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THE HIERARCHY OF CENTRAL PLACES IN NORTHERN CEYLON

ABSTRACT

There are over one thousand settlements in Northern Ceylon ranging in size from less than ten to over one hundred thousand people. Though most of them are rural, they have developed in a variety of ways and been affected by both economic and physical conditions. The functional character of these settlements varies greatly; 446 are without any recognized central functions and the number of functions range from one to one hundred and eight.

The study is primarily concerned with the central place system and the related phenomena of central place theory. The role of commercial and service organizations and markets and fairs in the distributive system of goods is analysed. The population and functional relations of settlements and threshold entry for different functions are determined. One hundred and twelve functions were recorded to assess the functional level of settlements. The concepts of aggregate and relative importance (nodality and centrality) were explored and techniques to measure these criteria were developed. Seven grades of central places were identified based on hierarchical principles and these are city, major town, town, township, large village, village and hamlet. Functional characteristics of the central place system are analysed on a regional and intra-urban basis. Service areas of functions and places were determined from the public transport pattern and other related data. Finally, an analysis was made of the future regional economic and settlement pattern and the application of central place theory in the creation of new settlements and to improve urban/rural relations.

THE HIERARCHY OF CENTRAL PLACES
IN
NORTHERN CEYLON

A thesis submitted to the Faculty of
Social Science, University of Durham
for the degree of Doctor of Philosophy

By

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B.A. (Hons).

Durham City, England
1972

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PREFACE

I was encouraged to undertake this research when I joined the staff of the Department of Geography, University of Ceylon in 1965. My interest in Northern Ceylon settlements and in central place theory was the main reason for undertaking this research. Many people helped me to accomplish the work and in particular, my supervisor (1969-1971) Mr. B. D. Clark, now a senior lecturer at the University of Aberdeen, to whom I wish to express my sincere gratitude. Though he left the University of Durham at a later stage of my work, he continued to help, guide and encourage me to complete the thesis.

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Lastly I would like to acknowledge the assistance of my wife both in a general and a particular sense. Not only has she encouraged me, but also read and typed the original manuscript. Her cheerful sacrifice and patience in looking after a house and two children made possible the completion of my work.

P.B.

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A GLOSSARY OF NON ENGLISH WORDS USED IN THE WORK

- Arecanut - Astringent seed of a species of areca(areca-kinds of palms).
- Arrack - Liquor usually distilled from the coconut palm.
- Aru - River or stream.
- Ayurvedic - Local medical system.
- Bazaar - Main market place of the town.
- Chena - Patch cultivated by shifting cultivation.
- Commandary - Administrative area.
- Eddam Madai - Feast on the eighth day after the car festival.
- Ganga - River.
- Grama Sevaka- Village Administrative Officer.
- Jaggery - A kind of sugar made from palmyra toddy.
- Kadai - Shop, Shopping area.
- Kanda - Hill.
- Kovil - Hindu temple.
- Kudiyiruppu - Settlement.
- Kulam - Tank.
- Kulama - Tank.
- Kurakkan - Finger millet (Eleusine Coracana), the main cereal crop of chena in the Dry Zone.
- Madhya Maha - Central College.
Vidyalayam
- Maha - Great season, the period of paddy cultivation during the North East Monsoon.
- Maha Vidya- _ High school.
layam
- Malai = Hill
- Mandapam - Cavern or hall.

measure - A quantity of two pounds of solids, i.e. rice.

Oya - River.

Palmyra - Borassus flabellifer.

Paranki - Burghers, descendants of Dutch people.

Pattu - Division.

Periya - Big.

Rupee - Ceylon currency; approximately 15 Rupees is equal to one Pound sterling.

Siddhi - Sub-system of local medical system.

Sinna - Small

Sinnamelam- Dance troopers.

Ther Thiru- Temple's chief festival day.
vila

Theru - Road or street.

Tivu - Island.

Toddy - Sap of palmyra or coconut.

Udayar - Chief village head-man.

Uliyam - Free service rendered to the state.

Unnani - Sub-system of local medical system.

Wewa - Tank.

Yala - Little season, the period of paddy cultivation during the South West Monsoon.

LIST OF ABBREVIATIONS USED IN THE WORK

A.A.A.G.	The Annals of the Association of American Geographers
C.B.D.	Central Business District
C.G.	Ceylon Geographer
C.J.H.S.S.	Ceylon Journal of Historical and Social Studies
C.T.B.	Ceylon Transport
C.W.E.	Co-operative Wholesale Establishment
D.R.O.	Divisional Revenue Officer
E.G.	Economic Geographer
G.C.E.A/L.	General Certificate of Education Advanced Level
G.J.	Geographical Journal
G.R.	Geographical Review
M.C.	Municipal Council
M.M.V.	Madhya Maha Vidyalayam
M.P.C.S.	Multi-Purpose Co-operative Society
M.V.	Maha Vidyalayam
N.D.A.P.U.	Northern Division Agricultural Producers' Union
PT50	Median Population Threshold
T.C.	Town Council
T.E.S.G.	Tijdschrift voor Economische en Sociale Geografie
J.T.G.	Journal of Tropical Geography
T.I.B.G.	Transactions of the Institute of British Geographers
U.C.	Urban Council
U.C.R.	University of Ceylon Review
V.C.	Village Council

INTRODUCTION

1

Northern Ceylon comprises three districts of Ceylon,^x namely Jaffna, Mannar and Vavuniya. This area is mainly settled by Ceylon Tamils and the Hindu culture is predominant. The history, customs and traditions of this part of the country are markedly different to the southern part of the Republic. Topographically, the whole study area is essentially a plain with most areas below 300 feet. Jaffna Peninsula and the Islands are flat low lying areas nowhere rising above 50 feet. The sedimentary limestone on the Peninsula which provides good ground water has assisted the growth of the region. Seasonal rainfall patterns and lack of ground water resources on the Mainland (taken in the thesis to mean the area south of the Peninsula) have restricted the development of agriculture and settlements. Malaria, cholera and other endemic diseases also prevented the development of the Mainland prior to the 1940's. Primary activities such as agriculture and fishing are dominant in the economic structure of the area. However, tertiary activities and financial remittances particularly from Southern Ceylon and Colombo are important elements in the geographical functioning of the Peninsula.

In 1971, there were 874,285 inhabitants in Northern Ceylon and this represents 7 per cent of the total Ceylon population.¹ In population density and distribution there is

^xNow known as Republic of Sri Lanka.

a great contrast between Jaffna Peninsula and the Mainland. Some of the most important features of the population composition are as follows: (1) fifty per cent of the population is under 19 years of age, (2) males predominate and this is particularly apparent on the Mainland and in urban areas, (3) Ceylon Tamils practising the Hindu religion are the main ethnic group.

Northern Ceylon consists of one city (Jaffna), a few urban centres and a large number of rural settlements. In the 20th century the country has not experienced so rapid a growth of urbanization as in many other underdeveloped countries in Asia or Africa, such as Malaya or Morocco. Though the degree of urbanization is low in African countries, the growth of major towns and cities has been very rapid as shown for example, by Kinshasa, Casablanca, Johannesburg and Cairo.² Only 18.8 per cent of the total population of Ceylon was defined as urban in 1963, and the urban population increased by only 6.4 per cent between 1901 and 1963, 2.9 per cent of this increase occurring between 1953 and 1963. This latter figure was due to the inclusion of town councils as urban status settlements, whereas in previous censuses, the municipal and urban councils alone were considered as urban. These figures show the low growth of urbanization in Ceylon. The limited urban growth that did occur between 1901 and 1931 was due to immigration to urban centres from rural areas.³ Thereafter, the main reason for the urban growth has been natural population increase within the towns, the promotion, wholly or partly, of rural settlements to urban

status and the boundary extension of existing towns. In fact, in the 1953 and 1963 intercensal period, except for a few urban centres in the Dry Zone and the suburban centres of Colombo, all other towns of Ceylon had a low population growth in comparison with their districts.

With the exception of Colombo, the urban centres of Ceylon are mainly non-industrial in character and primarily perform service functions. These places act as centres providing goods and services to their rural complementary areas and for themselves. The service functions are the basic or city forming processes in the growth of urban centres. In this respect, a functional study of settlements is more effective than the analysis of a few important centres. The definition of urban centres in some cases excludes functionally important rural centres which may be of equal importance. Some urban phenomena such as immigration, industrial employment, land use patterns, morphology and other related concepts are in general not important in the context of an analysis of the urban centres of Northern Ceylon. Characteristics of urban land use and morphology do however, have some importance in Jaffna city. The other smaller centres have a very small core area and there is often no clear spatial differentiation between commercial and other functions. Overall therefore, it can be argued that the functional aspects of settlement study, based on a central place theme, give the most suitable interpretation of functional relationships. The present study is an attempt at a detailed analysis of the functional aspects of the settlements and the hierarchy of central places. However,

general geographical aspects of the area and other characteristics of the settlements are discussed in order to analyse the regional character which has had an influence on the hierarchy of central places.

In recent years the application of central place theory to study settlement relationships, urban spheres of influence, town and country relationships, and planning of shopping centres and settlements has increased.⁴ However, such studies are as yet few in number in developing countries. In Ceylon, with the exception of Gunawardena's work on Southern Ceylon, no previous study of this nature exists.⁵ The present study therefore, is an attempt to extend coverage to a further part of the country.

Central place theory is one of the few location theories developed by geographers for most of the other location theories were the products of economists and sociologists. Christaller's central place theory deals with locations of trades and institutions. This theory is similar to Von Thunen's theory of location of agricultural production, and Alfred Weber's theory of location of industries. Christaller and Losch's theories were based on the behaviour of retailers and consumers over time and space. However, Christaller's theory is more suitable for the analysis of retail and service functions in the tertiary sector than that of Losch whose "economic landscapes" are more relevant to secondary production at its later market oriented stages.⁶ Because of this, Losch's theory is not generally used by settlement geographers. Christaller's central place theory is more suitable and in

Bunge's words "if it were not for the existence of central place theory, it would not be possible to be emphatic about the existence of a theoretical geography independent of any set of mother sciences. Geography is a basic science since it produces new theory and the proof of that assertion lies most clearly in the existence of central place theory. With the possible exception of cartography, this author is of the opinion that the initial and growing beauty of central place theory is geography's finest intellectual product and puts Christaller in a place of great honour".⁷

Christaller (1933) starts his analysis with the question "are there laws which determine the number, sizes and distribution of towns?".⁸ In explaining the growth and distribution of towns, he rejected "purely geographical inquiry", and at the same time he equally rejected historical investigation and statistical method. He formulated his central place theory from the logic of economic principles. He developed the theory based on the concept of the range of goods. From this, he built up the hierarchical concept of goods and places. The different system of central places was developed based on marketing $K = 3$, transportation $K = 4$, and administrative principles $K = 7$. In each system, concepts of efficiency, minimum effort, maximum competition between centres and compactness of centres are taken. However, because of the dynamic character of towns, these factors change according to social and economic changes.

Berry and Garrison refined and expanded his marketing principle to modern needs.⁹ They used the two concepts of

threshold (conditions of entry) and range (dimensions of trade area under spatial competition), and showed how a hierarchy can result whatever the distribution of population and purchasing power. They further point out that there are other problems regarding Christaller's central place theory. It does not explain the locations and all types of towns, as it is mainly concerned with service towns; hexagonal trade areas are not found in reality, and the concept of a hierarchy of centres is in partial conflict with the concept of a continuum.

Free movements of goods and people on an economic and rational basis are important in central place theory. The market forces play without any interference for production and supply of goods. However, this does not fully apply in the study area, for the role of the state in the distribution of goods, state subsidies, control and monopoly characteristics affect the free development of goods and services. State control and restrictions affect the growth of towns. For example, in Northern Ceylon, if the state removes control systems in the economic field as well as in the distribution of food commodities, lower order centres will lose their importance in favour of higher order centres.

Berry has also pointed out that markets and fairs are an important element in the distribution of goods and services in peasant societies.¹⁰ These are also central places but not of a permanent character. Though, there are markets and fairs in Northern Ceylon, their importance is limited because of the large number of permanent urban and rural centres.

However, they do play an important role in the distribution of food commodities (fish and vegetables) in the main distributive system.

As central places increase in population, they are expected to show an increase in their number of central functions, increases in functional units and increases in their trade areas. These patterns are noticeable in the settlements of Northern Ceylon. However, there are some anomalies due to their functional characteristics and their locations. The concept of threshold is one of the fundamental aspects of central place theory. The Reed-Muench method for establishing the median threshold population is examined for nearly three quarters of the functions recognized in the study.¹¹ The population threshold is high except for a few lower order functions. This reflects a low standard of living and low consumption of goods. Underemployment, unemployment and low capital investment are the reasons for small population thresholds in lower order commercial functions.

The identification of true central places is the main feature of central place study. All settlements with central functions are not central places. Places with relative importance of functions are the true central places. However, the relative (centrality) and aggregate (nodality) importance of the settlements are essential in a functional study. Because of this the concepts of nodality and centrality are analysed in the study but these rigid criteria will not help to analyse the functional importance of places. Measuring the nodality and centrality of settlements is one of the most difficult problems in central place studies. Existing techniques

mainly deal with nodality measurements. There is no suitable centrality technique to measure the relative importance of places in underdeveloped areas. In order to calculate the true centrality of places, a technique is evolved to express the relative importance of the places. This is called the "cumulative dependent population", technique. According to this method, dependent populations for each function and cumulative dependent population for places are calculated. Based on nodality and centrality measures, hierarchical classifications were also made.

The size of places reflects the size of their complementary areas. The urban sphere of influence can be determined by various methods. Firstly, comprehensive or sample surveys can be made of the central functions in an area to determine their complementary areas. This is based on an analysis of deliveries, location of customers, or central goods suppliers' assessment of their service areas. The second survey method is to interview shoppers and central goods consumers at consuming places or at their residences. Thirdly, the service areas of central places can be determined by analysing public transport systems, movement of passengers and other indicators of functional areas such as newspaper circulation and administrative functional areas. In this study, the public transport system and administrative functional areas are taken for the demarcation of service areas. However, some information gathered during the field work about urban rural relationships are also used to demarcate the service areas.

Central place theory has been applied to the development of settlement in Israel¹² and the Netherlands,¹³ and used in

Canada to improve rural facilities in Saskatchewan province.¹⁴ The application of central place concepts in the Northern Ceylon settlement hierarchy will bring long term benefits. Colonization on the Mainland and in the entire Dry Zone of Ceylon is a main feature of the programme of development and is associated with agricultural development and creation of new settlements. The rapid population growth on the Mainland as well as in the Dry Zone is a major factor leading to this policy. Creating more amenities and service facilities are essential for the growth of the settlements. Central place concepts can be used in developing service centres in new areas and rationalizing the distribution of functions in developed areas.

Choice of Study Area

Spatial interdependence of centres and functional wholeness of the system are two fundamental characteristics of central place theory. To a large extent, Northern Ceylon fulfills these two conditions. Towns within this area are more interlinked than with the towns outside the area. In terms of its functional wholeness, the study area can be treated as a closed system under Jaffna. In the context of Ceylon, Jaffna, Kandy and Galle are the second tier of urban centres after Colombo in the urban hierarchy. The second order hierarchical level of national functions are found in Jaffna. As Green pointed out "By speaking of "functional" regions, we make regional geography more realistic to the man in the street."¹⁵ In addition to these, homogeneity and the author's familiarity with the area were of considerable help.

Tamil is the main language of the people of the study area and this helped the author to understand the social characteristics of the people and to undertake field survey. However, the author's knowledge of the Sinhala language also helped the field surveys in the four Grama Sevaka divisions in the Vavuniya district and in reading official reports, which in some cases are only available in Sinhala. Though the study area is culturally homogeneous, it contains sufficient variations of a geographical, historical and economic nature for the development of different patterns of settlement.

Source of Data

The problem in central place studies is the need for similar data for different sizes of settlements, ranging from cities to small hamlets. This absence of data is one of the main factors hindering urban research in developing countries. In the study area, there is a marked paucity of published data about commercial and non-government functions. Some published and unpublished data is available for certain administrative functions. The main problem with the published data is that the details are not given by settlement units but by district which may include several settlements. The usefulness of this type of statistical data is very limited in central place studies because data about functions and population are needed at settlement level. Information about commercial functions is scanty and there are no detailed comprehensive trade or telephone directories as in western countries, where many central place studies based on this source have been utilized. Central

function details were collected by field inventory. The field work was carried out between October 1968 and August 1969.

In summary therefore, data on Northern Ceylon settlements and central functions is in three categories:- Published data, Unpublished data and Field work.

1. Published data

1. The Census of Ceylon 1871-1963. (population of the area by district, division, town and village and demographic characteristics)
2. The Census of Agriculture 1960.
3. Statistical Abstract of Ceylon. (This covers a wide range of data, but the figures are usually at the district level).
4. Annual reports of Central Bank of Ceylon. (National economic situation and the production figures of some of the industrial corporations within the study area).
5. Ceylon Government Gazettes. (Information about local authorities, Local Government budgets and other related details).
6. Administrative reports from heads of government departments. (Information concerning departmental activities).
7. Reports of District Government Agents. (Annual district reports about local revenue, rice ration coupons, toddy, arrack and foreign liquor bars, and the general economic progress of districts).
8. Village lists of the Northern Province. Villages in the Northern Province are listed alphabetically and show the G.rama Sevaka Division in which they are located, the

Magistrates, Rural Courts and Police stations which have jurisdiction over them, and Births and Deaths Registration divisions and Electoral districts.

9. Telephone directory of Ceylon.
10. Ferguson's Ceylon directory.

Maps

Topographical sheets and land use sheets - one inch to one mile, town maps - ten chains to one mile, and air photographs. These maps and air photographs were produced by the Department of Survey, Ceylon. The location of settlements is identified from the topographical sheets. However, some of the topographical sheets do not cover the development of settlements that took place on the Mainland in 1950's and 1960's. The land use sheets and air photographs are recent ones (late 1950's and 1960's) and these are useful to identify the pattern of settlements.

From published data, details of the population of settlements, and information on some state central functions are available. In Ceylon, there is no fully developed trade directory giving detailed information about urban functions. The amount of information in Ferguson's directory is limited and as field surveys showed far from accurate. The directory mainly deals with higher order state, mercantile and professional functions found in large towns. Details about towns, except Colombo, are scantily covered. The telephone facilities are inadequate and the usefulness of the telephone directory is also very limited. However, one can identify the location of higher order functions such as some central government functions.

2. Unpublished data

1. District Kacheheri (District Head Office) - Details about recent colonization schemes; Food Control Department's activities, co-operatives, Multi-Purpose Co-operative Society Union Depots, authorised dealers and registered traders in some trades and professions; Information about cottage and handicraft industries.
2. Assistant Commissioner of Local Government Offices - Information about Local Government institutions such as Urban, Town and Village Councils.
3. Municipal, Urban, Town and Village Councils Offices - Information about certain central functions and details about markets, revenue, facilities and amenities under their jurisdiction.
4. Ceylon Transport Board - Bus traffic data - (roads, scheduled and operated mileages; frequency of bus services; fares and number of passengers travelling on routes).
5. Ceylon Government Railway Stations - Frequency of services and passenger details.
6. Co-operative Federation Office - Details about co-operative societies.
7. Department of Education - Details about schools.

3. Field work

Field work was the main method of collecting data on central functions and functional units found in settlements. Based on the 1963 census and the village lists of the Northern province, 1,015 settlements of Northern Ceylon were identified.

The field work involved a personal survey of centres, the

making of an inventory of functions and functional units and interviews. The main aspect of the field work was the inventory of functions and functional units found in the settlements. The inventory of functions was not restricted to retailing alone but included all other major functions such as administrative, social, cultural, entertainment and transport activities. In order to identify the hierarchy of central places, this large inventory of functions was made in the belief that it would be more satisfactory than choosing a few selective "indicator" functions. Inclusion of more functions gives better centrality measurements and clearer hierarchical differences. From the field inventory, 112 central functions are recognized in the study (see Appendix I and II for questionnaire and the complete final list of central functions).

The second type of field work, was the collection of information about the urban sphere of influence from traders, local authority officers, teachers, railway station masters, geography graduates and other people who were involved in trading or service professions. In this, general information about villages and their relations with towns for different functions was elicited. With the help of four assistants, a field survey was made of the jewellery, furniture and shoe industries and of motor garages and printing presses to establish their trade areas. These functions were chosen because of their importance in the commercial and service field of the study area. They are not only higher order retail and service functions, but also constitute some of the important small scale and handcraft industries of the study area. By analysing

these functions one may be able to understand the retail patterns, service areas and also their industrial characteristics. With the help of information derived from these interviews, general surveys, bus services and state administrative functional areas, the urban sphere of influence was identified.

This study therefore is mainly concerned with an inventory of functions, their weighting and the hierarchical classification of central places. Consumer movement is not assessed by sample survey but by bus service analysis and administrative and other functionally defined service areas. These factors are taken in demarcating service areas of the central places. Consumer movement and the shopping patterns are not complex in Northern Ceylon. Per capita income is very low. An average Ceylonese spends 60 per cent of his income on food items and a greater proportion of this goes to the local co-operative stores. In addition to this, the absence of large scale ownership of private cars, means that public transport flows reflect the movement of people.

The data collected from published and unpublished works was checked with field inventories. Further published and unpublished data, particularly historical sources were obtained in the British Museum and Public Records Office in London.

Some of the large calculations, such as population thresholds were done on the IBM computer in the University of Durham.

A pull out location map of major places mentioned in the text is attached to the thesis for easy reference.

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CHAPTER ONE

THE GENERAL GEOGRAPHY OF NORTHERN CEYLON

The area under study comprises the three northern districts of Jaffna, Mannar and Vavuniya which form the administrative Northern Province of Ceylon. The area extends for approximately eighty miles north to south, sixty miles east to west in the southern part and twenty-five miles east to west in the northern part. The area is bounded by sea to the north, west and east and to the south by the districts of Puttalam, Anuradhapura and Trincomalee. The total area under study including inland water is 3429.4 square miles and comprises 7.39 per cent of the area of Ceylon. District totals of land and inland water are shown in Table 1.1. The term Northern Ceylon will be used to indicate the study area.

Table 1.1.

<u>District</u>	<u>Area of Northern Ceylon by districts</u>		
	<u>Square</u>	<u>miles</u>	
	<u>Total</u>	<u>Land</u>	<u>Large inland waters</u>
Jaffna	998.6	964.5	34.1
Mannar	964	957.5	6.5
Vavuniya	<u>1466.8</u>	<u>1431.5</u>	<u>35.3</u>
Total	<u>3429.4</u>	<u>3353.5</u>	<u>75.9</u>

Source: Statistical Abstract of Ceylon, 1966, p.1.

The districts are further divided into administrative "Divisional Revenue Officer" areas. Jaffna, Mannar and Vavuniya districts are divided into 12, 3 and 5 D.R.O. divisions

FIG.1-1



respectively. The total area of each division is shown in Table 1.2 (Fig. 1.1.).

Table 1.2.

Area of Northern Ceylon by D.R.O. divisions

Jaffna district	Area in Sq. Miles excluding large inland water areas	Mannar district	Area in Sq. Miles excluding large inland water areas
Delft	18.5	Mannar Island division	77.8
Islands	59.7	Mantai	599.5
Jaffna	18.5	Musali	280.2
Valikamam West	38.5	Total	<u>957.5</u>
Valikamam North	34.3	<u>Vavuniya district</u>	
Valikamam East	38.5	Vavuniya south (Tamil)	221
Tenmaradehy	77	Vavuniya South (Sinhala)	78.3
Vadamaradehy	61.6	Vengalcheddikulam	153.7
Pachehilapallai	82.9	Vavuniya North	626.5
Karachehi	177.3	Maritime Pattu	352
Thunukkai	164.4	Total	<u>1431.5</u>
Punakari	193.3		
Total	<u>964.5</u>		

Source: Statistical Abstract, op.cit., p.7.

This study area has two broad physical divisions. One part is formed by the peninsula of Jaffna with the group of islands lying off the west coast. The Peninsula is connected with the Mainland on the eastern coast by recent sand bars at Chundikulam. The term Peninsula will be used to indicate the Jaffna Peninsula and its adjoining islands and the term Mainland will be used to indicate Mannar and Vavuniya districts and the three southern divisions of Jaffna district.

Three district areas can be identified on the Peninsula. These are Valikamam, Tenmaradehy-Pachehilapallai and Vadamaradehy. The islands off the west coast of the Peninsula are Velanaitivu,

FIG-12

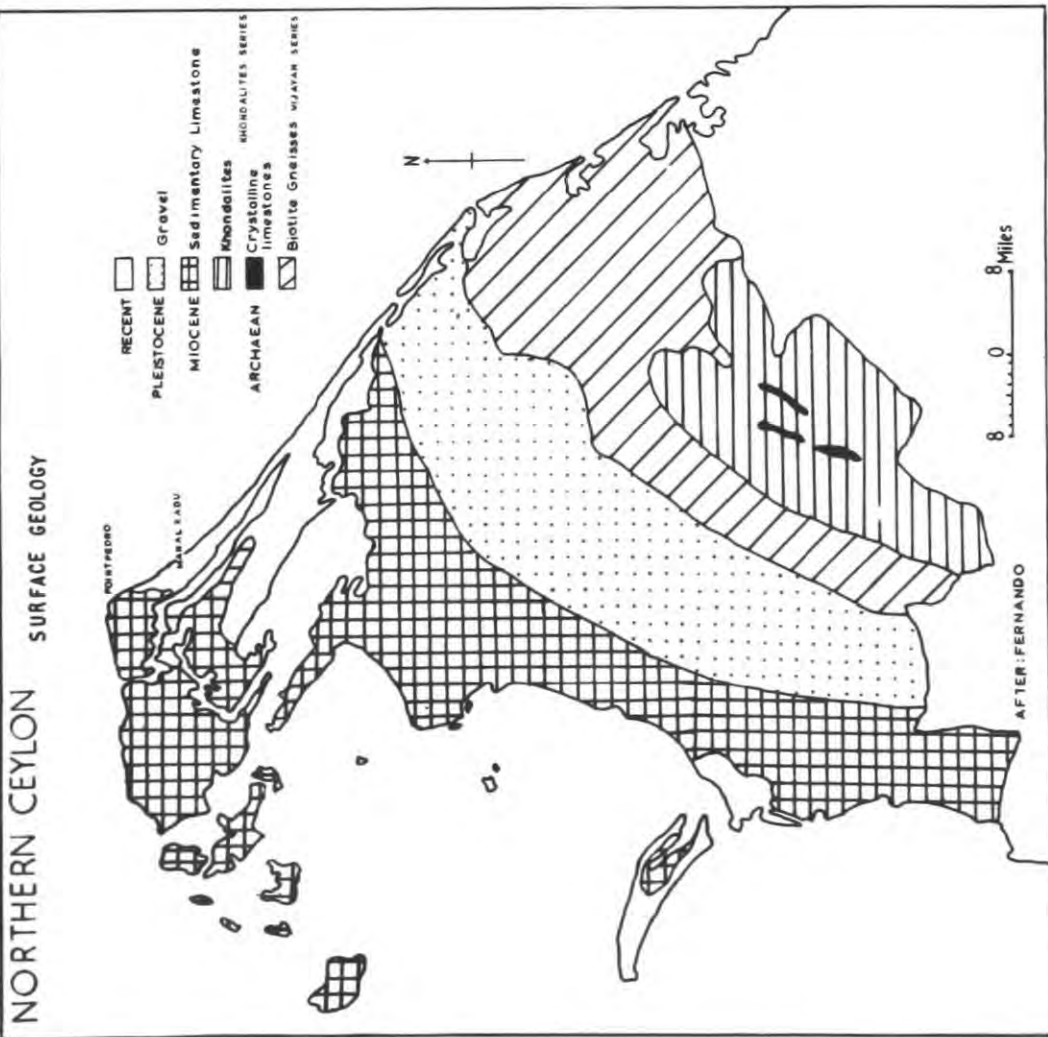
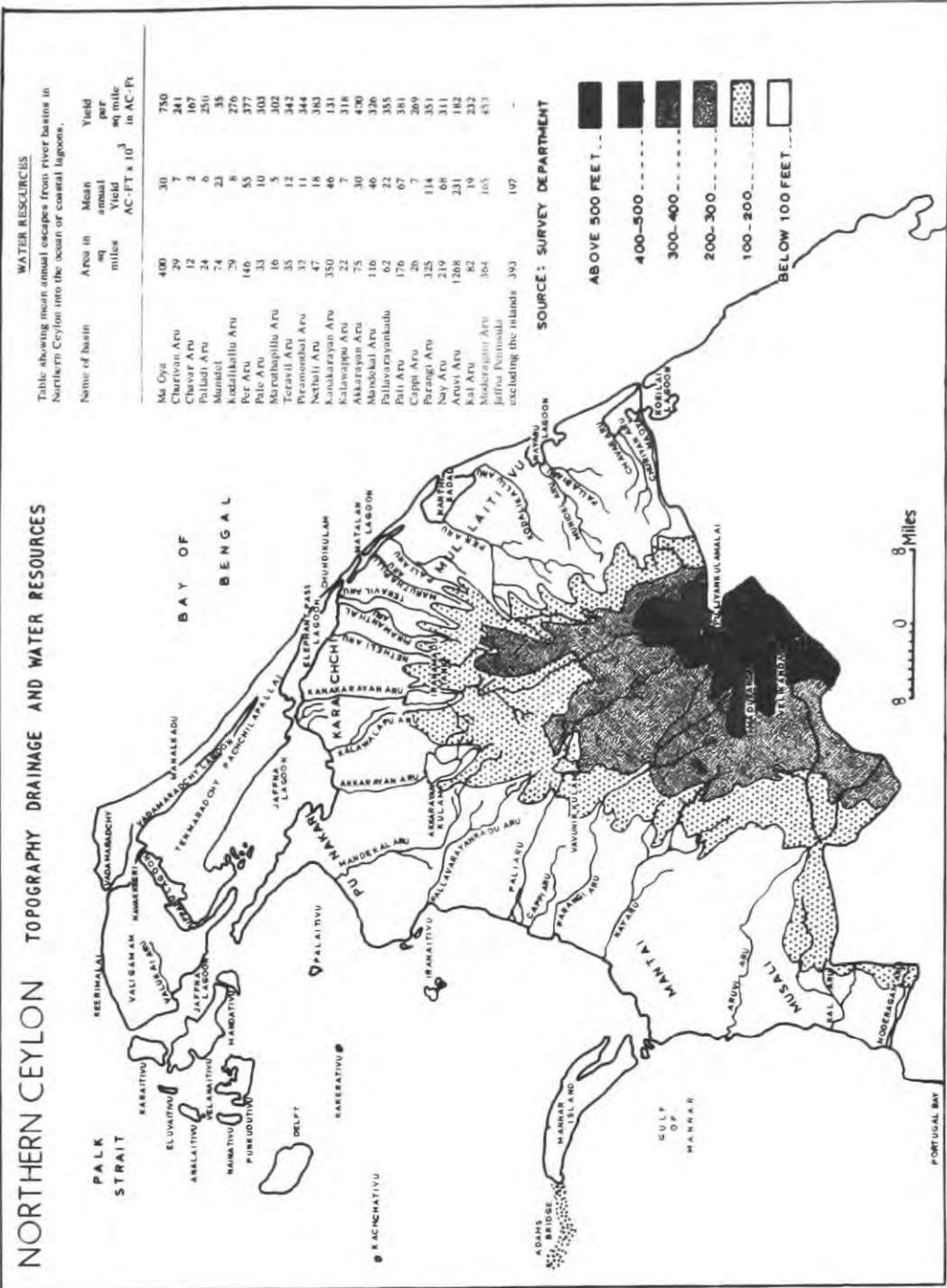


FIG-13



Punkudutivu, Neduntivu, Karaitivu, Mandaitivu, Nainativu, Analaitivu, Palaitivu, Kaehhaitivu and some smaller islands.¹ There are no permanent settlements on Palaitivu, Kaehhaitivu and on the other small islands, although the first two became famous because of the church of St. Anthony's.

The second part of Northern Ceylon is the Mainland. It consists of Karaehchi, Punakari and Thunukkai divisions of the Jaffna district and the administrative areas of Mannar and Vavuniya districts. The Matalan, Nandhi, Nayaru and Kokilai lagoons lie on the eastern coast of the Mainland. The islands of Mannar, Kakitivu and Iranaitivu lie off the west coast.

Geology

Northern Ceylon consists of both the oldest and youngest known rocks. The oldest belong to the Archean or Pre-Cambrian era. The youngest rocks are sedimentary in character and belong to Miocene, Pleistocene and recent periods.² Fig. 1.2. shows the surface geological distribution of the different rock types. There are two types of rock of the Pre-Cambrian period:

1. The fundamental gneisses, composed of metamorphosed igneous rocks and often referred to as the Viayan series.

2. Highly metamorphosed sedimentary rocks called Khondalites. These rocks comprise more than one third of the area and are found in the south eastern half of the Mainland.

The western and northern parts of the Mainland and the peninsula are composed of Miocene sedimentary rocks. The Jaffna limestone is a hard and compact rock of creamy or greyish

colour. In some places it is covered by thin layers of grey and red soils, both of which are products of its own decomposition. The limestone rocks are exposed in some places, particularly in the localities of Keerimalai, Karakampanai and Palaly on the Jaffna Peninsula. The limestone beds are usually horizontal and have only been slightly disturbed.³ The area between the Mioene limestone and Pre-Cambrian Mainland has Pleistocene period sedimentary rocks. Recent sand deposits are found mainly along the east coast from Point Pedro to Mullaitivu and the islands of Mannar and Velanai. With the exception of limestone, clay and glass sand, the mineral resources in the area are very restricted in both quality and quantity.

Topography

Topographically the whole area is essentially a plain with most areas below 300 feet. Jaffna Peninsula and the islands are flat, low lying areas less than 50 feet above sea level. Some parts along the inland lagoons and on the islands are under water during the winter rainy season. Limestone features are significant on the Peninsula. There are limestone caverns such as Sinna and Periya Mandapam at Kerudavil, where underground galleries extend for upwards of half mile. There are tidal wells whose waters rise and fall twice a day with the tides of the sea; the largest of which, at Navakkeeri is 145 feet deep, fresh at the surface but salty below 45 feet at high tide. Keerimalai is one of the main springs on the Peninsula. The topography of the study area is shown on Fig. 1.3. The Mainland is divided into two distinct areas of relief:

1. Coastal plain
2. Inland tableland

The coastal plain is below 100 feet and extends along the coastal areas of the Mainland. The plain is broader in the western part than in the east. It has four principal subdivisions known as Mullaitivu, Karachchi, Punakari and Mantai-Musali plains. The coastal plain is dissected by many seasonal streams and lagoons.

The tableland of the Mainland is over 100 feet and the south east of Vavuniya is over 300 feet. There are no mountains, but there are many monadnoeks which are characteristic of Ceylon. These occur chiefly in the south eastern corner of the Vavuniya district, and form ridges and isolated outcrops in the southern part of the Mullaitivu division. There are only a few hills which rise above 500 feet such as Madukanda (627 feet), Velikanda (616 feet) and Tamankanda (597 feet) which are the highest points. A much narrower ridge runs north and south through the Malpattu division which forms the border in the east between Vavuniya North and the Maritime Pattu division.

