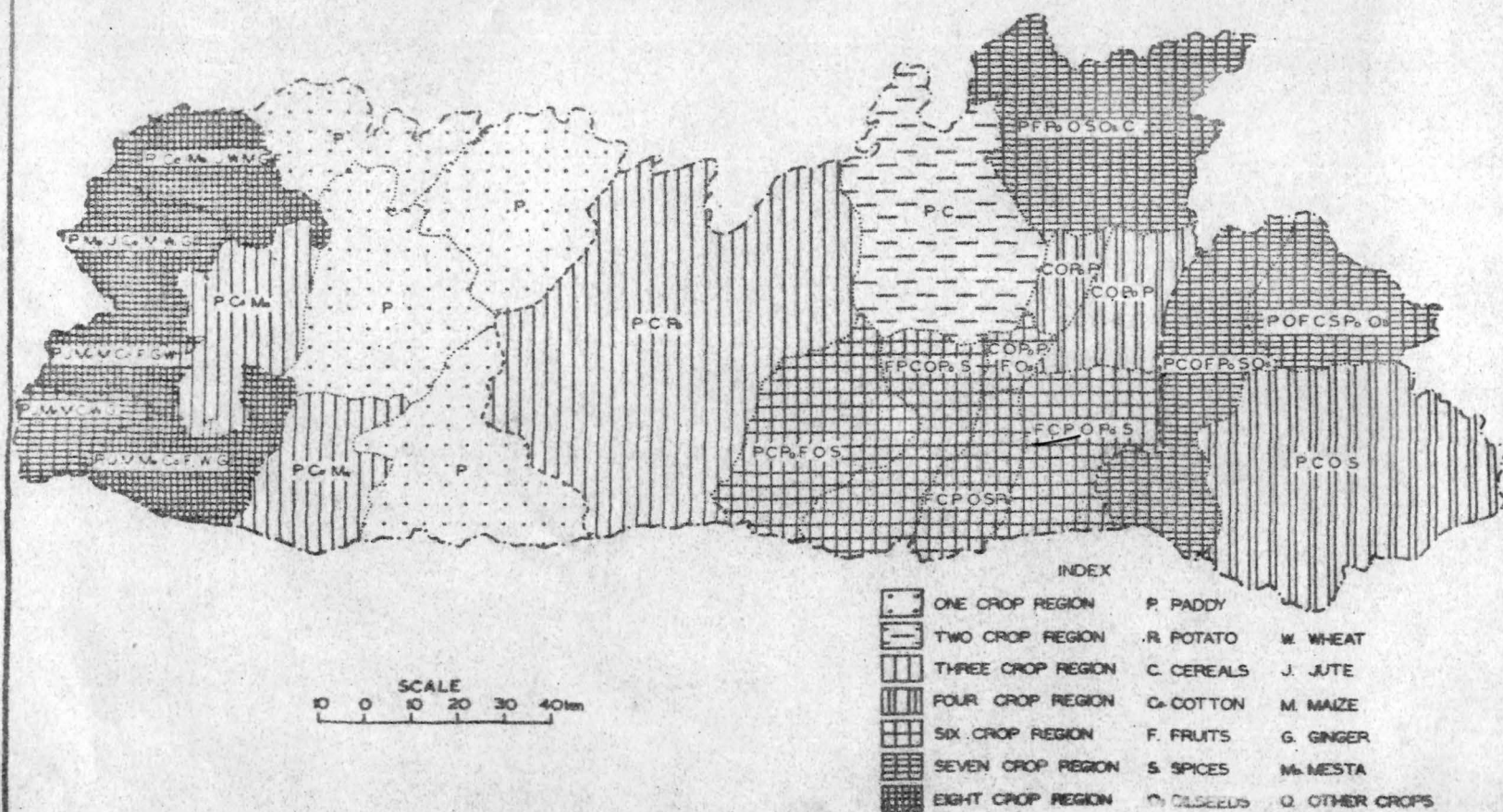


Fig. 20

facilities. Table 11 shows the livestock population and its percentage variation in the region.

TABLE - 11

Livestock Population in
Meghalaya

Sl. Livestock No.	1966	1972	Percentage variation
1. Cattle	4,14,737	4,67,725	(+) 12.78
2. Buffaloes	38,021	46,021	(+) 21.04
3. Sheep	20,672	18,379	(-) 11.09
4. Goats	99,697	95,941	(-) 3.77
5. Horses and Ponies	9,371	5,025	(-) 46.38
6. Pigs	1,08,349	1,26,735	(+) 16.97
Total Livestock	6,90,847	7,59,826	(+) 9.98

Source: Statistical Hand-book Meghalaya, 1975.

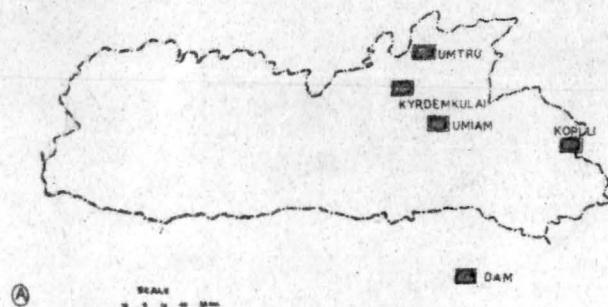
The above table shows that there has been a fall in the number of sheep, goats and horses and ponies but a considerable increase has been recorded in the case of cattle, buffaloes and pigs.

Fig. 21 shows the regional distribution of livestock in Meghalaya. It is observed that more than 70 per cent of the buffaloes are found in the Garo Hills and about 50 per cent of the cattle are distributed in the Khasi Hills. The high concentration of buffaloes in the Garo Hills is due to its warm climate, presence of low-lying areas, grazing facilities and their demand for ploughing the land.

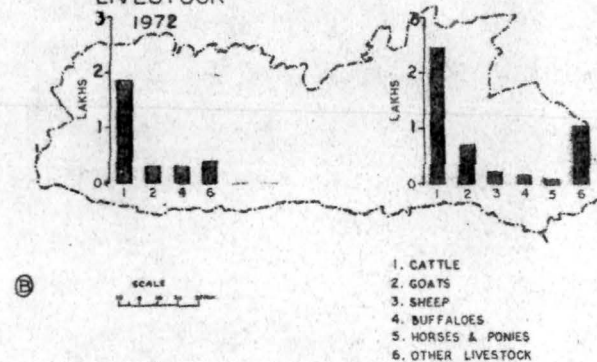
Meghalaya has the highest number of high-yielding cross-bred cattle in India⁵ most of which are reared in and around Shillong. According to an estimate the total population of cross-bred cows yielding over 15 litres of milk per day is 8,000 and the number of those yielding 8 to 15 litres per day is 15,000.

5. Bora, L.K. "Livestock for a Living", Meghalaya Chronicle April 1973.

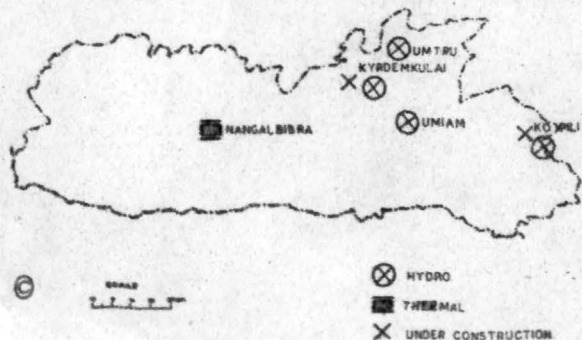
IRRIGATION



LIVESTOCK



POWER



INDUSTRIES



Fig. 21

Since pork forms a part of the menu of most of the tribal people, pigs are reared in large number. The Government has taken various steps to develop piggery in the state. The pig farms at Tura and Shillong have been expanded with additional stock of pigs of special breeds such as Berkshire and Saddle-back. Pig farms have also been established at Nongstoin, Jowai and Rongjeng. The Government is distributing pigs to the farmers at a subsidy of 75 percent of the cost.

Dairy farming is an important industry in Meghalaya. There is a milk chilling plant at Naya Bunglow which produces about 5,000 litres of milk per day. The milk is distributed in Shillong and Gauhati. Jowai has a rural dairy extension centre which produces high quality butter, ghee and cream. Creamery and ghee making centres have also been established at Tura and Rongram.

The geo-economic conditions are quite favourable for development of animal husbandry and dairy farming in the region. The economy of the rural population will greatly improve if the scientific methods of animal husbandry and dairy farming are adopted.

Forestry :

Forests play an important role in the economy of Meghalaya. They prevent soil erosion, preserve wild life and provide numerous materials such as timber, fuel, fodder, medicinal herbs, orchids, etc. They also provide opportunities for games.

At present the region has 9,48,060 hectares of forests which may be classified, from the view-point of administrative control, into five categories:

1. Reserved Forests	71,000 hectares
2. Unclassed state forests	7,41,000 hectares
3. Private forests	38,800 hectares
4. Protected forests	17,900 hectares
5. Village forests	76,800 hectares
Total area	9,48,060 hectares

Source: Office of the conservator of Forest,
Govt. of Meghalaya, Shillong

Only the reserved and the protected forests are under the management of the Government. The rest are owned by individuals, clans or villages, or they are controlled by the District Councils.

The region is characterized by four major forest types (Fig. 9).

- (a) The Sal forests which occupy the northern parts of Khasi hills and the border areas of Garo Hills;
- (b) The Evergreen and Semi-evergreen forests in the sub-mountain tracts in the southern part of the region;
- (c) The Pine forests in the central upland zone of the Khasi and Jaintia Hills;
- (d) The Bamboo forests which grow within the sal forests and the evergreen and semi-evergreen forests.

Among the various types of trees found in the forests of Meghalaya, Sal and pine are the most important. The northern part of the region has fine broad and rich varieties of sal trees, particularly in the Garo Hills. The Rongrenggiri Reserve in the Garo Hills is considered to be the best sal reserve in India.⁶ Since the Sal wood is very hard, it is used for purposes entailing much wear and tear. It is ideal for making railway track sleepers. The Khasi

6. Goswami P.C. "The Economic Development of Assam", 1963 p.12.

pine dominates the higher parts of the Khasi and Jaintia Hills, between 3000 - 5,000 feet elevation. It offers opportunity for the extraction of resin and the manufacture of turpentine oil.

Meghalaya produces large quantities of timber and also the minor forest produce such as fodder grass, bamboo, Vitex leaves (for medicinal use), fire wood and various species of orchids. In 1970-71 the state produced 5,125 cubic metres of timber (Khasi and Jaintia Hills 1994 cubic metres and Garo Hills 3331 cubic metres).⁷

Forests are a great source of income to the State Government. The Government earns about rupees 30 lakhs annually which constitute nearly 10 per cent of the total revenue of the state.

Considering the importance of forest wealth the State Government has implemented various plantation schemes in the region. During the Fourth Five Year Plan the plantation of the main species were done as teak 926.26 hectares, Sal 75.20 hectares, pine 621.95 hectares, plywood species 28.33 hectares, eucalyptus 6.47 hectares and mixed plantation 116.60 hectares - altogether 1774.81 hectares.⁸

Mineral Exploitation and the Development of Hydel Power :

The mineral resources, their distribution, production and reserves have already been discussed in Chapter-I. Here only the production trend of three important minerals of the region i.e. coal, limestone and sillimanite is being analysed.

7. Office of the Conservator of Forests, Government of Meghalaya, Shillong.

8. Office of the Conservator of Forests, Government of Meghalaya, Shillong.

TABLE - 12

Production of Chief Minerals in Meghalaya
(Figures in '000 tons)

S.No.	Items	1962	1964	1966	1968	1970	1972	1974
1.	Coal	215	102	54	37	39	63	53
2.	Limestone	79	79	30	66	65	74	145
3.	Sillimanite	8	11	10	5	3	2.7	2.1

Source: Statistical Hand Book Meghalaya, 1975 p.45.

The production of coal and Sillimanite shows a downward trend during the period from 1962 to 1974. The production of limestone, however, shows an upward trend, specially after 1970 (Table-12).

Limestone and coal were formerly exported to East Pakistan but the production came down substantially during 1965-66, following the Indo-Pak war. After 1970 there has been considerable increase in the production of limestone due to expansion of the cement factory at Mawmluh, near Cherrapunji, and in the production of coal after the establishment of the Nangalbibra thermal project in Garo Hills. Sillimanite was formerly exported to foreign countries, particularly to Belgium and Germany but now since it is not exported, the production has gone down.

Meghalaya has great potentiality for the development of hydel power as it receives adequate rainfall and has a rugged topography. Since the region is a developing one, there will be great demand for electricity in future.

The important hydel projects in the region are the Umtrue, the Umiam and the Kyrdenkalai (Fig.21). The Umtrue project was set up with the Canadian help under the Colombo Plan and the generation

of hydro-electricity started in 1957. Originally it had the installed capacity of 8,400 k.w. but later on the capacity was raised to 11,200 K.W. The first stage of the Umiam hydel project, with the installed capacity of 36,000 K.W. was commissioned in 1965 and the second stage, with the installed capacity of 18,000 K.W. in 1970. The third stage of this project has an installed capacity of 60,000 k.w. The Kyrdenkalai hydel project will have an installed capacity of 60,000 k.w. and the work is in progress.

Although Meghalaya has large potentiality in the hydel power, the generation has not been much due to the low levels of urbanization and industrialization without large industries the power potential will obviously remain untapped. The development of power and the establishment of industries are inter-related. Therefore, measures should be taken to develop water power and industries at the same time.

Industries :

Inspite of the fact that Meghalaya is rich in mineral, forest and agricultural resources, it is industrially backward. Only 2.35 per cent of the population of the state depends upon industries. As compared to other parts of India, the region is insignificant industrially, although some industries are important from the regional point of view.

The location of various industries (Fig. 21) shows that the Khasi Hills is industrially more developed than the Jaintia Hills and the Garo Hills.

The industries of the region may be grouped into three categories : (a) Large scale industries (b) medium scale industries

and (c) Small scale and Cottage industries. Table-13 shows the regional distribution of these industries.

TABLE - 13

Industrial Units in Meghalaya 1974-75

Categories	Khasi Hills	Jaintia Hills	Garo Hills	Meghalaya
Large scale Industries	1	---	---	1
Medium Scale Industries	39	---	6	45
Small Scale Industries	561	54	45	660
Total :	601	54	51	706

Source: Based on tables 10.4 and 10.5 statistical Hand Book, Meghalaya, 1975.

Large scale Industries :

The cement industry is the only large scale industry in the region. The factory was established in 1962 at Mawmluh, near Cherrapunji which uses the limestone and coal resources of the nearby areas. It has a capacity to produce 250 tons of cement per day. The Government of Meghalaya has been taking steps to increase the capacity of the factory to 950 tons per day. The meter factory at Shillong was another large scale factory which is not functioning at present.

Medium Scale Industries :

The plywood factory at Burnihat was set up in 1974. This factory enjoys the distinction of being the first medium scale industry in Meghalaya. The plant is unique in India, being the first which is equipped with special machinery required to manufacture plywood panels as large as 3m x 1.5m in size.⁹

A factory for the production of essential oils and

9. Bawri, B.K. "The Meghalaya Plywood Ltd." The Assam Tribune, Dated 2.6.76.

chemicals has been set up at Mawshawok, a village in South Khasi Hills. The factory will produce cinnamon oils, lemon grass oils, ginger oboresin, etc. Other industries include Saw Mills, motor workshops, engineering works, printing presses, cotton ginning mills, flour mills and fruit preservation factories.