The rivers of the Mainland only flow in the wet season and are intermittent and seasonal. They begin to flow with the rains at the end of October and usually flow until the middle of January, their continuance depending entirely upon rainfall. Heavy rains at other periods sometimes cause a fresh flow for a few days, but this often extends for only a mile or so and then becomes lost in the sand of the river channel. At other times of the year the rivers are simply dry water

FIG. 1.4

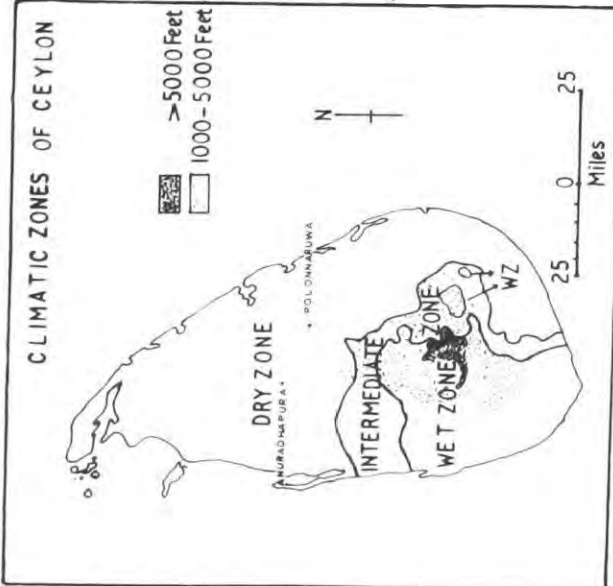


FIG. 1.5

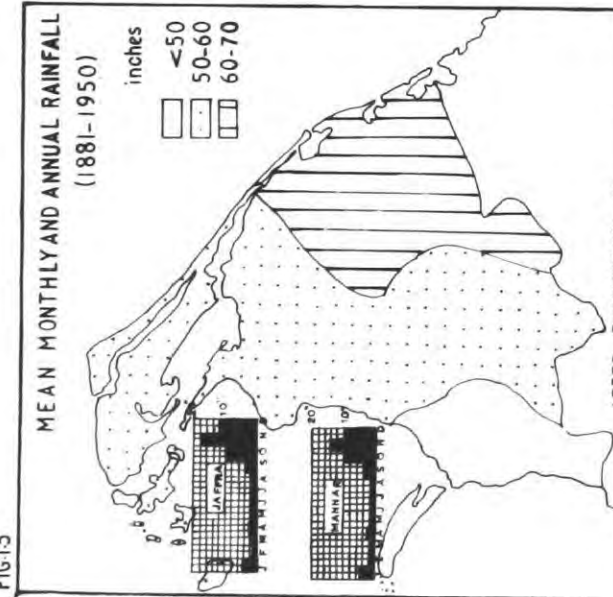


FIG. 1.8

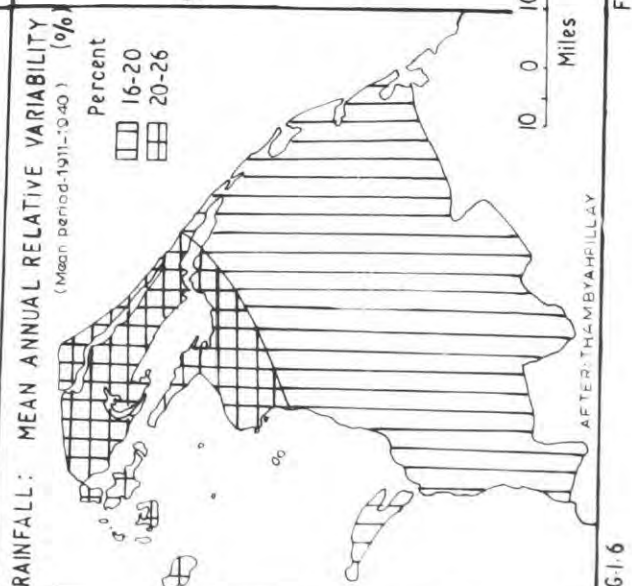
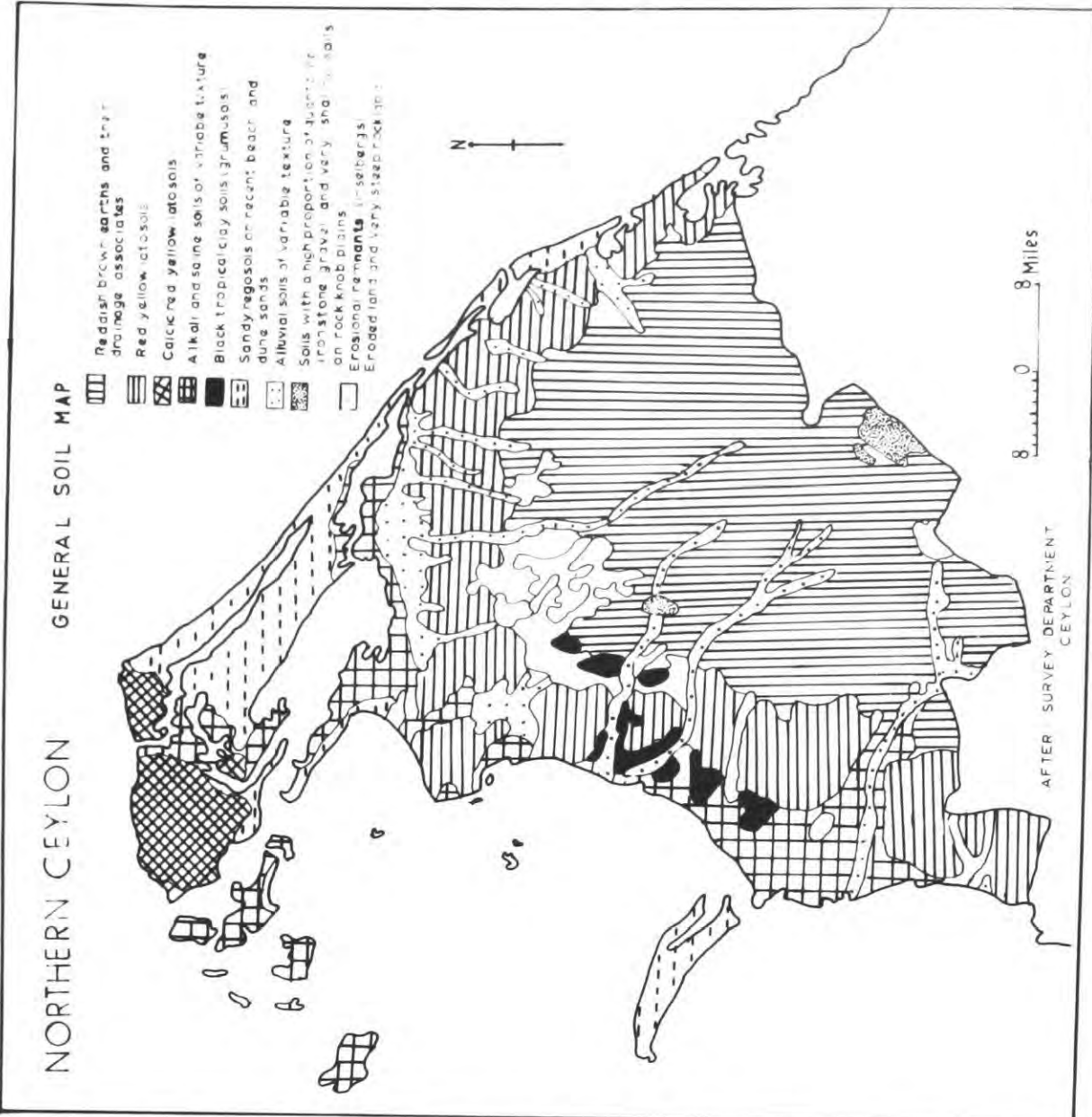


FIG. 1.6



FIG. 1.7

courses, consisting of beds of fine sands or gravel, with here and there stagnant pools surrounded by masses of rocks.⁴ The Aruvi Aru (104 miles), the second longest river in Ceylon, is the only stream which rises outside the study area in the Matale hills. All other streams except Maoya's and Mudarangan Aru's catchment area fall within the study area. The distribution of the streams are shown on Fig. 1.3. together with their topographic features. The small Valukai Aru is the only important seasonal stream in Jaffna Peninsula. The inset on Fig. 1.3. shows the water resources of the study area. They are very important in relation to both present and future agricultural colonization schemes.

The sedimentary rocks are favourable for the formation of underground water resources. Except for the Pre-Cambrian area all other parts of the area are composed of differing types of sedimentary rocks. The central area of Jaffna Peninsula has the best water resources because of sedimentary limestone rocks. Along the coastal areas and on the islands, water resources are limited and become more brackish. Water is available from deep wells in the sedimentary rocks in the Western Mainland, but owing to digging difficulties the ground water is not used for agriculture and is insufficient for large scale agricultural purposes. In the metamorphosed rocks ground water is found only in certain localities.

Climate

Climatically the study area is part of the DRY ZONE of Ceylon. (see Fig. 1.4.) The temperature is fairly uniform

TABLE 1.3

Mean Annual Temperature (°F) and Mean Monthly Diurnal Temperature Ranges (°F) for Jafina & Mannar

Jafina

Mean annual temperature	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Year
	77.6	79.0	82.2	84.7	84.8	84.6	82.9	82.4	82.6	81.6	79.2	77.6	81.5
Mean monthly diurnal temperature range	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Year
	11.0	13.2	12.7	9.4	6.5	5.7	6.2	6.7	7.1	8.2	9.0	9.5	7.5
													8.8

Mannar

Mean annual temperature	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Year
	78.8	80.1	82.2	84.2	85.0	84.4	83.3	83.0	83.2	82.2	80.0	78.8	82.1
Mean monthly diurnal temperature range	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Year
	9.2	12.6	14.3	12.5	8.9	7.7	8.4	8.9	9.1	9.7	8.9	8.0	5.9
													9.9

Source: Dry Zone Climatology - Thambyahpillai
Reprinted from the Journal of the National Agricultural Society of Ceylon Vol. 2 No. 1. 1965.

throughout the year. The rainfall is below 70", less than the ~~WET~~ Zone of Ceylon, and is unevenly distributed throughout the year. There are distinct wet and dry seasons.

The mean annual temperature is above 81°F except for the Mannar area where it is above 82°F. The mean maximum temperatures occur between April and June with the monthly mean minimum temperature falling between December and February. The mean variation is less than 7°F for the study area, (Jaffna 6.8°F and Mannar 6.2°F). Table 1.3. shows the mean annual temperature and mean monthly temperature and diurnal temperature ranges. Due to the influence of the sea the diurnal range of temperature is less than 10°F in coastal areas and 10°-15°F inland.

There are two important wind systems in the study area. The North East Monsoon Wind prevails between November and February and the South West Monsoon Wind between late May and August. Light equatorial westerlies occur during April and May.

The mean annual rainfall based on the data from 1881 to 1950 shows that there are three identifiable distribution patterns. (see Fig. 1.5)

I. The Mannar and western coastal areas have a mean rainfall between 35-50".

II. The central parts and the Peninsula have a mean rainfall between 50-60".

III. The south eastern corner of the area receives a mean rainfall between 60-70".

The seasonal distribution of rainfall is the main feature of the area. There are five seasonal weather patterns

identifiable in the climatic year beginning in March.⁵

I. Vernal Equinox Period: late April. Light convectional showers; Inter Tropical Convergence Zone influence.

II. Pre-Monsoon Period: late April - late May. Local westerlies very slight rainfall.

III. The South West Monsoon Period: June - August. Drought throughout the period.

IV. Autumnal Equinox Period: September - October. Light convectional showers; Inter Tropical Convergence Zone.

V. North East Monsoon and Cyclonic Period: November - February. Heavy rainfall.

The mean annual rainfall figure for Jaffna is 53.1" and for Mannar is 39.7". The mean monthly figures for these stations are shown in Fig. 1.5. Nearly 65 per cent of the area's total rainfall occurs between October and January. Cyclonic activity in the Bay of Bengal brings most of the rain at this time. There is some relationship between years of highest rainfall and cyclonic activity.⁶ The mean deviation of rainfall in Mannar is 6-8" and in other areas lies between 8-12". The mean annual relative variability in the Jaffna Peninsula and surrounding areas is between 20-26 per cent. (see Fig. 1.6) In the rest of the area, including the Mannar district, it is between 16-20 per cent. Because of the great variability of rainfall there is a high rate of crop failure.

Based on the Köppen classification Thambyahpillay divided Ceylon into several climatic regions, three of which are found in the study area.⁸ (see Fig. 1.7)

- I. (AW"SI) Tropical rainy climate. Distinct rainfall maximum separated by two dry seasons. Winter maximum and mean variation of temperature is less than 9°F.
- II. (AMSI) Tropical monsoon rainy climate. Short dry season. Drought season in the high sun period. The drought is compensated by the surplus moisture from the rainy season. Mean temperature variation is less than 9°F.
- III. (ASWI) Tropical rainy climate. Winter maximum. Summer drought. Mean temperature variation is less than 9°F.

Vegetation

Light tropical vegetation, and thorn jungle and scrub are the two types of natural vegetation. The former is found in areas receiving over 50" of rainfall, particularly on the eastern part of the Mainland, whilst the latter are found in areas receiving less than 50" rainfall on the western part of the Mainland and on the Islands. Land development, irrigation and colonization schemes have led to the recent clearance of much of the forest land.

Soil

The major soil groups in the area are taken from the classification of the general soil map of Ceylon compiled by the Land Use Division of the Irrigation Department. The soil surveys conducted under the National Soil Survey programme were used to produce the map. (see Fig. 1.8) The entire ~~Dry Zone~~ has been covered by detailed soil surveys.⁹

1. Reddish-brown earths and their drainage associates; undulating terrain.

2. Red-yellow latosols; level to slightly undulating terrain
3. Calcic red-yellow latosols; level terrain
4. Alkali and saline soils of variable texture (solodized solonetz and solonchaks); level terrain
5. Black tropical clay soils (grumusols); level terrain
6. Sandy regosols on recent beach and dune sands
7. Alluvial soils of variable texture
8. Soils with a high proportion of quartz or ironstone gravel, and very shallow soils on rock knob plains
9. Erosional remnants (inselbergs)
10. Eroded lands

The distribution of soils is shown on Fig. 1.8. The Reddish-brown earth is the most common soil on the Mainland and is found in Eastern Mannar and throughout the Vavuniya district except in the coastal belt. The soil is developed on the metamorphosed gneisses, Khadalites, Chankites and Pleistocene sedimentary rocks on the Mainland whilst Calcic red-yellow latosols are found mainly in the western part of Jaffna Peninsula and in Vadamaradehy. Alkali and Saline soils are found on the Mainland, the lagoon areas of the Peninsula, and on the Islands, Black tropical clay soils in Thunukkai and the sandy regosols and dune sands at Pachchilapallai, Tenmaradehi, on the east coast between Point Pedro and Mullaitivu and on Mannar island. The Alluvial soils are found along the streams and other less important soils are scattered throughout the Mainland.

Economy

The economy of the area is not diversified and depends predominantly on agriculture and fishing particularly on the Mainland. However, tertiary activities are significant on the Peninsula. Twenty-six per cent of the total population of the area is gainfully employed whilst, for the districts of Jaffna, Mannar and Vavuniya the figures are 25, 31 and 33 per cent respectively.* A small percentage of the gainfully employed population is in young age groups, reflecting the youthfulness of the demographic structure of the area. Fifty per cent of the total population is under nineteen years of age. The Mannar and Vavuniya districts have a higher percentage of economically active people than the Jaffna district because of immigrant labour. The total gainfully employed population for the area in 1963 was 194,375 and for the districts of Jaffna, Mannar and Vavuniya the figure was 153,098, 18,002 and 23,275.

The gainfully employed population by industrial** classifications for districts of the study area is shown in Table 1.4. The percentage of people in primary activities for the districts of Jaffna, Mannar and Vavuniya is 40, 58 and 67 per cent.

*The Gainfully Employed Population comprises all persons who were engaged at the time of the Census in any kind of work for profit.

**Industry refers to the branch of economic activity in which a person is employed or in other words to the kind of establishment or place of work in which his occupation is performed.

Table 1.4

Percentage of Gainfully employed population by industrial
classifications by districts 1963

	<u>JAFFNA</u>	<u>MANNAR</u>	<u>VAVUNIYA</u>
Agriculture, Forestry, Hunting & Fishing	39.78	59.93	66.61
Mining and Quarrying	.49	.21	.17
Manufacturing	14.50	5.92	4.38
Construction	3.38	3.70	3.45
Electricity, Gas, Water and Sanitary services	.30	-	.17
Commerce, Banking and Finance	9.66	10.01	6.56
Transport, Storage and Communication	4.46	2.72	1.94
Services	18.60	15.41	13.84
Activities not adequately described	<u>8.83</u>	<u>2.10</u>	<u>2.88</u>
Total	<u>100</u>	<u>100</u>	<u>100</u>

Source: Census of Ceylon, 1963, Vol. 1, Part II, Table IV, p.13.

Although the Mainland area of Jaffna district is very similar to Vavuniya and the Mannar. Jaffna district has a higher percentage in manufacturing employment than the other two districts.

Table 1.5 shows the gainfully employed population by major occupation[⊠] groups for the three districts. Agriculture and fishing are the predominant occupations, particularly on the Mainland. The percentage of Jaffna district population employed in non-primary occupations is higher than the percentage in the other two districts.

The economy of the Jaffna Peninsula depends not only on local resources but also on contributions from outside the area. Remittances and earnings of Jaffna residents who are

⊠ Occupation refers to the type of work performed by the person employed irrespective of the industry concerned or his place of work.

FIG. I-9

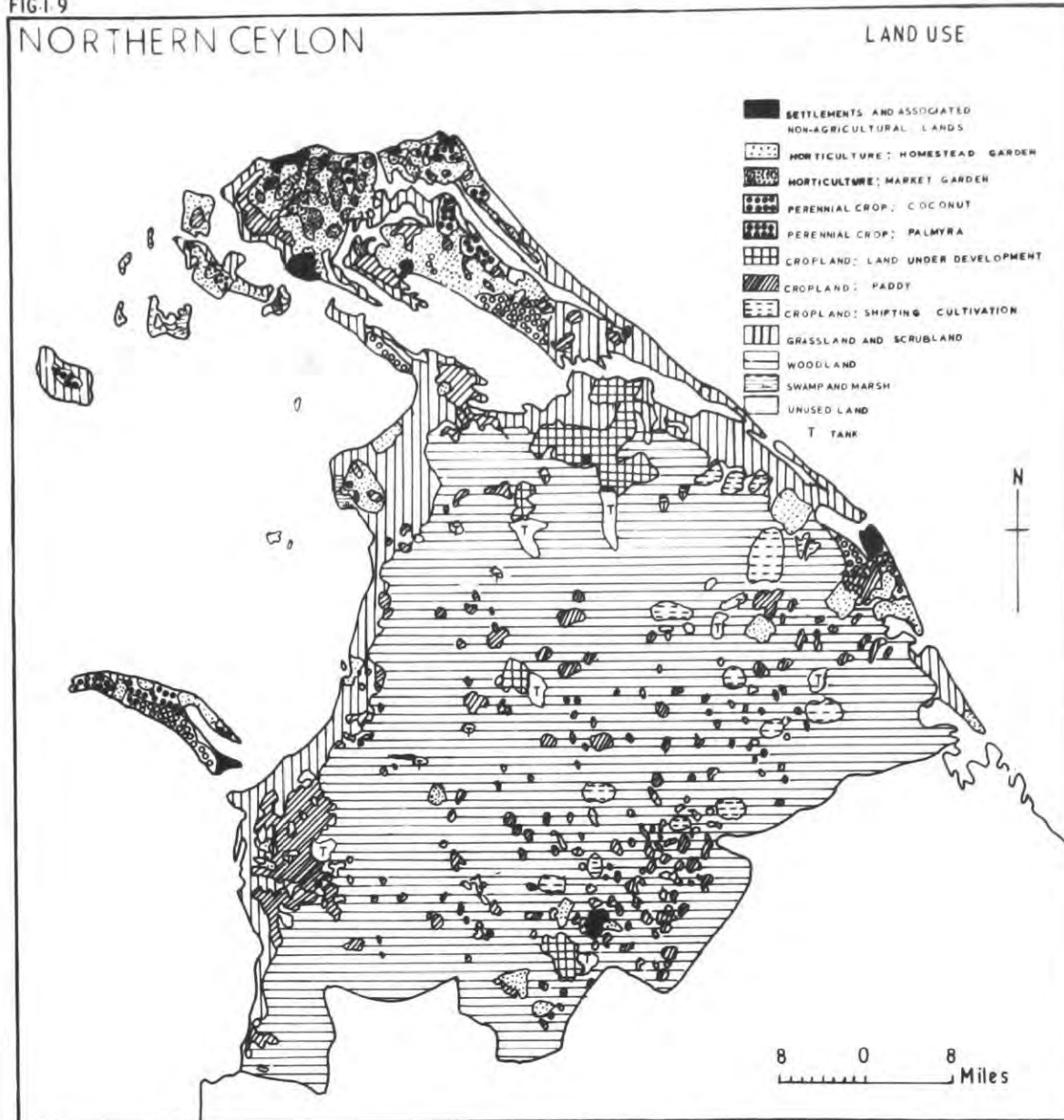


FIG. I-10

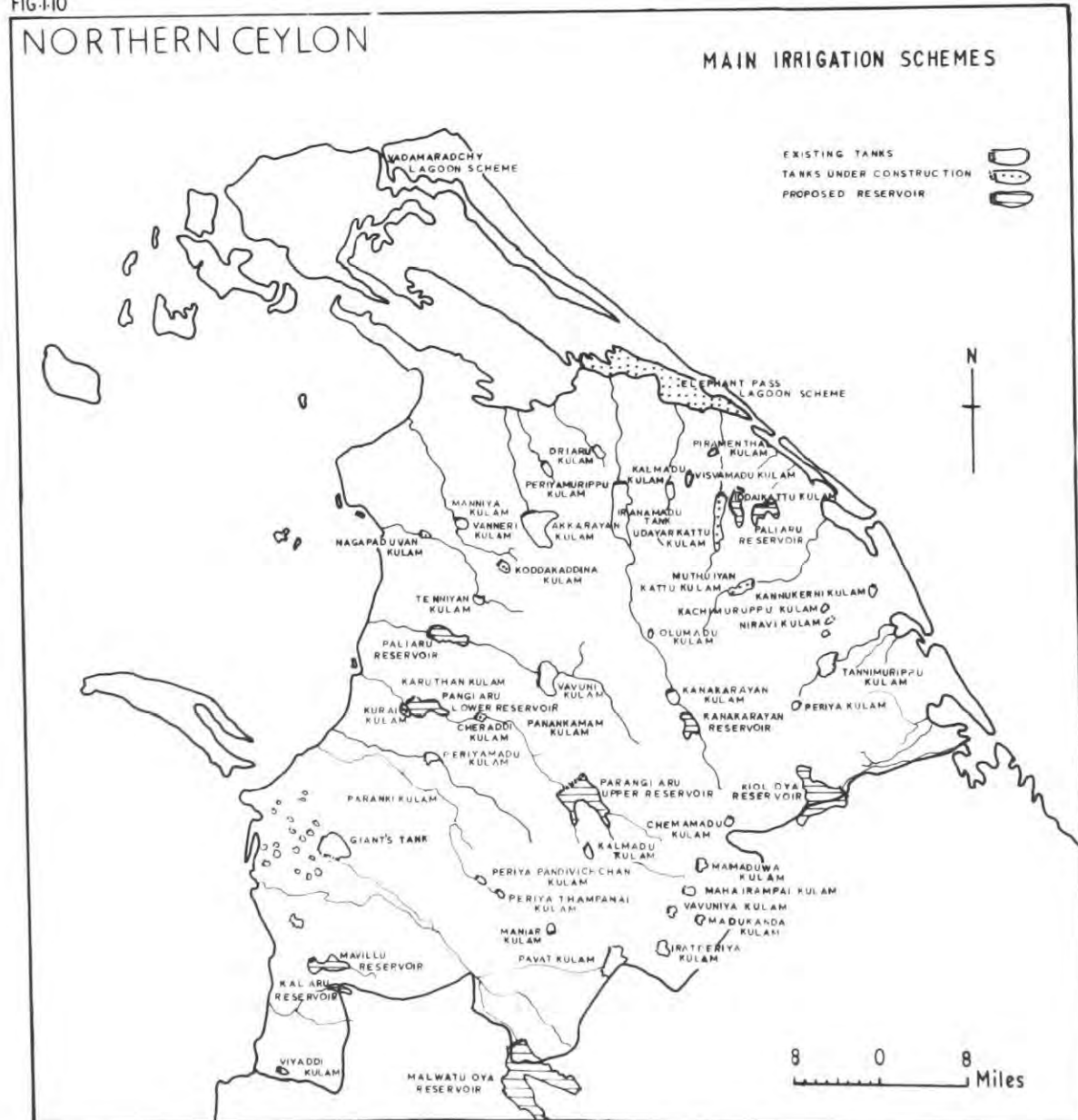


Table 1.5

Percentage of Gainfully employed population by major occupation
by districts 1963.

<u>Major occupation groups</u>	<u>JAFFNA</u>	<u>MANNAR</u>	<u>VAVUNIYA</u>
Professional, Technical and Related Workers	8.11	4.06	4.19
Administrative, Executive and Managerial Workers	.98	.59	.92
Clerical Workers	3.35	2.37	2.89
Sales Workers	7.59	8.40	4.89
Workers in Agriculture, Hunting and Fishing	45.02	56.54	66.24
Miners and Quarrymen	-	.43	.13
Workers in Transport and Communications	3.42	2.51	2.23
Craftsmen, Production Process Workers and Labourers	17.34	15.29	12.14
Service, Sport and Recreation Workers	12.76	8.47	5.63
Occupation unidentified or Inadequately described or Unspecified	1.43	1.34	.74
	<u>100</u>	<u>100</u>	<u>100</u>

Source: Census of Ceylon, 1963, op.cit., p.32.

working in government and trade occupations in other parts of Ceylon, together with pensions from the Governments of Ceylon and Malaysia contribute a sizeable proportion of the finance of the Jaffna economy. A high proportion of the male population of the Islands and Vadamardhy divisions migrate to Colombo and South Ceylon for work. In fact the economy of settlements such as Punkudutivu, Karaitivu, Nainativu and certain villages in the Vadamardhy division are entirely dependent on these external earnings.

Land Use Patterns

Generalised land uses and forest cover are shown on Fig. 1.9. The map is a synthesis of the seventeen one mile

to one inch land use sheets of Northern Ceylon. The main categories of land use patterns have been adopted from the Commission on The World Land Use Survey of the International Geographical Union, by the Department of Survey, Ceylon. The subdivisions have been modified according to local needs. (e.g. local perennial crops)

The Peninsula and the Mainland have different types of land use. "The Peninsula is characterised by a distinctive pattern of land use. No-where in the Dry Zone is the use so intensive and complex."¹⁰ The major land use classes on the Peninsula are, settlements and associated non-agricultural lands, horticulture (homestead and market gardens), tree and other perennial crops (coconut and palmyra), and crop land (paddy and tobacco); these are the most productive land uses. Sixty per cent of the land is effectively in productive use on the Peninsula. Grass land, scrub, swamps and marsh are the main types of land use along the sandy tracts and inland lagoons.

On the Mainland the land use is neither intensive nor complex. Paddy, homestead garden, coconut and; "Land under development" are the main agricultural land categories. Paddy lands are widely distributed and there is a large tract of land under the Giant's Tank Scheme. More than three quarters of the land is under forest, grassland and scrubland. Shifting cultivation is another important category which is found on the Mainland. (see Fig. 1.9) Chena or shifting cultivation is one of the problems in the land use of the Dry Zone of Ceylon. B.H. Farmer has pointed out that "the shifting

cultivation is unique in Ceylon because it is practiced by the people who are well aware of sedentary method of cultivation and who possess draft animals".¹¹ In chena cultivation a variety of crops are cultivated but mainly drought resistance cereals such as maize, and millet. The main feature in this cultivation system is that one cannot cultivate an area for more than one or two years because of weeds and pests rather than loss of soil fertility. This cultivation is a wasteful method of land use. The conversion of this type of land use to other systems by the application of different techniques in cultivation or crop growing would be more productive. The importance of chena is now declining in Ceylon through the colonization and irrigation developments in the Dry Zone.

Agriculture: Paddy

Paddy is the main crop on the Mainland and on the low lying grey soils of the Peninsula. In many areas it is a rainfed crop. Double-cropping occurs only in tank irrigated areas. The amount of cultivation fluctuates annually and is dependent on the amount of rainfall. Paddy is cultivated by the peasants; those on the Mainland derive their income from paddy cultivation, whilst on the Peninsula it only produces a subsidiary income, the main source coming from garden crops. The acreage under paddy is being increased annually in a drive to increase food production through colonization and land development schemes. The acreage under paddy during Maha season in 1964/1965 and Yala season in 1964 is shown by districts in Table 1.6.

Table 1.6

Paddy: Cultivation details for 1964/65 Maha season
and 1965 Yala season by districts

<u>1964/1965 Maha season</u>	<u>1964 Yala season</u>
Jaffna - 71903 acres	1239 acres
Mannar - 34564 "	4334 "
Vavuniya - 39608 "	4424 "

Source: Statistical Abstract, op.cit., p.104-105.

The acreage in 1964/1965 under Maha paddy crop cultivation in major schemes, and rainfed areas by districts is shown in Table 1.7. From the figures it can be seen that large percentages of the paddy area are not under irrigation.

Table 1.7

Paddy: Cultivation details (1964-1965) Maha season
by irrigation types

<u>District</u>	<u>Major scheme</u>	<u>Minor scheme</u>	<u>Rainfed</u>	<u>Total</u>
Jaffna	20946	1844	49113	71903
Mannar	21625	6244	6713	34564
Vavuniya	7467	14338	17803	39608

Source: Statistical Abstract, op.cit., p.105.

The Yala crop is entirely dependent on irrigation. If there is no irrigation, crops cannot be cultivated during the Yala period. Figure 1.10 shows existing schemes, those under construction and proposed major irrigation schemes.

After the eradication of malaria in the 1940's a number of irrigation schemes were developed by damming small streams or renovating old abandoned tanks. The landless peasants from localities within the project area and from the Jaffna Peninsula are being settled under these schemes. More schemes are being developed on the Mainland for the cultivation of paddy and

subsidiary food crops. Farmers in colonization areas are initially given five acres of paddy land and three acres of highland. But this size has now been reduced with farmers receiving only three acres of paddy and two acres of highland.¹² The paddy lands in Punakari and on the Peninsula are without irrigation.

In Northern Ceylon the paddy yield per acre is 44 bushels; this figure is very low when compared to average world yield. (e.g. Pounds per acre - Spain-5,542, Italy-4743, Egypt-3,719, Japan-3,362, Formosa-2,296). As a result of government assistance the farmers have started using chemical fertilizers, insecticides, weedicides and certified paddy seeds. Mechanization in agriculture has increased very rapidly within recent years and approximately three quarters of the paddy lands are now being ploughed by tractors.

Agriculture: Marketing and Homestead Crops

Garden and highland crops are next in importance in the area. Many such crops are cultivated without irrigation but only during the rainy season. On Jaffna Peninsula garden crops are very important with tobacco, onions, vegetables, chillies, potatoes and jams being the main ones. Particularly on the red soil belt of the Peninsula garden crop cultivation is carried on with ground water irrigation. In the period, before the 1950's, well-sweeps were the common method of irrigation but electric and oil pumps are now very common. The Jaffna farmer obtains most of his income from the sale of his garden crops. Insecticide, weedicide and fertilizer usage is very heavy. However, owing to urban and residential developments in rural areas large tracts of high quality agricultural land are being converted to non-agricultural use year by year.

Drought-resistant subsidiary crop cultivation is important in the highlands. Maize, greengram, gingelly, and groundnut, manioc, kurakkan and mineri are the main crops. These crops are cultivated during the Maha season in the highlands and in the Yala season on the paddy lands.

The coconut is an important crop in both sandy and coastal areas. The total acreage under coconut cultivation in 1965 was 30,543, 3,352 and 3,847 acres respectively for Jaffna, Mannar and Vavuniya districts.¹³ The coconut estates are concentrated in Tenmarachy, Pachchilapallai and the Veddukkadu areas in Pannakari. Mannar island and the Mullaitivu coastal area are also important coconut cultivation areas. The coconut is widely grown as a homestead garden crop throughout the area. The palmyra is another important local palm and nearly 40,000 acres are under cultivation mainly on the Peninsula and on Mannar island. Drumstick, jak and other fruit trees are the other main homestead garden crops.

Fishing

The fishing industry is also important in the economy of the area. The total production of 987,479 tons in 1964 was more than fifty per cent of the total production of Ceylon's 1,872,248 tons of fresh fish.¹⁴ The MUKUWA, THAMILA and "KARAYA" castes are the main fishermen. In many localities the industry is not well organised or developed. In the 1960's mechanization of boats and the use of nylon nets increased, but the majority of the fishing boats remain unmechanized and use traditional fishing methods. Important fishing centres are Jaffna, Point Pedro, Mullaitivu and Silawathurai. The Sinhalese fishermen from Negombo and the west coast of Ceylon

migrate to the east coast during the South West Monsoon Period (May - September). They are concentrated mainly on Thalayady, Mullaitivu and Nayaru. Fish landed at Mullaitivu, Mannar and Thalayady is transported to the Colombo area. The catches in other centres are consumed by local people. Beach-de-mer catches are significant in the Jaffna lagoon and there are pearl fisheries in the Gulf of Mannar.

Industry

The industrial sector is very limited, with the few state owned industries being the most important. Traditional cottage and handicraft industries still play a significant role in certain activities. Cement, chemicals, salt, tile and brick and fish canning industries are publicly owned. The Cement Corporation has a factory at Kankesanthurai. It was established in 1950 with a total capacity of 80,000 tons but after several expansions the capacity has been increased to 265,000 tons per annum.¹⁵ Local limestone, Murungan clay and a small percentage of imported gypsum are the main raw materials for the industry. Nearly one thousand persons are employed at the factory. The Paranthan Chemicals Corporation was established at Paranthan in 1957 to produce caustic soda and chlorine. Another plan for a D.D.T. factory was later abandoned. The Corporation has installed two plants for the manufacture of hydro-chloric acid and potassium chloride with an annual capacity of 600 tons and 25 tons respectively.¹⁶

The salt industry occupies a prominent place in the context of the national salt industry. Climatic and other conditions favour the development of the open pan systems. There is a major

saltern at Elephant Pass and small salterns are found at Irupalai, Chiviyatheru and Kallundai. The Salt Corporation of Ceylon is developing a fully mechanized saltern at Chavakacheheri which will be capable of producing 115,000 tons of salt per annum.¹⁷ When all the present expansions of old schemes and the new schemes are completed, they will produce more than two thirds of Ceylon's total production. A small industrial corporation has established a brick and tile factory at Odduchuddan near Mullaitivu. The factory started production in 1968. In full capacity it will produce four million bricks and one million tiles annually.¹⁸ The Ceylon Fisheries Corporation has a fish canning factory at Pesalai on Mannar island. This factory went into production in October, 1968 with an output of two tons of canned fish per day but the factory is still running below full capacity.

In the private sector confectionery, utensils, garments, rice milling, printing, metal works, garages and furniture manufacturing are the main industries. There is one confectionary factory at Manipay and a utensils plant at Maviddapuram. There are two garment manufacturing companies at Jaffna: one of them produces socks, vests, and the other cotton knitware. Rice mills are located throughout the area but there is a concentration at Jaffna, Nellyyady, Kilinochchi, Murungan and Cheddikulam. In metal working, gates, windows and other metal products are important and premises are concentrated in the towns of Jaffna and Kilinochchi. Motor garages, in addition to motor vehicle repairs, also do welding, and manufacture some minor spare parts. A few garages in Jaffna

have lathes and other garages are found in Kilinochchi, Mannar and Vavuniya. The furniture industry is concentrated in Jaffna and is a caste occupation; most of the carpenters are Sinhalese and come from Moratuwa. Two government factories in Jaffna and Chunnakam make school furniture. There are two very small soap factories, one in Jaffna and the other at Atchuveli.

Cigar and beedi rolling are important small scale industries. Most of the cigar rolling companies employ an average of less than 50 persons in one booth. Some people buy the raw materials and roll them at their home as a part time job. The industry is concentrated at Kokuvil, Kondavil, Inuvil, Thavady and Kurumbaciddi villages.¹⁹ Due to urban development and social changes at Kokuvil the industry has moved northward to the contiguous villages of Kokuvil, Kondavil, Inuvil and Thavady.

The beedi rolling industry, unlike cigar rolling is a new development and commenced after the import ban on beedi from India in the early 1960's. A high percentage of the workers in the industry are women and children. A few workers get their raw materials from the beedi companies and return the rolled beedies to the same companies after producing them at home. The industry is concentrated at Karaiyur and the Muslim wards of Jaffna, Anai~~o~~oddai, Manipay and Karainagar.

Cottage Industry

Making onion baskets, general ware, mats and hat weaving from palmyra leaves and sweet jaggery from toddy a kind of sugar, are the main cottage industries. These industries are important at Vadamaradehy and on the Island D.R.O. divisions. The

coconut leaf-plaiting industry is important in the coconut areas of Pachehilapallai, Tenmaradehy and on Mannar island.

Handloom textiles, pottery, coir and leather works are also important. Pottery working employs 250 families and is particularly important in Chankanai (60), Irupalai (20), Udupidy (50), Thunnalai (70) and Meesalai (50). Raw materials are obtained from Kandawalai and Odduchuddan.²⁰ The government centre in Chankanai employs over 100 persons and turns out good quality dolls and statues in addition to their normal production. An important aspect of the industry is that the younger generation is not keen to take up this traditional employment. The handloom textile works are widely dispersed; most of them are weaving training centres which have dual functions of production and training. In addition to the handloom centres, there are a number of traditional weavers at Kopay, Nallur, Thumpalai, Madduvil North, Sarasalai and Meesalai renowned for their work. Vathiri, a sub-village in Vadamaradehy has become important for leather working.

Manufacture of jewellery is an important handicraft industry. Nearly one thousand goldsmiths are engaged in the industry. The Hindu Tamil social structure, and the importance of jewellery in the dowry system, contributed to its development. The industry still remains a caste industry, and the goldsmiths families are concentrated in Jaffna, Kokuvil, Nallur, Alaveddy, Tellipallai, Chankanai, Puloly and Thumpalai.

Toddy tapping from palmyra and coconut palms is the main occupation of the ~~Nalawa~~ and ~~Palla~~ communities. The tree

tax system in the Jaffna district is the main reason for the development of the industry, but in the other two districts the tavern system exists. The details of these systems will be discussed in Chapter Three.

Power

Until 1971 electricity in the area was produced entirely from thermal plants. Vavuniya Urban Council and Mannar Town Council still have small thermal plants. The excess of power from the Paranthan chemical works supplies the Kilinochchi town council area. On the Peninsula there is a medium sized plant in Chunnakam with a 10,000 KW generating capacity. All the local bodies including Jaffna Municipality obtain their electricity from Chunnakam. Most villages and even a few towns are however without electricity. In 1971 the government completed a 132 KV high tension electric line from Polpitiya to Chunnakam and joined the area with the National Grid. The scheme has just been completed with the building of a substation at Kilinochchi. In future the electricity demand at Northern Ceylon will be met by hydro-electric power stations in the south. A high percentage of the electric power is used for home lighting and in agriculture.

Conclusion

The physical and economic characteristics of Northern Ceylon show a strong relationship. The influence of the physical factors such as geology, rainfall, underground water resources played an important part in the development of agriculture and settlement development on the Peninsula are based on ground

water resources. The seasonal rainfall and inadequate ground water resources have restricted the development of the Mainland, particularly after the 1940's. However, human factors also contributed to the development of the Peninsula. In Farmer's words "The Jaffna Peninsula is a unique region with a strong personality in which traits due to its physique, its people and its position may all be discerned".²¹ According to Cook "The Jaffna Peninsula is one of the most remarkable settlements in South Asia. The Tamil inhabitants are strongly individual in character, and the region is comparable with parts of Holland, where the people seem to be so much more important than the land itself".²²

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CHAPTER TWO

POPULATION AND SETTLEMENTS

Origin and Growth of Settlements

Human settlements have existed in Ceylon from pre-historic times. According to Mahavamsa an Indian prince named Vijaya with his band of seven hundred men colonized the island of Ceylon in approximately 483 B.C.¹ At the time of Vijaya's arrival aboriginal people called Yakkas and Nagas inhabited Ceylon. The present day Veddhas are the survivors of these legendary tribes. They were seafarers and probably practised snake worship.

The first agricultural settlements were established in approximately 500 B.C. in the Mantota area along the Aruvi Aru. Some of the other earliest settlements were on the west coast, on the banks of the Kalyani River, and in Southern Ceylon at Mahagama. Agricultural and other settlements such as Anuradhagama, Uruvela, Ujjeni Vijitha were established at the same time as the capital city of Anuradhapura. During this period Tamil settlements were built by merchants and mercenaries in Mantota and Anuradhapura.

The area was under the Sinhalese kingdom of Rajarata and its capital was situated in Anuradhapura until the 11th century. The capital was then moved to Polonnaruwa and remained there until the 13th century. (see Fig. 1.4.) Before the 13th century, during the period of the Anuradhapura and Polonnaruwa kingdoms, the Dry Zone of Ceylon was well developed with agriculture based on tank irrigation. Seasonal rainfall and unfavourable geological structures for ground water resources

encouraged the building of many tanks for irrigation. The entire Dry Zone was colonized with the aid of tanks and irrigation. Although some of the big tanks have recently been renovated, most of the smaller ones have been abandoned.

It is commonly believed that the population of ancient Ceylon during the time of the Sinhalese kings (5-13 A.D.) was greater than the pre 20th century population. So far no documentary evidence has been found of any enumeration of the population at this period. It is generally believed that the Dry Zone had a large population and was densely populated during the period of the Anuradhapura and Polonnaruwa Kingdoms. Historians and the past census directors of Ceylon have estimated the population of the ancient country during the period of the Sinhalese kingdoms as follows: Tennant - 17.5 million, Johnson - 4-5 million, Pridham - 6 million, Forbes - 5 million, Arunachalam - 10 million and Denham - 4 million. They estimated the population from the numbers of people needed to construct the tanks and dagobas (temples), and to support and recruit the large number of priests. The ancient chronicles of Ceylon such as Mahavamsa, Pujavaliya, Rajavaliya, and Rajaratnacari also give some information relating to population.²

Before the 13th century a large proportion of the population lived in the Dry Zone, particularly in the areas around Anuradhapura and Polonnaruwa. The capital then moved towards the Wet Zone, to Dambadeniya (1232-1271), to Yapahuwa (1272-1284), to Kurunegala (1293-1341), to Gampola

(1341-1412) and at a later date to Kotte and Kandy in West and Central Ceylon respectively. With the shift of the capitals, the Sinhalese population in the North Central Dry Zone moved south towards the Wet Zone. The reasons for migration were invasion by the South Indian army, malaria and endemic diseases, the destruction of irrigation works and local wars resulting from an unstable political situation. Recently more scientific reasons have been put forward to explain this migration such as soil erosion, loss of soil fertility, secular fluctuations of climate (such as dry and wet phases) and natural disasters such as major floods and drought which were the main causes for the abandonment of Rajarata.³

Tamil settlements were built in Ceylon from the first millennium A.D. Because of the proximity of South India, they tended to cluster in Northern Ceylon. Further settlements were established during the South Indian occupation of Ceylon by Tamils from the Malabar and Coromandal coasts of India who settled in Northern Ceylon. By the 13th century Jaffna kingdom was formed in Northern Ceylon by the Tamils and covered most parts of the study area.

Before the formation of Jaffna kingdom, the nature of settlements on the Jaffna Peninsula or who the settlers were is not clear about. Godakumbra has expressed the view that the Sinhalese people lived in the Jaffna Peninsula before the Tamil settlements of the 13th century.⁴ He produced archaeological, historical and place-name evidence to support this case. Indrapala has also stressed that before the formation

of the Jaffna kingdom the Tamil settlements in Ceylon were found outside Northern Ceylon.⁵ According to him, planned and peaceful settlements took place after the formation of the Tamil kingdom in Northern Ceylon. "The real Dravidian^{*} influence was felt only after the Cholan invasions. Their power was so great about the 13th century that they established an independent kingdom in the north, and also exacted tribute from the south in the 14th century."⁶

However, there is also some literary and geographical evidence for the existence of early Tamil settlements in Northern Ceylon. The Jaffna Peninsula is very much closer to Southern India than Anuradhapura or Polonnaruwa.

Adjoining islands between the sub-continent and the Jaffna Peninsula may have provided stepping stones for migration. The seasonal winds of the South West and the North East Monsoons further assisted navigation between South India and North Ceylon.

The Jaffna Peninsula was extremely favourable for settlement because it was free from malaria and had supplies of good ground water. These physical advantages stimulated agricultural colonization of the Peninsula. Along the coastal areas fishing settlements, and in other areas agricultural settlements, developed with well-water irrigation. On the Mainland fishing settlements were created along the east and west coasts. The "Mukkuwa", the fishing caste from South India settled along the east and north west coastal areas of

^{*} Tamil

Ceylon in the 15th century. Later they spread over the Jaffna Peninsula and established sovereignty over the Island of Delft and over a number of principalities in the hinterland of Jaffna.⁷ In addition to fishing in inland water lagoons they were also farmers. At the time of abandonment of most tanks the Mainland had again become a forested area. The people who lived on the forested Mainland were called "Vanniyars". The Vanniyars were ruled by the Jaffna kingdom but because of the physical environment they enjoyed some degree of freedom.⁸ People from the Jaffna Peninsula migrated to the south, particularly to Punakari and the western part of the Mainland, and settled by certain selected tanks. Physical conditions did not however favour large scale settlements on the Mainland.

Apart from the rural settlements there was a port at Mantota which was active as early as 2 A.D., but it decreased in importance after the decline of the Anuradhapura and Polonnaruwa kingdoms. Nallur, sometimes called Sinkainagar, became the capital city of the Jaffna kingdom. The city, unlike Anuradhapura and Polonnaruwa, was small and no spectacular archaeological remains are left, but the temples built during the early 15th century are still in good condition. In commerce, Arab traders played a significant role before the arrival of the Portuguese. Alupanthi, which is three miles from Nallur, was a small port. Except for Nallur, there was no other major urban settlement between 13th and 17th century. Another port settlement was at Uratota (modern Kayts).

Portuguese Period (1620-1658)

When the Portuguese arrived in 1505 there were three kingdoms in Ceylon: Kotte, Kandy and Jaffna. By the early 17th century Kotte and Jaffna were already under direct Portuguese rule. These two Portuguese territories were separated by the malaria infested forested Dry Zone of the Kandyan kingdom. Since the Portuguese were a maritime power their activities were greatest in coastal areas. The developments of fishing settlements took place along the coasts of the Jaffna Peninsula and on Mannar island. The majority of the coastal fishing population were converted to Roman Catholicism. Even today a large number of the fishing settlements have predominantly Roman Catholic populations. Some of the population in agricultural settlements such as Karampan, Naranthanai and Atchuvveli were also converted.

Jaffna was developed as an important town during this period. The Portuguese built a defensive fort in the city in 1624 and it was the capital of the Portuguese northern territory. In addition to defence and administrative functions there were Catholic churches, seminaries and schools in the town. There was small scale commerce as the Portuguese replaced the Arab Moorish traders. They built residential quarters for their people, but the dignitaries lived within the fort. Mannar was established by the Portuguese on Mannar island, separated from the Mainland by a shallow sea. Mannar was a regional centre on the west coast. It was economically important to the Portuguese because of pearl fishing. Kayts was another important settlement founded in this period. It

was a small port and a defensive centre. The population of both Mannar and Kayts were converted to Roman Catholicism. Even now the Catholic population is in a majority in these towns.

Dutch Period (1658-1796)

The Dutch ruled between 1658-1796, having captured the area and all other Portuguese maritime provinces of Ceylon in 1658. The Dutch like the Portuguese, were a maritime power, and built forts for defence of their territory along the coasts at Jaffna, Mulliyan (Fort Pyle), Elephant Pass (Fort Beschutter), Punakari, Kayts (Fort Hammienhiel), Mullaitivu and Mannar. They enlarged some of the forts originally built by the Portuguese and constructed new ones. Around these forts, settlements developed with port, commercial and administrative functions.

The Dutch divided their territories in Ceylon into the three commandaries of Colombo, Galle and Jaffna. Jaffna was the capital city of the northern commandery. This covered the same area as the Portuguese northern territory. They built and enlarged the fort of Jaffna, which was bigger than Batavia fort on Java, their East Indies headquarters. They established schools, churches and Magistrates' Courts in the city. The European sector of the city was further developed along the present Main Street, the area known as "Paranki Theru" in Tamil. Besides the residential functions commercial and port activities were active in Alupanthi port. A number of warehouses built by the Dutch still remain in older parts of the city. Churches and seminaries were built on the Peninsula at Chavakachcheri, Palaly, Point Pedro, Pandatharippu

and Vaddukkoddai.

Mannar remained as a regional centre for the western part of the Mainland. Punakari, Elephant Pass and Kayts each had a significant role in defence and port functions. These places functioned as tax-collecting and commercial centres. No significant changes took place in rural areas except that a proportion of people became Christians.

Pre-Census British Period 1796-1871

The British captured Ceylon from the Dutch in 1796. During the British period the first organized national census was taken in 1871 although population estimates for the early and middle parts of 19th century are available from a variety of reports. From these reports one is able to assess the total population in the pre-censal period and to estimate the extent of deaths caused by malaria, cholera, small pox and other endemic diseases. Though malaria was the chief cause of the high death rate on the Mainland, cholera became more important in the 19th century, and was introduced to Mannar by the plantation labourers. On the Jaffna Peninsula cholera was the main endemic disease in the 19th century. In March-April 1867 alone, the number of deaths attributed to cholera was 10,210 out of a population of 314,558.⁹

The exact population of the area was not known before 1871. Estimates in 1814 and 1824 give 127,616 and 148,056 people respectively. The details of the regional distribution of population estimates by administrative areas of Northern Ceylon are shown in Table 2.1.

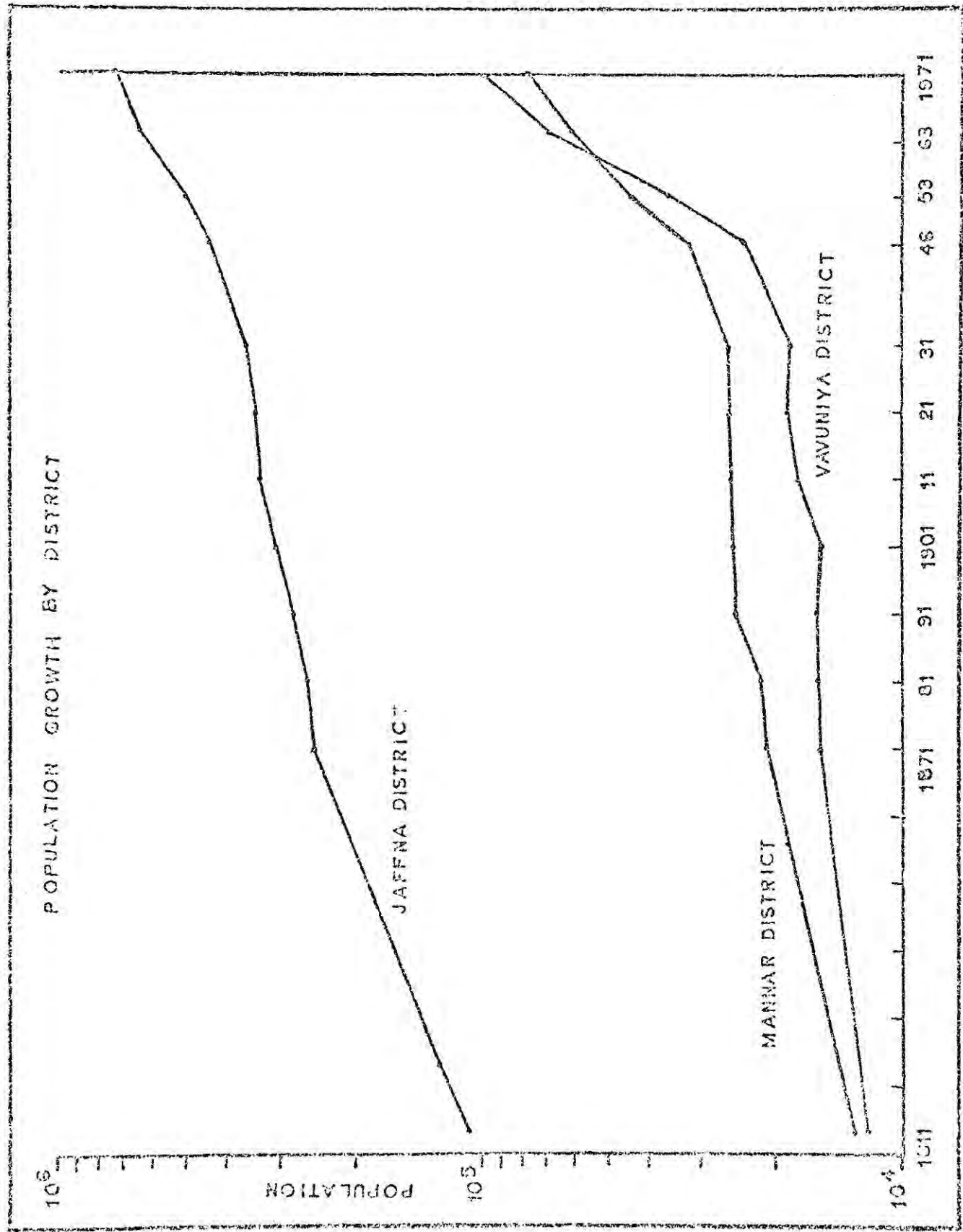


FIG 2.1

Table 2.1

Regional distribution of Population of Northern Ceylon byAdministrative Area in 1814 and 1824

<u>Administrative area</u>	<u>1814</u>	<u>Administrative area</u>	<u>1824</u>
Jaffna	103,849	Jaffna	123,188
Delft & two brother islands	2,470	Delft	2,432
Mannar	13,028	Mannar & Vanny	22,436
Vanny	<u>11,269</u>		
Total	<u>127,616</u>	Total	<u>148,056</u>

Source: Census of Ceylon, 1921, Vol. 1. Part 1, P.5-7.

Population Growth 1871-1971

The first organised census was taken in 1871 and thereafter a census was taken every ten years up to 1931. The 1946 census was taken after fifteen years, the 1953 census after seven years, the 1963 census after ten years and finally the 1971 census was taken after nine years.

Population details for Northern Ceylon therefore are available from census reports from 1871-1963. The total population of Jaffna, Mannar, and Vavuniya districts, for all of the area and for Ceylon are shown in Table 2.2 (see Fig. 2.1)

Table 2.2

Total population by district study area and country.
1871-1971

<u>Year</u>	<u>Jaffna</u>	<u>Mannar</u>	<u>Vavuniya</u>	<u>Area</u>	<u>Ceylon</u>
1871	246063	20258	115345	281666	2400380
1881	255383	21348	15669	292300	2795738
1891	279284	24571	15501	319296	3007787
1901	300857	24926	15159	340942	3565954
1911	326712	25603	17339	369654	4106350
1921	330541	25882	18706	375129	4497854
1931	355425	25137	18312	398874	5306863
1946	425251	31338	23246	479835	6657339
1953	491184	43638	35082	569904	8097895
1963	612596	60124	68621	741341	10582064
1971	701738	77319	95228	874285	12747755

Sources: Statistical Abstract, of Ceylon. 1966 PP.35-37
Census of Ceylon, 1953, Vol. 1, p.32-35.
Census of Ceylon, 1963, Vol. 1, p.6-7.
Census of Ceylon, 1971 Department of Census and Statistics.

FIG-2-3

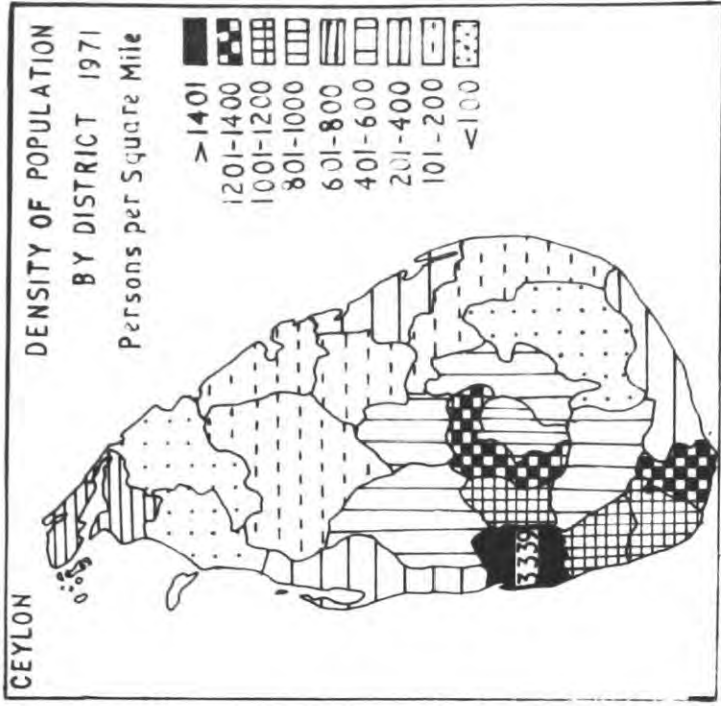


FIG-2-4

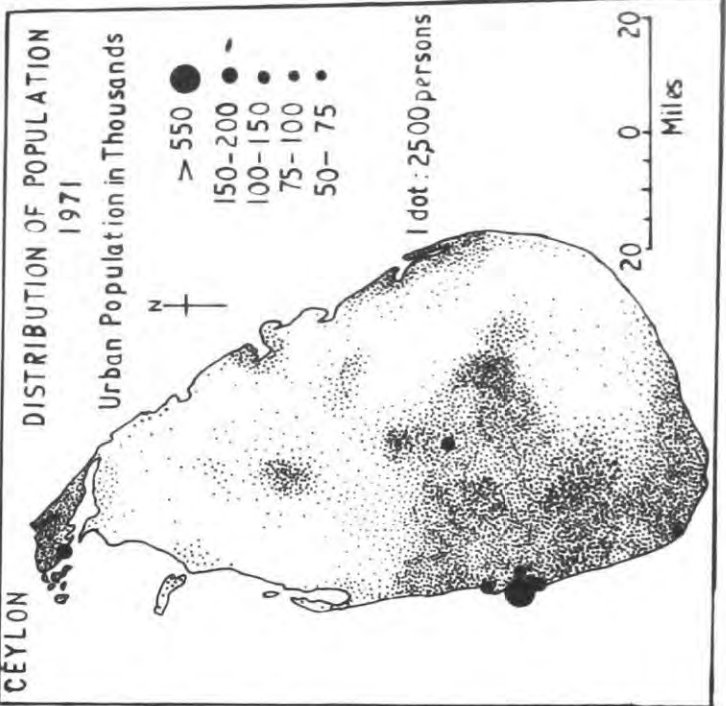
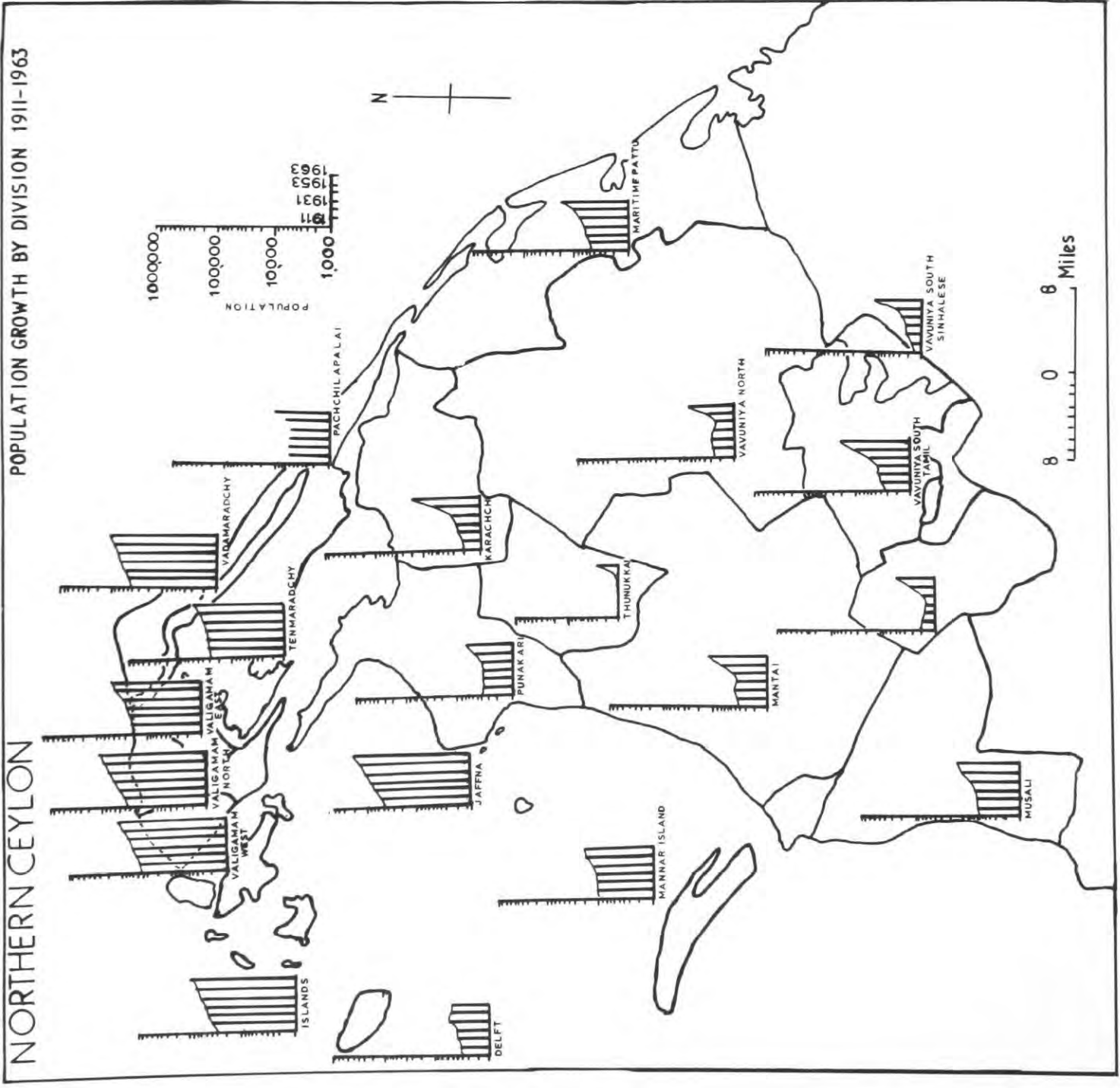


FIG-2-2



The study area had 6.89 per cent of Ceylon's population in 1971 and 7.1 per cent in 1963. Jaffna, Mannar and Vavuniya districts had 80.26, 8.85 and 10.89 per cent respectively of the area's population in 1971 and 82.22, 8.11 and 9.23 per cent respectively in 1963. In 1963 the population of the study area by D.R.O. divisions shows that 77 per cent of the total population were in divisions on the Jaffna Peninsula whilst 23 per cent were on the Mainland. At previous census periods (1901-1953) on average 86 per cent of the total population were on the Jaffna Peninsula and 14 per cent on the Mainland. The population growth of Northern Ceylon by divisions between 1911-1963 is shown on Fig. 2.2. By 1963 Jaffna and the three Valikamam divisions covered an area of 130 square miles or 4 per cent of the study area, but contained 48 per cent of the total population. A semicircular area of five miles radius from Jaffna city embraced 25 per cent of the total population. So great is the population in this area that some of the Peninsula's D.R.O. divisions (such as Jaffna, Valikamam West and North and Vaḍamaradchy) had more population than the total of the districts of Mannar and Vavuniya.

Density and Distribution

The density of population by district for Ceylon in 1971 is shown on Fig. 2.3. In 1971 the average density of population for Northern Ceylon was 255 persons per square mile and in 1963 it was 216 persons per square mile. There is a marked difference in density between Jaffna Peninsula with 1,346 persons per square mile and the Mainland with 55 persons per

square mile in 1963. The Mainland and the Peninsula reflect the very different geographical characteristics which have already been noted in chapter one. (see Fig. 2.5) Table 2.3 shows the population density for the three districts, Northern Ceylon, Ceylon, the Peninsula and Mainland between 1871-1971.

Table 2.3

Population density by district, study area, country, Peninsula and Mainland. 1871-1971. (persons per sq.mile)

<u>Year</u>	<u>Jaffna</u>	<u>Mannar</u>	<u>Vavuniya</u>	<u>Study Area</u>	<u>Ceylon</u>	<u>Peninsula</u>	<u>Mainland</u>
1871	246	21	10	83	95	-	-
1881	266	22	11	85	109	-	-
1891	280	25	11	93	119	-	-
1901	301	26	10	99	141	679	16
1911	327	27	12	108	162	747	17
1921	331	27	13	109	178	755	18
1931	356	26	12	116	210	810	17
1946	425	33	16	140	263	913	21
1953	493	45	24	166	320	1122	31
1963	635	62	48	216	418	1346	55
1971	702	80	65	255	507	-	-

Source: Calculated from Census Reports, 1921, Table. 226. p. 112-120,
Census Reports, 1946, Vol. 1, p.105-112.
Census Reports, 1953, Vol. 2, part 1 pp.32-35, 106-114.
Census Reports 1963, Vol. 1 part 1 pp.1-7.

The overall population density in 1971 of Jaffna district is nine times greater than Mannar and eleven times greater than the Vavuniya district (see Fig. 2.3). In 1963 the Jaffna Peninsula density is twenty-five times greater than the average population density of the Mainland. The density differences between the study area and Ceylon as a whole have increased from the 1871 census onwards in favour of Ceylon (see Table 2.3). The Wet Zone of Ceylon has had a continuous

FIG-2.5

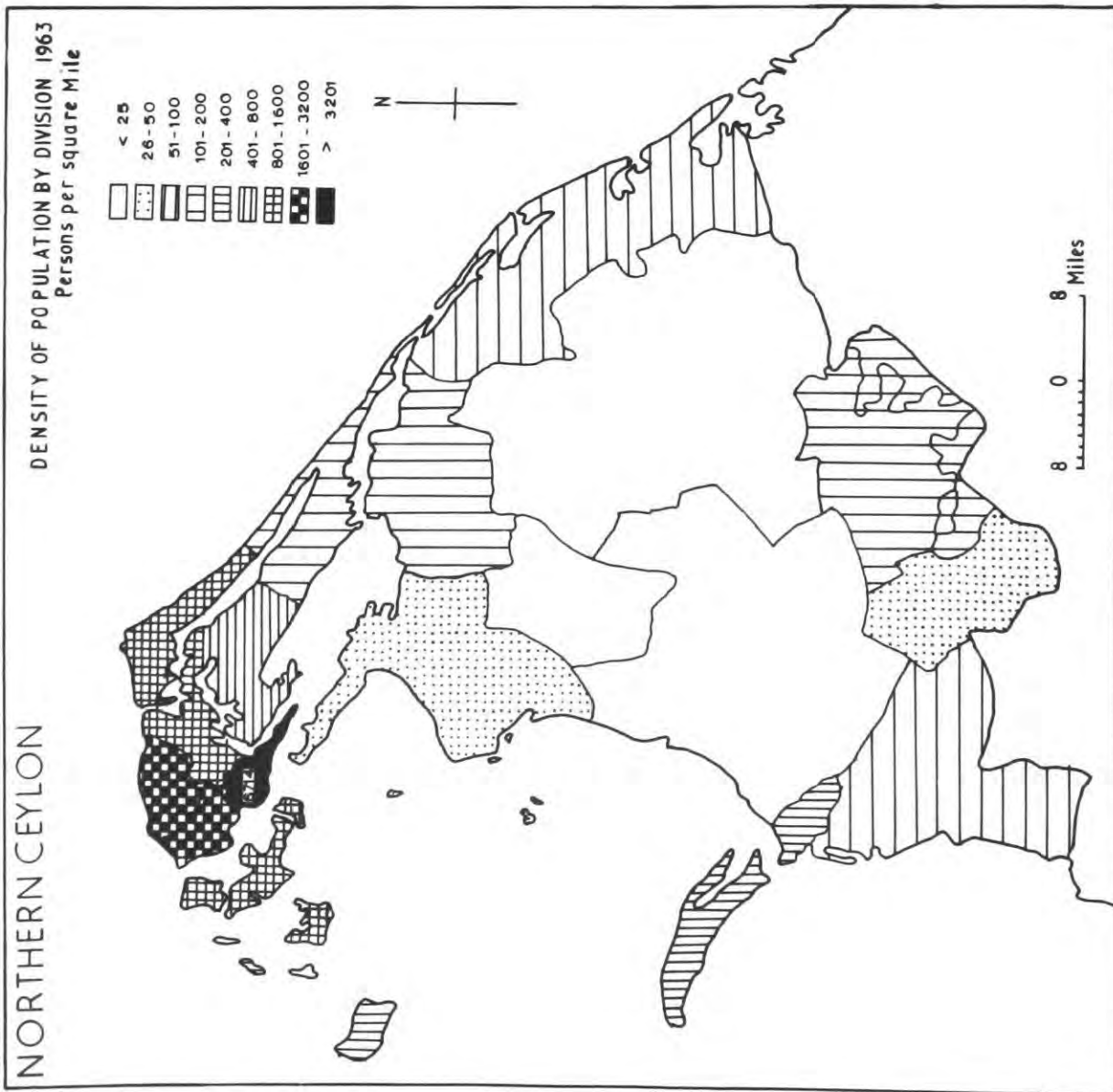
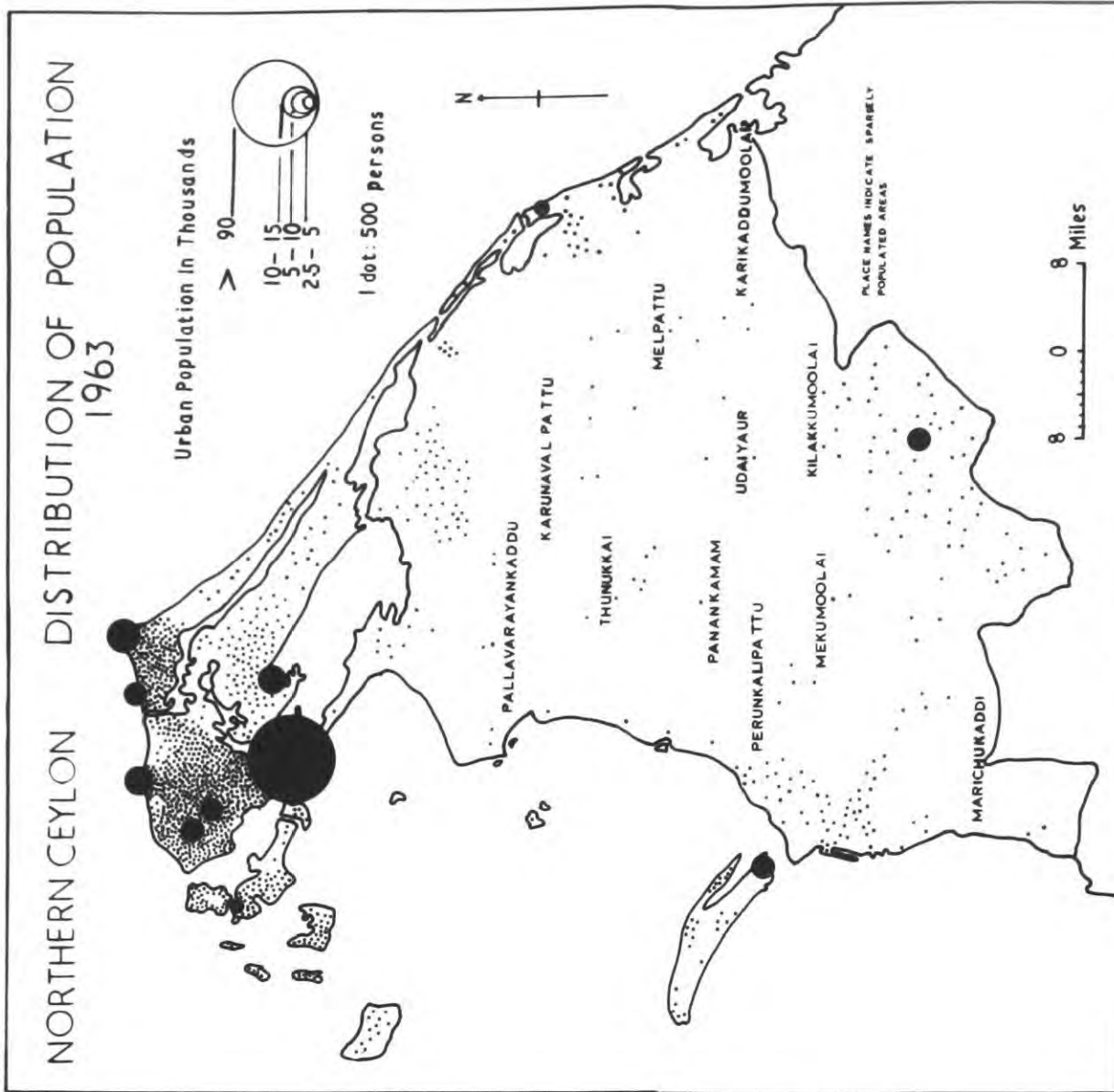


FIG-2.6



population growth but in the Dry Zone this growth was only rapid after the eradication of malaria from the 1940's onwards.