Small Scale and Cottage Industries :

Sericulture and weaving is an important industry in the region. Sericulture involves the rearing of endi cocoons which are fed on the castor plants and the pat silk cocoons which are fed on the leaves of mulberry trees. In the Jaintia Hills cocoons are reared on a kind of fodder which is locally known as myrda or sla ryndia. In the past the rearing of cocoons and weaving were important industries among the people of Sumer, Shangpung, Saipung, Mynso, Umpanai, Um Mynso, Bhoi Lalu, Bhoi Khyrwang, Bhoi Kai and others. In the Jaintia Hills, weaving is the monopoly of the Nongtungs and Khyrwangs.¹⁰ At present there are about 3000 looms in the whole state.

Among cottage industries mention may be made of cane and bamboo work. The tribal people of Meghalaya make mats, Japi,¹¹ Knup, baskets and moora from cane and bamboo.

Other cottage industries of the region are pottery, blacksmithy, soap making, tailoring, carpentry and bee-keeping.

10. Bareh, H. "The History and Culture of the Khasi People 1967, p. 459.

11. Japi is a kind of container used by the Khasis for carrying things from one place to another and Knup is used to provide protection from both rain and sun.

Economic Regions :

Due to lack of comprehensive data and information it is difficult to divide Meghalaya into economic regions. However, on the basis of available data and information and the analysis of the economies, contained in this Chapter, as many as four economic regions have been identified in the State. (Fig. 22).

(a) Forest Region :

The northern part of Meghalaya lying between the central watershed and the 150m contour, is demarcated as forest region. The northern boundary of this region touches the alluvial soil belt of the north. From near Shillong and the southern Bhoi area it follows another watershed which lies between the two sets of rivers - Khri and Umtrue on the west and the Umiam and other tributaries of the Kopili on the east. In the east it touches the north eastern boundary of Meghalaya and finally merges with the forests of west Mikir Hills of Assam. Near Umtrue and Nongpoh this forest belt becomes narrow due to the extension of agricultural activities from both sides.

The region is characterized by steep slopes, hot and moist climate and the occurrence of laterite soils. Sal, poma and bamboo are the main species found in this region. It is poor in settlements and is inhabited by the Jhum cultivators. The people in the interior parts have no contact with the plains people and as a result they are very backward.

(b) Agricultural Region :

This region has been further sub-divided into (i) the western region, (ii) the north-eastern region and (iii) the southern region. The divisions are based on climatic conditions and the major crops.

The western agricultural region roughly follows the 150m contour and covers a major portion of the alluvial belt of Garo Hills. The most dominant crops in this

ECONOMIC REGIONS

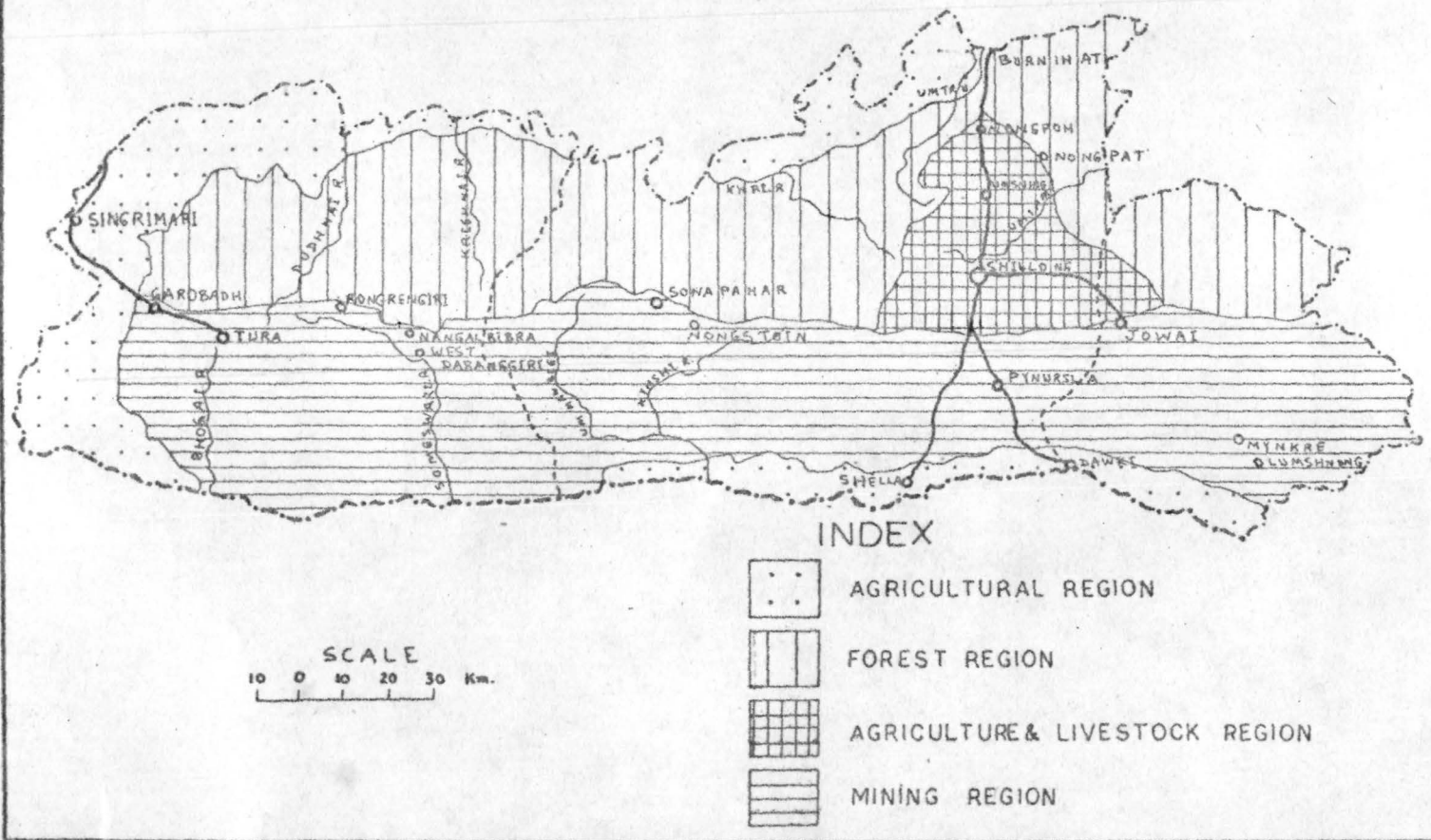


Fig. 22

BASED ON MAP PREPARED BY P.C. PHANGSHO
UNION CHRISTIAN COLLEGE, BARAPANI, MEGHALAYA.

region are rice and jute. Small quantities of cotton are also produced.

The north-eastern agricultural region lies along the northern slopes of Khasi Hills, extending north of the Khri and the Umtrue rivers. It also includes the alluvial belt of Khasi Hills. Rice and maize are the important crops of this region.

The southern agricultural region is a narrow belt running through the southern parts of Khasi and Jaintia Hills. It roughly follows the 150m contour, almost parallel to the southern margin of the districts. Heavy rainfall during summer, high temperature and steep slopes are the characteristic features of this region. It is noted for fruit cultivation and more than 50 per cent of the total production of orange, jackfruit and betal nut of Khasi and Jaintia Hills comes from this region.

(c) Agriculture and Livestock Region :

This region occupies Eastern Khasi Hills and a small parts of the Jowai block of Jaintia Hills. It is separated from the forest region by the watersheds of Eastern Khasi Hills, mentioned earlier. The boundary of the region roughly follows the 1500m contour. Here the rainfall is less than in the southern part of the state. Rice and maize are the principal cereals. Other crops grown in the region are potato, sweet potato and fruits. Animal husbandry and dairy farming is also important.

(d) Mining Region :

This extensive belt runs from west to east and occupies almost the southern half of the state, i.e. the area south of the central watershed. It covers almost all the important mineral bearing formations. The minerals which are being exploited are coal, limestone, sillimanite and clay.

CHAPTER - IV

CHAPTER - IV

TRANSPORT LINKAGES

Roads are the chief means of transport in Meghalaya; waterways and airways are practically insignificant and railways are absent. In this section an attempt has been made to analyse the road linkages in the region, with emphasis on their characteristics, distribution, traffic flow and accessibility pattern.

Road Network :

The general road pattern of Meghalaya is shown in Fig.23.

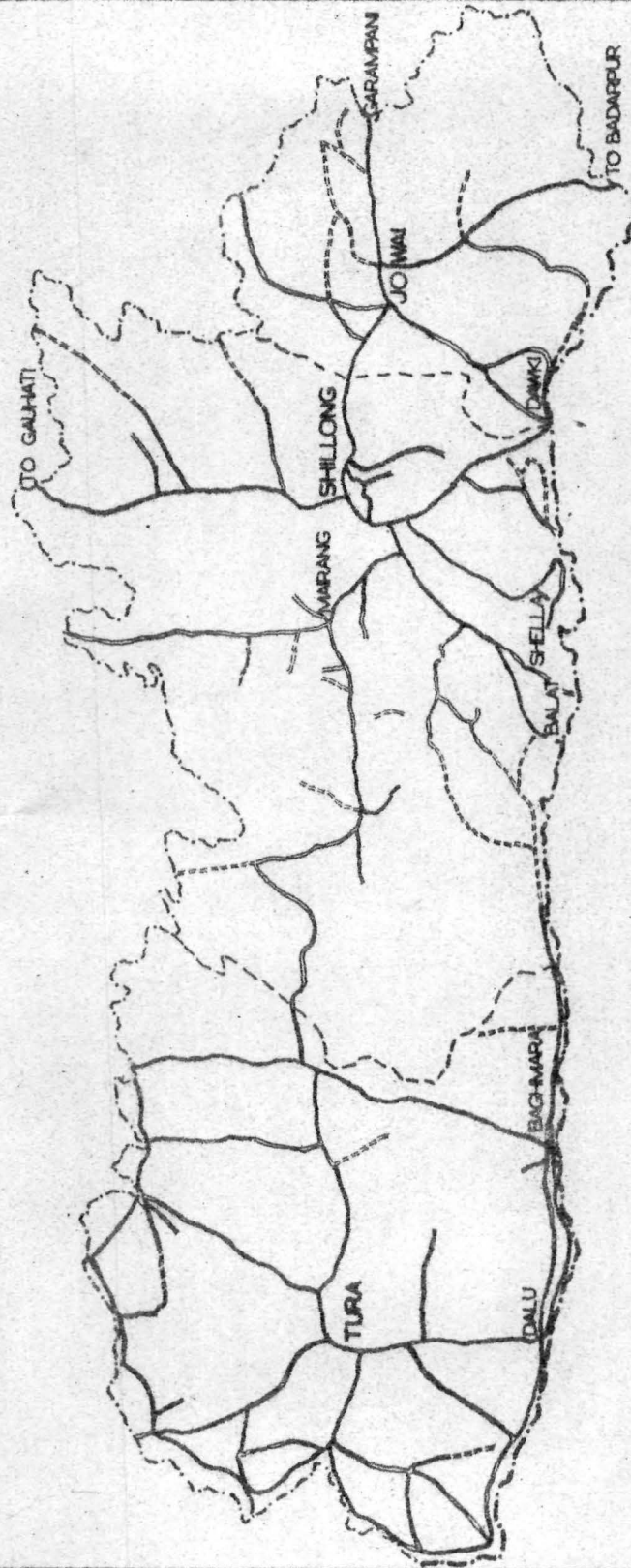
There are two National Highways in the region :

- (i) The National Highway Route No. 40 - Jorabat - Shillong - Tamabil Road;
- (ii) The National Highway Route No. 44 - Shillong - Jowai - Badarpur - Agartala Road.

The former is 161 km. long and connects Jorabat in Assam with Tamabil on the border, via Shillong. The newly declared National Highway Route No. 44 connects Shillong with Agartala in Tripura via Badarpur in Assam. The portion of this National Highway which falls within Meghalaya is only 174 km. from Shillong to Unkyang. The agency for the maintenance and improvement of the Shillong - Jowai section of this road which is 66 km. long is with the Government of Meghalaya and for the rest with the Border Road Development Board. These two National Highways form the backbone of the entire road network in the region.

Among other important road links mention may be made of

ROAD NETWORK



SCALE
0 0 10 20 30 40 km

ROADS
— BLACK-TOPPED
--- GRAVELLED
.... KATCHA

the following :-

- (1) Damra - Darugiri - Mangalbibra - Baghmara Road : This road traverses from north to south in the Garo Hills and passes through the coal and limestone bearing areas of the district. In the north it joins the National Highway Route No. 37 at Dudhnai in Assam.
- (2) Paikan - Bajengdoba - Tura - Dalu - Baghmara Road : This road is 205 km. long and runs from north to south in the Garo Hills. It connects Paikan in Assam with Baghmara along the border via Tura and Dalu.
- (3) Medhipara - Phulbari - Tura Road : It connects Medhipara and Phulbari along the border of Goalpara district with Tura. In the past this was the only road connecting Tura with Mendipathar Gauhati and Shillong.
- (4) Shillong - Jowai - Garampani Road : This is a road of inter-state importance. It connects Shillong with Garampani in the North Cachar district of Assam.
- (5) Shillong - Mawphlang - Mawsynram - Balat - Baghmara Road : This road connects Shillong with places like Balat, Maheshkhola and Baghmara on the border and is therefore of great strategic importance.
- (6) Umtyngar - Cherrapunji - Shella Road : This road starts from 23rd km. of Shillong - Dawki road and connects Cherrapunji and Shella with Shillong.
- (7) Shillong - Nongstoin - Tura Road: This road is being developed as a major trunk road to connect Shillong and Tura. Until this road is completed and opened to bus services, connection between Shillong and Tura will remain through Assam.

Characteristics of Roads :

Road characteristics include the surface conditions of roads, their width, number of lanes, gradients and sharpness of curves. These characteristics are of great significance as they

limit or promote the frequency, speed and permissible load of motor vehicles.

From the viewpoint of surface conditions the roads of Meghalaya can be classified into three categories: black-topped (metalled), gravelled and Kachcha (Table 14). Black-topped surface is the characteristic of National Highways and parts of PWD and municipal roads. Most of the P.W.D. roads and those maintained by local bodies (district councils) are either gravelled or Kachcha (Table 15). An important feature of road surface in Meghalaya is that the same road has got different types of pavements in its different sections. It seems to be due to haphazard development of roads in the region. The Table No. 14 shows that in the Garo Hills there is considerable proportion of gravelled and Kachcha surface, the share of black-topped roads being only 11 per cent. In the Khasi and Jaintia Hills, on the other hand, the percentage of black-topped roads is comparatively higher (35.02 per cent). The high percentage of black-topped roads in the Khasi and Jaintia Hills is due to heavy traffic.

TABLE - 14
Distribution of Different Types of Roads in Meghalaya
(1971-72)

Sl. No.	Types of Roads	Length in Kms.		
		K & J Hills	Garo Hills	Meghalaya
1.	Black-topped	610 (35.02%)	173 (11.00%)	783 (23.62%)
2.	Gravelled	693 (39.78%)	775 (49.27%)	1468 (44.28%)
3.	Kachcha	439 (25.20%)	625 (39.73%)	1064 (32.10%)
All Roads		1742	1573	3315

Percentages are percentages to total road length in the individual district.

Source: Statistical Hand Book Meghalaya, 1975 p.71

Many of the gravelled and Kachcha roads suffer from wash outs and the formation of potholes during the rainy season.

In respect of road width and number of lanes Meghalaya lags behind several states in the country. In the case of National Highway from Jorabat to Tanabil about 35 kms have provisions for double lanes with 35 feet total width and 12 to 24 feet metalled surface and the rest have only 25 feet road width and 12 feet metalled surface other roads in the state are 20 - 25 feet wide with 10 to 12 feet of metalled surface. Thus, a large part of the road network in the state does not possess the desired road width. The poor traffic, to some extent, influences the width and surface

TABLE - 15
Classification of Roads in Meghalaya (Agency-wise)

Agencies	Type of surface	Figures in kms.	
		All India	Meghalaya
A Urban Body	Surfaced	63,173	228
	Unsurfaced	30,550	200
	Total	93,723	428
B Extra Municipal Roads.			
(i) National Highways			
	Surfaced	25,912	161
	Unsurfaced	2,000	---
	Total	27,912	161
(ii) P.W.D. Roads			
	Surfaced	175,178	375
	Unsurfaced	78,885	2611
	Total	254,063	2986
(iii) Local Body			
	Surfaced	100,249	---
	Unsurfaced	366,717	2800
	Total	466,966	2800
All Agencies	Surfaced	471,982	857
	Unsurfaced	657,933	5811
	TOTAL	1129,915	6668

Source: Pocket Book on Transport in India, 1972-73 pp.106-112
Transport Research Division, Ministry of Shipping and Transport, New Delhi, February, 1974.

conditions of roads.² This is true in case of Meghalaya also. The routes served by one or two buses are less cared than those having high frequency of bus services.

Because of the hilly terrain of the region in some sections the high gradient creates a problem for road transport in Meghalaya. There are many blind curves particularly in the northern part of the Garo Hills and the Shillong-Cherrapunji area of the Khasi Hills. During the heavy rains there are landslides which also disrupt the movement of traffic in the region. Existence of bridges and culverts at many places due to high frequency of drainage lines is an important characteristic feature of road transport in Meghalaya. For instance, between Bajengdoba and Tura, a distance of about 70 kms, one comes across more than 50 culverts.

In view of the above mentioned characteristics of roads, certain restrictions have been put on vehicles in regard to load and speed by the Government of Meghalaya. According to Government rules no motor vehicle whether registered in the state or outside the state with a load exceeding 20,000 lbs shall ply on the routes in Meghalaya. Besides, there are restrictions on speed in regard to particular stretches, bridges and culverts.

Road Patterns :

By careful observation of the road map one finds various distinguishable road patterns in the region. An analysis of their distribution will be useful and meaningful.

2. James, Bird, "Road and Rail in the Central Massif of France". Annals of the Association of American Geographers, March 1954 p.1.

- (a) **Triangular Pattern :** This pattern is found in the south-western and north-western parts of the Garo Hills and in the vicinity of Jowai and Dawki.
- (b) **Radial Pattern :** The radial pattern has developed at Shillong, Jowai and Tura. This pattern helps in the concentration of traffic at a central place from where through traffic can be diverted on a route for the next part of the journey. This system, in fact, is analogous to that of a telephone exchange.³
- (c) **Rectangular Pattern :** A somewhat rectangular pattern is observed in the north eastern part of the Garo Hills where roads following the river courses from north to south have been intersected by roads running from east to west.
- (d) **Fork Pattern :** This pattern in its developing stage is found in the northern part of the Khasi Hills. On the Shillong - Gauhati road the arms of the fork ^{have} ~~has~~ developed on the right side and in the case of Mairang - Ranigodam road on the left side.
- (e) **Cobweb Pattern :** This pattern has developed near Ampat-giri where many triangles and rectangles meet together.

The above patterns of roads are closely related to the land surface and the economic conditions of the region. For example, the north-south alignment of roads in the northern part of the Khasi Hills and in the north-eastern part of the Garo Hills follows the drainage lines. Besides, the economic backwardness of these areas is also a retarding factor. As a matter of fact, physiographic conditions and the level of economic development directly affect the territorial structure of the highway network.⁴

3. Appleton, J.H., Geography of communication in Great Britain, London, 1962 p.117.

4. Kansky, K.J., Structure of Transportation Network: Relationship between Network Geometry and Regional Characteristics, Chicago, p. 120.

Density of Roads :

The overall density of roads in Meghalaya is 13.85 km. per 100 square kms of area. Within the region, however, there are great variations in this regard (Table-16). The highest density of roads (198.20 km. per 100 sq.km) is found in Mauza IX of the Garo Hills district. Areal coverage under this category, however, is very small. The whole of Khasi and Jaintia Hills and Mauza I, II, III and IV have road densities below 50 km. per 100 sq.km. The intermediate range of road density (50 - 100 km. per 100 sq. km.) covers Mauza V and VI in the northern part and Mauza VII and VIII in the western part of the Garo Hills district.

While analysing the uneven distribution of road density it is observed that the areas of high density coincide with the

TABLE - 16

Density of Roads in Meghalaya 1971
(Mauza and Police-station-wise)

Mauza/Police Station	Area in sq. km.	Road length in km.	Road length per 100 sq.km. of area
Mauza I	1,620.3	180	11.11
Mauza II	1,850	185	10.00
Mauza III	1,998.7	229	11.50
Mauza IV	2,228.2	256	11.49
Mauza V	92.5	71	77.83
Mauza VI	100.5	53	52.5
Mauza VII	107.5	55	51.3
Mauza VIII	107.5	62	82.22
Mauza IX	70.7	140	198.20
Mauza X	19.9	27	135.67
Nongpoh P.S.	1,985.6	187	9.42
Shillong P.S.	5,858.5	646	11.02
Cherrapunji P.S.	2,224.7	368	16.53
Dawki P.S.(i)	439.7	130	29.56
Jowai P.S.	3,295.9	420	12.74
Dawki P.S(ii)	659.6	106	16.63
Meghalaya	22,489	3115	13.85

N.B. Areas of Mauzas/Police Stations as provided in the District Census Hand Books, 1971 and the road lengths have been worked out from the road map. Supplied by P.W.D. Govt. of Meghalaya, Shillong.

areas of low relief and high productivity. On the other hand, the areas of low density are those which have uneven topography and less productive soils. True, more rugged the relief of a region, the more persistent is the influence exerted upon location of transportation routes.⁵ This factor alone, however, is not a sufficient explanation, for at the time of alignment of a transportation route there are two problems to be confronted requiring solution at the same time.

The first consideration is of obstacle but the second and more dominant factor seems to be the availability of traffic.⁶ In other words, the development of transportation is regulated by the interplay of two factors : feasibility and demand. For example, the thickly populated plains which have, also, the high degree of feasibility for construction have better road development. Population creates the greater demand, for, effects of difficult terrain, unequal distribution of resources and the like on the distribution of roads may be regarded as being partly subsumed by population and area variables; much of the impact of these factors on the transportation is expressed through their relationship to population.⁷

Passenger Traffic Flow :

Table - 17 and Fig. 24 reveal that the highest passenger traffic flow is on the Shillong - Gauhati road. This route enjoys the daily services of 20 up and down buses. Of these, 15 bus

5. James, P.E., "Geographic Factors in the Development of Transportation in South America", Economic Geography, vol.I, 1925, p. 247.

6. Ullman, E.L., "The Railroad Patterns of the United States" The Geographical Review, Vol. 39, 1949, p.256.

7. Taffe, Edward J., Morill, Richard L., and Gould Peter R. "Transport Expansion in underdeveloped countries; A comparative Analysis". The Geographical Review, vol. 53, 1963 p.516.

TABLE - 17

Bus services in Meghalaya
(As on 7.6.77)

Sl. No.	Name of the Route	Length in km.	No. of Buses Per day (Up and Down)		
			Government	Private	Total
1	2	3	4	5	6
1.	Shillong - Shella	91	1	2	3
2.	Shillong - Cherra	52	3	3	6
3.	Shillong - Nongstoin	93	2	2	4
4.	Shillong - Sonapahar	138	1	1	2
5.	Shillong - Lawbeh	74	1	2	3
6.	Shillong - Mawsynram	58	2	2	4
7.	Shillong - Balat	96	1	1	2
8.	Shillong - Mawkyrwat	94	2	2	4
9.	Shillong - Nongkhlaw	58	1	2	3
10.	Shillong - Dawki	85	2	2	4
11.	Shillong - Jowai	66	3	3	6
12.	Shillong - Gauhati	103	19	-	19
13.	Shillong - Tura	323	1	-	1
14.	Shillong-Silchar-Keringanj	240	2	-	2
15.	Shillong-Garampani	124	1	-	1
16.	Gauhati-Shillong-Silchar	-	1	-	1
17.	Shillong-Nowgong	-	1	-	1
18.	Jowai-Garampani	58	2	2	4
19.	Jowai-Khliehriat-Sutanga	44	1	1	2
20.	Jowai-Dawki	59	1	2	3
21.	Jowai-Muktapur	51	1	1	2
22.	Jowai-Nartiang	27	1	1	2
23.	Jowai-Mynso	25	1	1	2
24.	Tura-Baghmara	122	1	1	2
25.	Tura-Rongra	158	1	1	2
26.	Tura-Rongjeng	111	1	1	2
27.	Tura-Williamnagar	76	1	2	3
28.	Tura-Gauhati	220	-	2	2
29.	Tura-Phulbari	100	-	2	2
30.	Tura-Mankachar	51	-	1	1
31.	Tura-Dalu	72	-	1	1
32.	Nangal-Bibra Dudnai	80	-	1	1
33.	Dalu-Mahendraganj	66	-	1	1
34.	Nongalbibra-Baghmara	80	-	1	1
Total			55	41	96

Source: 1. General Manager, Meghalaya Transport Corporation, Shillong.

2. Station Superintendents, Meghalaya Transport Corporation, Shillong, Tura and Jowai.

3. Station Superintendent, Assam Transport Corporation, Shillong.

4. District Transport Officers, Shillong, Tura and Jowai.

PASSENGER TRAFFIC FLOW (BY BUS SERVICES)

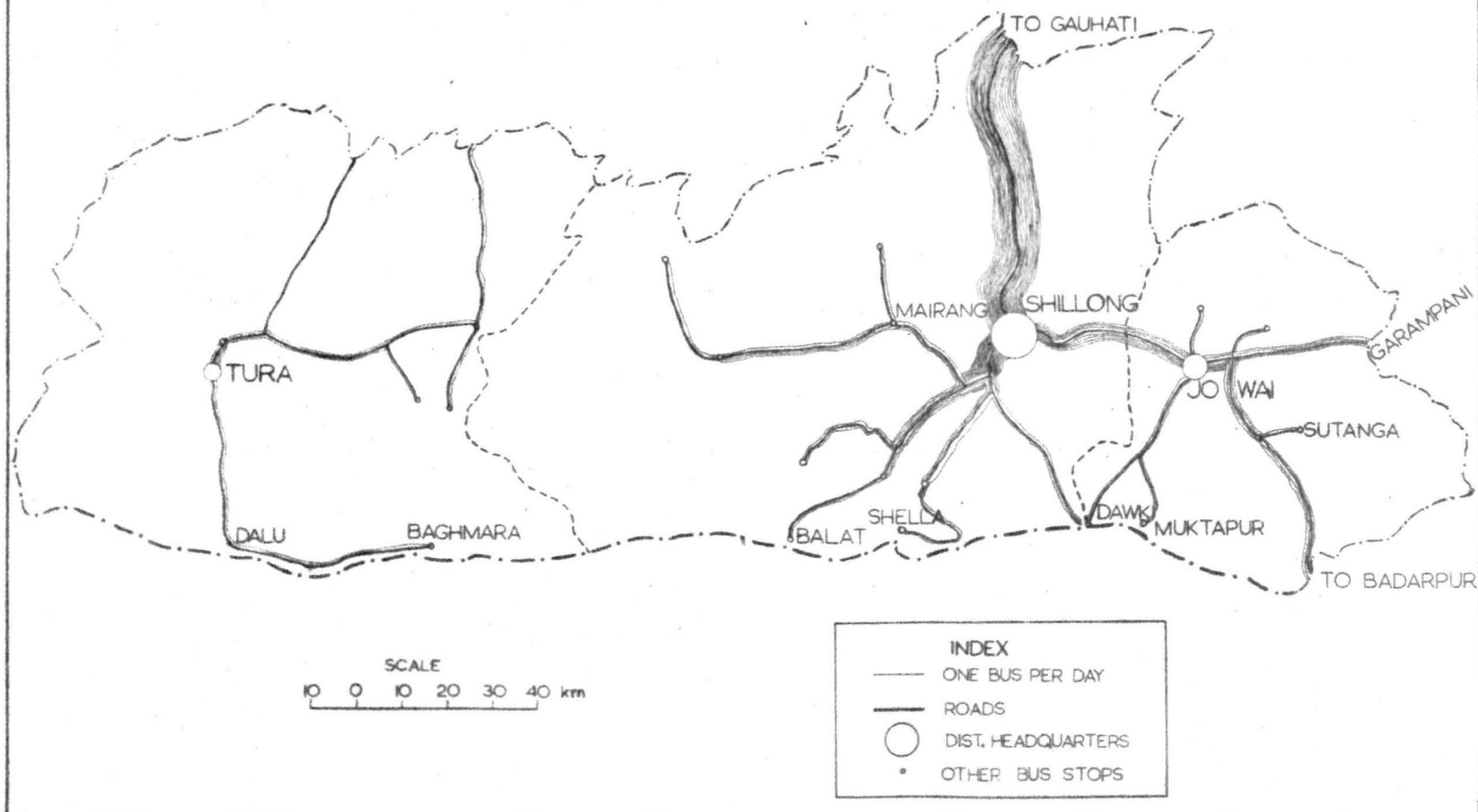


Fig. 24

services are operated by the Meghalaya Transport Corporation and the rest by the Assam Transport Corporation. Other busy routes are the Shillong-Cherra (12 services per day), Shillong - Jowai (10 services), Shillong - Nongstoin (10 services) and Shillong - Mawsynram (6 services). On different routes in the Garo Hills district only 2 - 4 bus services are available.

Regional variation in respect of passenger traffic flow is worth mentioning. From the map it is obvious that the central part of the state gets the heaviest traffic, moderate traffic flow occurs in the eastern part and the western part has the lowest passenger traffic.

The following facts explain the regional variation in traffic flow in the state :

- (i) The Shillong - Gauhati route which runs from north to south in the Khasi Hills district, has the highest passenger traffic flow because this is the only notable route through which the northward or southward bound traffic can pass. Besides, it provides links between Shillong and other cities like Silchar, Gauhati and Calcutta.
- (ii) The density of traffic flow is also controlled by the population density. In the central and eastern part of Khasi Hills the density of population is higher which causes high traffic flow in these areas. On the other hand, in the western part of the Khasi Hills and in the hilly tracts of the Garo Hills the low traffic flow is partly due to low density of population.
- (iii) The poor economy of the Garo Hills and certain parts of the Khasi Hills is responsible for low traffic flow in these areas.
- (iv) The route pattern also causes variation in the traffic flow. The Gauhati - Shillong, Balat-Shillong, Shella - Shillong and Bedarpur - Shillong routes have accumulation

of traffic at Shillong and Jowai and therefore these routes show heavier passenger traffic flow than those of other routes.