The population density varies within the districts and one can identify this at divisional level. The divisions are mainly administrative but do have some regional geographical relevance. Fig. 2.5 shows the density of Northern Ceylon by D.R.O. division in 1963 whilst detailed figures for these D.R.O. divisions (1911-1963) are shown in Appendix 3. The population density was however, not uniform either on the Peninsula or on the Mainland. The area of densest population was Jaffna division with 6,714 person per square mile whilst the Vavuniya North division was the lowest with 13 persons per square mile. All the Peninsula divisions have very high densities except the Pachchilapallai division where density is low because of large tracts of scrub land and coconut estates. The Jaffna division has a very high population density, with 6,714 persons per square mile, because the division includes Jaffna City and its suburban settlements. The density within Jaffna City was 12,215 persons per square mile in 1963. The three Valikamam divisions have high densities because of intensive market gardening due to the fertile red soil and good ground water resources. The population densities in the Vadamardchy and the Islands division are also high owing to the non-farm population.

On the Mainland, with the exception of the Mannar island division, all other divisions had a density of less than 150 persons per square mile. Vavuniya South Tamil and Sinhala

and Karachchi divisions had relatively higher density within the Mainland because of colonization and urban settlements. The Mainland divisions have a low population density because large proportions of the area are under forest or are non-productive land uses.

The geographical distribution of population of Ceylon and Northern Ceylon is shown on Figs. 2.4 & 2.6. A great concentration is found on the Jaffna Peninsula although within it the Pachchilapallai and eastern part of Vadamarachy divisions are sparsely populated. On the Mainland there is a scattered population distribution, although in some areas a marked concentration of population exists as for example, Mannar island, a triangular shaped area under the Giant's tank scheme, the locality around Vavuniya town, Kilinochchi colonizations and in the Mullaitivu-Mulliyawalai areas. Higher population densities are found on the Mainland where settlements associated with tanks have been developed. There is a scanty distribution of population in forest and tankless areas particularly in Karunavalpattu, Karikaddumoolai South, Mekumoolai, Melpattu, Panankamam, the eastern part of Udayaur, Marichukaddi, Pallavarayankadu, Thunukkai, Perunkalipattu and Kilakumoolai.

Population Changes

Population changes in the three districts in Northern Ceylon are shown in the Table 2.4. The absolute growth was very small before 1946 in the districts of Mannar and Vavuniya and the growth of Jaffna district accounts for 90 per cent of the total population growth of the study area before 1946.

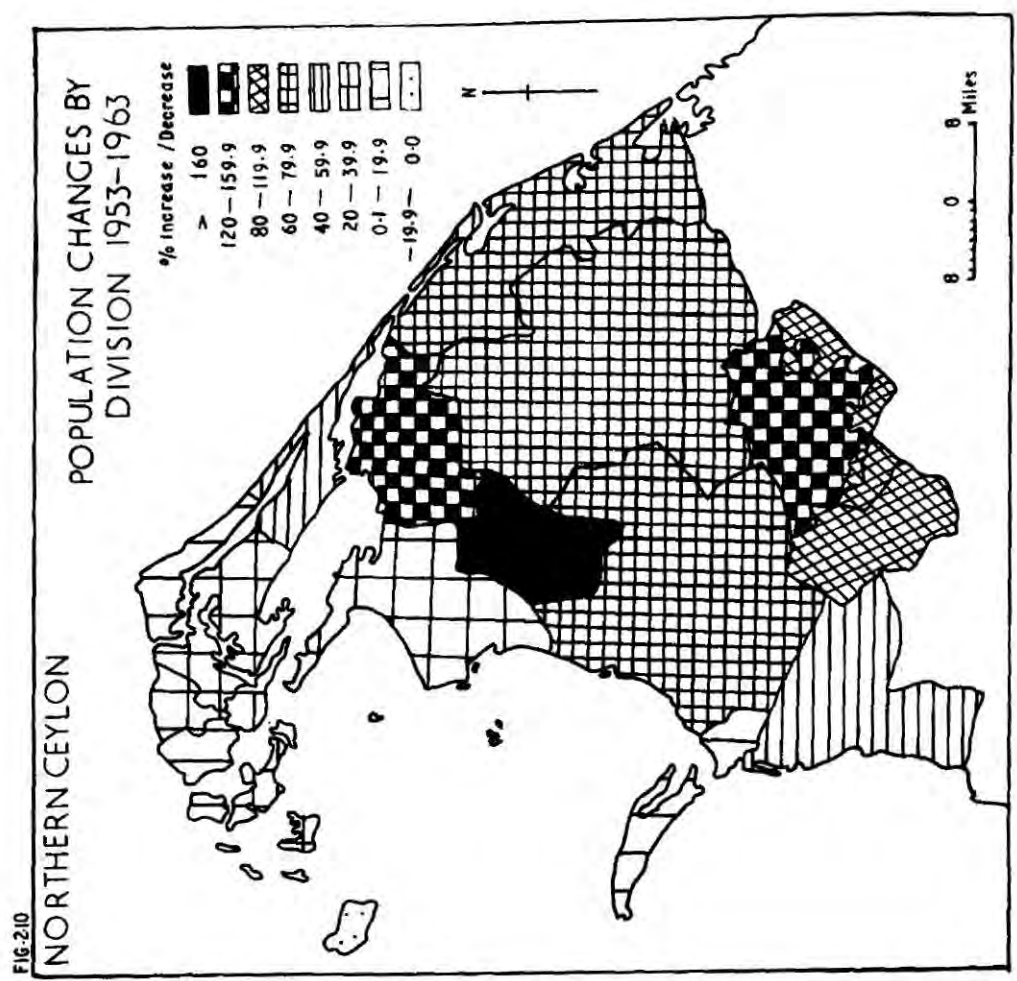
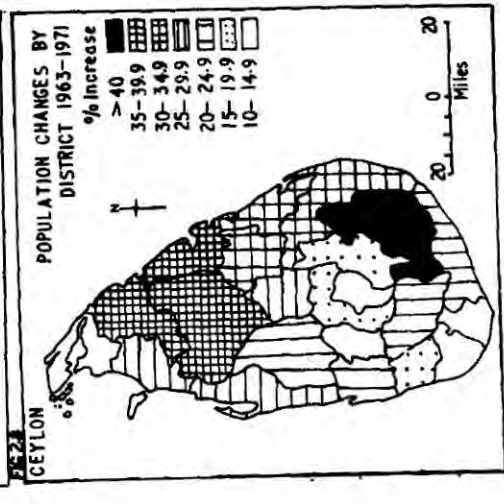
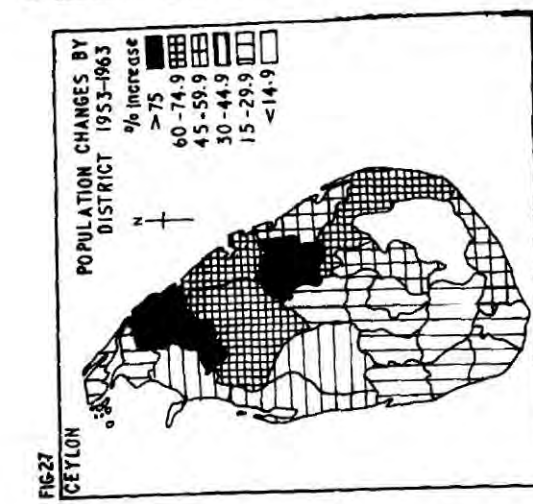
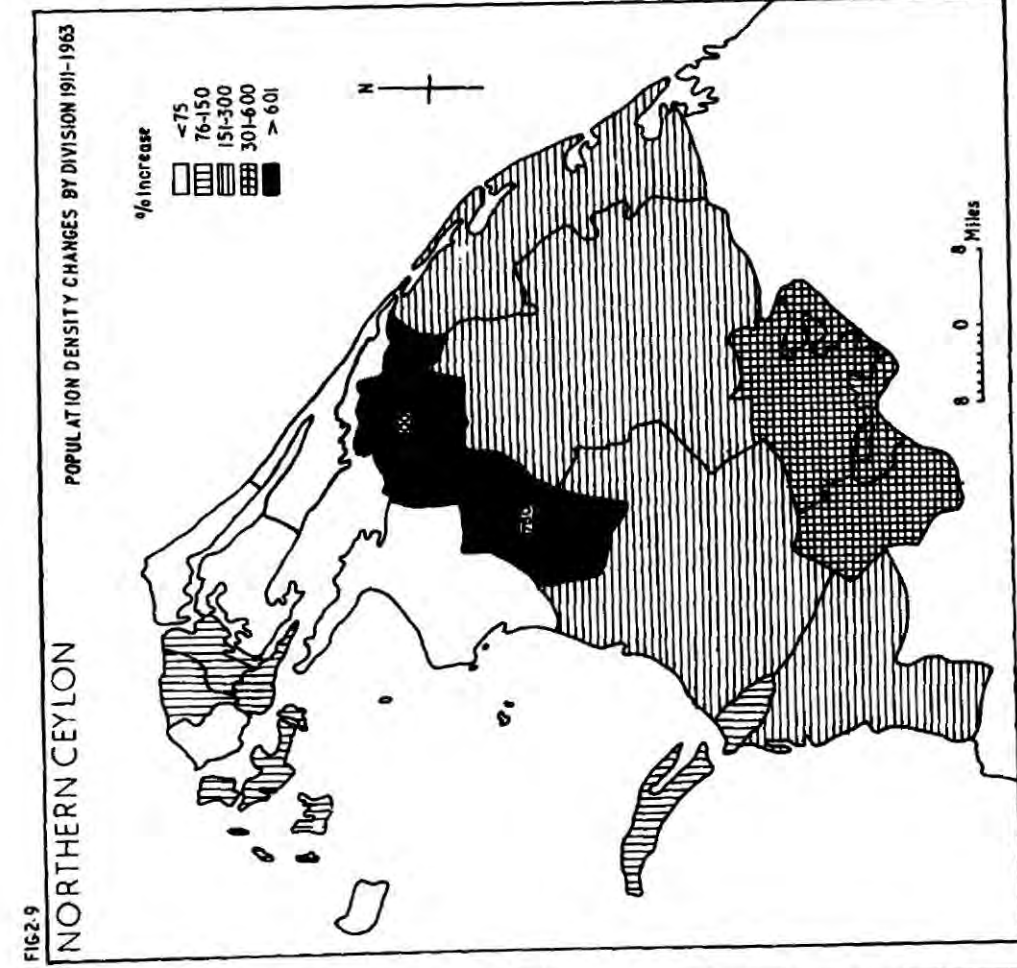


Table 2.4.

Population change by district and study area, 1871-1971.

<u>Inter censal</u>	<u>Jaffna</u>	<u>Mannar</u>	<u>Vavuniya</u>	<u>Study area</u>
1871-1881	9320	1089	224	10633
1881-1891	23901	3163	- 68	26996
1891-1901	21573	415	-342	21646
1901-1911	25855	677	2180	28712
1911-1921	3829	279	1367	5475
1921-1931	24884	-745	-394	23745
1931-1946	69826	6201	4934	80961
1946-1953	65933	12300	11836	90069
1953-1963	122046	16542	33418	172006
1963-1971	89142	17195	26607	132944

Source: Census Reports, op.cit.,

After 1946 Mannar and Vavuniya experienced a very rapid increase of population. There were very small populations in the Mannar and Vavuniya districts prior to 1946, in fact, as Table 2.5 shows they lost population in certain inter-censal periods. Figures 2.7 and 2.8 show population changes by district for Ceylon between 1953-1963 and 1963-1971. The population growth in percentage terms is shown in Table 2.5.

Table 2.5

Percentage population change by district and study area 1871-1971

<u>Year</u>	<u>Jaffna</u>	<u>Mannar</u>	<u>Vavuniya</u>	<u>Study area</u>
1871-1881	3.79	5.38	1.46	3.77
1881-1891	9.36	14.82	- .44	9.24
1891-1901	7.72	1.69	-2.21	6.78
1901-1911	8.59	2.72	14.38	8.42
1911-1921	1.60	1.09	7.88	1.42
1921-1931	7.53	-2.88	-2.11	6.33
1931-1946	19.65	24.66	26.92	20.30
1946-1953	15.50	39.25	50.92	18.77
1953-1963	24.85	37.91	95.26	30.18
1963-1971	14.6	28.6	38.8	17.93

Source: Census Reports, op.cit.,

The population growth before 1946 was very slow particularly in the Mannar and Vavuniya districts. Although the population growth rate was significantly higher at the 1946 census than in previous intercensal periods it represents the growth of fifteen years, and not ten.

The numerical changes in Northern Ceylon by D.R.O. division between 1911-1963 show certain anomalous patterns within districts. At the district level Jaffna district showed a population growth in all intercensal periods. But at the divisional level Pachehilapallai, Punakari, Thunukkai, Karachehy and Tenmaradchy within the Jaffna district lost population in some intercensal periods. The Maritime Pattu and Vavuniya South Sinhala divisions in Vavuniya district and the Mannar Island division of Mannar district had a very small increase in all intercensal periods before 1946.

The Tenmaradchy division lost population (1911-1921) because of influenza, fever and malaria. On all the Mainland divisions cholera and malaria were the main reasons for the loss of population before 1946. In addition to malaria and other endemic diseases, high infant and maternal mortality, poor health of the population and inadequate health institutions caused high death rates particularly on Mainland divisions. Although the Jaffna Peninsula was free from malaria, the other factors mentioned were prevalent, although to a lesser extent than on the Mainland.

The population changes by D.R.O. division between 1911-1963 are shown on Fig. 2.9., and the population changes between 1953-1963 on Fig. 2.10. All Mainland divisions except Punakari had higher growth rates than Peninsula divisions and also a

more rapid percentage growth of population. Although in numerical terms the Peninsula divisions had a greater population increase than those on the Mainland. The divisions which had high growth rates on the Mainland between 1953 and 1963 are as follows: Thunukkai - 590, Karachchi - 126 and Vavuniya South Tamil division - 125 per cent.

Reasons for the very high growth between 1946-1963 included the rapid control of malaria through D.D.T., a reduction of infant and maternal mortality, and general improvements in health facilities throughout the area. The general health of population improved after the introduction of the subsidised food rationing system. Under this system people were able to obtain rice and other subsidiary food items very cheaply and this helped their diets. The improvement in standard of living was one of the main factors for the population growth in the post 1940's. The pre-forties situation was clearly visible from the report of the Commissioner of Relief in 1936: "The specially dangerous feature of the domestic economy of many of the people is the lack of any reserve at the back of their low standard of diet. They are brought very near to starvation point by any small disturbance of their equilibrium such as the death of a man, sickness or unemployment, bad weather conditions, even a small fine in the court, an invasion of their small patch of cultivation by deer, wild boar, an elephant or a neighbour's cattle Then the morning meal may be reduced to a small quantity of weak plain tea

with a suspicion of sugar in the palm of the hand touched by the tongue to get an impression of sweetness, and later to nothing. The midday meal becomes a small quantity of boiled breadfruit, jak, papaw or some jungle fruit".¹⁰

Although this comment was made about the Dry Zone, it also applies to Northern Ceylon. Here, the main diet was manioc, palmyra roots and fruits, soup made out of palmyra root flour and some cereals. In addition to malaria, malnutrition and poor medical facilities also were reasons for high death rates. For example, excess of males over females in Ceylon is not only the result of high rates of maternal mortality but also disparity in food consumption between males and females. Prior to the 1940's, 90 per cent of the population lived in relatively malaria free areas of the Wet Zone, Jaffna Peninsula and eastern coastal areas of Ceylon. The control of malaria helped to reduce the death rate in the infested Dry Zone and led to resettlement there. The impact of subsidised rice and other food commodities in the improvement of the diet of the Ceylonese should not be under estimated. In addition to the above factors, restoration of old tanks abandoned and planned agricultural colonizations on the Mainland, particularly in the 1950's and 1960's, were reasons for rapid growth and consequent changes. On the Mainland in addition to natural growth, migrant settlers from the Peninsula are further reasons for the rapid growth of population. The population changes between 1963-1971 in the Mannar and Vavuniya districts, were 28.6 and 38.8 per cent respectively, showing the rapid growth during this period. In the future, further agricultural colonization schemes will attract more and more people from the Jaffna Peninsula.

Population Composition:

Age Structure

The population structure of Northern Ceylon by age, sex, ethnic religious characteristics is very significant in the consumption of central goods. One of the most significant features of the age structure is the high proportion of young people. According to the 1963 census, 14.75 per cent of the population were under four years, nearly 50 per cent under nineteen years and 76.01 per cent under thirty-nine years. The pattern is very similar to other South Asian countries. In most developing countries 40-50 per cent of the total population are under 15 years of age, whereas in developed countries only about 20-33 per cent are within this group.¹¹ Table 2.6 shows the age structure of the districts of Jaffna, Mannar and Vavuniya and of Northern Ceylon.

Table 2.6

Age structure by district and Northern Ceylon 1963

<u>Age groups</u>	<u>Jaffna</u> %	<u>Mannar</u> %	<u>Vavuniya</u> %	<u>N. Ceylon</u> %
0-14	14.08	18.16	17.79	14.75
5-19	35.22	34.47	35.09	35.15
20-39	25.89	26.25	27.94	26.11
40-59	16.29	15.25	14.19	16.01
60-74	6.45	4.35	3.46	6.01
Over 75	1.66	.98	.68	1.44
Unspecified	.40	.33	.48	.48

Source: Census of Ceylon, 1963, op.cit., p.5-7.

One of the reasons for the severe economic problems of Ceylon is the youthful population taking a massive proportion of state expenditure on education and health facilities. Population above 60 years represents 7 per cent of the total of the Jaffna district, and this figure is higher than comparative figure for all other districts of Ceylon.

FIG-2-11

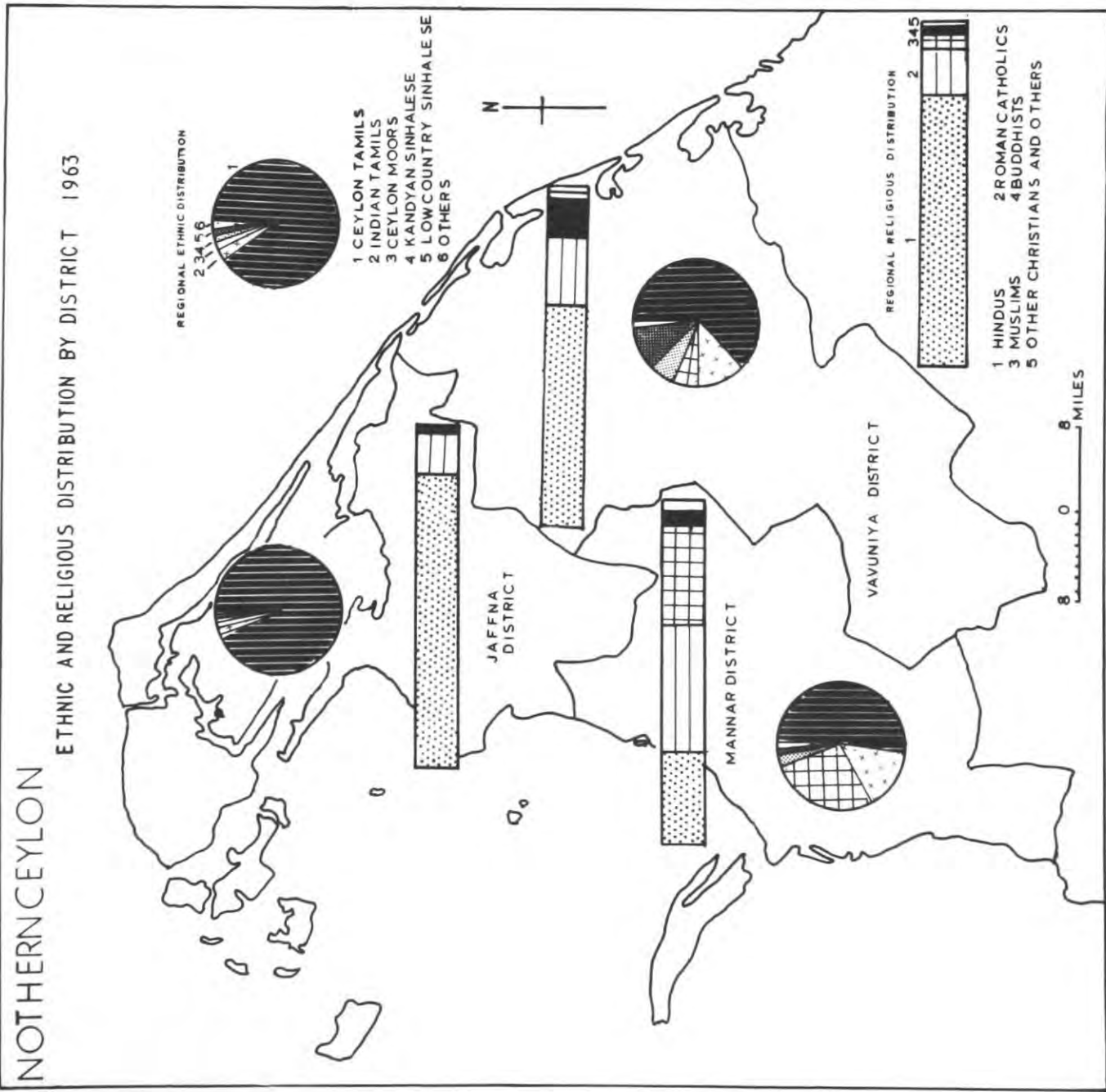
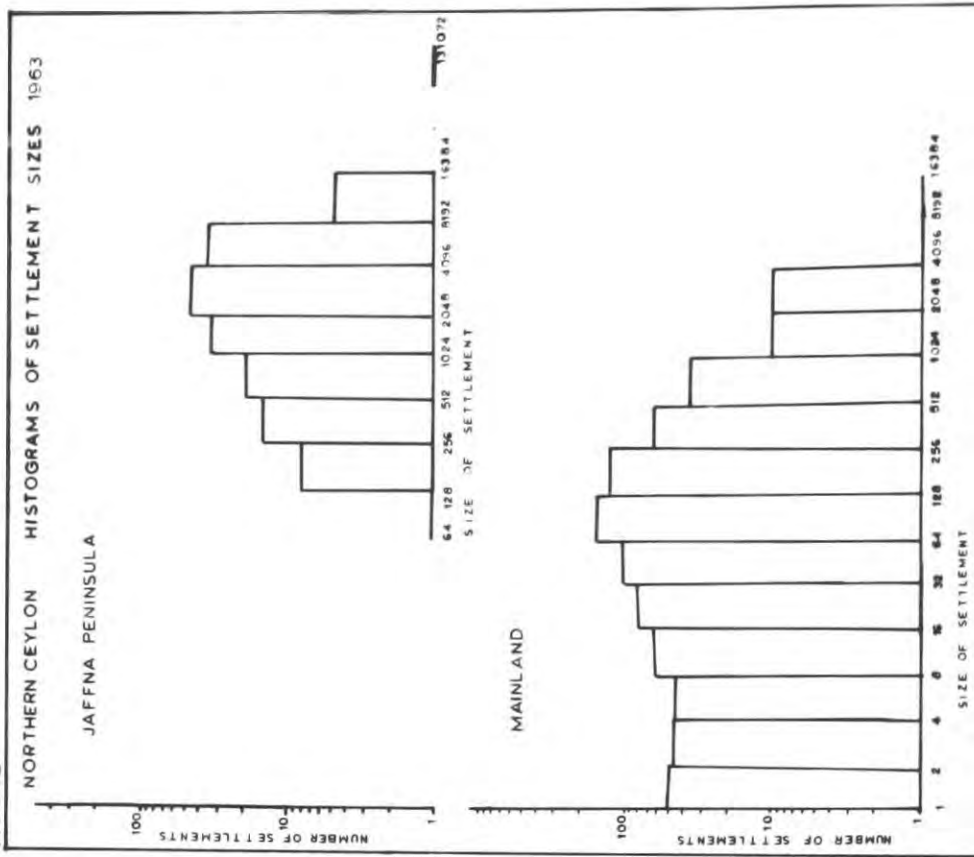


FIG-2-12



Sex-Ratios

At the census of 1963, 379,082 males and 361,259 females were enumerated. There was therefore an excess of 17,823 males giving a sex ratio of 95 females for every hundred males. The population of the three districts and for the whole study area by sex in 1963 is shown in the Table 2.7.

Table 2.7.

Sex ratios by districts, and Northern Ceylon: 1963Sex ratios

	<u>Total male</u>	<u>Total female</u>	<u>Number of female per 100 males</u>
Jaffna	307931	304665	99
Mannar	32921	27193	83
Vavuniya	39220	29401	75
N. Ceylon	379082	361259	95

Source: Census of Ceylon 1963.

As the table shows the gap between male and female sex ratio in Jaffna district is very small. In Mannar and Vavuniya districts there was an excess of male population and a high percentage of these males were immigrants from the Peninsula and other areas. In the Jaffna district the actual male to female ratio is higher than the census figures and an analysis of the Ceylon Tamil populations' sex ratio in South and West Ceylon districts helps to explain this situation. Among the middle and lower income groups, a high percentage of the male population of the Jaffna Peninsula are now working outside the area.

The sex ratios by D.R.O. divisions shows that the six Peninsula divisions (Delft, Islands, Valikamam East, West and North and Vadamardchy) have a higher female ratio to total population and that this ratio varies between 102-113 females to 100 males. In all other divisions the female population is

lower than the male population; Tenmaradchy - 99, Jaffna - 92 Venkala-Cheddikulam - 88, Musali - 86, Punakari - 82, Pachchilapallai - 78, Karachchi - 73, Mantai - 82, Vavuniya-South Tamil - 84, Maritime Pattu - 71, Vavuniya North - 66, Thunukkai - 65 and Mannar Island - 81.

Within the Jaffna Peninsula three divisions have a lower female to male ratio. The male-female ratio in Tenmaradchy is almost equal but slightly favours the male side. The Jaffna division is an urbanized part and non-primary activities have attracted a larger male population. The Pachchilapallai division and all the Mainland divisions have a very low female-male population ratio. For every hundred males there are only 65-86 females found. Compared with the Peninsula all the Mainland divisions are developing areas. Large scale irrigation, land development, agricultural colonizations and the related development of economic activities such as trading and transport have attracted a large number of migrants, particularly males from the Peninsula and other parts of Ceylon.

Place of Birth

Place of birth is an important factor in assessing migration. Ninety-four per cent of the total Jaffna population were born in the district. See Table 2.8 this shows that people born outside the district represent a very small proportion of the total and the district is losing population by migration to other districts. In contrast the two districts of Mannar and Vavuniya had 29.1 and 43.4 per cent respectively of their total population born outside the district of enumeration or in foreign countries. This figure shows that a

large proportion of the population are recent settlers from other districts but mainly from Jaffna. 56 per cent of Vavuniya district's urban population were born outside the district.

Table 2.8.

Population by place of birth by district, 1963

<u>Place of birth</u>		<u>Jaffna</u>	<u>Mannar</u>	<u>Vavuniya</u>
Born in the district of enumeration	Total	94.6	70.9	57.6
	Urban	91.1	67.4	37.0
	Rural	95.8	71.5	61.6
Born outside the district of enumeration but in Ceylon	Total	3.9	20.7	38.3
	Urban	6.4	27.4	56.0
	Rural	3.0	19.6	34.9
Foreign	Total	1.5	8.4	4.1
	Urban	2.5	5.0	7.0
	Rural	1.2	9.0	3.0

Source: Census of Ceylon, 1963 op.cit., p.46.

Ethnicity

The study area is predominantly Tamil and is known as the traditional homeland of Ceylon's Tamils. In the districts of Jaffna, Mannar and Vavuniya 95.7, 50.9 and 63.7 per cent of the total populations are Tamil. Except for the Vavuniya South Sinhalese D.R.O. division, all other areas are settled by Tamil speaking people and includes Ceylon and Indian Tamils, and Ceylon and Indian Moors. The ethnic pattern of the district is shown in Table 2.9 and the ethnic and religious distribution patterns are shown by district on Fig. 2.11.

Table 2.9

Ethnic groups by district, 1963

<u>District</u>	<u>Kandyan Sinhalese</u>	<u>Low country Sinhalese</u>	<u>Ceylon Tamil</u>	<u>Indian Tamil</u>	<u>Ceylon Moors</u>	<u>Others</u>
	%	%	%	%	%	%
Jaffna	9.7	0.2	95.7	1.8	1.2	.2
Mannar	3.3	1.9	50.7	15.9	26.1	2.6
Vavuniya	6.1	11.5	63.9	11.2	7.0	.4

Source: Census of Ceylon, 1963, op.cit., p.27.

In Jaffna district, the majority of the Sinhalese population are found in urban centres and predominantly in Jaffna City. In Mannar district they are found in Mannar town and Madhu Road settlement. In the Vavuniya district, the four Grama Sevaka divisions of Mamaduwa, Madukanda, Iraperiyakulam and Ulukulama are settled entirely by Sinhalese. Ceylon Moors are found in two wards of Jaffna City, several villages in the Mannar district and a few isolated villages in the Vavuniya district.

Religion

The great majority of the inhabitants are Hindus. Though the study area is mainly settled by Hindus, particularly in the Jaffna and Vavuniya districts, other religious groups such as Roman Catholics, Muslims, Buddhists and Christians represent 21.3 per cent of the total population. (see Table 2.10 and Fig.2.11)

Table 2.10

Religious groups by district, 1963

	<u>Jaffna</u>	<u>Mannar</u>	<u>Vavuniya</u>
Buddhists	.86	2.72	14.74
Hindus	85.30	27.60	64.44
Muslims	1.46	28.85	7.28
Roman Catholics	10.76	38.78	12.55
Other Christians	1.54	.01	.81
Others	.01	.03	.16

Source: Census of Ceylon, op.cit., p.31.

Though the Hindus have an overall majority, Roman Catholics are the main religious group in the Mannar district, particularly in Mannar Island and Musali divisions. In Mannar no religious group is in a total majority. In Jaffna district,

within the Jaffna parliamentary constituency, Roman Catholics are the main religious group. In Vavuniya district along the east coastal fishing settlements, Roman Catholicism is the main religion.

Ceylon and Indian Moors are Muslim by religion but they are not a majority in any D.R.O. or town. This reflects the Moors ethnic distribution pattern. In Jaffna district they are found mainly in two wards of Jaffna City (Old Mosque and New Mosque) and a number of villages in the Mannar district and a few villages in the Vavuniya district.

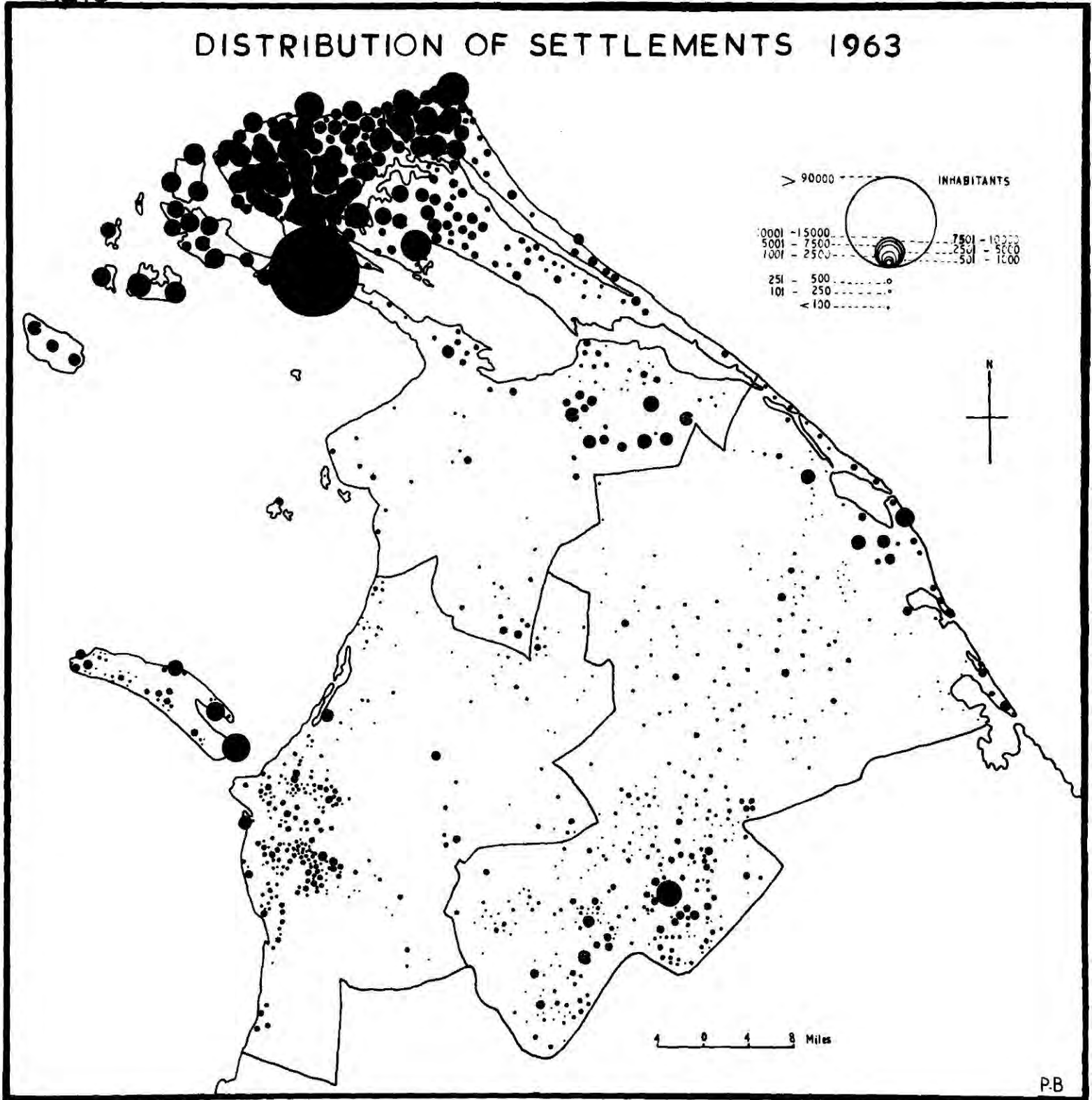
The Low Country Sinhalese and Kandyan Sinhalese are predominantly Buddhists. The Vavuniya South Sinhalese D.R.O. division is predominantly Buddhist. Except for this division the rest of the Buddhists are widely distributed over the study area but are mainly found in urban settlements particularly in Jaffna City.

Hindus are found throughout the Northern districts except in Vavuniya South Sinhalese D.R.O. division. They are in a minority position in Mannar town, on Mannar Island and in Musali division. Within the Mannar district, Mantai division is predominantly Hindu.

Settlement Pattern

There were 1,015 settlements in the study area in 1963. The largest being Jaffna with a population of 94,670. There are 158 settlements with ten or less people. The number of settlements in the Jaffna, Mannar and Vavuniya are 280,307 and 428 respectively. The Peninsula with 77 per cent and the Mainland with 23 per cent of the total population, have 195 and 820 settlements.

FIG 213



Nine groups of settlements based on population size may be identified in the study area. The classification is based on a modified United Nations categorization.¹² In this study settlements with less than 500 people are grouped into three divisions, whereas the United Nations system treats all places with a population of under 500 as one group. (see Table 2.11)

Table 2.11

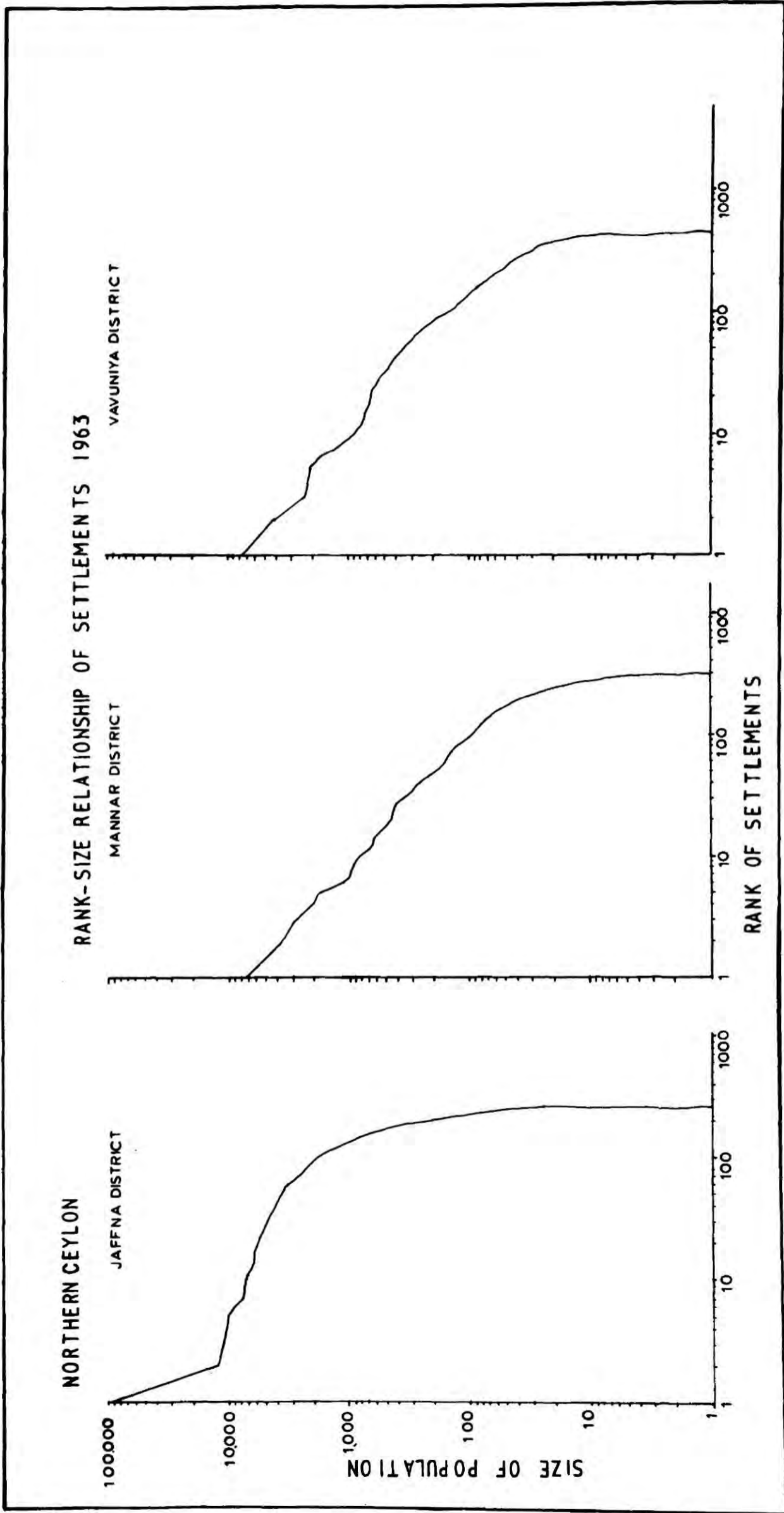
Classification of settlements by population size; Northern Ceylon 1963

<u>Population size</u>	<u>Number of settlements</u>	<u>Percentage of population</u>
94,670	1	12.72
10,000-15,000	4	6.01
5,000- 9,999	26	22.47
2,000- 4,999	74	31.59
1,000- 1,999	45	8.77
500- 999	69	6.30
250- 499	102	5.05
100- 249	192	4.74
Under 99	502	2.35

Source: Census, 1963, Dept. of Census & Statistics.

The last three groups contain 796 settlements but represent only 13 per cent of the total population. Groups 3 and 4 have 100 settlements with 54 per cent of the population. Out of 502 settlements, 501 settlements with less than 99 people were found on the Mainland. Except for a few urban planned colonizations and older fishing and agricultural settlements, the majority are very small tank settlements. There are only 26 settlements on the Mainland which have more than a thousand people. Histograms of settlement size for Peninsula and Mainland on a geometric scale are shown on Fig. 2.12. The distribution of the settlements by population size is shown on Fig. 2.13. The majority of the large settlements are found on the Peninsula

FIG-2.14



and here 126 settlements have over a thousand inhabitants. These are mainly urban, intensive agriculture or non-farm settlements. The differences between the Peninsula settlements and those on the Mainland are easily identified on Fig. 2.12 and 2.13, the Peninsula appearing as an agglomeration of large settlements.

The rank-size distribution of the settlements of the three districts is shown on Fig. 2.14. This is important in the analysis of the spacing of settlements. The graphs for Mannar and Vavuniya district show a smoother pattern of rank-size than the one for Jaffna district which shows a primate distribution with a marked gap between the leading city (Jaffna) and the next town. Jaffna City, a leading regional primate city is seven times larger than the second rank town. The frequency distribution of settlement sizes on the Peninsula and on the Mainland reflects a different distribution pattern in the relationship of the size and number of settlements. On the Mainland the frequency distribution shows a continuous increase in number of settlements with decrease in size. Jaffna Peninsula follows a similar pattern, but there is an abrupt decrease in the number of settlements at the lower end of the distribution. According to the rank size rule the number of settlements should continue to increase as size decreases, so that we should not only expect more villages than towns but more hamlets than villages, more isolated farms than hamlets. The same assumptions are made in the Christaller-Losch ideas of a functional hierarchy.¹³ On the Mainland the pattern is

similar to the predicted one, but on the Peninsula the pattern is different at the lower end of the distribution. The frequency of distribution of settlement sizes in the Wet Zone and the Dry Zone of Southern Ceylon show similar curves for both zones. The pattern on the Peninsula therefore is similar to Gunawardena's findings of the settlement pattern in the Wet Zone of Southern Ceylon, but the Mainland pattern differs from that of the Dry Zone.¹⁴

An analysis of physical conditions, land forms, soil, water resources, land use, housing patterns and population sizes may be used to identify marked differences between settlements. As pointed out in the first chapter, the Peninsula and the Mainland are two separate geographical regions. On both the Mainland and the Peninsula the functional differences between settlements could be related to the above geographical factors. Bearing all these factors in mind, eight types of settlements can be identified in the study area. Cook identified twelve types of rural settlements in Ceylon.¹⁵

1. Urban settlements
2. Sub-urban or Rururban settlements
3. Non-farm rural settlements
4. Intensive agricultural settlements
5. Non-intensive agricultural and fishing settlements
6. Fishing settlements
7. Tank settlements
8. Recent colonizations

Table 2.12 shows the divisional pattern of functional types of settlement. (The numbers indicate the types of settlements)

FIG-215

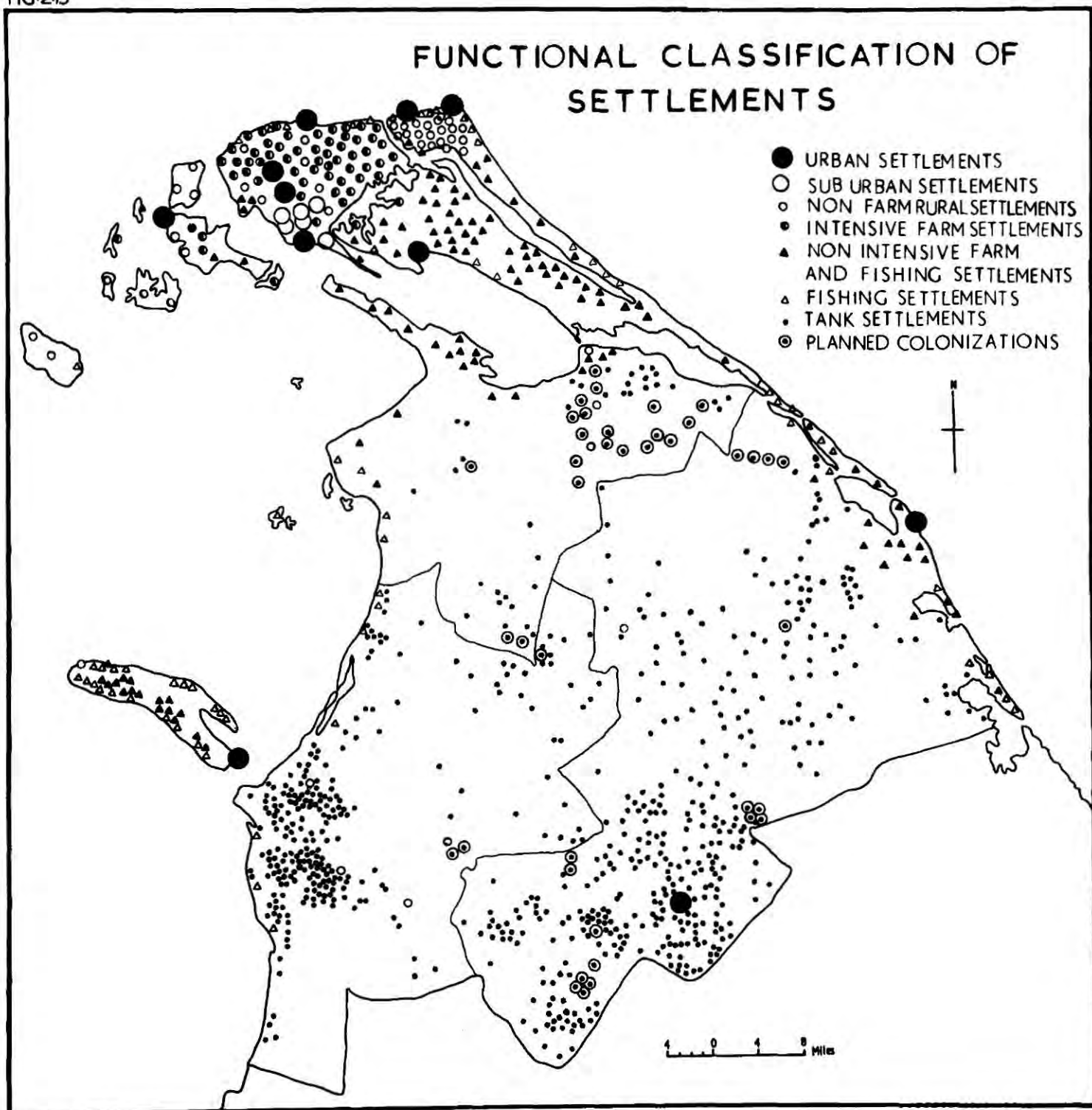


Table 2.12

Functional classification of settlements by division
Northern Ceylon 1963
 Type of settlement (see Text)

<u>D.R.O. division</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>Total</u>
Delft	-	-	2	-	1	-	-	-	3
Islands	1	-	8	5	3	-	-	-	17
Jaffna	1	5	-	1	1	-	-	-	8
Vali-West	2	1	3	10	4	2	-	-	22
Vali-North	1	-	3	23	-	2	-	-	29
Vali-East	-	-	2	15	-	1	-	-	18
Tenmaradchy	1	-	1	2	28	2	-	-	34
Vadamaradchy	2	-	21	-	7	7	-	-	37
Pachchilapalai	-	-	-	-	22	5	-	-	27
Karachehi	-	-	4	-	4	-	20	17	45
Thunukkai	-	-	-	-	-	-	12	2	14
Punakari	-	-	-	-	16	5	5	1	27
Mantai	-	-	1	-	-	4	108	3	116
Mannar	1	-	1	-	17	22	32	-	73
Musali	-	-	3	-	-	4	110	-	117
Vavuniya South (Tamil)	1	-	-	-	-	-	143	7	151
Cheddikulam	-	-	-	-	-	-	67	4	71
Vavuniya South (Sinhala)	-	-	-	-	-	-	38	1	39
Vavuniya North	-	-	1	-	-	-	97	1	99
Maritime Pattu	1	-	-	-	17	11	34	4	67
Total	11	6	50	56	110	65	665	40	1,015

Source: Field survey, 1968/1969.

The distribution of functional classification of settlement is shown on Fig. 2.15. Before considering them in detail certain generalizations can be made about the broad distribution pattern. All suburban settlements are found close to Jaffna City. Intensive agricultural settlements are found contiguously in the three Valikamam divisions of Jaffna district and some on the Islands and Tenmaradchy. The western part of the Vadamaradchy division has mainly non-farm settlements. Non-intensive agricultural and fishing, and exclusively fishing settlements are found on Tenmaradchy, Eastern Vadamaradchy and Maritime Pattu division along the east coast and on Punakari and Mannar island on the west coast. The entire Mainland, except for

the east and west coasts, consists of numerous tank settlements and a few planned colonizations.

Urban Settlements

According to the 1963 population census, 22.76 per cent of the total population of the study area were urban dwellers and 77.24 per cent were rural. In the 1963 census Municipal, Urban and Town Council areas were considered to be urban in status, but in 1953 and in previous censuses only Municipal and Urban Councils were so categorized. The proportion of the population classified as urban and rural in 1953 was respectively 13.65 and 86.35 per cent. Jaffna City was the only urban settlement according to the 1953 urban criteria. If the urban criteria of 1963 were applied to the 1953 census figures then the urban percentages would increase to 22.73 per cent.

From an administrative point of view, the Town Council is the lowest category of urban settlement but certain Town Councils have more population and revenue than some urban Councils. The Town Councils were created in place of Sanitary Boards in 1947 and the Urban Councils were known as Urban District Councils before 1949. In 1953 there was one Municipal Council and nine Town Councils in the study area but by 1963 the number of urban settlements had increased to eleven, with one Municipal, three Urban and seven Town Councils. In 1971 the number of Town Councils had increased to twelve, Urban Councils to four, whilst Municipal Council remained the same.

The urban/rural population for Jaffna district, the study area and for Ceylon from 1881-1963, are shown in Table 2.13.

Jaffna City was the only urban settlement in the Jaffna district as well as in the whole study area up to 1963. Though there were many sanitary board towns in the study area, they were not considered as having urban status.

Table 2.13

Urban and rural population for Jaffna district, Study Area, and Ceylon 1881-1963

<u>Year</u>	<u>Jaffna district-urban</u> %	<u>Study area-urban</u> %	<u>Ceylon-urban</u> %
1881	15.2	13.2	-
1891	15.5	13.2	10.7
1901	11.3	9.9	11.8
1911	12.4	10.9	12.2
1921	12.8	11.5	12.9
1931	12.9	11.3	13.2
1946	14.7	13.1	15.3
1953	15.8	13.7	15.3
1963	22.2	22.7	18.2

Source: Calculated from the census of Ceylon, 1901-1963.

Prior to 1963 urban/rural ratios in the Jaffna district and Ceylon were very similar but by that date the urban ratio in the Jaffna district and the study area were higher than the national figure.

Historically Jaffna City, Mannar and Mullaitivu were important urban settlements. In the 19th century these towns were further developed by the British as provincial and district capitals. Jaffna City had urban status from the 19th century, but although Mannar and Mullaitivu remained functionally important places in district administration and commercial functions they did not have defined urban status. During the Portuguese and Dutch period, Mannar was a chief administrative and defensive centre, but during the British period, it lost its defensive role. It remains the largest settlement in the Mannar district and functions as the chief administrative and commercial centre.

Mullaitivu was founded by Liet. Thomas Nagal during the Dutch period. He selected the site as the headquarters of the administration and also built a fort. The town of Mullaitivu consists of three distinct villages lying close together. Kudiyiruppu, the Hindu quarter, Kovilkudiyiruppu, the Roman Catholic quarter and Manalkudiyiruppu which was inhabited chiefly by fisherfolk. It was the chief administrative and commercial centre of the district. In 1928 the Mullaitivu district was renamed as Vavuniya district with slight boundary alteration; the administrative centre also shifted to Vavuniya and became the district's capital. The shifting of the administrative centre affected the Mullaitivu bazaar function and the town declined in importance.

After becoming the district administrative centre, Vavuniya, situated on the Colombo-Jaffna railway, Kandy-Jaffna and Vavuniya-Mannar main roads, had a favourable location for urban development. The centre included the adjoining village of Irampaikulam. It had a population in 1891 of 598 persons living in 125 houses. The population of this centre before 1946 was always under a thousand.

In the 1930's excluding Jaffna City, there were nine sanitary board towns. These had an important place in the sanitary service function. These towns were district or divisional administrative centres or minor ports. (see Table 2.14) In other words the sanitary board towns had more functions than other rural settlements. In 1946, however, they were abolished and replaced in 1947 by town councils. Some of the sanitary board towns were promoted to town council status while some were demoted to village councils. In 1949 Jaffna City was raised to municipal council status. The

names, their present and past local government status and the constituted date of the present urban status of the urban settlements in December 1971 are shown in Table 2.14.

Table 2.14

Past and present status of urban settlements, Northern Ceylon:
1971

<u>Name of the settlement</u>	<u>Past status</u>	<u>Present status</u>	<u>When constituted</u>
Jaffna City	urban district council	municipal	1.1.1949
Point Pedro	sanitary board town council	urban council	1.7.1963
Chavakachcheri	sanitary board town council	urban council	1.1.1964
Vavuniya	sanitary board town council	urban council	1.1.1964
Kayts	sanitary board	town council	1.1.1947
Valveddithurai	sanitary board Town council	urban council	1.11.1971
Mannar	sanitary board	town council	10.1.1947
Kankasanturai	village council	"	1.1.1950
Manipay	"	"	"
Chankanai	"	"	1.2.1963
Chunnakam	"	"	1.1.1964
Nelliyady	"	"	"
Urumpirai	"	"	1.1.1965
Kilinochchi	"	"	1.1.1968
Pandatharippu	"	"	1.1.1969

Source: Unpublished; Assistant Commissioners of Local Govt., Jaffna, Mannar and Vavuniya.

As in England and Wales, no definite number of people are required for a place in Ceylon to have urban status. In some countries population criteria indicate the urban status of a settlement. The Netherlands and Italy consider as urban only those administrative municipalities of 20,000 people or more; Switzerland, communes of more than 10,000 inhabitants; India and Cuba, more than 5,000 people; France and Germany over 2,000 people; New Zealand and Canada, more than 1,000 people.¹⁶ In the case of India, after the 1961 census, in addition to a total population of 5,000, the density had to

exceed 1,000 persons per square mile and three quarters of the population had to be employed in non-agricultural activities.

In Ceylon, as there is no population criteria for urban status, the Minister of Local Government has the discretionary power either to declare any area a municipality, or to confer urban council status on a settlement. If a rural authority has adequate revenue, and the place has some importance in commercial, administrative and service functions, and if the people of that place request or are willing to accept the urban status, then the Minister of Local Government creates a new urban settlement consisting wholly or partly of the rural authority. In some cases he gives promotion from one grade to another within the urban status hierarchy. Some of the rural settlements have a large population and better amenities than some of the urban centres, but because of higher taxes people are not willing to accept urban status. In some cases the urban settlements are very small in area and because of this the town population is also arbitrarily low.

The population of the urban settlements, therefore, varies because there are no defined or rigid criteria of population size. The population of the urban settlements in the 1953 and 1963 censuses, and the percentage growth in the intercensal period are shown in Table 2.15. (see Figs. 2.6 and 2.15)

Table 2.15.

Population of urban centres and intercensal changes, 1953 & 1963

<u>Town</u>	<u>1953</u>	<u>1963</u>	<u>Increase in %</u>
Jaffna City	77187	94670	+22.1
Point Pedro	10047	12653	+14.1
Chavakachcheri	8966	11299	+26.4
Vavuniya	2879	7115	+149.3

Valveddithurai	5327	6753	+27.7
Kankesanturai	9278	10286	+10.6
Manipay	5249	6185	+17.9
Kayts	3356	3558	+ 0.7
Mannar	7062	8988	+27.7
Mullaitivu	2218	4025	+81.5
Chankanai	-	5584	-

Source: Census, 1953, op.cit., p.144-155
1963, op.cit.

After the 1963 census five new towns were created in the study area. The population of these towns was as follows: Chunnakam 8699, Nelliyaady-11809, Kilinochchi-4490, Urumpirai-7881 and Pandatharippu-4511. Growth between 1953-1963 was low for Peninsula towns but high for those on the Mainland. There was no large scale rural-urban migration on the Peninsula and natural increase and boundary adjustments leading to the inclusion of new rural areas were the two factors contributing to their population growth. On the Mainland, however, migration to the urban areas was the principal factor leading to population growth; in addition natural growth and the inclusion of new rural areas played an important role. Vavuniya had a growth of 149.3 per cent during the intercensal period. During the same period Vavuniya district increased by 97 per cent.

Phases of Urban Growth

Three phases of urban development can be identified in Northern Ceylon. In the first phase, during the pre and early 20th century, Mannar, Mullaitivu and Vavuniya were next in importance to Jaffna. Reasons for the growth of these towns have already been noted. In the second phase of urban growth, the 1920's to 1940's, in addition to the above centres, minor coastal ports such as Kayts, Valveddithurai, Kankesanthurai,

Point Pedro, Pesalai, Talaimannar and Vidalaativu developed as small townships. Except for Kankesanturai, all the other centres had Sanitary Board status. However, officially these places were not urban centres but "developed villages" in between town and rural settlements. In 1947 Pesalai, Talaimannar and Vidalaativu were demoted to Village Councils and the status of all the others was changed to that of Town Councils.

Development of these places was associated with shipping and foreign trade with India and South East Asian countries. Tile imports from India and tobacco exports from Northern Ceylon were the most significant items of foreign trade. All these places were and still are the main fishing centres. In some towns such as Kayts, Point Pedro and Mullaitivu, administrative commercial and market functions further assisted their growth.

The 1950's and 1960's, may be viewed as the third phase of urban development. The most important changes being the slow growth of the coastal towns of the Peninsula, the promotion of agricultural market centres on the Peninsula to urban centres and the growth of towns on the Mainland associated with colonization schemes.

In this period, coastal ports declined in relative significance for a number of reasons: Firstly, the growth of Colombo harbour with international road and railway development focussed on the capital affected the northern ports. Secondly, the increase in size of ships and inadequate berthing facilities proved a severe handicap. Thirdly, the control of food imports by the Government. Fourthly, the decline of trade between Northern Ceylon and South India and lastly, the growth and competition of the agricultural

market centres with the coastal port towns.

Of all the ports, Kankesanturai still remains as a secondary port of Ceylon. The government has plans to build a major harbour there. The port is important for the import of food commodities and gypsum. The cement factory and the railway terminal have assisted the continuance of this port. Point Pedro and Kayts lost their former importance and had a population growth of only 14.2 and 0.7 per cent respectively in the 1953-1963 intercensal period. The slow growth of Point Pedro was due to the decline of port functions. After 1960, the Vadamadachy division was divided into Point Pedro and Udupiddy parliamentary constituencies. Point Pedro parliamentary constituency consists of coastal fishing villages, Valveddithurai town and part of Point Pedro town. After the creation of Udupiddy parliamentary constituency, the development of Nellyyady town affected the growth of Point Pedro town. Kayts has declined in importance since the construction of causeways between Punkudutivu, - Velanai, and Jaffna. This shortened the distance between Jaffna City and the Islands and diverted traffic through Velanai.

Agricultural markets and other functionally important centres such as Chunnakam, Chankanai, Chavakachcheri, Pandatharippu, Nellyyady, Manipay and Urumpirai were promoted to urban status. The development of these towns was associated with tertiary functional growth. Though the Peninsula market towns have had a rapid growth in their range of functions, their population growth is slow. This shows that the migration of population towards towns is not an important factor.

On the Mainland, Vavuniya, Mullaitivu, Mannar and Kilinochchi had a very rapid growth of population. (see Table 2.17) These places, particularly Vavuniya and Kilinochchi are gaining population through migration. The development of agriculture and colonization schemes on the Mainland were the reason for the growth of these centres.

A Case Study of Jaffna City

Jaffna City has developed from the 13th century as the capital city of the Jaffna kingdom of North Ceylon. The city was known historically as Nallur, Sinkainagar and Jaffnapattana. All these three names probably mean "The Capital City". During the period of the Jaffna kingdom the original centre was in Nallur and later during the Portuguese and Dutch periods the centre shifted towards the coastal site of the present fort area. The Portuguese built the fort in 1624, and during the Dutch period the fort was expanded. During the Portuguese and Dutch rule the city remained as the capital of their northern territory and had an important role in defence, administration and commerce. Outside the fort, a commercial and residential European town was developed. This part was known as the Pettah and later the Old Dutch Town. When Ceylon was unified in 1815, provincial administration was set up in 1833 and Jaffna City became the seat of the Government Agent of the Northern province. In addition to the provincial, district and other administrative functions, a number of schools and colleges were established by Christian missionaries in the 19th century which in turn stimulated the growth of the town.

During the mid-19th century the town had three separate

FIG-2.16

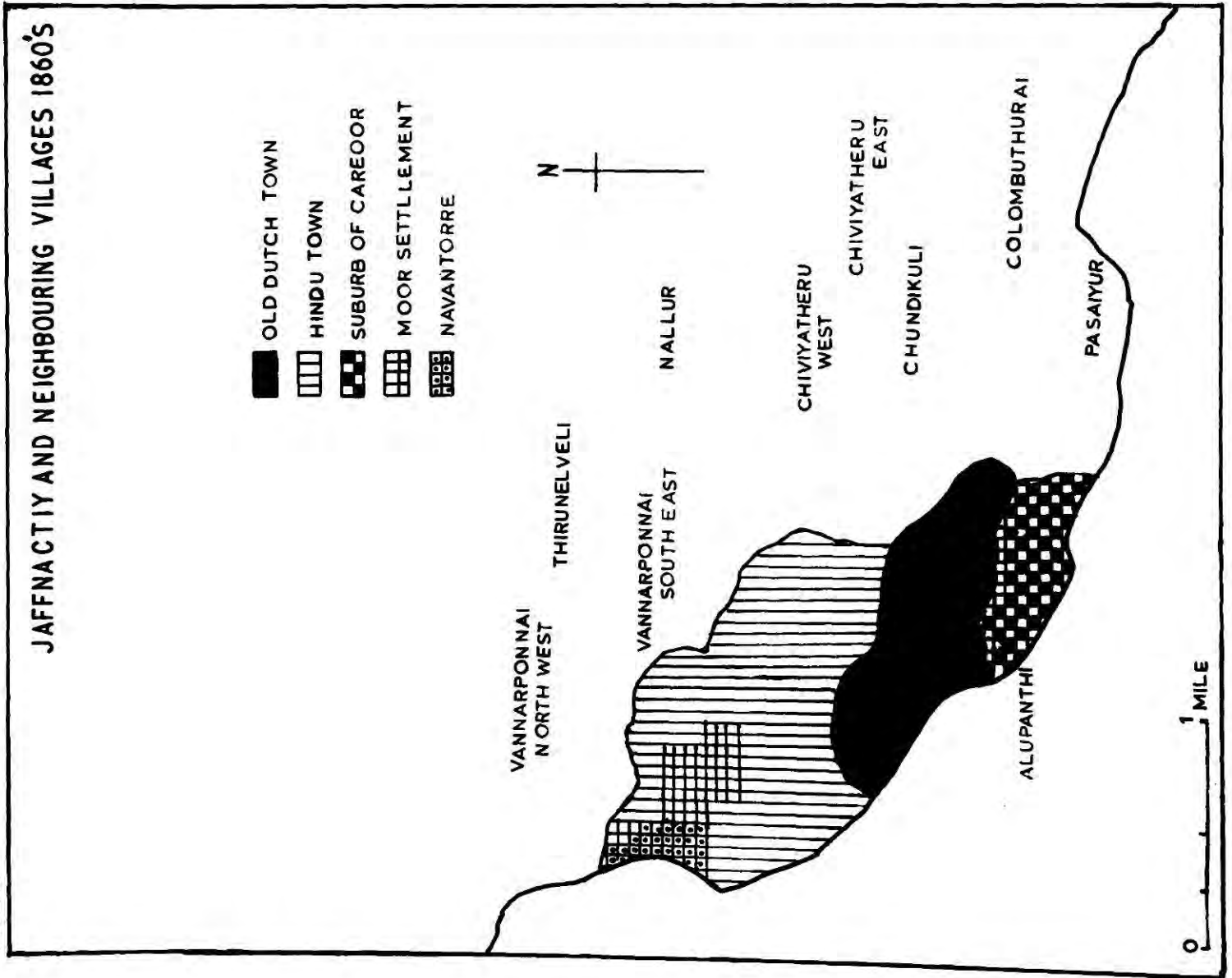
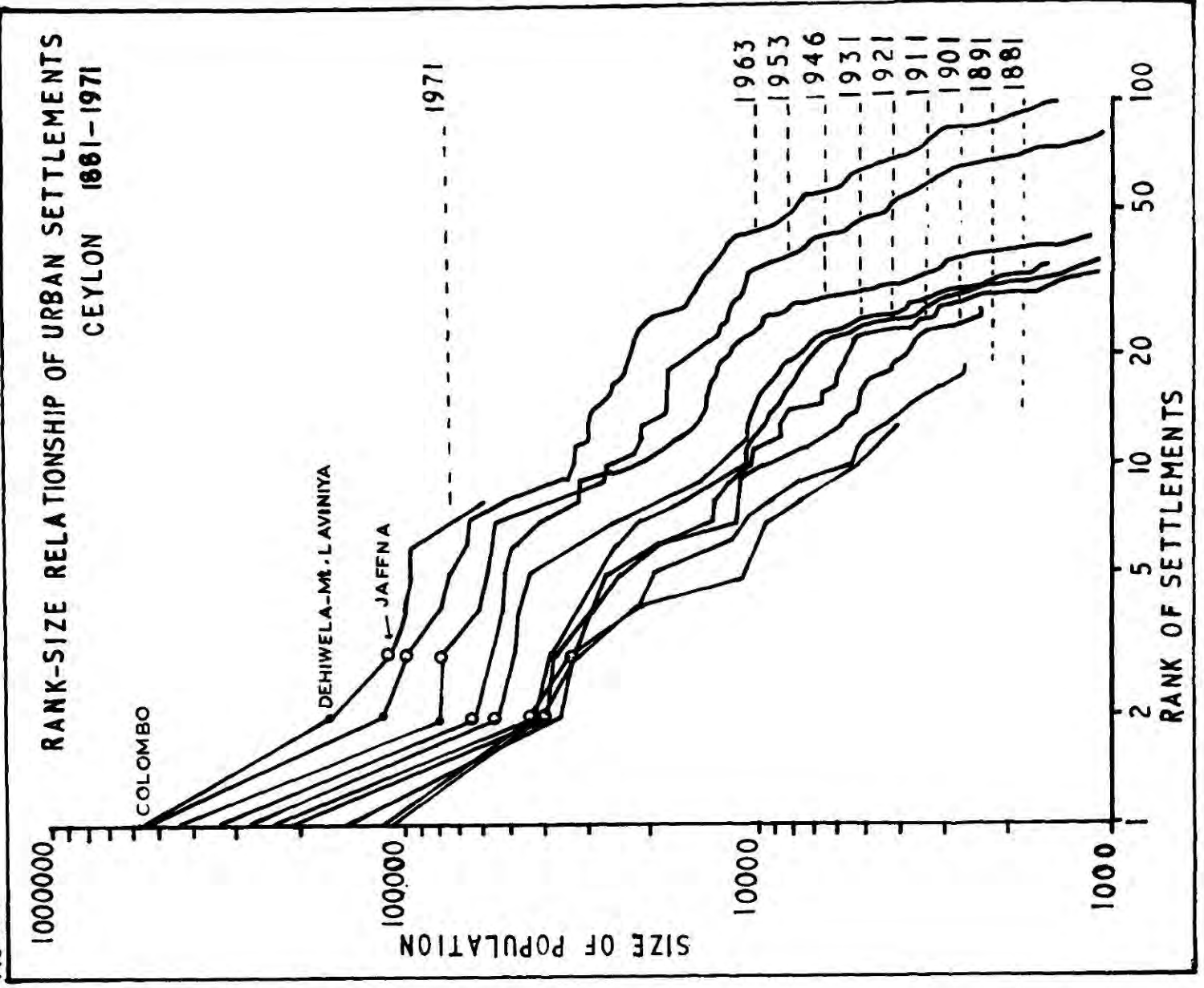


FIG-2.17



parts.¹⁷ (see Fig. 2.16).

1. The Pettah or Old Dutch Town.
2. The suburb of Careoor to the east.
3. The Hindu town on the west of Pettah.

The European part of the town contained business premises, ware-houses and the European residential areas. The European or the Pettah part of the town contained large houses with verandahs and courtyards or a compound at the rear. The streets were wide and straight running north-south and intersected at right angles by east-west thoroughfares.

The village of Careoor was a suburban settlement to the east of the Pettah, inhabited principally by fishermen. Careoor still remains essentially a fishing community but is now a part of the town. The port of Alupanthi was contained within the village of Careoor which was, and still is, densely populated

The Hindu town on the west of the fort was also very densely populated and included both the portion known as Moor Village, in which the Moor population resided, and the fishing village of Navantorre. The town spread out from the fort area, from the 17th century towards the west, north and east in a semi-circular form. By the late 19th century, this included Vannarponnai, Moor settlement and Navantorre on the west, Careoor, Pasaiyur, Chundikuli, and on the north Vannarponnai and Nallur villages. Later, part of Thirunelveli village was included within the town.

The city was administered by the Government Agent of the Northern Province between 1906 and 1923, and he administered the city with the help of Jaffna District Council. The city

was divided into three wards in 1917. In 1923 an urban council was created for Jaffna City, with a total area of 8.5 square miles and containing 8 wards. But in 1932 the total area was reduced from 8.5 to 7.75 square miles. The number of wards was increased to 12 in 1944, 15 in 1949, 17 in 1960 and 23 in 1969 but the total area remained unchanged.

In the rank size of urban centres of Ceylon, Jaffna City held second or third position from 1881-1971. The rank size distributions of urban centres of Ceylon from 1901 to 1971 are shown on Fig. 2.17. The national or regional city size distributions explain the importance of the urban centres and their relationships. Auerbach, Jefferson and Zipf observed the regularity of city size distributions and formulated different theories about it. Berry identified three types of city size distributions in 38 countries and these countries were at different stages of economic growth.¹⁸

1. Countries with log_e-normal distribution: e.g. U.S.A., Finland, India and China.
2. Countries with primate distribution: e.g. Ceylon, Mexico, Uruguay, Denmark and Spain.
3. Countries with intermediate distribution: e.g. Pakistan, Malaya, England and Wales and Norway.