Accessibility Pattern :

Here an attempt has been made to know the accessibility of roads in the region. To quote Forbes (1964)⁸ "Accessibility is the term which generally implies to the ease of getting to a place". In the words of Winger (1961)⁹ "Accessibility in technical sense is a relative quality occurring to a piece of land by virtue of its relationship to a system of transport." According to B.J. Garner (1967)¹⁰ accessibility is the variable quality of centrality or nearness to the functions or locations.

Fig. 25 showing the accessibility of roads in Meghalaya also delimits the inaccessible areas. It is evident from the map that there are vast tracts of inaccessible land in the region. It is mainly due to rugged topography of the region. The region has got 8386.54 km² of inaccessible area which accounts for 37.29 per cent of its total geographical area.

8, 9 & 10. Chorley Haggett, 'Models in Geography', p. 305.

CHAPTER - V

CHAPTER - V

HUMAN SETTLEMENTS

The study of settlement is important as the various aspects of settlement in a region reflect man's relationship with the environment. Settlements have gradually evolved over a long period of time and by analysing their site, types, spatial pattern and functions one could decipher the history of man's exploitation of the surrounding environment and resources. The structure and house forms in a town or village such as a town or village hall, a church, mosque or temple, administrative buildings, palace, fort, etc. would also help in understanding the religious and the social conditions prevailing in the area of study.

In the present Chapter the settlements of the region have been studied under the two broad heads: (a) rural settlements and (b) urban settlements. While analysing the rural settlements stress has been laid down on their evolution, location, density and the degree of concentration and dispersion. In order to present a picture of the rural landscape, the village Monabari (Garo Hills) has been selected for case study. As regards urban settlements, only their population growth and functional morphology of Shillong have been examined.

A. Rural SettlementsEvolution of Rural Settlements:

It is a difficult task to trace the origin and evolution of settlements in this region, because there is no integrated historical account of the region as it is occupied by various tribes who have lived for a long time in physical isolation and have no script

of their own. However, there are some references about these people in Buranjis of the Ahoms and the historical records of the last century based on Ahom Chronicles supplemented by inscriptions, coins, copper plate, etc. particularly on the Khasis and Jaintias which provide evidence of occupation of its northern fringe even before the Christian era. There is no evidence of pre-historic settlement of this region except for the recent claim by some scholars that the Pongram valley of the Garo Hills was inhabited during the Palaeolithic times, based on their findings in the Daojalinahading excavation of the said valley.

Since there is paucity of historical data and information we may discuss the evolution of settlements of the region in three major phases, viz. (i) Pre-British Period, (ii) British Period and (iii) Post-British Period.

Before the advent of the British in this region practically the entire population was engaged in agricultural pursuits. They were also engaged in making pottery and agricultural implements and in quarrying limestone and smelting iron-ore. The people were isolated from each other due to difficult terrain, dense forests and lack of transport network. At that time the settlements were of clustered type and they were isolated from each other. The lack of interaction with the outside world added by inaccessibility of the land left them comparatively untouched and therefore they remained primitive in character.

The British opened up this region for the first time by shifting the British headquarters from Cherrapunji to Shillong in 1876 and gradually the external influences crept into the region.

The rural settlements of the region started experiencing some changes particularly in their size and structure. The British constructed 8 principal lines of transport and communication¹ which affected the growth of rural and urban settlements and facilitated administrative and political control.

Later on, through the activities of various missionaries, Christianity was propagated to bring the essentially animist tribal people to their religious fold. An important aspect of this was that they could easily influenced the rural as well as urban landscape of this region by establishing schools, hospitals and churches. New roads were constructed and thus accessibility within the region was improved. More administrative units were established. Trade and commerce for the first time showed the tendency of developing at a larger scale. All this resulted in the expansion of urban centres and it also generated rural-urban migration in the region.

During the Post-British period or after the independence of India this region experienced rapid changes in structure and content. The forced migration into the region as a result of partition and the general economic development in the North-East had profound influence on the settlements. Shillong was the centre of administration of the undivided Assam and remained the centre of political and economic activities. Consequently, the region underwent major changes giving sufficient strength to the settlements located along the main

1. The Eight principal lines of transport and communication were (i) Shillong to Gauhati 63 miles (ii) Gauhati to Bholaganj via Nongkhla, Mawphlang, Cherrapunji and Theriaghat - 120 miles; (iii) Shillong to Mawphlang - 13 miles (iv) Shillong to Jaintiapur via Jowai and Muktapur - 70 miles; (v) Shillong to Shella - 60 miles; (vi) Laithyinkot to Sohrarim and Cherrapunji - 22 miles; (vii) Jowai to Nongritiang - 12 miles and (viii) Shillong to Sonapahar - 52 miles.

arteries of movement and gave further impetus to develop in size and functions. It led to the rural urban migration both due to push and pull factors.

Further, certain amount of interaction took place and the rural settlements became dependent on the urban centres like Shillong, Jowai and Tura which acted as collecting and distributing centres. Some of the rural centres developed certain services and they grew in size and functions. The examples of this are along the Gauhati-Shillong axis where one notices the growing settlements of Burnihat, Pongpoh, Naya Bungalow and Barapani. The introduction of cash crops e.g. potato, ginger, pineapple, banana, papaya, etc. further strengthened the rural settlements economically and brought them to a close interaction with the urban centres.

Locational Analysis and Density of Rural Settlements :

The location of rural settlements in this region is governed by physiography, soil, availability of cultivable land, supply of drinking water and accessibility. Since the economy is based on primary productions, the secondary and tertiary activities have hardly played any significant role in the location of these settlements. The rural settlements in this region are confined to the gentle slopes and intermontane valleys which are suitable for agriculture. Since the sources of drinking water are streams and springs, many settlements are located by the side of a river or near spring points.

Table - 18 and Fig. 76 show the density of rural settlements in the region. They reveal that the density is high, ranging from 6 to 14 villages per 10 km.² in the bordering mauzas of Garo

Hills, the highest being in Mauza No. V. The high density in this part is due to level land, fertile soil and better means of communication. It is also high in the neighbourhood of Shillong, Tura and Jowai due to magnetic urban influence. In the whole of Khasi and Jaintia Hills and mauzas III and IV the density is below 3. This is because of uneven terrain and dense forests leading to poor accessibility in the area.

TABLE - 18
Density of Rural Settlements (1971)

<u>Mauza/police station</u>	<u>Density per 10km²</u>
Mauza I	3
Mauza II	3
Mauza III	2
Mauza IV	2
Mauza V	14
Mauza VI	6
Mauza VII	7
Mauza VIII	8
Mauza IX	12
Mauza X	6
Nongpoh P.S.	2
Shillong P.S.	2
Cherra P.S.	2
Dawki P.S. (i)	2
Jowai P.S.	1
Dawki P.S.	2
Meghalaya	2

Types of Rural Settlements and their Distribution:

The rural settlements can be classified on the basis of their site, functions, the degree of concentration or dispersion and population size. But here an attempt has been made to classify the rural settlements of the region according to the degree of concentration or dispersion² and their population size. On the basis

2. The degree of concentration and dispersion is very difficult to find and it needs detailed survey and relevant quantitative method. However, here, on the basis of visual inspection of the topo-sheet and the field survey one could broadly locate these patterns.

DENSITY OF RURAL SETTLEMENT 1971

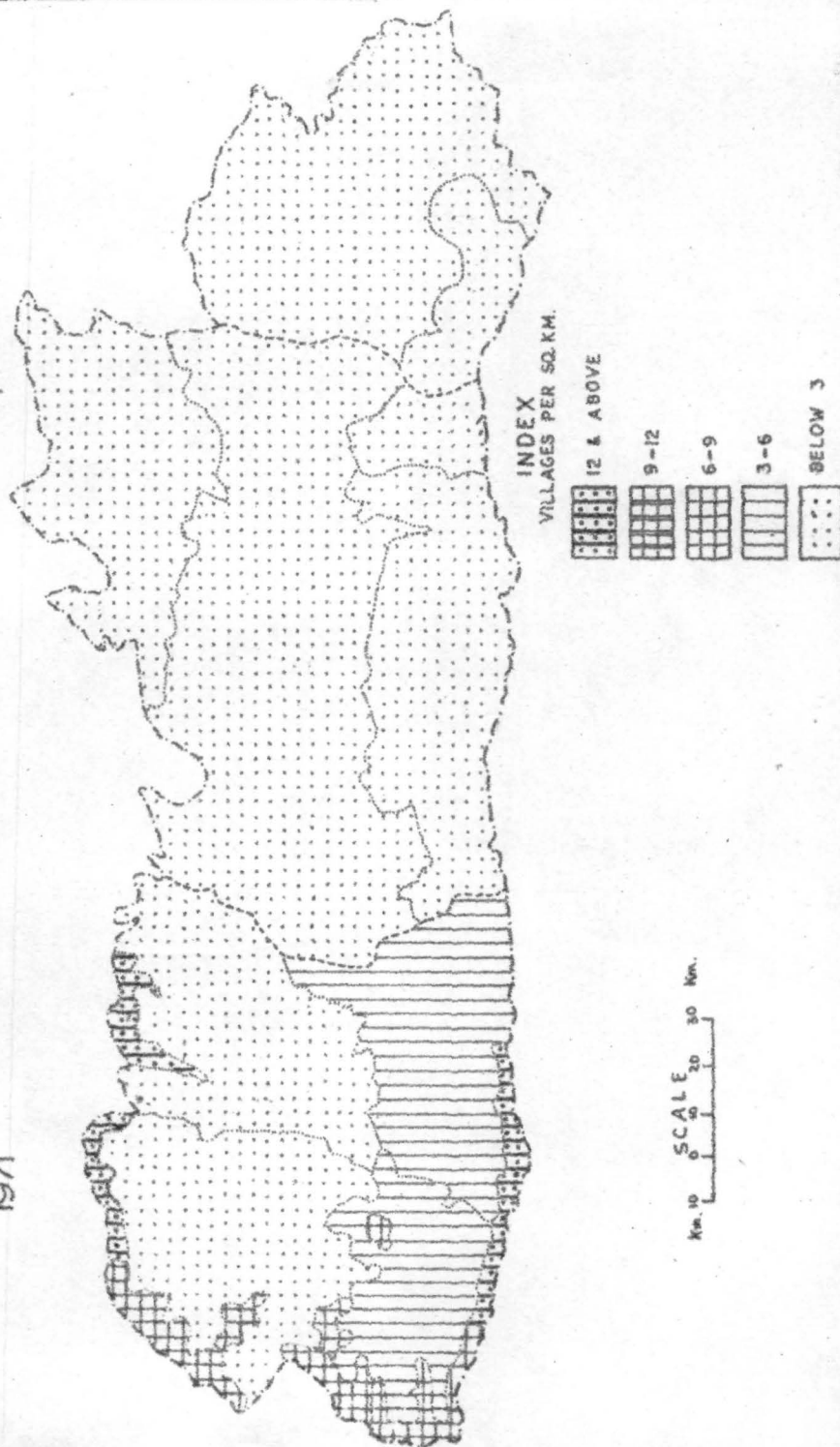


Fig. 26

of the first criteria the rural settlements of the region may be grouped into :

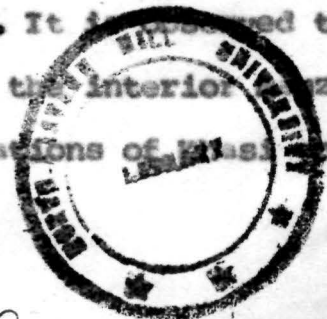
- (a) Compact settlements in which all the houses are concentrated at one site in a block. Mawsynram, Smit, Twahlongwar, Laitschim and Lawbyrtum are few examples of compact settlements.
- (b) Semi-compact settlements where the houses are located at one site but the degree of concentration is relatively less. This type of settlements are Rangmew, Jakrem, Mawhiang, Nongspung and Rangshken.
- (c) Semi-dispersed settlements where the houses are fragmented but not to the extent as in the dispersed settlements. Laitmawpen, Mawkma, Mawkyllei, etc. are the settlements of this type.
- (d) Dispersed settlements in which the houses are scattered. This type of settlements include Sohphoh, Laitmawsiang and Diwah.

These various types of settlement are shown in Fig. 27.

Meghalaya has 4583 inhabited villages which contain a population of 8,64,529. This is the average size of village in the region ^{is 189}
^{On the basis of population size}
 the rural settlements may be grouped into (a) Small size villages with less than 500 population, (b) Medium size villages with 500 - 999 population and (c) Large size villages with 1000 and above population.

Small Size Villages :

The small size villages are widely distributed in Meghalaya. The percentage of such villages varies from 70.3 to 100 percent. In Mauza I all the villages belong to this category. It is observed that there is heavy concentration of such villages in the interior areas of Garo Hills and in Nongpoh and Dawki police stations of Jaintia Hills.



TYPES OF RURAL SETTLEMENTS

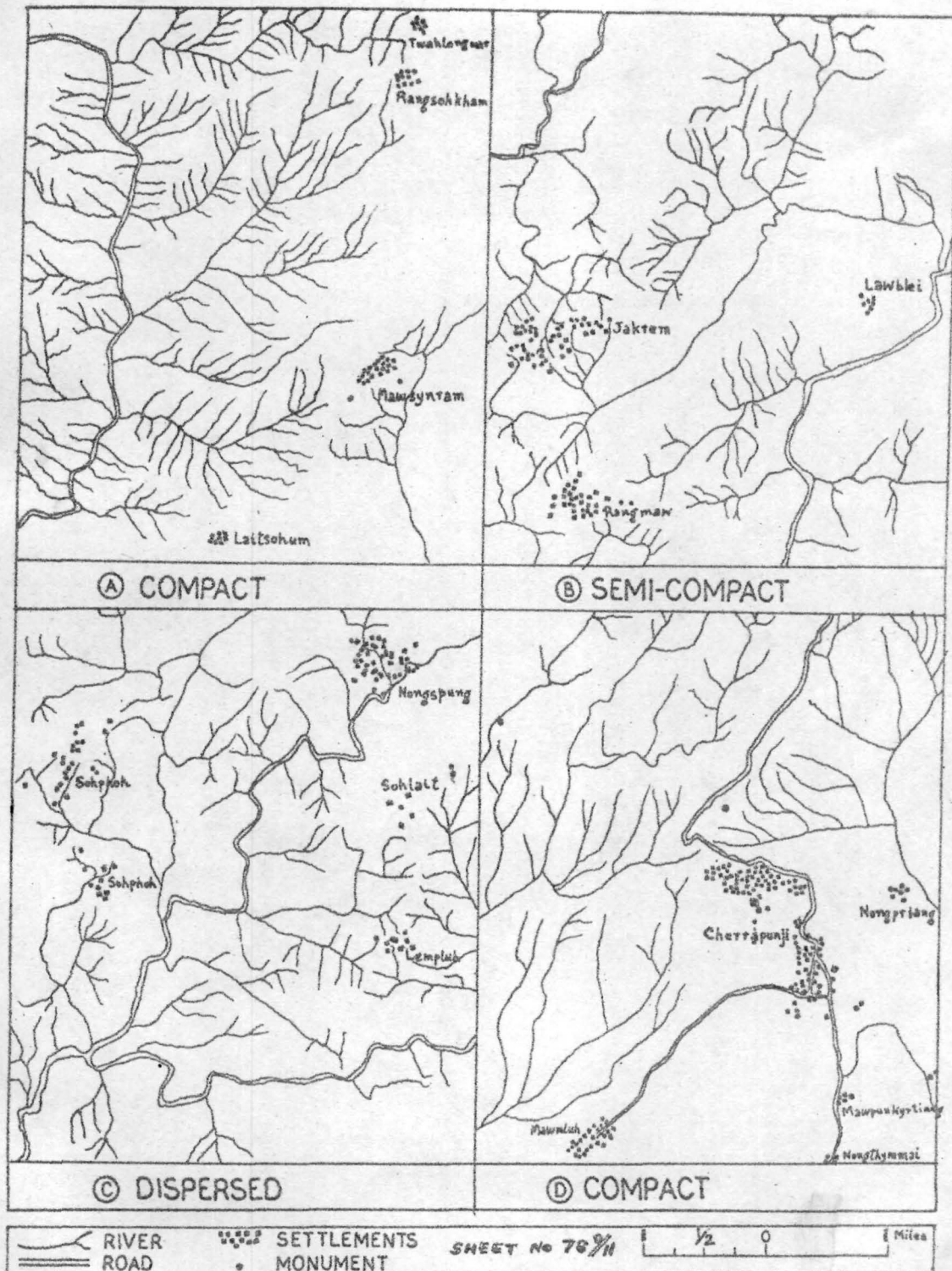


Fig. 27

Jaintia Hills. The percentage share of such villages has decreased from 96.10 per cent in 1961 to 93.50 per cent in 1971. This indicates that the villages are growing in size due to increase in communication links and development of markets and government establishments. The small size villages accommodate more than 70 per cent of the total rural population of the region.

Medium size villages :

The medium size villages are concentrated mostly in mauzas V, VI, VII, VIII, IX and X of Garo Hills and in Shillong and Jowai police stations. Their percentage varies from 6 percent to 17 per cent, the highest being recorded in Mauza VI. The percentage of medium size settlements in this region increased from 3.31 percent in 1961 to 5.17 percent in 1971. This type of villages contain a little more than 18 percent of the total rural population of the state.

Large Size Villages :

The concentration of large size villages is high in mauzas VI, VIII and IX. Shillong and Jowai police stations also have several large villages. Here it may be mentioned that the total number of villages with 1,000 and above population is 61, out of which only 7 have a population more than 2,000. The percentage share of large-size villages increased from 0.59 per cent in 1961 to 1.33 per cent in 1971. These villages accommodate about 10 per cent of the total rural population of the region. Fig. 28 shows the location of this category of villages.

Here it is worth mentioning that out of the total number of villages in the region 93.50 per cent belong to the first category,

LOCATION OF SELECTED SETTLEMENTS



Fig.28

TABLE - 19

Distribution of Small, Medium and Large size Settlements - 1971

Mauza/Police Station	Total no. of Inhabited villages	villages with less than 500 Pop		villages with 500 - 1000 Pop		villages with 1000 and above Pop	
		No.	P.C*	No.	P.C*	No.	P.C*
Mauza I	504	504	100	---	---	---	---
Mauza II	516	510	98.84	6	1.16	---	---
Mauza III	474	463	97.68	10	2.11	1	0.21
Mauza IV	422	404	95.73	15	3.55	3	0.71
Mauza V	126	115	91.27	11	8.73	---	---
Mauza VI	64	45	70.31	11	17.19	8	12.5
Mauza VII	77	67	87.01	10	12.99	---	---
Mauza VIII	60	51	85.0	7	11.67	2	3.33
Mauza IX	83	76	91.57	5	6.02	2	2.41
Mauza X	12	11	91.67	1	8.33	---	---
Nongpoh P.S.	303	291	96.04	10	3.30	2	0.66
Shillong P.S.	878	793	90.32	65	7.40	20	2.28
Cherra P.S.	498	467	93.78	25	5.02	6	1.20
Dawki P.S.(i)	160	145	90.63	12	7.5	3	1.88
Jowai P.S.	328	69	82.07	47	14.33	12	3.66
Dawki P.S.(ii)	74	74	94.87	2	2.56	2	2.56
Meghalaya	4583	4285	93.50	237	5.17	61	1.33

*Percentages are p.c. to total no. of villages in respective areas.

VILLAGE MONABARI MORPHOLOGY

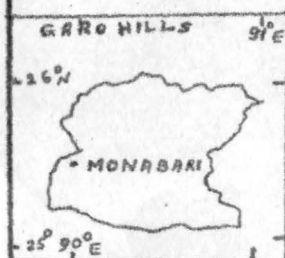
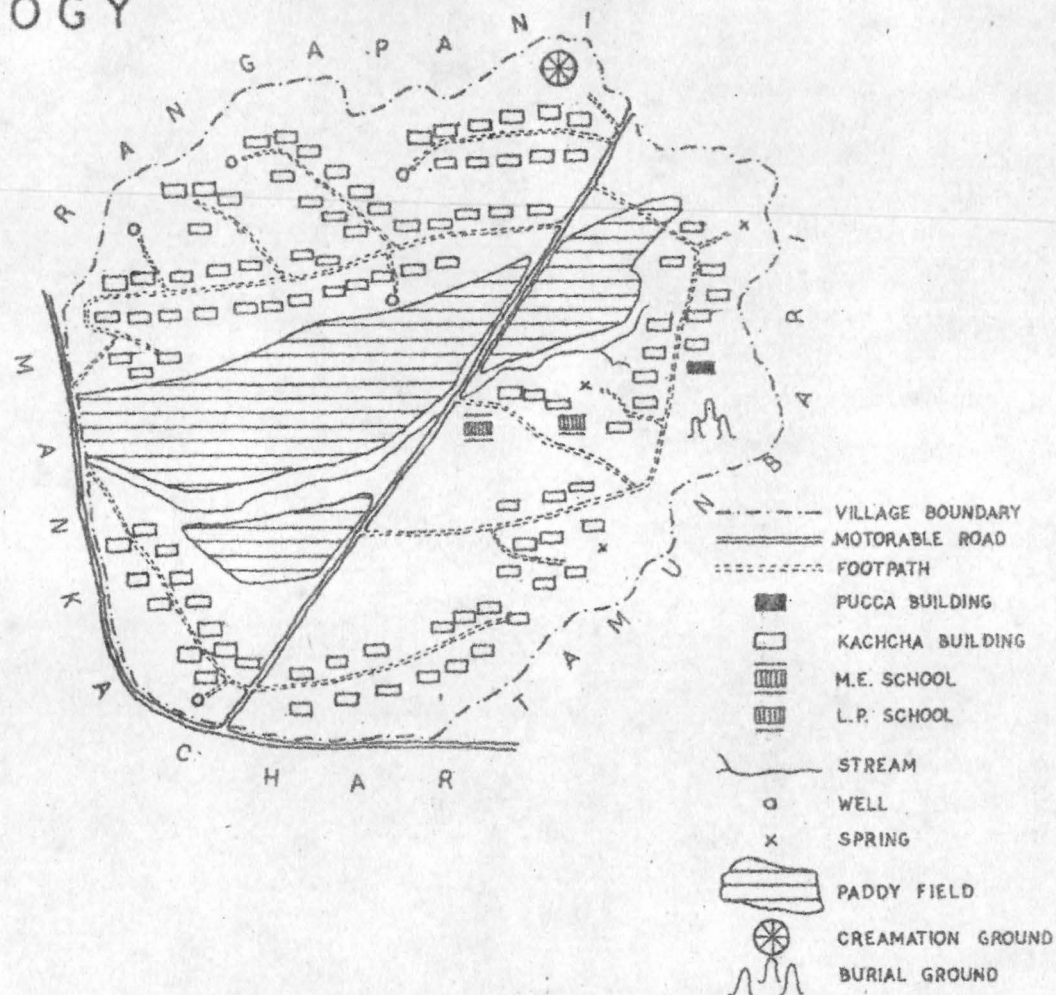


Fig. 29

BASED ON VILLAGE MAP, CENSUS OF INDIA, 1971,
SERIES 13- MEGHALAYA PART II A.

5.17 per cent to the second and only 1.33 per cent to the third. Table 19 shows the regional variation in the distribution of different categories of villages in the state.

Village Monabari - A case study :

Fig. 29 shows the morphology of the village Monabari which is situated on a motorable road in Mauza II of Garo Hills. It is a small village of 103 households with a population of 474. Except one pucca building, the houses of the village are Kachcha and thus they reflect the poor economy of the people. Springs and wells are the sources of drinking water in this village. The village has no postal and medical facilities. However, there are two schools; one is Lower Primary and the other Middle English School. Electricity has not yet reached the village. The paddy fields in the village form a belt running from west to east, in the central part and are surrounded by houses on all sides. On the periphery of the village there is a cremation ground in the north and a burial ground in the east.

B. Urban Settlements

The Table - 20 gives the list of urban centres and their population size, density of population, census category, status, function and regional location.

Of the six urban centres in the region, Shillong with its three satellite towns namely Shillong Cantonment, Nongthymmai and Mawlai forms the largest urban concentration and contains 83.41 per cent of the total urban population of the state. It has developed mainly due to the administrative base. The satellite towns mentioned

TABLE - 20

Sl. No.	Name of the Town	Population (1971)	Density per km ²	Census Category	Status	Function	Location
1.	Shillong(M)	87,659	8461	Class II	Municipality	Multi functional	Khasi Hills
2.	Shillong cantonment	4,730	2571	Class VI	Cantonment	Defence	Khasi Hills
3.	Nongthymai	16,103	5496	Class IV	Non-Municipality	Residential	Khasi Hills
4.	Mawlai	14,260	2322	Class IV	Non-Municipality	Residential	Khasi Hills
5.	Tura	15,489	1704	Class IV	Town Committee	Multi functional	Garo Hills
6.	Jowai	8,929	1144	Class V	Non-Municipality	Multi functional	Jaintia Hills

Source: General Population Tables, 1971.

above are contiguous suburbs of Shillong proper and they have grown to accomodate the growing population of the state headquarters. There is likelihood that in future Happy valley, Umpling Pynthermukhrah, Upper Shillong, Umtyngka may become new satellite towns of Shillong.

Tura in Garo Hills and Jowai in Jaintia Hills also have developed to carry out administrative function. Besides these, a number of market centres with several urban characteristics are growing along the main roads. Among such centres mention may be made of Cherrapunji, Mawphlang, Shella, Dawki, Nongstoin, Naya Bungalow, Nongpoh, Burnihat in Khasi Hills, Phulbari, Dalu, Baghmara, Siju, Dainadubi, Garobadha, Singrimari and Pechu Belpara in Garo Hills. Here it is worth mentioning that Cherrapunji developed as a market and administrative centre even earlier to Shillong when it was selected as the headquarters of Assam. Barapani has grown due to the establishment of hydro-electric project and Burnihat due to the establishment of hydro-electric project and industries.

The urban centres of Meghalaya have undergone considerable changes in regard to their population size (Fig. 30). The population of Shillong Municipality has increased steadily from 1901 to 1931. After that it has recorded a sharp rise with an increase of 44.29 per cent during the decade 1931-41 and 74.91 per cent during 1941-51. However, during the last two decades (1951-61 and 1961-71), the population growth has been comparatively less due to observance of family planning measures and the shifting of a number of offices to Dispur in Assam when Meghalaya became an autonomous state.

DECADAL VARIATION IN URBAN POPULATION SINCE 1901

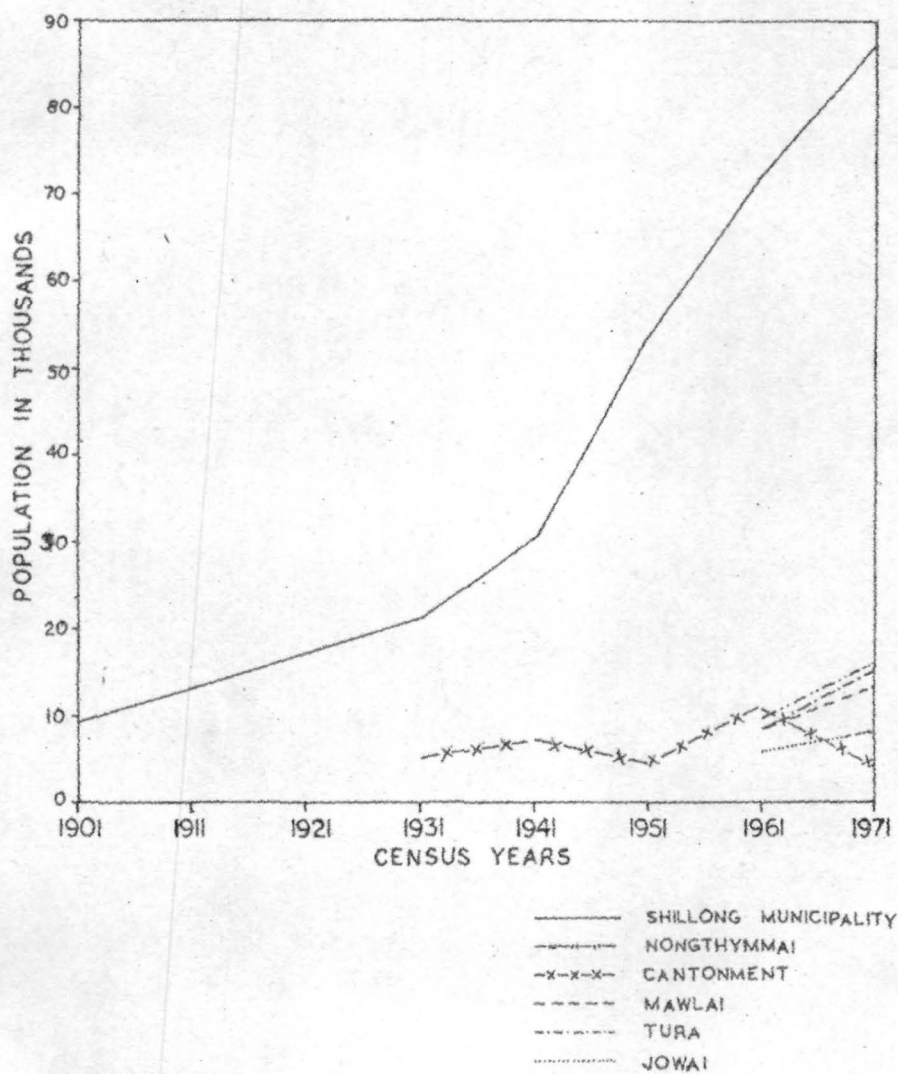


Fig.30

In the case of Shillong cantonment there has been a sharp variation in population between the decades 1931-41 and 1941-51 from +44.44 per cent to -36.23 per cent. This is perhaps due to movement of military personnels at the time of second world war. The variation is more significant between the decades 1951-61 and 1961-71 from +138.6 per cent to -48.32 per cent. This may be due to the Chinese aggression in 1962 and the Indo-Pak war of 1965, resulting in the movement of military personnels to the border areas. The population of Mawlai increased from 8,528 in 1961 to 14,260 in 1971, recording an increase of 67.21 per cent. Nongthymmai has also recorded high growth percentage (59.69 per cent) during the decade 1961-71. The same decade has recorded the growth percentage of 74.27 in case of Tura and 44.09 in case of Jowai.