In Ceylon, Colombo has been the primate city since the Portuguese period. Jaffna City has also been a prominent regional capital and was ranked second in six of the censuses and third in the other ~~four~~. Functionally, Jaffna City can be regarded as the second most important town of Ceylon because the second largest town by population size is

Dehiwela-Mt.lavinia , a residential suburb of Colombo.

Intercensal population changes for Jaffna City from 1881-1963 are shown in Table 2.16.

Table 2.16

Population growth and intercensal changes of Jaffna City
1881-1971

<u>Year</u>	<u>Total population</u>	<u>Inter censal period</u>	<u>Inter censal numerical changes</u>	<u>Inter censal changes %</u>
1881	39855	1881-1891	-	-
1891	43179	1891-1901	3324	+ 8.3
1901	33819	1891-1901	-9360	-21.67
1911	40411	1901-1921	6622	+19.58
1921	42436	1911-1921	1995	+ 4.93
1931	45708	1921-1931	2672	+ 6.30
1946	62543	1931-1946	17435	+38.65
1953	77811	1946-1953	15268	+24.41
1963	94670	1953-1963	16869	+21.32
1971	106856	1963-1971	12186	+12.9

Source: Statistical Abstract, op.cit., p.41.

Except for one intercensal period (1891-1901) the town has shown a continuous growth. The loss of population between 1891 and 1901 was a result of a reduction of town size owing to boundary changes. The population growth before the 1960's was generally low and natural increase was the main growth factor. Between 1881 and 1971 Jaffna district had greater growth than the ~~city~~. Migration into Jaffna City has been to a large extent for educational and social, rather than economic, reasons. Migrants have come particularly from the Islands, Punakari and other parts of the study area where school facilities were inadequate. However, the ~~city~~ failed to offer widespread employment opportunities. Rapid population growth took place in the 1940's and 1950's, because of natural growth and migration from the Islands and Punakari. A large number of Burghers and Christians and a smaller number of Hindus have migrated to Colombo in the last three decades.

FIG-2.18

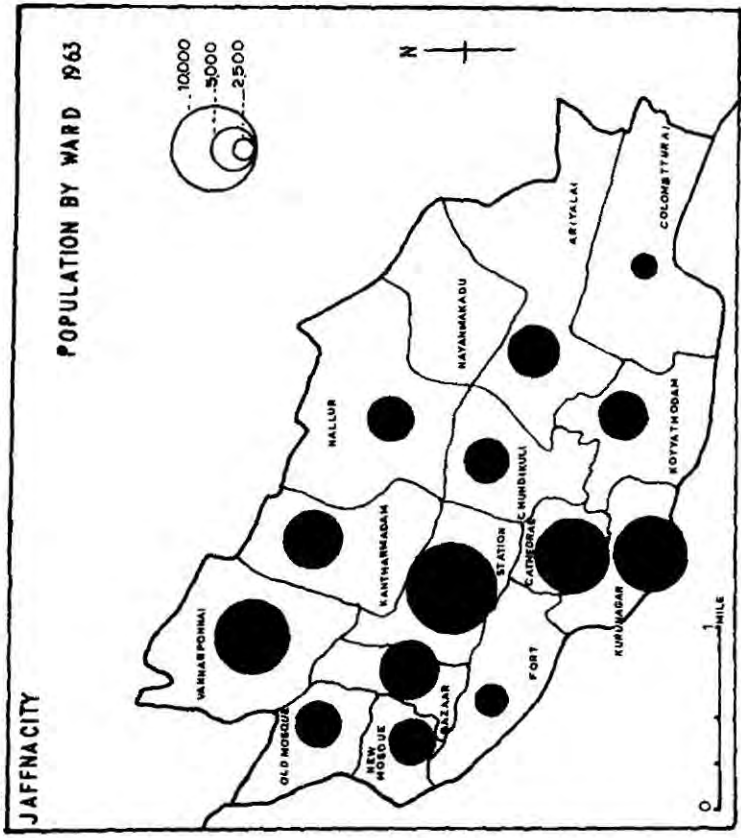


FIG-2.19

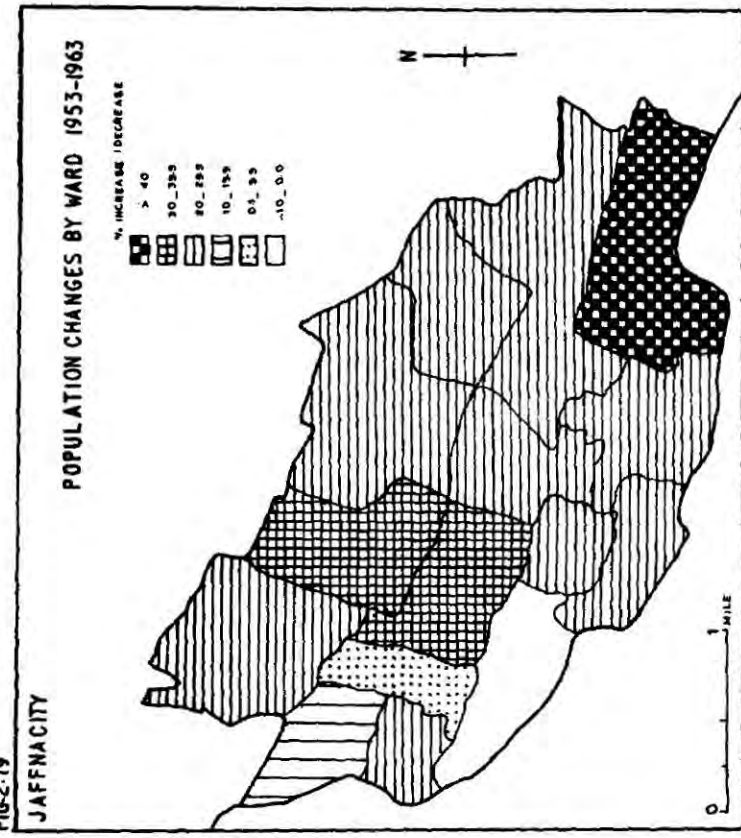


FIG-2.20

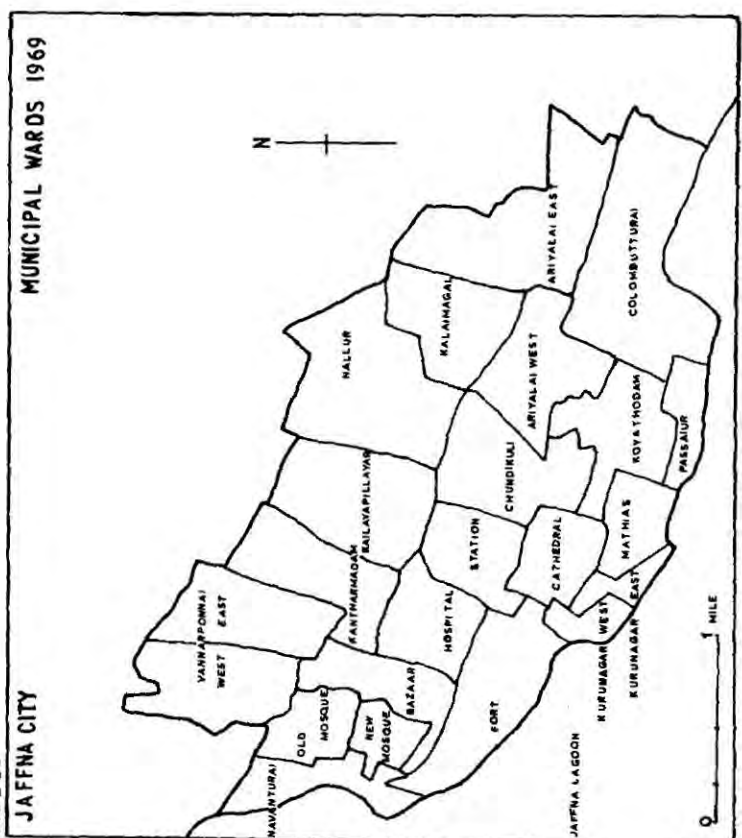
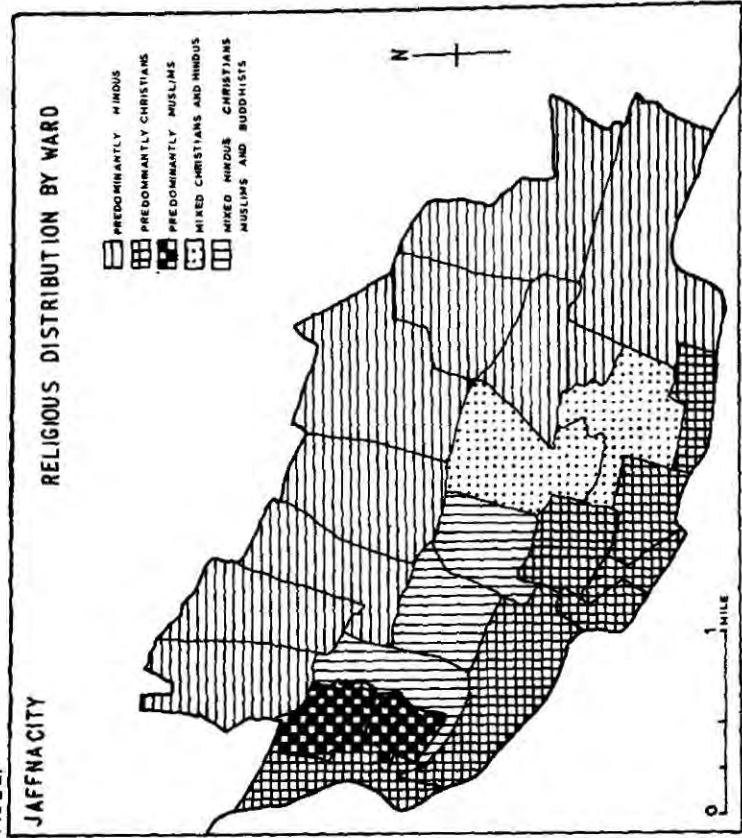


FIG-2.21



Population by wards for 1953 and the 1953 and 1963 intercensal changes are shown on Fig. 2.18 and 2.19. The Fort Ward which is in the core area, lost population, (-2.46%) during the intercensal period. The Bazaar Ward had a low population growth of 5.87 per cent. This shows that the population is moving to outer zones and suburban villages. The wards in outer zones such as Colombutturai, Kantharmadam and New Mosque had a growth of over 25 per cent. Only the Station Ward in the inner zone of the town had a growth of over 25 per cent (30.10).

The sex distribution shows a majority of males over females: 49,673 men and 44,947 women. The population is composed mainly of Ceylon Tamils (85%) and the rest are Ceylon Moors (7.3%), Indian Tamils (5%), Low Country and Kandyan Sinhalese (2%), Indian Moors and others comprise less than 1%. Ceylon Moors are concentrated in the two wards of the Old and New Mosque. The Sinhalese, Indian Tamils and others are concentrated in the Bazaar and Station Wards. Except for the Old and New Mosque Wards, the Ceylon Tamils are the predominant racial group in all other wards.

Apart from the Hindus, who account for 61 per cent of the population, Roman Catholics and other Christians are a very large section of the population. The rest comprise Roman Catholics - 26.4%, other Christians 1.6%, Muslims 7.5% Buddhists and others 2%. The Spatial distribution of the population in Jaffna City by religion is easily identifiable. At a smaller scale, 1969 Municipal Ward divisions (see Fig. 2.20) showed a very clear distribution pattern of religious

groups. (see Fig. 2.21) Two wards, the New and Old Mosques, are mainly settled by Muslims, coastal wards are principally occupied by Roman Catholics whilst the northern part of the ~~city~~ wards are predominantly settled by Hindus. The wards in the central area of the ~~city~~ are mixed but are settled mainly by Hindus.

Sub-Urban Settlements

There are six sub-urban settlements identified in the study area. They are suburbs of Jaffna City. Three of the settlements are small because parts of them were annexed by Jaffna City. The economy of the settlements is linked with Jaffna City and a large proportion of their inhabitants work there. Major occupations include cigar and beedi rolling. The dominant land use functions of the suburbs are residential with some homestead gardens. These settlements are within one hour's bicycle journey or fifteen minutes bus journey of Jaffna City. They became more important in the 1960's because overcrowding and lack of building sites within Jaffna City led to suburban growth. It is mainly Hindu people who prefer to live in the suburbs for social reasons. The southern half of Jaffna City or the present Jaffna parliamentary constituency is mainly settled by Roman Catholic fisher castes, lower caste Hindus and Muslims, and this is the older part of the town. In addition to these social reasons, land availability and lack of good ground water for drinking purposes has encouraged the Hindu population to move northwards leading to growth along the North, Palaly Road.

Non-Farm Settlements

There are fifty settlements in this group, all of which have large populations. The physical conditions, particularly

the salinity of the water, prevent large scale agricultural activity. In some cases, because of rapid population growth, and the shortage of agricultural land the settlements have become "non-farm" in character. More than two thirds of the people in these settlements depend on non-farming activities, trade and government services. Less than one third depend on agriculture. This group of settlements is found predominantly in the Vadamardchy and Island divisions. In the Islands trading is the major activity but in Vadamardchy, government service contributes a high proportion of jobs. A very high proportion of the male population migrate from these settlements to Colombo and other parts of Southern Ceylon for work. This is a permanent movement throughout the year and migrants only return to their homes during holiday periods. They leave their families in their own settlements as it is difficult to take them due to economic and social problems such as housing shortage, schooling in the Tamil medium and racial disharmony between Tamils and Sinhalese. Among the middle class, young married couples migrate with their families to South Ceylon or to Colombo for a few years and then return to their own settlements, usually when the family is enlarged or children reach school age.

Intensive Agricultural Settlements

These are mainly located on the red soil market gardening belt of Jaffna Peninsula (see Table 2.14). The farmers practise very intensive agricultural methods and the use of fertilizers, insecticides and pesticides has increased the yields of crops. Garden cultivation includes crops such as tobacco, onions, vegetables and bananas and the farmers

practise multiple and rotation cropping systems. Because ground water is available farmers are able to cultivate crops but in other parts of the Peninsula, water is only available for crop cultivation in the summer months. Except for seven settlements, all others in this group have more than one thousand people, twenty-five over three thousand, ten over five thousand and three over seven thousand people. The size of the settlements reflect the intensive farming systems. See Fig. 2.5 for divisional density and Figures 2.13 and 2.14 for the size and functional distribution of these settlements.

Non-Intensive Agricultural and Fishing Settlements

These settlements all occur on alkaline and sandy soils (see Fig. 2.14) and this together with lack of ground water resources does not favour intensive farming. Because of the quality of the soil and insufficient water resources in all these areas, paddy and coconut cultivation are the main farming activities. In most of these settlements, (except in Tenmaradchy and the western part of Pachchilapallai), fishing and agriculture are the main activities. The proportion of the fishing population differs from area to area but no data is available. In Maritime Pattu, Vellalar and Karayar caste populations are found together in the coastal settlements. The Karayar caste are engaged in farming as well as in fishing. On Mannar Island, fishing and coconut cultivation are predominant.

Fishing Settlements

In these settlements fishing is often the sole occupation, whereas in non-intensive agricultural and fishing settlements

and some urban settlements it is only one of several types of employment opportunities.

Whilst settlements are found along the whole coastline of the study area, they tend to be clustered in selected localities and have a very high density of population. The majority of them lack good houses, transport facilities and drinking water. Roman Catholicism predominates. The distribution of these communities is shown on Fig. 2.15.

Temporary fishing camps are found along the east coast from Chempianpattu to Kokilai and are particularly important during the South West Monsoon period from May to September. Similar camps are found along the west coast but are fewer in number. The eastern coastal migrant fishermen are mainly Sinhalese from Chilaw and Negombo and the western coastal migrants are Tamils from Jaffna and the Islands.

In the towns of Jaffna, Valveddithurai, Point Pedro, Mannar, Kankesanturai, Mullaitivu and Kayts, the fishing population are an important element in the towns population. Four fishing neighbourhoods, Kurunagar, Pasaiyur, Colombutturai and Navanturai are found within Jaffna City. The majority of the population in Valveddithurai, Mullaitivu and Kankesanturai are also of the fisher caste.

Tank Settlements

These are a common form of settlement throughout the Dry Zone of Ceylon. They are found throughout the Mainland except in coastal areas. The size of settlement is dependent on the size of the tank, i.e. the larger the tank the larger the settlement. The Mainland area receives rainfall for only four months of the year. The reason for the small average size of settlements is due not only to these

productive constraints but also to the very high death rate that resulted from malaria and other diseases prior to the 1940's. The population on the Mainland has been increasing very rapidly since malaria was controlled. (see Figs. 2.13 and 2.15).

Three land use types are found in the tank settlement areas. First, above the tank there is forested or state reserved land; secondly, below the dam the low-lying areas are under paddy cultivation; and thirdly, the high land, on both banks above the paddy land, is used for residential and homestead gardening. In the small tanks there may be only one outlet. The settlements on Karachchi division, and the agglomeration of settlements under the Giant's Tank Scheme have deltaic as well as tank characteristics.¹⁹ Under the Giant's Tank Scheme a large number of small tanks are connected with the main tank.

Major Colonization Schemes

The main differences between the tank settlements and the colonization schemes are that the latter are planned developments and the amount of land owned is usually equal. Land use differences are clear cut, with paddy on the low-lying land, and high land allocated to settlements and homestead gardening. Colonization settlements usually have a larger population than small tank settlements. In the planned colonization schemes, the farmers are selected from widely differing areas and therefore tend to belong to different social groups.

These colonization settlements incorporate planned agricultural settlements. Since the start of the 1930's, the

Government of Ceylon has been engaged in a programme of establishing planned land-settlement schemes in the Dry Zone to increase food production and to relieve population pressure in the Wet Zone, Jaffna Peninsula and other populated areas. In these schemes landless peasants from local and neighbouring districts were brought in and settled. Every allottee (colonist) was given three acres of high land and five acres of paddy land with irrigation facilities but in 1955 the size was reduced to two acres of high land and three acres of paddy land.

All these settlements have large populations compared with other tank settlements. Karachchi, Iranamadu, Akkarayankulam, Vavunikkulam, Pavatkulam, Tenniyankulam and Muthaiyankaddukulam are the main colonizations on the Mainland. Visvamadu, Udayarkaddukulam and Kurai Tank Schemes are under construction. (see Figs. 1.10, 2.13 and 2.15).

Conclusion

The high concentration of population within the Peninsula, an imbalance of the sex-ratio particularly on the Mainland, the large proportion of young age groups and the small proportion of active age groups are the main problems of the population structure of Northern Ceylon. The problem differs greatly between the Peninsula and the Mainland. Population pressure on the land is dominant on the Peninsula whereas the Mainland is sparsely populated and there is plenty of scope for the development of agriculture and other activities. For the development of the Mainland, the present migrant character of the population must be reduced. Encouragement

should be given to permanent settlement on the Mainland which will reduce the high male-female ratios. Birth control methods should be increased to reduce the birth rate, but inevitably there are problems of population control in a multi-racial country.

New peasant colonization schemes, and educated youth agricultural schemes should be accelerated on the Mainland for the benefit of both areas. However, small scale village expansion schemes should be undertaken to reduce population and land and housing problems in the Peninsula's densely populated villages.

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CHAPTER THREE

COMMERCIAL AND SERVICE ORGANIZATIONS

In this chapter the distributive system of different types of central functions will be discussed. A knowledge of the many organizations which constitute the distributive system is an advantage in understanding the functional characteristics of the area, particularly as studies about the retail distributive system become more important in marketing geography. These studies mainly deal with shopping facilities, trade types and the interlinkage of retailing with wholesaling.¹ The role of co-operatives, corporations, and private retailing will be analysed. Consideration will also be given to other functional types such as administration, health, education and the judiciary together with the special role of the caste system in Northern Ceylon.

Growth of Internal Trade

During the British period the internal trade system developed much more rapidly than it had during the Portuguese or Dutch periods. Retail and wholesale trade grew very rapidly after the Second World War, particularly in the 1950's and 1960's. Before the British occupation, the internal trade was very limited in both the quantity and range of goods traded. Economic and social factors were not favourable to the development of local retail or wholesale trade in a well organized form. As already shown the population was engaged in subsistence farming, fishing and domestic industries and they were able to produce

their own food and obtain simple needs from the local area. Villages were composed of many different castes and each group rendered goods and services to each other.

Though internal trade did not develop on a large scale before the British arrival in 1796, trade with foreign countries was important as early as 500 A.D. Pearls, gems, spices and elephants were exported from Ceylon.² There was trade with the Roman empire, India, Persia and the Far East. Mantota was a port during the period from 500 A.D. to the 11th century, but later its importance declined due to the shift of capital cities from North Central Ceylon to the South and North of Ceylon in the 13th century.³ There then grew up a regular flow of goods between Jaffna kingdom and South India for geographical, political and cultural reasons. Nallur was the capital city and the most important trading centre was Alupanthi harbour. Arab traders played a significant role in trade with Jaffna kingdom from this period until the arrival of the Portuguese. The internal distribution of goods was mainly handled by Muslim traders.

The Portuguese had come to Ceylon in 1505 and subsequently developed trade and defence treaties with Jaffna kingdom. The area was not attractive to them for trade because cinnamon and other spices were not grown. For trade purposes their main interest was focused on South Ceylon but they nevertheless collected many local commodities in Jaffna in the form of duty or taxes. Their monopoly of trade in the pearl fisheries in the Gulf of Mannar gave them considerable wealth. Wheat, wine, oil and dates were imported from Portugal. From the Vanni area

(now Vavuniya district), and the Mainland, cotton, tusk and wax were taken to Jaffna city and from Kandy and the coastal provinces tobacco was imported.

The Dutch captured Jaffna kingdom and other Portuguese territories in Ceylon in 1658. During the Dutch period, commercial activities were expanded and they encouraged trade and industry. In the Jaffna Peninsula they developed a cloth dying industry for export to South India together with textiles, palmyra timber, palmyra root products, coconut oil, coconut, elephants and arecanuts. There were in return, imports of tobacco, rice, garlic and cardamom.⁴ Internal trade with the Vanni area was continued and included the export of commodities such as wax, elephants and tusk to the East Indies. Trade commodities such as elephants, tusk and other goods were collected by the Dutch from the Vanni area as their annual tributes.⁵ Internal as well as external trade was far greater in the Dutch period than in the Portuguese period.

The British succeeded the Dutch in 1796. Their occupation of Ceylon was significant for political, economic and social changes. They unified the entire island under one administration after the capture in 1815 of the Kandyan kingdom, which had remained independent during Portuguese and Dutch rule. The British organized provincial, district and local administrations, and in the economic field large scale plantation industry was developed in the second half of 19th and early part of the 20th centuries. The plantation industry developed in South West and Central Ceylon. There was a big demand for plantations commodities on British and European markets. Coffee plantations

were developed first and the production reached a peak in the 1870's, but declined in the latter part of the 19th century through plant disease. After the decline of coffee cultivation, tea, rubber and coconut became the main plantation crops.

The development of plantations brought changes in the national economy. The development of transport networks and communications facilitated the movement of population. People from Jaffna migrated to Colombo and Central Ceylon in search of employment. The abolition of slavery and their ordinary "Uliyam"^{xi} in 1846 in the Jaffna area had created social and economic changes. The spread of English education to the upper classes also brought some social changes to the top stratum of society.

Unlike Portugal and Holland, Britain was an industrial nation which needed markets for her industrial goods and in return raw materials for her factories. These needs encouraged large scale investment in plantations and other commercial activities in Ceylon. As the local people were reluctant to work in the plantation industry, labour was brought from South India to meet the demand. The colonial government helped the development of plantation industry in many ways and the building of railways from Colombo to the plantation areas and loans were the most important. The traditional peasant paddy cultivation was neglected and this forced the British colonial government in Ceylon to import large

^{xi} Free service rendered to the state.

amounts of rice and other foodstuffs from abroad. These were imported from India, Burma and South East Asian countries together with industrial goods mainly from Britain. The traditional economy of Ceylon changed and became export orientated.

Owing to the early establishment of schools in Jaffna by Christian Missionaries, people had the advantage of being educated in English. ~~how~~ educational facilities were only available in a few other leading towns such as Colombo and Galle.⁶ Because of better educational facilities the people of Jaffna were able to obtain clerical and associated jobs in government service, commercial firms and the plantation sector. Many Jaffna people migrated to Malaya and the Strait Settlements for clerical employment and sent back large sums of money to Ceylon. Even now Malayan and Singapore pensioners in the Jaffna district contribute a large amount of money to the local economy. The regional economy was changed by the educated people both at home and abroad. These changes together with availability of goods favoured the development of retail trade.

British companies and banks opened branches in Colombo and in other major towns, thus providing banking facilities for commercial transactions.⁷ The development of roads between Colombo and Northern Ceylon towns and the opening of the railway in 1905 facilitated the transport of imported goods from Colombo. The minor ports such as Kayts, Jaffna, Kankesanthurai, Valveddithurai Point Pedro and Talaimannar were also important in trading until to the late 1940's⁸ Rice, chillies and subsidiary foodstuffs such as spices and corriander, textiles and tiles

were imported at these ports by local ship owners from South India and Burma. As the ships were small it was easy to accommodate them in the ports. But when the cargo ships became larger the importance of these minor northern ports declined because of the lack of berthing facilities.

"Chettiyas", the money lending and business men, from South India, were engaged in the jewellery, textile and wholesale provision trade during the 19th and first half of the 20th centuries before Ceylon's independence in 1948. Because of the political changes in the country after independence, Ceylonization and the decline of small ports, most were encouraged to leave the country. Since this date, only small scale import and export trade has taken place through these ports, although Kankasanturai and Jaffna still remain as minor ports.

When imported rice and subsidiary foods became available, there were changes in agricultural patterns. The farmers started to cultivate cash crops instead of food crops. Before the 1940's they cultivated paddy on lowland, and dry grains, manioc and vegetables on the highlands for their own needs. Tobacco, bananas, onions, tomatoes and vegetables have now become the main cash crops. These changes in agriculture stimulated market development. Farmers had to sell their products in the markets and buy food and other articles in shops. Simultaneously a change took place in the pattern of food consumption among the people. Consumption of rice increased, while, at the same time, root crops, palmyra foods and dry cereals declined in importance. This created a large scale demand for rice and other food commodities. Cash crop

cultivation brought further economic changes to the Peninsula and increased the volume of local retail trade.

During the Second World War the international situation and the scarcity of foodstuffs and consumer goods in world markets created food shortages in Ceylon. The Government introduced a subsidized rice ration scheme in February 1942 and other essential foodstuffs and consumer goods were subsidized in order to avoid food shortages and to defeat the Black Marketeers. The Government started importing a large amount of flour for home consumption. In consequence, consumption of wheat flour increased and now the diet of the Ceylonese is very dependent on this commodity. Rice, subsidiary foodstuffs and textiles are still distributed through ration schemes. The rice ration scheme is financially a heavy burden on the national economy although for political and social reasons no government is willing to abolish it. Firstly, the Government buys rice both locally from the farmer at a guaranteed price above the market price, while purchasing rice at high prices from foreign producers and selling it to the public at a lower price. If this were not so prices would be low and there would be no incentive to the farmers to engage in rice cultivation.

In 1953 the Government increased the price of ration rice from twenty-five to seventy-five cents per measure^{*} and this led to considerable social and political unrest throughout the country.⁹ Consequently, by 1960 the price has been gradually brought down again to twenty-five cents. Since December 1966 the Government has reduced the amount of rice it gives freely from four pounds to two pounds per head per week. Since

* one measure is equal to 2 pounds.

September 1970, the Government has given the first two pounds free and the second two pounds at seventy-five cents. The Government has an import monopoly for some trade items such as rice, wheat flour, sugar, baby foods, dry fish, milk powder and also many subsidiary food items. The Government sponsored industrial corporation is not only engaged in production but also handling imports and distribution. Home production of many goods is not enough to meet home demand and imports are restricted because of the lack of foreign exchange. The Government therefore plays an important role in the public distribution of food and consumer goods so as to avoid Black Market trading.

Trade Types

In commercial organization, government departments, state industrial and trading corporations, government financed Co-operative Wholesale Establishment (C.W.E.), public and private joint stock companies, Multi-Purpose Co-operative Societies union depots (M.P.C.S union depots), co-operative retail stores, private companies, petty traders, peddlers, pushcart and pavement hawkers are all important in the wholesale and retail provision of goods and services to the public. These are the main types of outlets in the distributive system. Basically there are three types of commercial organizations found in the area; state assisted, private and petty traders without permanent shop premises. C.W.E. is a state owned multiple chain store and has branches throughout the country. State industrial corporation sale stores perform the dual function of promoting and selling goods. M.P.C.S.

retail stores also have some of the characteristics of multiple retail stores in ration goods. M.P.C.S. bulk depots function as bulk-breaking points and stores.

Departmental stores, multiple retail stores and small mail order firms are not important in the commercial organization.

The Department of Food Control, Department of Marketing, Department of Excise and the Department of Cottage industry are the four main departments involved in the distribution of goods. The Department of Food Control handles the import and distribution of ration rice, subsidiary foodstuffs and consumer goods. This department operates with the assistance of the District Government Agents, Divisional Revenue Officers, and finally Grama Sevakas (Village Administrative Officers) who actually distribute the ration cards to the public. The activities of the Department of Food Control are highly integrated. They purchase the paddy from the farmers through the Department of Agrarian Service and mill it at government mills and also import, transport and distribute rice to the local co-operative stores. The distribution of goods is channeled through the Multi-Purpose Co-operative Society unions. Each D.R.O. division has one or more M.P.C.S. union depots. The M.P.C.S. union depots distribute the goods through the M.P.C.S. retail depots, co-operative stores and authorised dealers. Some of the goods purchased by the M.P.C.S. union on the open market are also supplied through retail depots. Some M.P.C.S. unions have separate stores for textiles, hardware and agricultural implements. Specialized stores are located at Atchuvelli, Chunnakam, Punakari, Neervely and Alaveddy. The Government gives special concessions to the co-operative

unions and scarce imported goods are normally channeled through them. The co-operative unions have facilities to obtain loans from the government to purchase vehicles or to expand trade at low interest rates.

The Department of Marketing has sales branches in important towns and sells vegetables, fruits and baked foods. It also supplies fruits, vegetables and bread and packed food to hospitals, army units, prisons, and on special occasions or celebrations establishes temporary stalls. In addition to their sales activities the department purchase agricultural products from farmers and transport the surplus to Colombo. The Department of Excise has a monopoly in the supply of arrack to local taverns whilst the Department of Cottage Industry runs a shop in Jaffna City called "Laksala" to sell the cottage and handicraft industrial products of Ceylon.

The Ceylon Petroleum Corporation handles the distribution of petroleum products throughout the island. The State Timber Corporation supplies timber, lumber and firewood to the traders and also has some firewood depots. The State Industrial, Cement and Chemicals Corporations have factories and sales offices. The Ceylon Salt Corporation also supply salt from the Elephant Pass and Chiviyatheru salterns. The Ceylon Plywood Corporation has recently opened a sales branch in Jaffna city.

The Co-operative Wholesale Establishment (C.W.E.) is another big government trading company which was established in 1950, and has sales branches in Northern Ceylon. The C.W.E. handles the wholesale trade of some state industrial

corporation products such as iron and steel, hardware and china, paper and paper products. The C.W.E. is a big trading establishment in the provision of goods and the main importer of dry fish, milk powder and consumer goods.¹⁰ The "Salu Sala" is a private and public joint stock company handling the import and wholesale distribution of popular varieties of textiles.

Private Traders

Private traders play a significant role in retailing and wholesaling and the following groups of retail functions are the most important. The following criteria are used to group the private retailing and wholesaling functions listed below:- (1) the similarity or interrelationship of functions, (2) the substitute nature of functions, (3) the co-occurrence of functions in a single business premises, and (4) higher order functions - certain ones are grouped together.

1. Retail of provision goods, rice and other commodities and vegetable oils such as coconut and gingelly oil shops.
2. Green grocers (vegetables, fruit and beatles).
3. Beef, Mutton, fish and dry fish.
4. Tea and coffee boutiques, eating houses and hotels.
5. Arrack taverns and foreign liquor bars.
6. Shoe, textile shops and ready made garment stalls with tailors.
7. Jewellery shops.
8. Books and stationery shops and printers.
9. Hardware, motor spare parts and electrical goods and glass shops.

10. Chemists and drug stores.
11. Photographers, florists and funeral directors.
12. Timber and firewood depots.
13. Petrol filling stations.
14. Barbers' saloons and laundries.
15. Motor repair garages and bicycle lending and repair shops.
16. Miscellaneous shops.

The majority of private retail provision shops are very small and are run by the owner with the assistance of his family or one or two shop assistants. Provision shops are very common and are widely distributed throughout Northern Ceylon. Several reasons for the great number of shops of this type may be suggested; underemployment, the small amount of capital investment, and the attraction of a family owner-operated business in a rural area. This is a common feature in many developing countries such as Iran¹¹ and India¹². Village retail shops have small quantities of many articles and supply the day to day needs of the population. The M.P.C.S. retail depots, and co-operative stores are also retail shops but mainly distribute ration goods. The retail shops in villages sell rice (off ration rice) wheat flour, curry spices, cigarettēs, beedi, cigars, chewing tobacco and sweets. Some of the shops act as the local agents for daily newspapers. The village shop-keeper is an important part of the village economy, being indispensable to the villager because he gives credits and loans which can be repaid by agricultural or other products.¹³ The shops in towns, particularly in the

business districts, perform both wholesale and retail functions but there are specialized shops in leading urban centres. The Jaffna co-operative stores have five branches in Jaffna City and six branches in other towns. Except for the Jaffna co-operative stores no other traders have more than four shops of the same trade name in other settlements. Multiple chain stores, supermarkets or large department stores are not yet important in the trade pattern of the area.

Meat stalls open daily in leading towns but in some settlements function only once or twice a week because there is not enough trade. Tea and coffee boutiques are commonly found in villages and towns and provide light food and drinks. Eating houses provide rice or other meals for lunch or dinner. The Local Government authorities classify these last two functions separately even though a shop performs both and is taxed for both. With the increasing consumption of bread because of high rice prices bakeries have become very popular. The Government supplies a midday meal to all school children and this has stimulated business for the bakeries.

Foreign liquor bars, arrack and toddy taverns sell liquor. Some of the bars only retail but others provide facilities for drinking. All government rest houses, tourist hotels and a few clubs have liquor bars. There are only eleven arrack taverns in the study area, and in some localities people have to travel more than twenty-five miles to reach one. Though there is a demand for arrack taverns, the majority of the people, particularly the religious leaders, are against more

being opened. This has created a lot of illicit arrack brewing and selling, and tea boutiques, provision stores and other small business premises are major illegal outlets and some traders obtain more income from selling arrack than from their main business. This is one of the reasons for the existence of many small business units. There are two systems in the toddy trade : The "Tree Tax" system and the Tavern system. The first is found in Jaffna and the other is found in Mannar and Vavuniya. In Jaffna district toddy is sold by the tapper himself from his home or in common sheds. In the tavern system the government auctions the taverns annually to the public, and only the legal tenders of the taverns ~~annually to the public, and only the legal tenders of the taverns~~ can tap and sell toddy. But in the "Tree tax" system anyone in the Jaffna district can tap and sell toddy from palms. There is a tax for each palm and a different rate for coconut and palmyra palm and further different rates between male and female palmyra palms.

Jewellery shops manufacture and sell gold and jewellery and buy old gold and silver jewellery from the public. In addition, some of the jewellery shops act as pawn brokers. The Hindu Tamil people wear a lot of gold jewellery and the dowry system is the main factor explaining their large ~~scale trade~~.

In the textile trade, in addition to private traders, M.P.C.S. retail depots and co-operative stores sell a few cheap varieties of cloth. But cloths which are rationed can be bought in any textile shop by surrendering textile ration coupons. The fact that textile coupons can be used at any

store has not encouraged the local co-operatives to develop the sale of textiles whereas in the case of the rice ration a purchaser has to buy from the co-operative at which he is registered and this gives steady custom. The demand for footwear was limited but has been increasing steadily in recent years because of social change. Formerly shoes were made locally by the retailers but now they sell factory made Bata, D.I., D.W.I. and Sinwa brand shoes.

Hardware, cement and electrical shops have increased in number in recent years. Some of the hardware shops sell motor spare parts, water pumps and bicycles. A few shops have recently begun specializing in motor car spare parts, tyres and tubes. Electrical goods are sold by the hardware merchants mainly in town but, due to the rural and urban electrification programmes, a wider demand has been created. Increase of hardware stores in the 1960's is significant when compared with other trades. Increase in the building sector and the local production of hardware materials are assisting this growth.

Book shops are important for school text books, general books and stationery. Some book shops have printing presses. The Department of Education and Publication is now writing, translating and publishing all school text books and this has affected the book shops which were previously engaged in printing and publishing.

There are two types of florist shop in the towns. Firstly, the florists who meet the demands of the Hindu population and make garlands in local flowers for both ceremonial functions and daily use. Secondly, they meet the demand of the Christian

population and sell wreaths, bouquets and flowers for home decorations.

Photographic studios are important because of low camera ownership levels of the public and the greater demand for personal identity photographs for bureaucratic purposes.

Firewood depots are mainly found in densely populated areas for in other areas the people are able to obtain firewood from local forests or from their homestead gardens. Use of kerosene cookers has been increasing in recent years.

Tailoring is an important aspect of service retail functioning and produces a variety of clothing for sale. Tailors take orders for tailoring and some textile shops have tailors within the shops to increase their sales. Tailors are important in the retail function because of the limited availability of ready made clothes except for mens' shirts.

Bicycle lending and repair shops are common in villages and towns. Some of the bicycle repair shops also mend and service water pumps. The number of motor garages has increased in the 1960's in the study area, but particularly in Jaffna City, because of the import ban on new motor vehicles. As existing vehicles became older they need more frequent repairs and spare parts.

Markets and fairs are also important in the commercial organization of the study area. Hourly, daily, twice weekly, thrice weekly and weekly markets function in the area but are so important in the market system that they will be analysed separately in the next chapter.

Peddlers and Street Traders

Peddlers are important for the selling of textiles, mats and metalware. Fish is sold daily by the peddlers in many interior villages. The peddlers who sell textiles and other articles used to be stationed in towns and visit villages weekly or fortnightly. During the temple festival season they move between the temples. In some villages and towns, mainly in the Peninsula, fish and vegetables are sold by women traders on foot. The itinerant trader goes round the villages and houses purchasing goods such as eggs, poultry, goats, cattle, mats, etc. Some of the peddlers do the work of itinerant traders. The itinerant trader takes advantage of the villager's ignorance of market conditions and sometimes buys the crop whilst it is still in the field and makes advance payment. Since the farmer is usually in financial difficulty, the trader often gets the crop below the normal market price.

Street traders and pavement hawkers are found mainly in towns but particularly in Jaffna city. They sell a variety of goods, such as fruit, second hand clothes and miscellaneous goods. Many have temporary sheds and some have carts and trays. Selling of lottery tickets and daily newspapers mainly by small boys is one of the most prominent activities at bus stations. Some of the carts and trolleys are mobile tea and food shops. In urban areas the street traders play an important role in supplying goods to the poorer classes. Ice-cream vendors and peanut sellers (women) also trade in front of educational institutions. This pattern of street trading is a ubiquitous

feature of many towns and cities in the developing world.¹⁴

Banking and Insurance

Banks are another feature of the commercial organization. The role and number of banks have increased in the 1960's. In the 1950's there were only three banks in the study area and all were in Jaffna City. The number has now increased to twenty-eight, there being twenty-five commercial and three rural banks. The Bank of Ceylon assists urban and industrial development and the Peoples' Bank finances developments in agriculture, animal husbandry, cottage industry and commerce. Co-operative banks help the co-operative societies in agricultural and fishing developments.¹⁵ The Peoples' Bank and the Co-operative Bank also act as pawn brokers. In addition to the banking system money lenders and pawn brokers conduct an active business in the society although their importance is declining with the increase in the number of banks who lend money at lower interest rates.

Administrative Organization

Administrative organizations can be grouped into two types:-

- I. Central Government departments.
- II. Local Government institutions.

1. Central Government Departments

A large number of government departments are found in the area. Some of the departments are grouped under the district administration whilst others are not. In Central Government there are three hierarchial administrative levels: Districts,

Divisions (D.R.O. division) (see Fig. 1.1) and Grama Sevaka (formally known as Village Headman) divisions). These are mainly organized for internal civil administration. The Grama Sevaka divisions are grouped into Divisional Revenue Office (D.R.O.) division, and one or more D.R.O. divisions are grouped into Districts. Before the 1950's there was a hierarchy of five administrative systems: Provincial, District, Division, Udayar (subdivision) and Grama Sevakas. Within the District there are several sub-divisions for different functions such as Registrar of Births and Deaths, Department of Excise, Department of Public Works, etc. Basically Districts are the highest administrative area but for some higher order functions one or more Districts are grouped together. The whole of the study area is under a single administration for certain functions such as Regional Education, and Superintendent of Police. The Grama Sevakas, D.R.O. and District Government Agents also perform the duties of Police Officers in non-policed areas. In the villages with police stations the Grama Sevakas are still active in police work whilst in non-police D.R.O. divisions initially the D.R.O. of the area carries out the functions of a Police Officer. In the later stages of a case responsibility will be handed over to the District Police.

Local Government Institutions

The role of Local Government in the provision of services is very limited. The Local Government institutions mainly provide basic amenities and facilities in their areas such as water supply, electricity and refuse collection. They have

FIG. 3-1

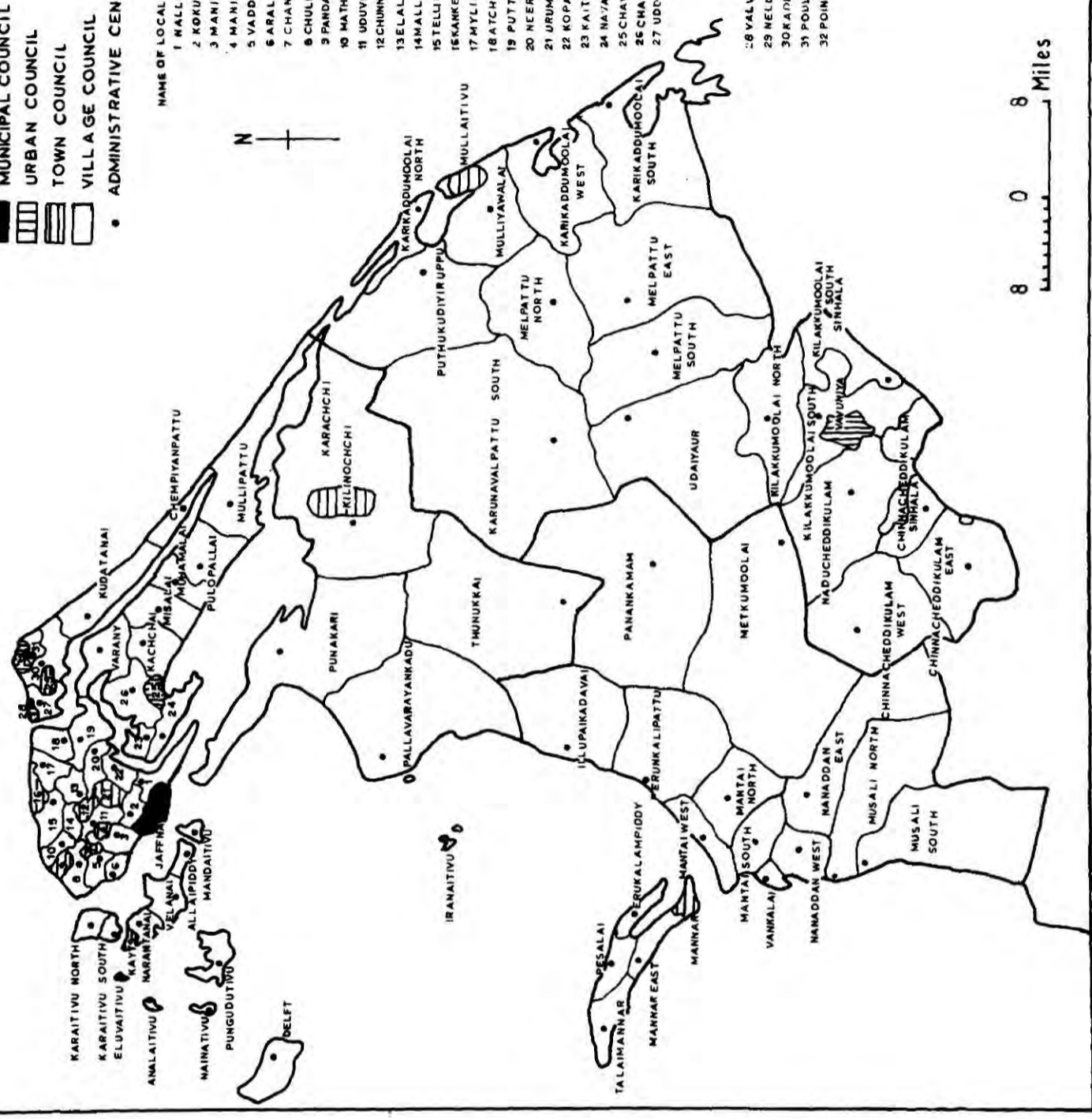
NORTHERN CEYLON

LOCAL AUTHORITY UNITS 1971

-  MUNICIPAL COUNCIL
-  URBAN COUNCIL
-  TOWN COUNCIL
-  VILLAGE COUNCIL
-  ADMINISTRATIVE CENTRE

NAME OF LOCAL AUTHORITY

- 1 MALLUR
- 2 KOKUVIL
- 3 MANIPAY (VC)
- 4 MANIPAY (TC)
- 5 VADDUKODDAI
- 6 SARALY
- 7 CHANKANAI
- 8 CHULIPURAM
- 9 PANDATHARIPPU
- 10 MATHAGAL
- 11 UDUVIL
- 12 CHUNNAKAM
- 13 ELALAI
- 14 MALLAGAM
- 15 TELUPALAI
- 16 KANKESANTURAI
- 17 MYLIDDI
- 18 ATCHUVELI
- 19 PUTTUR
- 20 NEERVELI
- 21 DRUMPIRAI
- 22 KOPAY
- 23 KAITHADY
- 24 NA'ATKULI
- 25 CHAVAKACHHERI (UC)
- 26 CHAVAKACHHERI (VC)
- 27 UDDUPIIDY
- 28 VALVEDDITHURAI
- 29 NELLIADY
- 30 KADDAVELI
- 31 POULOLY
- 32 POINT PEDRO



very limited or no power in other sectors including health, education, social services and various aspects of planning.

There are four Local Government institutions; Municipal, Urban, Town and Village Councils.¹⁶ (see Fig. 3.1) Of these the first three are regarded as urban settlements and the latter as rural. The Municipality has more power than Town and Urban Councils in housing, road maintenance and health. Urban Councils have been established in important urban areas. Their power and duties are similar to Town Councils, but the control exercised by Government over this type of local authority is less than that over the Town Councils. Town Councils have been established in developed rural areas which because of their stage of development are urban in character. These councils have powers and duties substantially similar to those of Urban Councils, the main difference however being that Town Councils cannot impose and levy a property rate of more than nine per cent. The Village Councils are the smallest units of Local Government. They have extremely limited power and only maintain minor lanes and paths and public wells. All councils, except Municipalities are under the District Assistant Commissioner of Local Government.

Judicial Organization

The judicial organization of Ceylon follows a clearly defined hierarchy of courts which is as follows; Supreme Court, District Court, Magistrates Court, Rural Court and Municipal Court.¹⁷ In addition to this, appeals can be made to the Supreme Court, the highest judicial organization, from any level in the hierarchy.

In the study area there is one Supreme Court, five District

Courts, nine Magistrates' Courts, thirty-seven Rural Courts and one Municipal Court, although its functions are carried out by a Magistrate's Court.

The functions of the different courts are clearly defined. The Supreme Court handles the most serious criminal offences and has exclusive jurisdiction. The District Courts are concerned mainly with civil cases such as all civil revenue, matrimonial and testimonial matters. They also have criminal jurisdiction over all offences which are not within the exclusive jurisdiction of the Supreme Court. They can only try cases committed to them for trial by Magistrates' Courts. The District Courts hear appeals from Rural Courts over which they have appellate jurisdiction.

Magistrates' Courts have only limited powers. They hold preliminary inquiries into crimes with a view to committing for trial to a District or Supreme Court. The Rural Courts have powers of jurisdiction in minor civil cases in rural non-municipal areas, particularly the handling of cases such as damage to crops and land or disputes of less than 100 Rupees. In the case of Jaffna City, the Jaffna Magistrate Court has jurisdiction and performs the duties of the Municipal Court, since there is no actual Municipal Court. They try offences committed within the Municipality in breach of any municipal bye-law and any other ordinance relating to municipal affairs.

Educational Organization

The Department of Education has been in existence since 1869. Christian Missionaries, American, Wesleyan, Methodists and Roman Catholics have contributed to the improvement of

educational standards in Northern Ceylon as indeed in the whole of Ceylon.¹⁸ The American Mission established a high school at Vaddukkoddai in 1834. By 1866 there were five schools under the Wesleyan Mission, and two each under Roman Catholic and American Missions. In addition to Christian Missions, schools were established in the twentieth century by Hindu religious institutions (Hindu Board, Hindu College Board and Ramakrishna Mission), the state and also by philanthropists.

In 1960 the Government took over all private schools except for a few higher grade ones and in the study area all are state-owned except for eight higher grade private schools. These are either Protestant or Roman Catholic private schools, fees are not levied and membership is restricted to members of their own faith.

There are three grades of school: primary, high school (M.V.) and college (M.M.V.). The primary schools have classes up to the seventh standard. The main differences between high schools or Maha Vidyalayam and colleges or Madhya Maha Vidyalayam are that the latter have G.C.E. "A" level classes for Science and Arts and approximately a thousand students each. There are also technical colleges, specialized training colleges and private tutor~~ies~~es. However, there is a shortage of technical institutions. The emphasis on technical education will need more of these institutions, in future. Except for private institutions, all state establishments give free tuition and there are state scholarships for poor children from the sixth standard onwards.

Health Organization

In Ceylon western and native medical systems exist side by side. Although the native system has existed in the country for many centuries, its role is now very limited except for snake bites and jaundice. While the state medical system is mainly based on Western practices. The native system has three sub-systems: Ayurvedic, Unnani and Siddhi.

In both systems the state and private sector exist. The state medical system is completely free for both in and out patients. In the case of the native system the local authorities maintain dispensaries. The state medical institutions include a hierarchy of hospitals ranging from Provincial, Base, District, Cottage and Rural Hospitals and Central Dispensaries and Maternity Homes. In these institutions the services and hospitals facilities vary. Special clinics (such as T.B., E.N.T., Chest and Dental) function in Provincial and Base Hospitals. In the private sector there are only four hospitals and they are mainly for maternity cases, children and general ailments. In addition to the private hospitals there are many private doctors in general practice. Their contribution in out-patient treatment is considerable and they are found mainly in Jaffna.

Except for a few recently qualified ayurvedic doctors, the majority are not institutionally qualified and their practice is based on "traditional knowledge" methods. Although found in large numbers, their contribution is restricted to certain fields and their individual abilities vary greatly.

Entertainment Organization

Modern entertainment facilities in the region are mainly restricted to the cinema with Tamil, Sinhala, English and Hindi films being shown. Tamil films and those produced in other languages are usually first shown in Jaffna. The absence of television, theatre and sports activities make the cinema the major entertainment outlet. Major sports events of local, regional or national importance are held in Jaffna. In rural areas annual temple and church festivals are the main religious as well as social events.

Transport Organization

Railway, bus and internal aviation are state owned. Since private car ownership is very restricted buses are the dominant means of transport for both short and long distance journeys within the study area. Almost all the villages in the Jaffna Peninsula are within one or two miles of bus routes. There are a few long distance bus services from Jaffna City which go to Trincomalee and Batticaloa but long distance journeys to Colombo and South Ceylon are by train. There are two express and one slow train services between Colombo and Jaffna City every day.

Private taxis and private car-hire are important. Taxis are found only in Jaffna City and operate to and from Jaffna and within the city but privately owned cars in rural areas are used for hire on special occasions such as a visit to a hospital. For private transport bicycles and bullock carts are important. Bicycle lending and repair shops are also common and as the land is very flat, it favours cycling and this is

therefore a common method of village and intra-city transport. The importance of bullock carts has declined considerably since the introduction of tractors in the 1960's. Boat transport is significant in the communication between the Islands and the Peninsula.

The improvement of private and public transport systems has assisted the development of local trade. From the 1950's onwards the bullock cart was replaced in many places by lorries and buses. Before 1959 a transport route license system existed under which all lorry owners had to have a special route license before they were allowed to use selected long distance routes.¹⁹ This system prevented small-traders transporting goods from Colombo to Jaffna and vice versa. After the abolition of this system there was a vast increase in the flow of goods traffic between Colombo and Jaffna. Agricultural tractors and trailers are significant in the distribution and collection of goods in rural areas, where roads are inadequate and of poor quality.

Caste System

The caste system and its influence in Ceylonese society is still very strong, even more so among the Hindu Tamils than the Sinhalese. The early influence of the Portuguese, Dutch and British, universal franchise, education, and some industrialization and urbanization brought changes earlier to the Sinhalese of South West Ceylon. These changes had less impact amongst the Ceylon Tamils of North Ceylon and although some changes took place on the Peninsula it is still not free from caste prejudice. The caste system of the Ceylon Tamils, particularly the Jaffna Tamils, is similar to South India, but

there are some differences.²⁰

The system has existed in the area since the period of the Jaffna kingdom with its slave labour. In 1846 the British abolished the slavery system. This brought more freedom to the lowest caste people, particularly the Koviayar (indoor servants of Vellalas, the higher caste), Nalavar (toddy-drawers), Pallar (outdoor servants of Vellalas), Chiviayar (palanquin bearers) and the Parayar (tom-tom beaters).²¹

The villages and towns contain many caste groups. Each group depends on the other for a variety of goods and services. The village artisan caste meets the demand for several goods in the villages. This was a common feature in villages of this area before the 1940's. There have been changes, but the system still exists in various forms. The important caste groups starting from the top of the hierarchy are as follows:

- Piramanar - Brahmins or priests.
- Vellalar - Land owning higher caste.
- Koviayar - Formally indoor domestic helpers to Vellalar, now becoming land owning farmers considered next in importance to the Vellalar.
- Paravar - Fishermen.
- Karaiyar - Fishermen.
- Mukkuvvar - Fishermen.
- Pallivilli - Fishermen.
- Thimilar - Fishermen.
- Sempadavar - Fishermen.
- Thaddar - Gold smith - Artisan caste.
- Kannar - Brass smiths " "
- Thachchar - Carpenters " "

Kusavar	-	Potter - Artisan caste.
Kollar	-	Black smiths " "
Pandaram	-	Minor temple priest, garland maker and cook.
Vannar	-	Washermen or dhobies.
Ambaddar	-	Barbers.
Nalavar	-	Toddy drawers.
Pallar	-	Formally outdoor servants of Vellalar, now mainly agricultural labourers.
Parayar	-	Tom-tom beaters.

The caste system is important in the economic and social organization of the society. Not only are agricultural, fishing and artisan castes important to the economy, but also the supply of several central goods and services is met by this system. i.e. the village Thachchan, Thaddar and Kollar render goods and services to the community.

The Vannar and Ambaddar castes are important in providing service functions although the Ambaddar are ranked fairly low in the ritual and social hierarchy. They are usually barbers visiting houses periodically to cut hair and perform other functions. In the villages the Vannar collect dirty clothes from villagers and wash them. Before the development of maternity hospitals the washerwomen did the work of midwives in the villages. Their role in marriages, funerals and puberty ceremonies is also very important.

While the Nalavar are toddy drawers, the Pallar are agricultural labourers. The Pallar, formally the outdoor servants of Vellalar, are generally landless, poorly educated people who work on the land of higher caste people. Parayar are tom-tom beaters at the funerals of higher caste people.

Because of social, educational, economic and political factors the rigidity of caste behaviour has declined in the fifties and sixties. The real problem groups in the caste structure are the lower castes who are landless, and poor with low educational standards. They are not allowed to go to the temple, tea boutiques and barbers' saloons of the high castes. The caste influence on the commercial organization in the study area has two effects. The caste groups provide goods and services to other caste groups which otherwise might be undertaken by established institutions. Due to their social segregation they have to have separate commercial organizations to cater for them. But in the towns, particularly in Jaffna City, the social patterns have to some extent changed. In future the caste system and its importance will decrease. The young lower caste people are leaving their traditional jobs and taking other employment. Educational and modernization movements are spreading very rapidly. Because of political and social changes in society the higher caste groups are also adjusting themselves to the new environment and this influences service organizations.

Conclusion

The effective organizations in administration and other fields are important for all development processes. The effectiveness of organizational systems reflects the socio-economic level of a country. In Ceylon, small private retail traders play a significant role in commercial organization. The development of different types of large scale trade stores are related to economic development and standard of living of the people. The growth of supermarkets, self-service stores,

departmental stores, mail order firms and other large trading organizations will depend on economic progress of the country and government policies. Government involvement in wholesale and retail trade will limit the development of large scale private trading organizations. Future government involvement in various controls and restrictions may largely depend on the foreign exchange situation of the country.

In Ceylon the peoples' participation in decision making and in day to day administration is limited below the national level. The present local authorities have limited powers in administration and participation in local economic developments. Though the successive governments from 1956 have been in favour of a two tier Local Government system because of political complication none attempted to implement it. In order to tackle the specific regional socio-economic problem and to increase the peoples' participation in decision making the creation of county councils is desirable. Though the educational facilities are reasonably good, efforts should be taken to improve the quality of staff and technical education facilities. In health, the duplication of services in western and eastern medicine should be avoided. The absence of television in Ceylon hinders the progress of the people. Though the television is mainly used for entertainment purposes, it can also be used to diffuse ideas. The Government and the religious leaders should pay great attention to the eradication of caste prejudices in the society. The greatest need of economic development in developing countries like Ceylon is to improve the organizational systems that binds people with socio-economic activities to cope with modern needs and aspirations.

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CHAPTER FOUR

MARKET AND FAIRS

In the last chapter the commercial and service distributive system was analysed. In this chapter, aspects of markets and fairs in the commercial distributive system will be considered for they are important elements in the retail and wholesale trade of the area. In many developing Asian countries, such as India,¹ China² and Korea³ and in several African countries⁴ periodic markets and fairs still play a significant role in trade. This is especially the case among the different tribes in Africa. These institutions therefore are important in the commercial life of many non-urban industrialised societies and although the periodic market system still exists in some developed countries, it has declined in importance.⁵

Theories of Origin of Markets

There are two main theories concerning the origin of markets.

1. The system is based on the functional specialization and division of labour which leads to a barter system of goods, initially on a small scale. The production of a surplus of agricultural products in agrarian societies leads to specialization of labour at the village level. This assists the growth of a market or a trading place where the producers and consumers meet to exchange, to sell and buy different commodities. With increased scale of production and greater specialization, the emergence of a hierarchy of market centres

takes place. In this case the growth of a hierarchy is associated with population size and the development of settlements with their complementary areas.

2. The second theory suggests that the market system is based on the development of external or inter regional or long distance trade connections and communication facilities. Hodder pointed out that the origin of pre colonial African markets, particularly in the Yorubaland was due to external trade relations and communications.⁶ He cites this as the reason for the growth of markets in East and Central Africa. The absence of markets in South and South East Africa in pre colonial days was a result of isolation, in addition to which the local economy did not produce a sufficient surplus for the growth of markets. He noted in Yorubaland the lack of correspondence between the location of traditional markets on the one hand and the location and the hierarchy of settlement on the other. Traditional markets were not the nuclei of settlement but foci of communications.

Development of Markets in Northern Ceylon

The periodic and daily market system is fairly well developed in the study area as in the rest of Ceylon. The economic and social structure of the country is conducive to this form of trading. Marketing activities are most numerous on the Peninsula and very similar to the patterns of South West Ceylon. On the Mainland marketing activities are restricted to urban centres and a few large villages. Some of these markets such as Jaffna City (Grand Bazaar),

Jaffna-Karaiyut (Small Bazaar), Chankanai, Mannar and Eluthumadduwa markets existed during the Portuguese period. Some of these markets are mentioned in Philip Baldaeus's account of 17th century Ceylon.⁷ In addition to the above markets Point Pedro, Valvettithurai, Mullaitivu, Thaniyoothu and Chunnakam markets were in existence before the 20th century.⁸

Ceylon has had a long tradition of trade and relations with foreign countries. This assisted the growth of a limited number of markets in the early period but the subsistence nature of the economy and the caste system in society prevented the development of large scale markets before the 20th century. The population growth stimulated market trading in the early part of the 20th century with the establishment of Village Councils in 1912. When the Government established local authorities such as Village Councils, Urban District Councils, and Sanitary Boards, these councils took a keen interest in developing markets within their areas. The motives behind this move were financial: the councils could earn more revenue through tax and rent, increase the commercial importance of the village or town and create shopping facilities for the local residents. Local authorities received grants or loans from the Central Government for this development. The Central Government also assisted the local authorities in developing marketing systems in order to help farmers, fishermen and artisans market their goods, to reduce the role of middlemen, and to increase the availability of goods to the consumers. Changes in agriculture and crop patterns also assisted the growth of markets in size and number. During the latter part of the 19th and early 20th

centuries, new commercial crops were introduced to the area such as tobacco, tomatoes in the 1920's and beetroots, carrots and cabbages in the 1940's and 1950's. The changes in agricultural patterns towards market gardening, an increased urban and non-farm population and an overall increase in consumer demand assisted both the growth of new markets and expansion of old ones.

Fairs

There are no fairs comparable with the annual or monthly cattle sales in Uganda and Tanzania and other African countries.⁹ The livestock market is one of the most important activities in the commercial life of several North African market towns i.e. Misurata.¹⁰ In Northern Ceylon, however, there are many annual temple and church festivals which can be considered similar to fairs. "The festivals originated as religious celebrations, but soon developed commercial sidelines which became their raison d'etre".¹¹ Although the temple festivals are mainly religious their social and economic importance is still very great. Their importance has declined somewhat in the last decade because of the development of trade and transport and the growth of urban centres. However, local people in rural areas still buy many consumer goods at their village or nearest temple festivals.

Annual festivals are usually held for ten days but at Selva Sannathi and Nallur Kandasamy temples they last for 15 and 26 days. The main festivals of the Madhu church are held twice a year and last for ten to fifteen days. Several small temple festivals are held once a year. On festival days, except at some of the biggest temples, musicians, dance

troopers (Sinna melam), and drum beaters provide many cultural attractions. Large crowds come from the locality and surrounding areas to watch. During the festivals, but particularly during their last days, stalls are put up by both traders and welfare societies, to sell household utensils, metalware, textiles, framed pictures, pottery, dolls, coconuts and peanuts. Popular selling items at the festival stalls are bangles, wigs and household utensils. These items are very important, for if a rural woman missed this chance to buy a wig she might have to wait until the next festival.

On the last day of temple festivals there are usually sales of cattle and poultry, which take place outside the temples. These cattle and poultry are brought by the people to the temples as offerings. The offerings of cattle to the temple have decreased in recent years because of the reduction in the number of farm animals and a decline in the superstitious beliefs of the people. Before the availability of veterinary facilities, high death rates occurred amongst cattle, which led the local people to give offerings at the local temples to safeguard their cattle. The sale of cattle and poultry is held in many temples on car^x festival (Ther Thiruvila) day and on the eight day (Eddam Maddai) after the car festival.

Before the 1950's "animal sacrifices" to gods and deities

x Car in which an idol is placed and drawn round the temple in procession during the principal day.

FIG-41

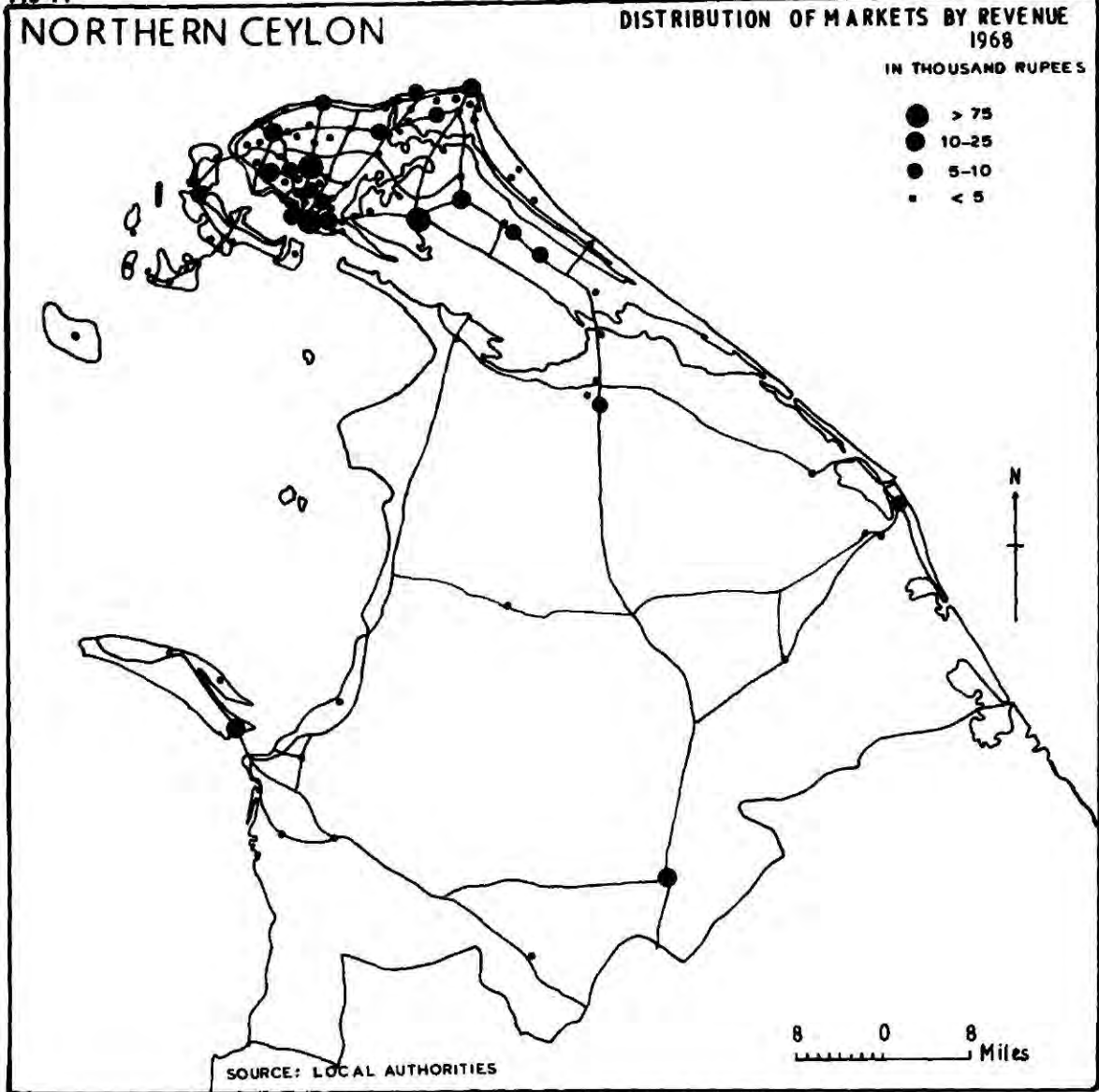
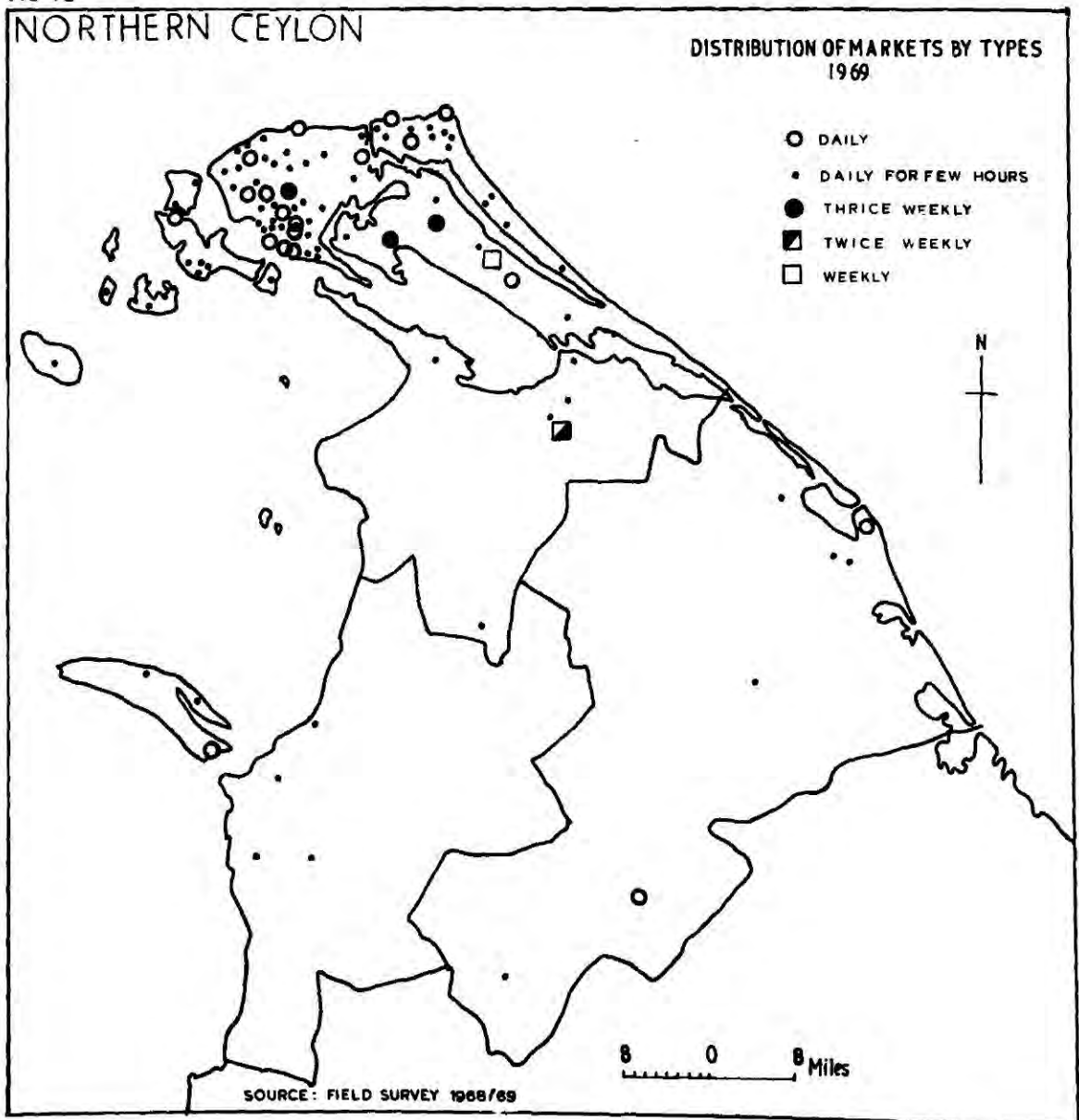


FIG-42



particularly to Kali (Goddess of destruction) and Vairavar temples were very common on the Peninsula. Anti-animal sacrifice propaganda led by Sri Arumuganavalar in the 19th century and other saivaites (Hindu religious leaders) in the 20th century reduced the animal sacrifices and stopped them in many temples. They are still held in a few temples, the Kadduvairavarkovil at Urumpirai being the most famous. When over two hundred goats and birds are sacrificed on two festival days at eight days intervals. The owner of the goats and birds has to give a tax to the temple to sacrifice his goat in the temple premises. After the sacrifice the owner sells the goat at the temple or shares it with his relatives and friends. Thousands of people from all over the Peninsula come to this place on these days to buy the goat meat, which is regarded as being of the best quality.