As regards the growth of towns in Meghalaya, we find that there was only one town till 1921. In 1931 another town namely Shillong cantonment was added and the position remained the same till 1951. In 1961 Mawlai, Nongthymmai, Tura and Jowai were declared as towns, thus making the total no. of urban centres as six in Meghalaya.

Shillong ($25^{\circ}34'N$ lat. and $91^{\circ}53'E$ long.) is the headquarters of the State of Meghalaya and also of the North Eastern Council and the Eastern command of the Indian air force. It is about 103 km. to the south of Gauhati and is located at an altitude of 1500 m above mean sea level. It is an agglomeration of four towns - Shillong Municipality, Shillong cantonment, Nongthymmai and Mawlai which together cover 21.27 km^2 and have a population of 122,752 (1971).

Situated in a valley, the town of Shillong has a mild and equable climate. The ideal climate with pleasant summer accounts for its charm as a hill station. Since its establishment in 1864, the town has grown considerably but the growth has been more mainly to the east and north-west. Shillong as a whole is marked by administrative and professional services and about 55 per cent of the total workers (1971) are engaged in non-categorised services. The percentage of workers engaged in industry is 10.53 per cent in trade and commerce 17.73 per cent and in transport, communication, etc. 8 per cent.

As regards morphology of the town, it is found that the residential areas account for 74 per cent of the total area of the town and defence 14 per cent. The commercial area occupies 3.5 per cent of the area. The main commercial areas of the town are Barabazar and Police Bazar. The educational area ranks fourth and the administrative fifth. The recreational areas cover a very small proportion of the town.(Fig. 31).

The townwise analysis of various land uses shows a somewhat different picture. While the residential areas pre-dominate in Shillong Municipality, commercial, educational, administrative, medical and recreational uses are also significant. The cantonment is essentially a defence area. Nongthymmai is a residential town, but has considerable defence, administrative educational and commercial uses. Mawlai is a residential town with considerable industrial activities.

The early growth and locational advantages of the Municipality attracted most of the urban functions within its boundary. Only recently some of the functions have begun to decentralise.

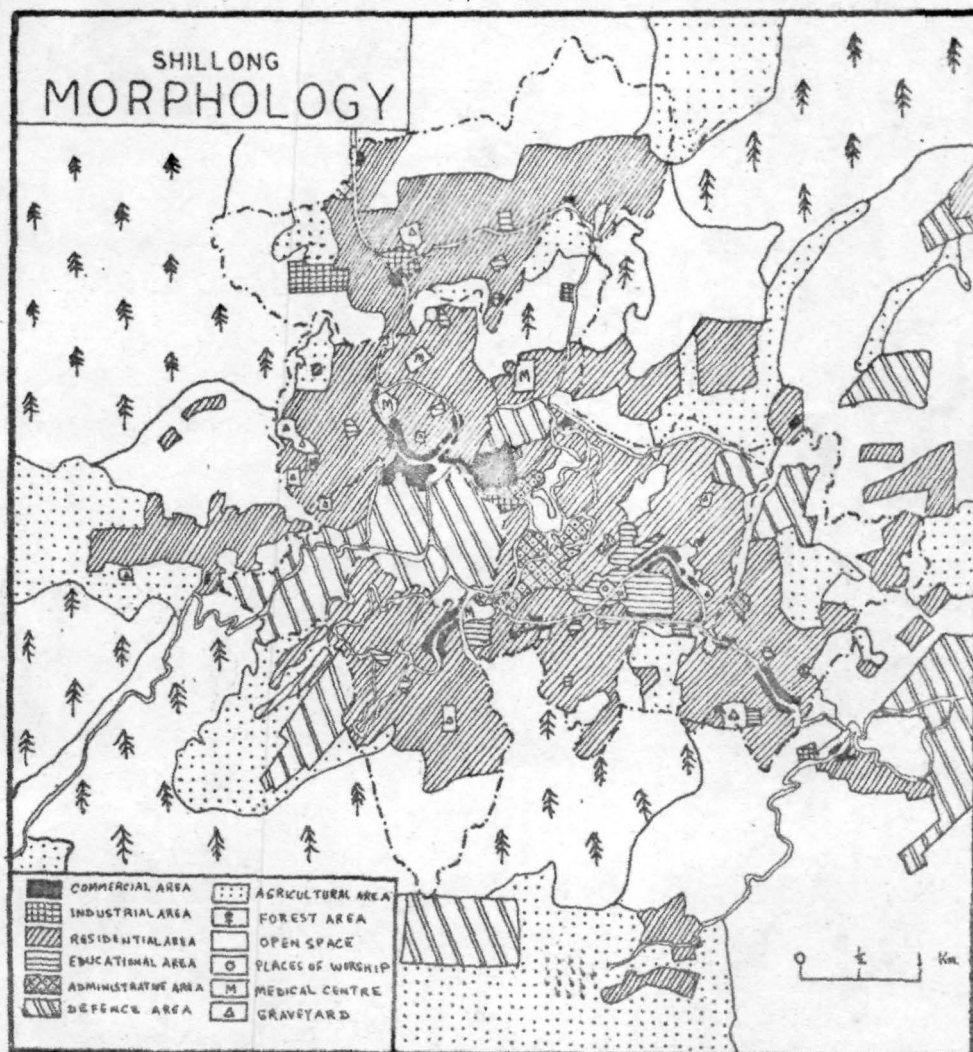


Fig. 31

BASED ON MAP PREPARED BY J.A. SINGH
ST. EDMUND'S COLLEGE, SHILLONG.

CHAPTER - VI

CHAPTER - VI

LEVELS OF DEVELOPMENT

Based on the foregoing analysis contained in the earlier Chapters an attempt, of course, lacking refinement, has been made to identify the relatively less developed and more developed areas within the state of Meghalaya by using data and information at mauzas/police station level.¹

In a developing region, within the broad national framework it has to be seen that the planning process is not only relevant and adequate at the macro-level or even inter-regionally but it is also manifested at the micro-level. For a new state like Meghalaya where the planning organisation and policies are yet to be streamlined, it is of great importance to highlight the relatively backward and developed areas within the state so as to facilitate a more regionally and locally oriented developmental policy. Sometimes it so happens that an area showing a higher degree of development in the state may come out to be one of the most backward regions in terms of the broader, national or even sub-national frame.² But it is of importance to identify and regionalise at a sub-district level because due to errors at aggregate level the

-
1. The next census unit in the hierarchy to districts happens to be mauza in Garo Hills and police station in Khasi and Jaintia Hills. Although choosing two different units in different districts seems to be a limited approach, it happens to be unavoidable in this region and methodologically may not distort the spatial picture significantly.
 2. According to Pal's classification ("Regional Disparities in the Levels of Development in India" IJRS, Vol.II, No. 1, 1975, Table 7, p.44) the United Khasi and Jaintia Hills rank high and medium from the agricultural point of view but in industries, urbanisation, etc., rank very low in all India level.

sub-district development differentials are oriented to a higher degree of error at a higher scale of reference.

As has been pointed out in the beginning the attempt is of preliminary nature and therefore, the objective is limited and the methodology tends to be more conventional. For an analysis related to the objective, eleven variables have been chosen (Appendix II) under the broad classification of (i) industrial levels (Group A, with 3 variables), (ii) social facilities (Group B, with 4 variables) and (iii) infrastructural facilities (Group C, with 4 variables). It must be admitted here that the variables are not adequate for any useful classification, but it is an irony that an under developed region is also qualified by a poverty of information and data and the problem gets accentuated when one starts probing at a more detailed unit level. The loss was particularly felt in terms of the agricultural sector, but the data available are on a different unit area basis (Development Blocks). Therefore, the limited but relevant use has been done.

Taking the data-form of eleven variables and sixteen units (10 mauzas and 6 police stations) one faces the problem of adopting or devising a method of combining all the variables into a single index so as to make an intra-comparison of the indices indicating the different levels of development or vice-versa of the unit areas.

There are possibly three major problems at the time of combining several variables into a final index :

- (1) whether one should combine all the variables directly on the basis of a stepwise combination by grouping of the variables.³ Sometimes, it is found that there

3. Pal, M.N., op. cit. pp.35-43.

might be a negative relationship of one or more variables; thus creating a paradox of combining negatively related variables which would negate each other in the final index;

- (ii) the problem arising out of duplication of variables if they are highly correlated (multi-collinearity) leading to a situation where an observation with higher magnitude is magnified while the other with low being relatively deminuted;
- (iii) the problem of attributing differential weightages to different variables in terms of varieties of their properties, i.e., whether to remove the problem of multi-collinearity or to highlight the aspects of intra-variable deviations and so on.

In the present study Kendall's⁴ method of weighting by a weight vector derived out of the highest principal component (eigen or characteristic value) has been adopted for the purpose of simplicity which serves some of the basic problems mentioned above. It may be pointed out that certain minor modifications are made here and there. As regards classification, Pal's⁵ step-wise method has been found very useful and therefore, used (Appendix-III).

By using Kendall - Pal method we arrive at 4 indices of development, A*, B*, C* and F*, the first three indicating the combinations of the groups of variables in industrial, social and infra-structural levels and F* indicating the final index for all the eleven variables arrived after the weighted combinations of A*, B* and C*

There are several methods suggested to classify a

4. Kendall, M.G., "The Geographical Distribution of Crop Productivity in England", JRSS, VOL.102, 1939, pp. 21-48.

5. Pal, M.N., op cit. pp. 35-43.

variable (or an index) into groups i.e., quartiles, deciles, mean standard deviation, or a host of them. Since quartiling does not suit to a variable with high variability, the mean standard deviation method has been used in classifying the mauzas and police stations.⁶

On the basis of our conversion into composite indices (Table 21) and classification of units into groups we will take each of the variable groups separately and then the final index would be taken into consideration.

Industrially, there are two units, Mauza X (the Tura area)⁷ and Shillong Police Station which come up high having index values 3.97 and 2.81, respectively. In the lowest two classes there are nine units (Table 22), mostly in Garo Hills and Nongpoh and Dawki police stations in Khasi Hills. Cherra and some bordering mauzas of Garo Hills are in the intermediate class. The high industrial development of Mauza X and Shillong Police Station can be attributed to their historical and administrative importance. But the moderately developed areas on the borders may be due to a 'spread effect'.^{ab} The nearby territories. However, it is futile to close oneself entirely from inter-regional considerations, even though intra-regional considerations are supreme.

6. (i) $\bar{x} \pm 1 \text{ S.D.}$

(ii) $\bar{x} \pm 2 \text{ S.D., etc.}$

7. It is found that the size bias of units is very significant. For example, in all the indices the values of Mauza X comes up very high while in reality Shillong P.S. is more developed compared to the rest. To remove this size bias a further weightage on the composite indices could be given by taking either an area or population ratio. At this stage it seems infeasible to incorporate these changes but in Table-23 the weightages are provided on the final index P^* and thus a revision of the position may be clarified.

TABLE - 21

COMPOSITE INDICES

Levels of Development in Meghalaya (1971)

Sl No.	Name of the Mauzas/police stations	A*	Classes	B*	Classes	C*	Classes	F*	Classes
1.	Mauza I	0.40	I	1.09	I	0.31	I	0.61	II
2.	Mauza II	0.26	I	0.87	I	0.15	I	0.46	I
3.	Mauza II	0.82	II	1.05	II	0.25	I	0.80	II
4.	Mauza IV	0.76	II	1.64	II	0.35	I	0.99	II
5.	Mauza V	1.44	III	1.20	III	0.45	I	1.16	II
6.	Mauza VI	1.49	III	1.70	III	0.93	I	1.38	II
7.	Mauza VII	0.77	II	0.90	II	0.87	I	0.73	II
8.	Mauza VIII	1.46	III	3.64	II	0.64	I	0.72	II
9.	Mauza IX	2.04	III	0.04	III	2.49	II	2.55	III
10.	Mauza X	3.97	V	5.94	IV	10.16	IV	4.31	V
11.	Nongpoh P.S.	0.83	II	1.46	I	1.15	I	0.97	II
12.	Shillong P.S.	2.81	IV	1.67	I	5.07	III	2.07	II
13.	Cherra P.S.	1.99	III	1.55	II	0.82	I	1.57	II
14.	Dawki P.S(1)	1.23	II	0.92	I	0.51	I	0.96	II
15.	Jowai P.S.	1.42	II	2.35	II	2.09	II	1.60	II
16.	Dawki P.S(11)	1.25	II	1.20	I	0.15	I	0.06	II

N.B. A* Levels of Industrial Development

B* Levels of Social Development

C* Levels of Infrastructural Development

F* Final Index of Development.

TABLE - 22

Frequency of Mauzas/Police Stations by
Classes

Sl. No.	Index	Classes	No. of Mauzas/ Police stations
1.	A*	I	2
		II	7
		III	5
		IV	1
		V	1
2.	B*	I	12
		II	2
		III	1
		IV	1
3.	C*	I	12
		II	2
		III	1
		IV	1
4.	F*	I	1
		II	13
		III	1
		IV	0
		V	1

In terms of social facilities, the position is more clear. There are 14 units which are broadly with low development of social facilities, including Shillong Police Station (Class-I). One would look into this contradiction that Shillong with known attributes of being highly developed is put lowest in the social facilities ladder. This is simply because the Shillong urban agglomeration is located in a vast hinter land of very low level of development.

Infrastructurally, apart from the inflated situation of Mauza X, the Shillong Police Station dominates, being in the third class (5.07) with 14 other units which are very less developed.

In the final index of development there are again 14 units (including Shillong P.S.) which are put in the lower ladder while Mauzas IX and X of Garo Hills come up significantly.

It is found that when the size bias of these indices has been removed the position of Shillong, Jowai and Cherra police stations changes significantly (Table 23 and Fig. 32).

Instead of going for a broad generalisation out of this analysis let us consider some of the issues involved in this study. It is important to mention here that the study becomes of limited significance because of the area bias of the units and therefore, a meaningful study has to devise a method to overcome this problem. Secondly, the variables related to agricultural sector will make significant difference in case of areas like Shillong and Cherra police stations and the central mauzas of Garo Hills which are predominantly agricultural. Thirdly, the homogeneous classification is less useful because in a hilly region the tendency of development

TABLE - 23

Levels of Development in Meghalaya (1971) (after
the size bias of units has been removed)

Sl. No.	Name of the Mauzas/ Police stations	P*	p*	P*p*	Classes
1.	Mauza I	0.61	.0438	.0071	I
2.	Mauza II	0.46	.0727	.0331	I
3.	Mauza III	0.80	.0733	.0586	I
4.	Mauza IV	0.99	.0780	.0774	I
5.	Mauza V	1.16	.0314	.0364	I
6.	Mauza VI	1.38	.0283	.0389	I
7.	Mauza VII	0.73	.0196	.0143	I
8.	Mauza VIII	1.72	.0189	.0324	I
9.	Mauza IX	2.55	.0176	.0449	I
10.	Mauza X	4.31	.0184	.0792	I
11.	Nongpoh P.S.	0.97	.0521	.0504	I
12.	Shillong P.S.	2.07	.3228	.6666	IV
13.	Cherra P.S.	1.57	.0830	.1299	II
14.	Dawki P.S. (i)	0.96	.0276	.0264	I
15.	Jowai P.S.	1.60	.0980	.1567	II
16.	Dawki P.S.(ii)	1.06	.0145	.0154	I

$$NB \quad P^* = \frac{P_i}{P}$$

where, P_i , - the population of i th Unit

P , the population of Meghalaya.

spreading on interactive basis (functional basis) i.e. along the corridor of highways has to be looked into. Therefore, a functional classification of areas seems much more relevant.

As has been mentioned, time and again, that the study is a preliminary attempt in identifying the relatively developed and under developed areas, the study helps in understanding the hazards and limitations when one has to work with secondary data at a micro-level in a relatively unexplored region.

CHAPTER-VII

CHAPTER - VII

SUMMARY AND CONCLUSION

Meghalaya is situated in the North Eastern Region of India between the Assam valley in the north and Bangladesh in the south. It covers an area of more than 22,000 km² with a population of 10.1 lakhs.

I

The rocks in the region belong to the oldest formation of the Archaean to the newer alluvium of the recent geological age. Some of the formations contain valuable minerals like coal, limestone, sillimanite, corundum, copper and clay.

The region is a plateau whose height varies from 150 m to 1961 m. It is marked by dissected and irregular terrain on the western and northern side and regular and steep slope on the southern side. The western part of the plateau i.e. the Garo Hills is a highly dissected tract with an average elevation of about 600m. The most important physiographic feature in this section is the Tura range with Norkek as its highest peak (1515m). The central and eastern part of the plateau i.e. the Khasi and Jaintia Hills is a true plateau with its senile topography and flat skyline. It is marked by peneplained surfaces, faults, flat-topped hills and river valleys. The most important physiographic unit in this part is the central upland zone which covers about one third of central and Eastern Meghalaya. The highest point of this region is the Shillong peak (1961m). The southern part of the plateau has steep slopes and

has been deeply eroded by heavy rainfall.

The drainage system of Meghalaya is controlled by the Tura range and the central upland zone which act as watersheds from where the rivers flow down to the Bangladesh plain in the south and the Brahmaputra valley in the north. Most of the rivers flow along joints and faults and therefore have straight courses. In the southern Khasi Hills they have carved out deep gorges and have several waterfalls.

The climatic conditions vary from one part of the region to the other. The western Meghalaya which is relatively lower in height experiences a fairly high temperature for most part of the year with the mean maximum of 32.5°C . The mean minimum goes down to 12.3°C . Here the average annual rainfall is more than 3,000 mm which occurs mostly during the summer months. In Central and Eastern Meghalaya, the central upland zone has a moderate climate but the foothills of the southern slopes and the sub-mountain region in the north and east are slightly humid and warm. In the Shillong area the mean maximum temperature does not exceed 24°C in any part of the year and in January the mean minimum is 3.6°C . The average annual rainfall in Central and Eastern Meghalaya is more than 7700mm. Mawsynram, a village near Cherrapunji receives an annual rainfall of 13,923 mm which is the highest in the world.

The differences in geology, relief, climate and vegetation have produced a variety of soils in the region - red loamy soils, laterite soils, red and yellow soils and alluvial soils.

The region has a variety of natural vegetation, ranging from tropical mixed forests to pure stand of pine forests. In western Meghalaya, the northern and the southern low hills with warm

and humid climate have dense tropical mixed forests where sal and bamboo are the most important trees. In the higher parts of the Tura range where the climate is relatively cooler, there occurs a small patch of temperate forest with pines and firs as important species. In central and Eastern Meghalaya, the mixed tropical evergreen hardwood forests occur in the northern and the southern parts up to an elevation of about 900 m. Thickets of bamboo, cane and wild banana occur on the hill slopes. The grasslands occur in the lower parts of the central upland zone between the elevations of 900 - 1350m.

II

During the period 1901 - 1971 the population of Meghalaya has gone up from 3,40,525 to 10,11,699, recording a population growth of 197.10 per cent. The average decennial growth during this period has been 17.12 per cent. In general the growth rate of population in urban areas has been much higher than in the rural areas.

The population of the region is very unevenly distributed. The distribution is governed mainly by topography, soil, availability of water, mineral resources and accessibility to the areas. Since the economy of the region is primarily agricultural, the topography and soil have profound influence on the regional distribution of population. The population of the region is mainly concentrated in (i) the areas around Shillong and Jowai, (ii) the neighbourhood of Cherrapunji and Dawki and (iii) the northern, western and Southern fringe areas of the Garo Hills. The sparsely populated areas of the region are the northern and south-western parts of Khasi Hills, most parts of Jaintia Hills and the interiors of Garo Hills.

The overall density of population in the region is 45

persons per sq. km. It is much less than the density of 77 persons per sq. km. in the North-Eastern Region and 162 persons per sq. km. in India.

The population of Meghalaya has two major groups - tribal and non-tribal. The tribal component of the population is about 80 per cent. In the interior mauzas of Garo Hills the percentage of tribal population is more than 97 per cent. In the fringe mauzas of Garo Hills the percentage of tribal population is quite low. Out of the total non-tribal population of the region, more than 40 per cent live in the urban centres and the rest in the rural areas.

The percentage of literate persons in the region as a whole is 29.49. It is slightly higher than the national average of 29.46 per cent. At district level, it is 42.50 per cent in Khasi Hills, 23.57 per cent in Garo Hills and 19.94 per cent in Jaintia Hills. The percentage of literacy is higher in the urban areas than in the rural areas - 65.22 per cent in urban and 23.40 per cent in rural. The female literacy in the region is 24.56 per cent which is higher than the all India average of 18.72 per cent.

The region has experienced large scale in migration of population during the recent years. According to 1971 census, from other states of India 53,171 persons have come who constitute 5.3 per cent of the total population of the region. The region has also received a large number of in migrants from Nepal and East Pakistan (now Bangladesh).

The in-migration of population has affected the social and economic life of the region by bringing changes in sex and age structure, dependency ratio, occupational structure, employment and in social and cultural set-up. On the whole, migration has resulted

in improving the economic condition and in general it has led to a broader social outlook and more education.

The Nepali immigrants have played an important role in the agricultural economy of the region and practically the entire business of milk and milk products is in the hands of these immigrants. The Bengali Muslims who migrated to the western parts of Garo Hills have engaged themselves as cultivators or agricultural labourers and thus have contributed to the agricultural economy of the area.

III

Meghalaya is a region where the proportion of working population is 44.17 per cent of the total population showing high dependency of the working population, 81.84 per cent is engaged in primary sector, 3.30 per cent in secondary and 14.86 per cent in tertiary.

Meghalaya is an agricultural region where 79 per cent of the total working population is engaged in agriculture. Although agriculture occupies an important place in the economy of the region, only 8.2 per cent of the total geographical area is available for cultivation. The important crops are rice, maize, cotton, jute, potato, pine apple, oilseeds and banana. The climatic conditions are quite suitable for agriculture but due to rugged topography and less productive soils the per acre production of crops is very low, except in valleys and the border areas. The intensity of agriculture is very high in Dadenggiri block of Garo Hills and Mawphlang, Mylliem, Bhoi area and Mawryngkneng blocks of Khasi Hills due to fertile soil, favourable topography and the availability of markets.

Animal husbandry and dairy farming is an important economic

activity in the region. The region has 4.7 lakh cattle, 0.46 lakh buffaloes, 0.18 lakh sheep, 0.96 lakh goats, 0.05 lakh horses and ponies and 1.3 lakh pigs. It has the highest number of high-yielding cross-bred cattle in India most of which are reared in and around Shillong. There is a milk chilling plant at Naya Bungalow and creamery and ghee making units are located at Tura, Jowai and Rongram. Pig farms have been established at Shillong, Tura, Nongstoin, Jowai and Rongjeng.

The forests of Meghalaya are rich and extensive and provide good quality timber and minor forest produce such as fodder grass, bamboo, fire wood and various species of medicinal plants and orchids.

The region is rich in mineral resources like coal, limestone, sillimanite and clay. Based on coal and limestone of the nearby areas a cement factory has been established at Mawmluh, near Cherrapunji. In future some more mineral-based industries may be established.

Meghalaya has great potentiality for the development of hydel power. The hydel power resources can be tapped when, with the growth of industries and the rural electrification the demand for power will increase.

The important industries of the region are the cement factory at Mawmluh (Cherrapunji), the plywood factory at Burnihat and the essential oils and chemical factory at Mawshwok, a village in south Khasi Hills. Other industries include saw mills, motor workshops, engineering works, printing presses, flour mills and fruit preservation factories. Sericulture and weaving, bamboo and cane works, pottery, blacksmithy, soap making, carpentry and bee keeping are the small scale and cottage industries of the region.

IV

Roads are the chief means of transport in Meghalaya; waterways and airways are practically insignificant and railways are absent. There are two national highways in the region: (i) The Jorabat-Shillong-Tamabil road and (ii) The Shillong-Jowai-Badarpur-Agartala road. Among other important roads mention may be made of the Damra-Darugiri-Nangalbibra-Baghmara road, the Paikon-Bajengdoba-Tura-Dalu-Baghmara road, the Mendipathar-Phulbari-Tura road, the Shillong-Jowai-Garampani road, the Shillong-Mawphlang-Mawsynram-Balat-Baghmara road, the Umtyngar-Cherrapunji - Shella road and the Shillong-Nongstoin-Tura road.

Meghalaya has a road length of only 3315 kilometers and most of the roads are either gravelled or Kachcha. The overall density of roads in the region is 13.85 km. per 100 sq. km. of area. It is observed that the areas of high density coincide with the areas of low relief and high productivity. On the other hand, the areas of low density are those which have uneven topography and less productive soils.

The region is marked by vast tracts of inaccessible land due to its rugged topography. As such, further development of roads in the region is essential.

V

Meghalaya is a region of ancient settlement in the country. Before the advent of the British the settlements of the region were isolated from each other due to difficult terrain, dense forests and lack of transport network. The British opened up this region and the rural settlements started experiencing some changes, particularly in their size and form. After the independence the settlements of the region were marked by rapid changes in structure and

content. The forced migration into the region as a result of partition and the general economic development in the North-East had profound influence on the settlements.

The rural settlements in the region are confined to the gentle slopes and intermontane valleys which are suitable for *agriculture*. More than 90 per cent of the villages are small size settlements, with less than 500 population. There are six urban centres in the region among which Shillong with its three satellite towns, namely Shillong cantonment, Nongthymmai and Mawlai forms the largest urban concentration and contains 83.41 per cent of the total urban population of the region. It has developed mainly due to the administrative base. The satellite towns mentioned above are contiguous suburbs of Shillong proper and they have grown to accommodate the growing population of the state headquarters. Tura in Garo Hills and Jowai in Jaintia Hills also have developed to carry out administrative function. Besides these, a number of market centres with several urban characteristics are growing along the main roads. Among such centres mention may be made of Cherrapunji, Mawphlang, Shella, Dawki, Nongstoin, Naya Bunglow, Nongpoh and Burnihat in Khasi Hills, Phulbari, Dalua, Bagmara, Siju, Dainadubi, Garobadh, Singrimari and Rachu Belpara in Garo Hills.

VI

As regards the levels of development it is found that there are two units Mauza X and Shillong Police stations which are industrially more developed. The interior mauzas of Garo Hills and Nongpoh and Dawki police stations of Khasi Hills are the most backward in this respect. In terms of social facilities the position is more clear. There are 14 units which are broadly with low development of social facilities, including Shillong Police Station. Infra-

structurally, apart from the inflated situation of Mauza X, the Shillong P.S. dominates with 14 other units which are very less developed. Considering the overall development it is found that Shillong, Jowai and Cherra police stations are more developed compared to other parts of the region.

Meghalaya is one of the backward regions of India where tribal culture economy and echos prevail. It awaits economic and social development.

The following are the main problems of the region connected with the socio-economic development.

1. Meghalaya possesses great potentiality for the development of agriculture. But there are several problems in the way of agricultural development. The greatest problem is the jhum cultivation (shifting cultivation). The jhum cultivation is uneconomic and wasteful. The per acre production under this system is quite low. It also affects the social conditions since social amenities can not be easily provided to the people. As such, the Jhum cultivation should be replaced by improved form of land management but the change should be introduced step by step so that the way of life of the jhum cultivators is not disturbed. In recent years there seems to be a change in the attitude of the cultivators as a result of measures taken by the Government.

The absence of proper marketing facilities also retards the development of agriculture in the region. New crops may be grown by the farmers but they must feel confident that they will get a remunerative price for their products in the market. The absence of a well developed transport net work does not help in the growth of markets and as a result hampers the cultivation of

cash crops in particular and agriculture in general. The Government may take steps to construct a network of feeder roads to connect the various centres of production. Steps should also be taken to eliminate the middlemen and to provide storage facilities to the farmers. This will go a long way in providing incentive to them.

The customary land laws also stand on the way of agricultural development. The land ownership system does not encourage the farmers to improve the land because they know that they may lose the land to the community if the plots are left for three years continuously. Banking facilities are not available to the farmers as they have only the right of occupancy and use over the land.

Another problem of agriculture is the soil erosion. It is mainly due to shifting cultivation in a region which is characterized by rugged topography and heavy rainfall. Controlled grazing, construction of bunds increased terrace farming and afforestation are some of the measures to check the soil erosion in this region.

The region has got vast areas classified as "uncultivable waste". Such lands may be used for the cultivation of horticultural crops like pine apple, plum, orange and others.

2. Meghalaya is industrially backward inspite of its vast mineral forest and agricultural resources. The only mineral based industry in the region is the cement factory at Mawmluh. Some new cement factories may be established in Garo Hills as well as Jaintia Hills. The limestone deposits at Nongkhlieh and Lakadong are most suitable for the manufacture of calcium carbide.

The vast reserves of coal can be used for the manufacture

of urea, carbon black and other chemical products. The clay deposits, both of fire clay and china clay can be utilized for setting up few refractory and pottery industries.

The forest resources of the region can be utilized for setting up forest-based industries. At present there are 28 saw mills in the region. Some more such factories may be established. The bamboo resources of Garo Hills can support a small paper plant.

Industries based on horticultural resources have a good prospect. More fruit processing units to produce squash, jelly, jam and tinned fruits can be established.

There also exists the possibility of setting up industries based on livestock and dairy farming, such as meat processing, tannery works and pig bristles for processing and brush making.

3. For the all round development of the region a good network of transport lines is essential. Unfortunately, Meghalaya has a poor network of roads, waterways are practically insignificant and railways are absent. Old roads are to be improved and new feeder roads are to be constructed. The North Eastern council sponsored a survey for a proposed broad gauge railway line from Jogighopa to Darranggiri. The Survey was done in 1975 from Pancharatna to Darranggiri via Dudhnai. The construction of the proposed railway line will help in the exploitation of the mineral resources of the Garo Hills.

The economy of the areas bordering Bangladesh was disrupted due to partition of the country in 1947. Before the country was divided the produce of the areas such as oranges, pineapples, betel-leaves and forest products like bamboo and timber had a ready

and accessible market. Due to partition the market was closed and the people were hard-hit. The economy of the border areas can be restored by constructing roads to link these areas with the markets.

4. The rural settlements of the region are mostly small sized settlements and are scattered. This is more so in the Garo Hills. The result is that the social amenities are not only costly but also unsatisfactory. The majority of villages have no access to the centralised services which are so essential for a happy and healthy life. Public utility services hardly exist. Electricity has practically not reached the villages. To solve these problems the grouping of villages may be suggested.

Old localities of the urban centres lack hygienic sanitary conditions houses are poor and worn out and public utility services are most unsatisfactory.

For any development and improvement programmes an understanding of the regional characteristics in respect of physical conditions, demographic and social structure, economic base, transport network and settlements is essential. It is hoped that the present study will provide a base for the social and economic development of the region. There is need of more geographical studies of intensive type on Meghalaya, both to understand the regional characteristics and to plan for its future development.

APPENDIX - I

Occupational Structure in Meghalaya 1971

Mauzas/ Police Stations		Percentage to Total popu- lation		Percentage to total workers in							
		Workers	Non-workers	Agriculture	Livestock Forestry	Mining & Quarrying	Manufg. processing	Const- nuction	Trade & Commerce	Transport Storage	Other services
				4	5	6	7	8	9	10	11
Mauza-I	R	47.67	52.33	94.32	0.23	0.02	0.16	0.17	0.44	.12	4.54
Mauza-II	R	50.59	49.41	96.97	0.25	...	0.26	0.14	0.16	.06	2.17
Mauza-III	R	47.17	52.83	93.37	0.41	...	2.05	0.06	0.38	.08	3.66
Mauza-IV	R	41.16	58.84	95.21	0.31	...	0.40	0.02	0.22	0.05	3.79
Mauza-V	R	30.74	69.26	88.84	0.4	1.0	1.61	0.16	2.71	0.89	5.75
Mauza-VI	R	29.69	70.31	84.46	0.68	...	2.60	0.58	4.88	0.37	6.43
Mauza-VII	R	29.39	70.61	90.97	1.32	...	1.29	0.02	1.22	0.45	5.09
Mauza-VIII	R	34.39	65.61	86.30	1.34	...	4.02	0.15	2.68	0.14	5.38
Mauza-IX	R	34.78	65.22	73.82	1.00	0.02	3.1	1.24	6.15	2.41	12.20
Mauza-X	T	29.71	70.29	19.91	0.60	...	5.9	3.36	15.90	2.03	52.30
	R	39.16	60.84	74.45	0.08	...	4.42	0.25	10.89	0.41	9.50
	U	27.81	72.19	4.46	0.74	...	6.32	4.25	17.32	2.48	64.43

Contd.

136

Table contd...

		1	2	3	4	5	6	7	8	9	10	11
Nongpoh P.S.	R	46.94	53.06	89.92	1.32	0.03	0.53	0.21	0.93	0.94	6.13	
	T	43.45	56.55	63.51	1.59	0.06	3.94	2.00	5.94	2.64	20.33	
	R	49.84	50.16	86.90	1.48	0.07	1.32	0.81	1.26	0.51	7.64	
	U	32.84	67.16	4.59	1.84	0.03	10.53	4.98	17.73	8.00	52.29	
Cherrapunji P.S.	R	49.60	50.40	72.91	10.71	1.33	2.59	1.21	2.49	1.63	7.21	
Dawki(i)	R	54.48	45.52	89.29	3.43	0.02	2.37	0.16	1.20	0.43	3.10	
Jowai P.S.	T	48.77	51.23	84.36	3.34	0.01	2.09	0.73	1.46	0.65	7.36	
	R	48.39	51.61	89.45	3.41	0.01	0.98	0.19	0.69	0.24	5.05	
	U	33.31	66.69	7.36	2.19	0.03	18.86	8.91	13.45	6.86	42.32	137
Dawki(ii)	R	48.72	51.28	58.89	28.21	0.07	1.90	0.45	2.85	1.09	6.54	
Region	T	44.17	55.83	79.0	2.66	0.15	2.35	0.95	2.98	1.25	10.63	
	R	46.18	53.82	87.88	2.77	0.16	1.36	0.45	1.26	0.52	5.60	
	U	32.34	67.66	4.75	1.76	0.03	10.67	5.16	17.43	7.43	52.77	

Source: Based on census of India, Part-II A State Primary Census Abstract 1971.

APPENDIX - II

Sl. No.	Code No.	Broad Groups	Title
1.	A ₁	Industrial	% of workers in secondary sector to total workers (1971)
2.	A ₂		% of workers in trade and commerce to total workers (1971)
3.	A ₃		% of workers in non-household industries to workers in secondary sector (1971)
4.	B ₁	Social	% of villages having primary schools to total villages.
5.	B ₂		Literacy rate (1971)
6.	B ₃		% of villages having dispensaries and primary medical facilities to total no of villages.
7.	B ₄		% of villages having post offices to total villages.
8.	C ₁	Infrastructural	Density of surfaced road/100kms ²
9.	C ₂		Density of un-surfaced road/100 kms ²
10.	C ₃		% of urban population to total population
11.	C ₄		% of villages having power connection to total no. of villages

N.B. (1) No methodological basis was taken for the classification into groups and therefore the groupings are subjective.

(2) All the variables roughly correspond to one time period.

APPENDIX - III

1. By Kendall's method, if there are three variables x_1, x_2, x_3 to arrive at a composite index x^* would be such that,

$$rx^*x_1 + rx^*x_2 + rx^*x_3 = K \quad L$$

$$\text{while } L = ryx_1 + ryx_2 + ryx_3$$

where y is any other composite index,

and r the correlation coefficients.

2. Find, R_x , the correlation matrix of x_1, x_2, x_3 which would be also symmetrical.

$$RP = P$$

$$\text{or } R = I$$

$$\text{or } R - I = 0 \text{ (characteristic equation)}$$

and solve values of

$$P = \text{a vector}$$

$$= \text{the eigen value (constant)}$$

$$I = \text{the identity matrix of the dimension of } R$$

$$4. \text{ But, } (R - I) P = 0 \quad (j \dots \dots k)$$

Simultaneously solve value of P vector; (P_1, P_2, P_3)

5. Normalise P , so that,

$$w_i = \frac{P_i (1, 2, \dots, n)}{P_1^2 + P_2^2 + \dots + P_n^2}$$

6. To remove the scale bias normalise x , i.e.,

$$\frac{x_1}{\bar{x}_1} \quad \frac{x_2}{\bar{x}_2} \quad \text{etc. to get } x^*_1 \quad x^*_2 \quad \text{etc.}$$

$$7. x^* = x_1^* w_1 + x_2^* w_2 + x_3^* w_3$$

APPENDIX - IV

Computed values of R_s , s and w_s

(a)	R_A	=	1.00				
			0.88	1.00			
			0.45	0.56	1.00		
	R_B	=	1.00				
			0.06	1.00			
			0.14	0.75	1.00		
			0.17	0.36	0.70	1.00	
	R_C	=	1.00				
			0.76	1.00			
			0.55	0.30	1.00		
			0.25	0.35	0.15	1.00	
	R_F	=	1.00				
			0.79	1.00			
			0.89	0.83	1.00		
(b)	A	=	1,	0.11	<u>1.94</u>		
	B	=	1,	1,	1.97	0.03	
	C	=	1,	1,	1.87	0.13	
	F	=	1,	1.83	0.17		
(c)	WA :	w_{A1}	=	0.88			
		w_{A2}	=	0.07			
		w_{A3}	=	0.48			
	WB :	w_{B1}	=	0.21			
		w_{B2}	=	0.60			
		w_{B3}	=	0.48			
		w_{B4}	=	0.60			
	WC :	w_{C1}	=	0.58			
		w_{C2}	=	0.02			
		w_{C3}	=	0.75			
		w_{C4}	=	0.30			
	WF :	w_{F1}	=	0.70			
		w_{F2}	=	0.71			
		w_{F3}	=	0.02			

BIBLIOGRAPHY

BIBLIOGRAPHY

A. BOOKS

1. AGARWAL, P.C., Human Geography of Bastar District
Garga Brothers, Allahabad, 1968.
2. BHOMIK, K.L. Tribal India - A Profile in Indian
Ethnology, The World Press, Cal-
cutta, 1971.
3. BAREN, H., Meghalaya, North-Eastern India News
and Features Service, Shillong,
1974.
4. _____ The History and Culture of the
Khasi People, Calcutta, 1967.
5. BLANFORD, H.F., The Climates and Weather of India,
Burma, and Ceylon, London, 1889.
6. BRUNHES, J., Human Geography, New York, 1920.
7. DAS, H.P. Geography of Assam, N.B.T., New
Delhi, 1970.
8. DAS, P.K., The Monsoons, N.B.T., New Delhi,
1968.
9. FINCH, V.C., Elements of Geography, McGraw Hill
Book Co. Newyork, 1936.
10. GOSWAMI, D.N.D., Geology of Assam, Gauhati, 1960.
11. HUNTINGTON, E. & Principles of Human Geography, Asia
SHAW B., Publishing House, Bombay, 1959.
12. KAR, P.C., British Annexation of Garo Hills, Neo
Bharat Publication, Calcutta, 1970.
13. LAHIRI, T.B., Balanced Regional Development,
Calcutta, 1970.
14. LEONG, G.C. & Human and Economic Geography, Oxford
MORGAN, G.C. University Press, Fourth Impression,
1973.
15. MAHMOOD, A. Statistical Method in Geographical
Studies, Rajesh Publication, New
Delhi, 1977.
16. MALI, D.D., An Introduction to the Economy of
Meghalaya, Patna's Mascot,
Shillong, 1978.

17. NATH, V., Resource Development Regions and Sub-divisions of India, New Delhi, 1954.
18. PRASAD, A., Chotanagpur-Geography of Rural Settlements, Ranchi, 1973.
19. PLAYFAIR, MAJOR, A. The Garos, United Publishers, Gauhati, 1975.
20. RAJAN, S.V.G. & RAO, H.G.G. Studies on Soils of India Vikas Publishing House, New Delhi, 1978.
21. ROBINSON, W., A Descriptive Account of Assam, Sanskaran Prakashan, Delhi, 1841, Reprinted 1975.
22. SHARMA, R.C., Settlement Geography of the Indian Desert, Kumar Brothers, New Delhi, 1972.
23. SINGH, R.L. India - A Regional Geography N.G.S.I., Varanasi, 1971.
24. ----- Rural Settlements in Monsoon Asia N.G.S.I., Varanasi, 1972.
25. SINGH, L.R., The Terai Region of U.P., Ram Narain Lal Beni Prasad, Allahabad, 1965.
26. SINGH, G., A Geography of India, Atma Ram & Sons, New Delhi, 1970.
27. SPATE, O.H.K. & LEARMONTH A.T.A. A General and Regional Geography of India, Methuen & Co. Ltd., London.
28. WADIA, D.N., Geology of India, Tata MacGraw Hill Publishing Co., New Delhi.

B. GOVERNMENT PUBLICATIONS

1. Census of India, 1961, Monograph series Vol.I No.8 "Economic Regionalization of India-Problems and Approaches" - Sen-Gupta, P.
2. Census of India, 1961, Vol. I, Part-I-A(i), "Levels of Regional Development in India - Mitra, A.
3. Census of India, 1971, General Population Tables Part-II A
4. Directorate of Economics and Statistics, Meghalaya Statistical Hand Book, 1975.

5. District Census Handbooks (1961 & 1971)
6. Geological Survey of India, Geology and Mineral Resources of the States of India, Miscellaneous Publication No. 30, Delhi, 1974.
7. Govt. of India, Monthly and Annual Normals of Rainfall Memoirs of the Indian Meteorological Department Part 3.
8. N.C.A.E.R. Techno-Economic Survey of Assam, New Delhi, 1960.
9. Planning Deptt., Govt. of Meghalaya, Fifth Five Year Plan, Draft Proposals, Vol. II Shillong, 1973.

C. JOURNALS AND MAGAZINES.

1. BHATTACHARYA, B., "Some observations on the Regional Disparities in India" Journal of the N.E.I.G.S., Vol. IX, No. 182, 1977 pp 1-8.
2. _____ "Methods for Identifying Less Developed Regions with specific reference to an Indian case" Journal of the N.E.I.G.S., Vol. II, No. 2, 1970 pp 135-140.
3. I.G.U. Proceedings of the pre-Congress Symposium and Field Study Meetings on the Physical Geography of Eastern Himalaya and the Meghalaya Plateau", S6 & E6, I.G.U., Gauhati, 1968.
4. JAMES, BIRD, "Road and Rail in the Central Massif of France", Annals of the Association of American Geographers, 1954.
5. JAMES, P.E., "Geographic Factors in the Development of Transportation in South America", Economic Geography, Vol. I, 1925.
6. KENDALL, M.G., "The Geographical Distribution of Crop Productivity in England", J.R.S.S., Vol. 102, 1939, pp 21-48.
7. MANDAL, B., "Crop-combination Regions of North Bihar, Journal of the N.G.S.I. vol.XV, Part-2, 1969.
8. MATHUR, L.P. & EVANS, P. "Oil in India". International Geological Congress, Twenty Second Session, New Delhi, 1964.
9. N.E.I.C.S.S.R "Shifting cultivation in North-East India" Shillong - 1976.

10. PAL, M.N., "Regional Disparities in the Levels of Development in India", I.J.R.S., Vol.II, No.1, 1975.
11. _____ "Quantitative Delimitation of Regions", Bombay Geographical Magazine No. 8 & 9, 1961.
12. SINGH, R.P., "Denudation Chronology in Indian Peninsula", Journal of the N.E.I.G.S., Vol. IV, No. 1 & 2, 1972.
13. ULFMAN, E.L., "The Railroad Patterns of the United States", The Geographical Review, Vol.39, 1949.
14. WEAVER, J.C. "Crop-Combination Regions in the Middle West", Geographical Review vol. XLIV, No. 2, 1954, pp 173-200.

D. MAPS AND ATLASES

1. Assam Surveys : District and Thana/Mauza Maps, 1956.
2. Govt. of India, National Atlas of India, Chatterjee, S.P., National Atlas Organization, Calcutta.
3. Oxford University Press, "Oxford School Atlas 1968.
4. Public Works Department, "Road Map of Meghalaya. Govt. of Meghalaya
5. Survey of India, One-inch Topo-sheets of the region.

ABOUT THE AUTHOR

The author was born in July, 1940 in the Ghazipur district of Uttar Pradesh. He obtained his Master degree in Geography from the University of Allahabad in 1960. Since September, 1961 he has been working as Head of the Department of Geography in St. Edmund's College, Shillong. In 1966 he did his B.T. from the Gauhati University. For the last few years he has been doing research in the field of Regional Geography along with his normal work.

MBRU Library
 Acc. 101408
 Acc. *Shillong*
 Cl. *Shillong*
 Sub. *Shillong*
 Date *Shillong*
 Transcribed by *Shillong*