Distribution of Markets

An analysis of the present distribution pattern of the markets (see Figs. 4.1 and 4.2) indicates that they are of greatest significance on the Peninsula. Out of ninety-six all-grade markets, seventy-five are on the Peninsula. The number of markets in each D.R.O. division is shown in Table 4.1.

Jaffna Peninsula divisions have over three quarters of the markets. The main reasons why markets have developed on the Peninsula include the nature of the agricultural crops, land use patterns, and the high density of population (Jaffna D.R.O. - 6714, Vali-West - 2136, Vali-East - 1377, Vali-North - 2726 persons per square mile). The characteristic

Table 4.1Markets by D.R.O. division, 1969

D.R.O. division (Peninsula)	Number of markets	D.R.O. division (Mainland)	Number of markets
Delft	1	Karachchi	4
Islands	10	Punakari	1
Jaffna	13	Thunukkai	1
Vali-West	12	Mantai	2
Vali-North	10	Mannar	3
Vali-East	5	Musali	3
Tenmaradehy	6	Vavuniya-South (Tamil)	1
Vadamaradehy	15	Vavuniya-South (Sinhala)	0
Pachhilapallai	3	Cheddikulam	1
		Vavuniya-North	1
		Maritime Pattu	4
Total	<u>75</u>	Total	<u>21</u>

Source: Field survey, 1968/69 and the informations from the Assistant Commissioners of Local Government - Jaffna, Mannar and Vavuniya and Local Authorities.

clusters of urban and rural settlements shown on Figs. 2.13 and 2.15 also induced the growth of local markets. Agriculture is mainly market and homestead gardening, particularly on the red soil belt of the Valikamam divisions on the Jaffna Peninsula.¹² In market garden cultivation a variety of vegetables such as beans, spinach, yams, brinjals, onion, tomatoes chillies and tobacco are cultivated. In homestead gardens on the other hand, drumstick, jak, mangoes, bananas, pomegranates and a variety of vegetables are cultivated although these are mainly rainfed crops. The market oriented cash crop cultivation has contributed to the growth of markets. All big agricultural markets such as Chunnakam, Chavakacheheri, Pandatharippu, Acheuvelli, Kodikamam and Palai are on the Peninsula.

The distribution of markets is closely related to population distribution, density, urban centres and agricultural and fishing activities. In the study area transport played a small role in the growth of markets. Hodder noticed the distribution of markets in Yorubaland shows little correlation either with the distribution of population or with the distribution, size or hierarchy of settlements. The pattern in Northern Ceylon is therefore very different from Hodder's findings in Yorubaland. The markets found in Vadamardchy, Jaffna and the Islands divisions are mainly urban, fishing and consumer oriented retail markets. The markets in Valikamams, Tenmaradchy and Pachhilapallai divisions are agricultural producer's markets. On the Mainland, with the exception of Kilinochchi, all the other markets are consumer oriented urban and large village markets. In consumer oriented markets, most commodities are brought from outside areas.

Four grades of markets can be identified, based on the revenue collected as tax and rents by the local authorities. The first three grades are very important and the last is not significant in financial or functional terms. The majority of the local authorities auction the markets annually, particularly the smaller ones, to the contractors who run the markets collecting the money from traders and vendors. The local authorities who auction the markets annually are usually Village Councils. They adopt this practice because the revenue obtained from the markets is not sufficient to support permanent employees. Some of the markets pay no revenue to local authorities. These markets are in villages which were

established recently, usually in the 1960's. Once trade expands the local authorities will collect the tax. Large markets are usually run by the local authorities themselves.

The pattern of charges varies from market to market and is dependent on their size and importance. The markets have a different variety and quality of trading premises, ranging from stalls, semi-open roofed blocks to open cemented places and even simple open spaces. The size and frontage of trading premises is also important in rent collection. Tax collection is based on either the quantity, quality or number of goods. For example, a tax of twenty-five cents is paid on a basket of green chillies or brinjals. The tax is low for cheap vegetables (spinach, chillies, roots) and more for those of quality. In some cases the number of goods offered for sale are taxed, as for example, fifteen cents per a stick of bananas. In some cases the rent or tax is fixed on a trading time limit, for example, for a full day, half day or three hours. A trader can be in the market for his paid time limit and if he wants to stay longer then he has to pay again.

The four grades of markets identified in the study area (See Fig. 4.1.) based on revenue to local authorities in 1968 are as follows:

1. Markets with an annual revenue of over 75,000 Rupees.
2. Markets with an annual revenue of between 10000-25000 Rupees.
3. Markets with an annual revenue of between 5,000-10,000 Rupees.
4. Free markets and markets with less than 5,000 Rupees annual income.

The revenue depends on the importance of the markets. Jaffna, Chunnakam and Chavakachcheri markets are in the first grade. All three markets are within urban areas and Chunnakam and Chavakachcheri are the two leading agricultural markets. The distribution of higher grade (first three grade) markets is closely related to higher order central places. There are seven markets in the second grade and thirteen markets in the third grade. These markets are very important in the commercial structure and in the early stages of the development of urban places, this function played an important role.

Functional Types of Markets

Hodder tentatively classified five main types on the basis of their location and periodicity.¹³ These were:-

1. Urban markets
2. Urban nightly markets
3. Rural daily markets
4. Rural periodic day markets
5. Rural periodic night markets

Of these markets, the rural periodic day market is the most widespread and important type of local market in Yorubaland.

In Northern Ceylon, five kinds of markets exist based on frequency of function.

1. Daily markets
2. Daily markets for a few hours
3. Thrice weekly markets
4. Twice weekly markets
5. Weekly markets.

The distribution of markets by types based on frequency of function is shown on Fig. 4.2. In the study area there are nineteen daily markets, seventy-two small daily markets functioning for a few hours, three thrice weekly, one twice weekly, and one weekly market. The daily markets are found mainly in the towns and in important commercial centres. There are five markets of this kind found in Jaffna and its suburbs. Except for the suburban market these markets serve not only their settlements but also their hinterlands. Some of these markets are found in main administrative centres such as Jaffna, Mannar, Vavuniya, Kayts, Point Pedro, Mullaitivu, Manipay, Chankanai, Pandatharippu, Nellyyady and Kankesanthurai. These markets are located in the towns and they are part of the town centre usually referred to as the Bazaar. Markets and bus stands are located close to one another and are the main urban features in these places. The markets are housed in permanent buildings or a market square. The fish and meat section is normally separated from the vegetable area.

There are seventy-two small daily markets which function for a few hours usually between 9 a.m. - 12 p.m. These markets are small with a few traders and a limited number of shoppers. The markets supply day to day needs of fish and some vegetables for the rural settlements and urban neighbourhoods. These markets are mainly consumer oriented with petty trade. Trading usually takes place between traders and shoppers rather than between producers and shoppers as occurs. In case of coastal fish markets. Some functions such as meat stalls operate once or twice a week in the markets and the same butcher visits different markets on different days.

Chunnakam, Chavakachcheri and Kodikamam are the only thrice weekly markets and are located on the Jaffna Peninsula. The first two markets are important not only to the Jaffna region but to the whole of Ceylon, for they are the main suppliers of bananas and mangoes to Colombo. Chunnakam is in the centre of the market gardening belt, whilst Chavakachcheri and Kodikamam are in the homestead and coconut cultivation area. All three are commercial agricultural markets where farmers sell their products to traders and are the main supply places for vegetables, fruits, roots, chickens and several cottage industrial goods. These markets function on alternative days. The alternative market day system as set out below has advantages to both traders and producers as they can go to both markets.

MARKET DAYS

Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

MARKETS

Chunnakam, Kodikamam

Chavakachcheri

Chunnakam, Kodikamam

Chavakachcheri

Chunnakam, Kodikamam

Chavakachcheri

Although Chankanai market functions daily it is essentially a thrice weekly market for on Tuesdays, Thursdays and Saturdays it attracts larger crowds than on other days. The farmers and fishermen of settlements in Valikamam West and Valikamam North division can take their goods to Chunnakam on Mondays, Wednesdays and Fridays and to Chankanai on Tuesdays, Thursdays and Saturdays. The distance between the markets of Chunnakam and Kodikamam is twenty miles and from Chavakachcheri to Chankanai eighteen miles.

Chunnakam is the biggest market in the study area. It is located in the heart of the market gardening belt and in the central position in relation to the three Valikamam and the Jaffna divisions. A hinterland of seven mile radius from this market place includes almost all of the area and population of the three Valikamam divisions and Jaffna and the entire market gardening area of the red soil zone. The total area of the four divisions is 120 square miles with a population of 352,483. Elalai, Uduvil, Inuvil, Tellipallai and other intensive market garden villages are adjacent to Chunnakam and all the villages have over 5,000 population.

The market is famous for the banana trade with sixty per cent of the banana trade of Jaffna Peninsula channelled through it. Seasonal differences in the markets are noticeable in the kind, origin and volume of goods. Vegetables and fruits sold vary from season to season. The months from February to May are important for local varieties of vegetables, June, July and August are important for fruits and November, December and January for root crops and recently introduced temperate zone vegetables. All the vegetables are locally produced but recently vegetables from the colonization area of the Mainland and South Ceylon are brought to the market. Fish from Myliddy, Ilavalai and Mathagal villages is brought together with vegetables. The Town Council obtains an annual revenue of over 75,000 Rupees from this market. Different types of market tax systems operate here: forty cents tax for a bag of chillies, twenty cents for one hundred drumsticks, five cents for a jak fruit and sixty cents for a heap of lime fruits, all

of which are measured in cubic feet. There are fourteen entrance gates to the market with four gates for banana trade and others for vegetables, fish, chicken and cottage industrial goods. Though the market functions on Monday, Wednesday and Friday, Mondays and Fridays see most business activity. On an average market day in 1968 and early 1969 over 500 Rupees was collected as tax. A sample weekly tax collection in the market in June 1968 on market and non-market days was:-

Table 4.2

Sample Weekly Tax Collections on Market
and Non-Market Days Chunnakam, 1968

<u>Day</u>	<u>Date</u>	<u>Tax</u>	
Monday	10.6.68.	Rs. 587.25	Market day
Tuesday	11.6.68.	Rs. 34.20	Non-Market day
Wednesday	12.6.68.	Rs. 393.55	Market day
Thursday	13.6.68.	Rs. 31.00	Non-Market day
Friday	14.6.68.	Rs. 575.75	Market day
Saturday	15.6.68.	Rs. 32.75	Non-market day

Source: Town Council, Chunnakam, Ceylon.

On certain festival days the tax rises to over 700 Rupees as, for example, at the Friday market prior to the Deepavali festival when 709.15 Rupees was collected.

Chavakachcheri and Kodikamam are the other thrice weekly market centres in the Tenmaradchy division. Homestead garden crops, fruits, coconuts and fish are the main local commodities. The two markets function on alternate days. The Chavakachcheri market is smaller than Chunnakam but the functional character is very similar. This is the main market for Tenmaradchy, Punakari and the eastern parts of Jaffna City. The sphere of influence of Chavakachcheri has been reduced on the southern

side because of the growth of Kilinichehi town. Before the 1960's Thunukkai, Karachehi, and Punakari were more attached to Chavakacheheri market. Further growth of Kilinochehi will reduce Chavakacheheri market influence on the southern side. Kodikamam is only five miles from Chavakacheheri and although smaller, is important for Eastern Tenmaradchy, Vadamaradehy South and Pachchilapallai divisions. Coconut and homestead crops are the main local commodities, but fish and palmyra products are brought from Vadamaradchy. The three thrice weekly markets and the daily markets of Chankanai, Pandatharippu, Atchuvveli and Palai on the Jaffna Peninsula are mainly agricultural markets. These markets are important in agricultural and wholesale trading.

There is only one twice weekly market and it is found in Kilinochehi. The hinterland areas particularly in Karachehi division were recently colonized and agriculturally developed. The market functions on Tuesdays and Saturdays. Unlike the Peninsula markets, a variety of goods are brought to the market by the colonists. This is the only big market place in the Karachehi division and the developing southern part of Jaffna district. There is a great future for this market and once the trade expands the market will be held thrice weekly. Since the settlements were established recently there is as yet no clear cut trading pattern.

Eluthumadduwal is the only weekly market in the study area and functions on Fridays. The market is very old and is mentioned in Philip Baldaeus's travels in Ceylon in the 17th century.¹⁴ The market is not only weekly but also seasonal. In

June, July and August the market is active during the tobacco and fruit seasons. Tobacco, mangoes, jaks and coconuts are the main local goods and fish from Nagarkovil is sold. The market's character is similar to Kodikamam and Palai although smaller. After the tobacco season the market activity is very limited. A road is under construction to connect Eluthumadduwal with Nagarkovil and Eastern Vadamarachy. After completion the coastal villages of the Eastern Vadamarachy and Pachehilapallai will be brought very close to this market. This will assist growth and fish from the coastal villages will be brought here to supply Eastern Tenmarachy and Pachehilapallai villages.

There is another type of activity, roadside marketing, which lasts from fifteen minutes to one hour. Table 4.3 shows the roadside markets in Jaffna City.

Table 4.3

Roadside markets in Jaffna City: 1969

Morning fish and vegetable markets

Evening grass market

Ariyakulam
Kantharmadam Junction
Mampalam Junction
Manohara Junction
Neeraviyady Junction
Perumakovilady Junction
Rasavinthiddam Junction
Temple Road Junction
Thaddatheru Junction

Point Pedro road-railway crossing

Source: Field Survey, 1968/69.

Fish peddlers and women vegetable hawkers gather at a junction or on the roadside and the people neighbouring the roadside market buy their daily fish and some vegetables. The fish traders arrive on bicycles in a group and sell fish. The

women traders stay in the places for a long time, but the fish traders come together to attract more people and collectively they can offer different varieties of fish, crabs and prawns. The consumption of fish is very great in the area and particularly in Jaffna City and fish is therefore the main curry for rice meals. The morning roadside market is very significant in Jaffna City. Owing to the lack of refrigerators, the people have to buy their fish, and to some extent vegetables, daily and neighbourhood housewives and children flock to these roadside market places.

In the evening near to the Point Pedro road railway crossing in Jaffna City, women traders sell grass for feeding cattle and a few vegetables. Urban cattle owners buy grass from these places. At Point Pedro, and at similar markets, women traders also sell Banian tree leaves for feeding goats.

In a traditional society markets and fairs play an important role in the transaction of goods and services between the producers and final consumers. In the study area the markets play a very important role in the distribution of vegetables fruits and cottage industrial goods. In the markets, in addition to the agricultural products, which are mainly vegetables, fruits, fish and cottage industrial goods, various kinds of services such as knife sharpening, umbrella repairs and fortune telling are also rendered. Prepared foods are also very significant, particularly along the coastal areas, where they are brought by the fishing population. Point Pedro market is very popular for a wide variety of prepared foods. Certain markets are important for specialized

commodities such as Chankanai for pottery, Chunnakam for vegetables and bananas, Chavakachcheri for coconuts, polished rice and fruits, Kodikamam and Palai for coconuts, Eluthumadduwal for tobacco and Point Pedro for prepared foods.

In the big agricultural markets (Chunnakam, Chavakachcheri, Pandatharippu, Chankanai, Kodikamam and Atchuvveli) direct trading takes place between producers and shoppers, but wholesale traders are also active in the Chunnakam, Chavakachcheri, Pandatharippu, Chankanai and Kodikamam markets with neighbouring villagers and traders coming to purchase goods for their own retail stores. For some family events people from distant villages used to come to these markets (except agricultural markets) such as Jaffna, Vavuniya Mannar and other urban centres, trading takes place between urban shoppers and traders. These centres are district and divisional or important urban centres, not only serving the town but also the hinterland population. But in the case of small markets the consumers are mainly from the village itself.

Conclusion

Markets play a very important role in the commercial distributive system, particularly in the trade of fish, vegetables, and cottage industrial goods. As in African tribal markets the exchange of goods has no cultural or ritual importance. Population and agricultural growth will assist the expansion of existing markets. The development of markets greatly depends on the initiative of local authorities and the financial assistance of the Central Government. However,

the development of service centres will reduce the importance of markets in consumer goods such as textiles and cottage industrial goods. Owing to urban development in periodic market centres, Chunnakam, Chavakachcheri and Kilinochchi may soon become daily market places.

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CHAPTER FIVE

SETTLEMENTS AND CENTRAL FUNCTIONS

The General physical background and economic characteristics of the population, settlement size and type, rank-size relationships and the functional distributive systems have now been considered. In this chapter, detailed aspects of functional evaluation, functional distribution and the relationship of population of settlements to function and functional units will be discussed and then the concept of population thresholds for the number of central functions will be analysed. In the next three chapters aspects of settlement, nodality and the centrality level of functions and places will be examined. In addition, the hierarchy of centres on a regional and intra-urban basis and the service areas of central places will be evaluated. In order to group the central places into different grades the central functions will be weighted and quantified.

Definition of Terms

A list of definitions used in this part of the thesis is provided here for easy reference:

1. Central function:- A function or tertiary activity demanded by the population and not found in all settlements. If a function is found in all settlements that function is not a central function.
2. Central good and service:- A function or tertiary activity. Central goods mainly refer to retail and wholesale activities whilst central services refer to activities such as schools,

hospitals and administrative offices. In this discussion the term function or good is also used to refer central functions and central goods and services.

3. Nodality criteria:- The importance of a place as a provider of tertiary goods and services both for its own residents and for other consumers.
4. Central place (nodality criteria): - A settlement possessing one or more function.
5. Central place (centrality criteria): a settlement possessing one or more central function and having a surplus of these functions over and above its requirements.
6. Functional unit: Each occurrence of a function constitutes one functional unit. An establishment refers to the physical premises where one or more function is performed.
7. Order of a function: Level of importance of functions. This associates with population thresholds size and the nature of occurrence in settlements.
8. Lower order function: Function occurring in large numbers and in places with low population threshold requirements.
9. Higher order function: Functions found in a few places or in functional units which needs a high population thresholds for their existence in central places.
10. Range of function: This is the distance the dispersed population is willing to travel to buy a function/service offered at a central place.
11. Threshold level of a function or good or service: The minimum number of people or sales volume or income required to support a function is called threshold population or threshold level of a function: if this level is not maintained the

function may cease to operate.

12. PT50: Median population threshold for a function.

Development and Consumption of Central Functions in Settlements

In 1963 there were 1,015 settlements in Northern Ceylon, with population ranging from less than 10 to 94,670 persons. Of the 1,015 settlements only 569 had one or more central functions recognized by the author. In the 100-249 size group 176 of the 192 settlements have central functions and in the 1-99 size group only 72 of the 502 settlements have central functions. All settlements lacking central functions have a population of less than 125.

Table 5.1 shows the population sizes and number of settlements with central functions in each grade.

Table 5.1

Absence and presence of functions in settlements

<u>Population grade</u>	<u>Number of settlements</u>	<u>Number of settlements with one or more functions</u>
94,670	1	1
10,000 - 15,000	4	4
5,000 - 9,999	26	26
2,000 - 4,999	74	74
1,000 - 1,999	45	45
500 - 999	69	69
250 - 499	102	102
100 - 249	192	176
1 - 99	502	72
Total	<u>1,015</u>	<u>569</u>

Source: Census of Ceylon 1963, and field survey 1968/69.

The present functional analysis of settlements relates to 569 central places. Out of these 569 settlements only 11 had urban status in 1963, although the number had risen to 16 by 1969. In a central place study a settlement's urban or rural status is only important from the functional aspect. For urban status may be an indicator of its functional status

although there are some rural settlements which have more functions and population than some urban settlements. Reasons for non-urban status may have been insufficient revenue from taxes, and a non-willingness to accept urban status by the population who would have to pay higher taxes.

Central place theory is most suitable for the analysis of a regional functional hierarchy of centres in an area where agriculture and non-secondary activities are predominant. Northern Ceylon is a topographically flat area, mainly rural and dominated by the primary economic sector. The tertiary sector employs more than 50 per cent of the gainfully employed population of the urban centres. (see Table 5.2)

Table 5.2

Percentage of gainfully employed population for urban areas by district. 1963

<u>Industrial classifications</u>	<u>% Jaffna</u>	<u>% Mannar</u>	<u>% Vavuniya</u>
Agriculture, Forestry, Hunting and Fishing	18.36	26.35	28.78
Mining and Quarrying	0.05	.35	-
Manufacturing	16.58	5.61	9.81
Construction	5.29	7.63	5.96
Electricity, Gas, Water and Sanitary Services	.57	-	.85
Commerce, Banking and Finance	15.08	21.74	19.40
Transport, Storage and Communication Services	8.92	5.28	3.62
Activities not adequately described	<u>9.77</u>	<u>1.46</u>	<u>4.92</u>
Total	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>

Source: Census, 1963, Vol. 1, Part II, p.13.

The dominant nature of service functions in towns is found in all three districts and primary activities are more important than industry. Although there are a few small scale industries in the area, they usually belong to the service sector as for example, bakeries and garages. This shows that

the towns of Northern Ceylon are predominantly service centres. They act as the centres where shopping, administration, health, social, cultural and similar services are sought by the people from the surrounding areas.

In order to assess the functional level of settlements, 112 central functions were selected from the field inventory of 120 functions initially recorded. Functions excluded were milk bars, cool drink bars, ayurvedic physicians, semi-mobile truck shops, peanut sellers, religious establishments, Army and Navy units, and the Department of Meteorology. Milk bar and cool drink bars are grouped with tea and coffee boutiques because similar functions are found in these boutiques. Ayurvedic physicians were dropped because of their ubiquitous distribution, and only registered Ayurvedic Dispensaries were taken as central functions. Peanut selling, and semi-mobile truck shops were not counted because of their migrant nature and random occurrence. Army and Navy check points and the Department of Meteorology were excluded because they have no importance as a central function and places of religious worship were not included because of their ubiquitous distribution.

Central functions range from primary schools to district administrative functions and include commercial, educational, health, government, financial and social functions. Government central functions are very important in the functional growth of settlements. Gunawardena's study of South Ceylon included some government orientated functions which supported low order functions such as primary and secondary schools, co-operative stores, post offices, sub-post offices, Rural Courts and

Magistrate Courts.¹ This suggests that government functions are likely to be important in the study area. For in Ceylon the government's role in the distribution of central goods and services, as well as in the economic sphere, is far greater than in the western world. In western countries the government function may not be important as a central function because it is not necessary to go to the central place in order to obtain this service.

The functional growth of a place has been a result of the interaction of various central functions. Existence of one function assists the development of other functions, particularly in large central places because of the economic advantages the places have for both lower and higher order functions. Each function has its own level of influence which assists the growth of other functions. For example, the existence of motor vehicle repair garages assists the growth of motor spare parts and tyre shops, or vice versa. The relationship between functions leads to centralization and in turn this leads to segregation and specialization of central functions within central places.

Central functions are grouped into variables and attributes. Out of 112 central functions, 74 are variables and 38 are attributes. In the case of variables a central place may possess one or more functional units of a particular function as, for example, textile shops, the number usually depending on population size and regional importance of a settlement. The variables therefore mainly comprise commercial, educational and social functions such as Rural Court, Divisional Revenue

FIG. 5.2

NORTHERN CEYLON

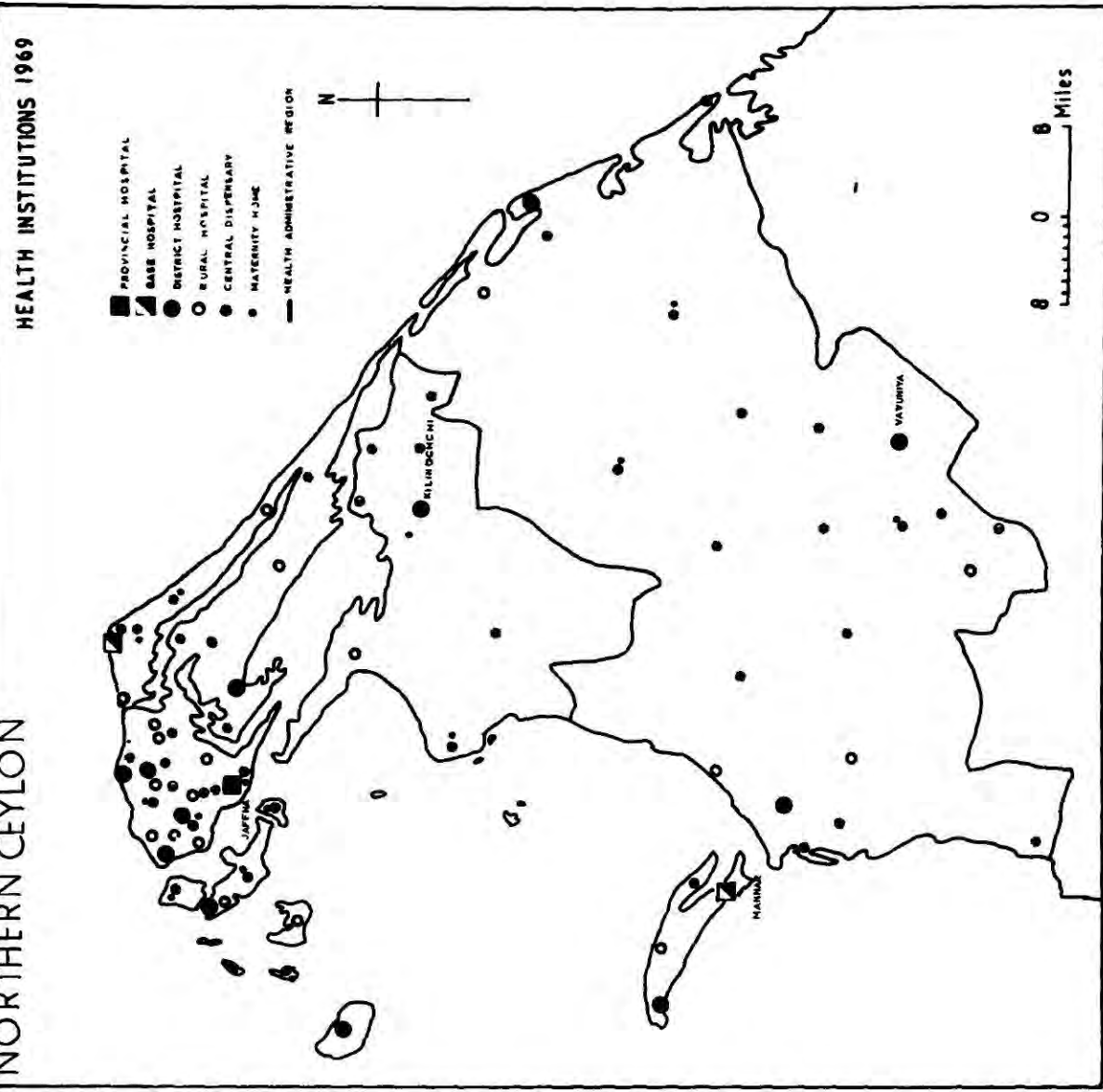
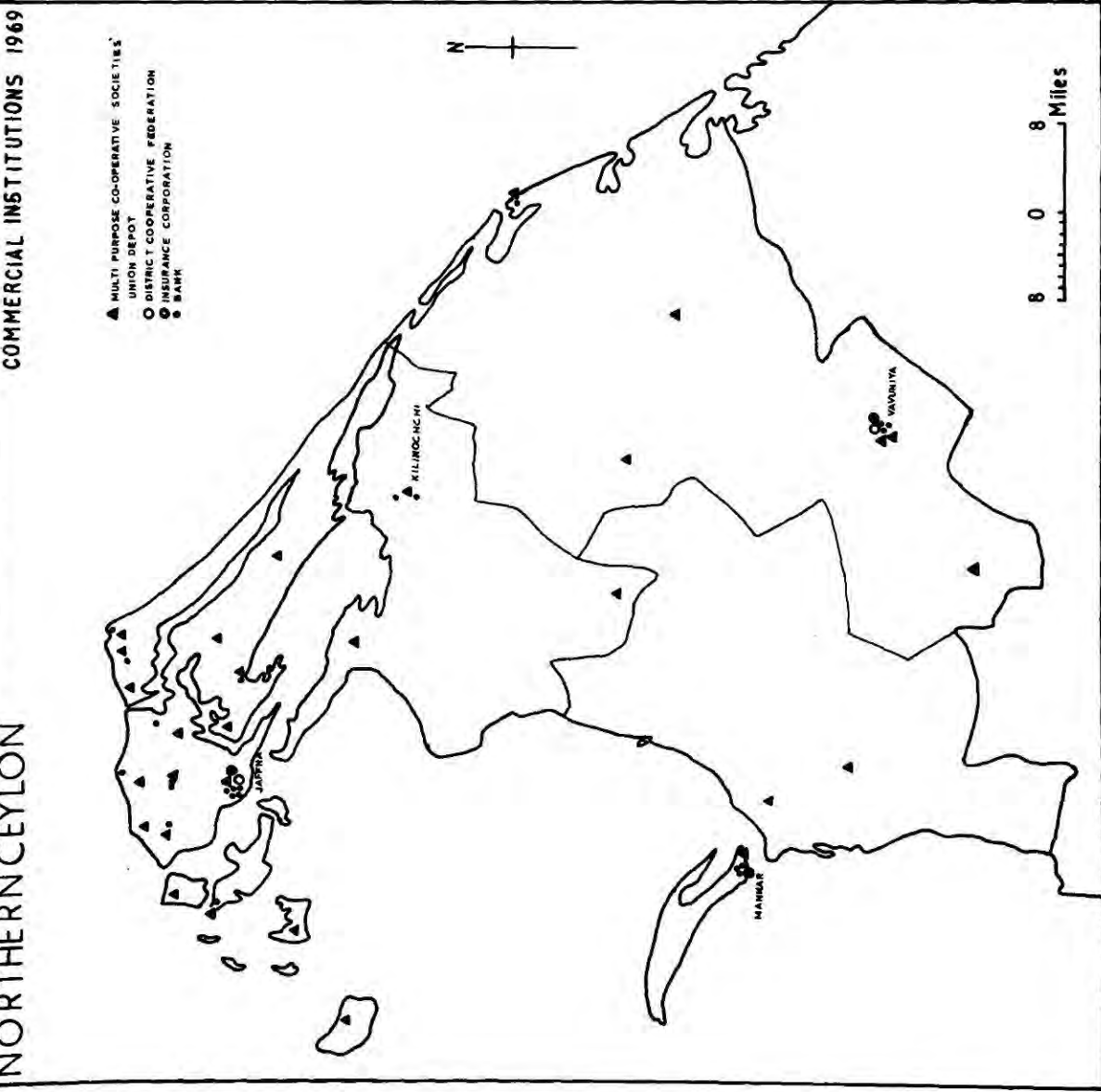


FIG. 5.1

NORTHERN CEYLON



Office, Magistrates' Court, etc. of which only one occurrence can be expected in any one settlement. The attributes mainly comprise administrative, health, transport and higher order functions.

The number of central functions range from 1 to 108. Jaffna has the greatest number of central functions as well as functional units. Table 5.3 shows the number of settlements within particular classes of central functions.

Table 5.3

Settlements by number of central functions

<u>Number of central functions</u>	<u>Number of settlements</u>
108	1
84	2
70	1
63-65	2
58	1
46-50	3
41-45	3
36-40	4
31-35	3
26-30	4
21-25	13
16-20	16
11-15	42
6-10	101
3-5	106
1-2	207
Total	<u>569</u>

Source: Field survey 1968/69.

Out of 569 settlements 474 have less than 10 central functions. In this group primary schools, retail stores, tea and coffee boutiques, and co-operative stores are the most ubiquitous. The number of functional units is greater in low order commercial functions. The higher order functions, mainly administrative, have fewer functional units than those of a lower order.

FIG. 5.3

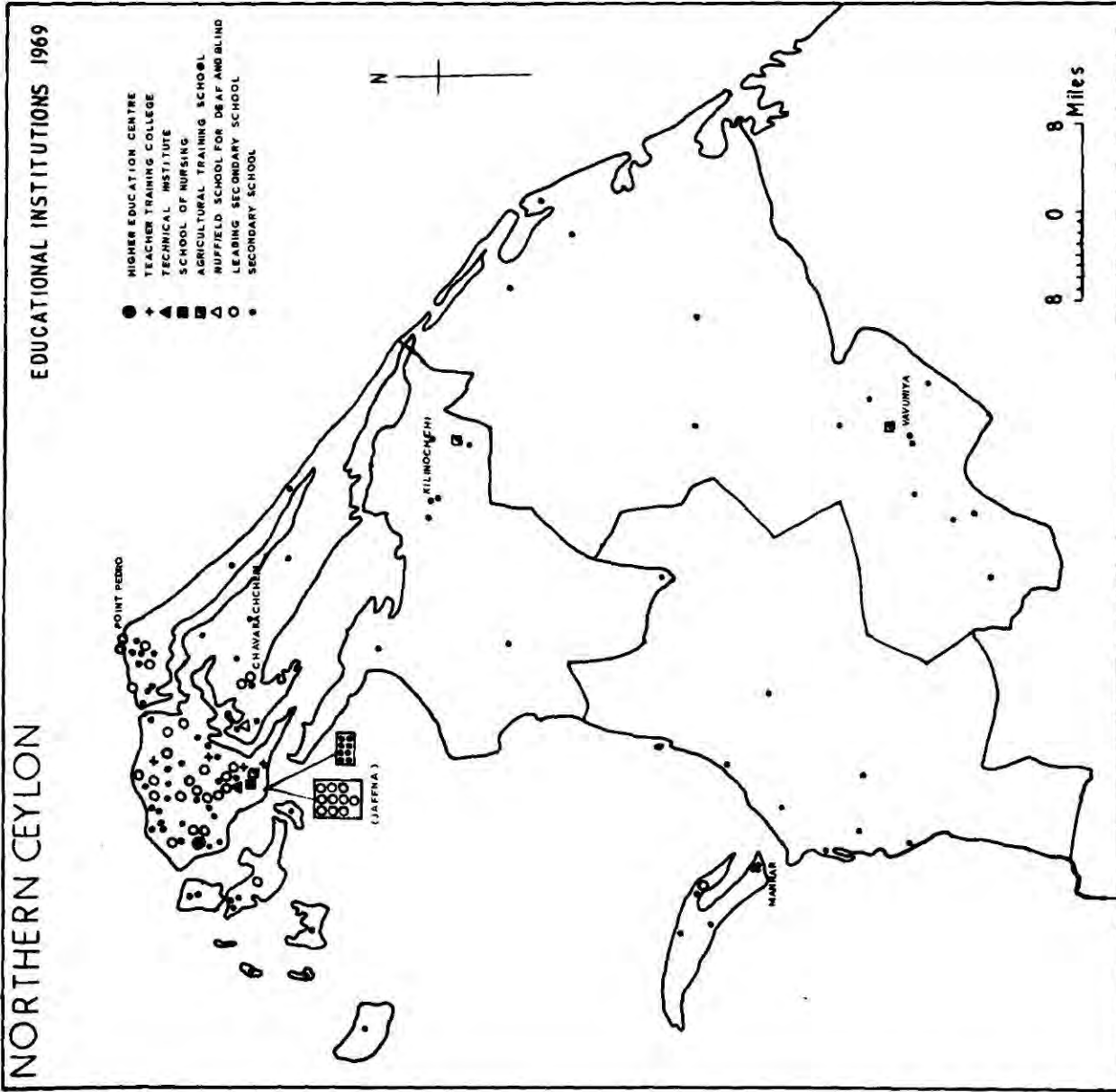
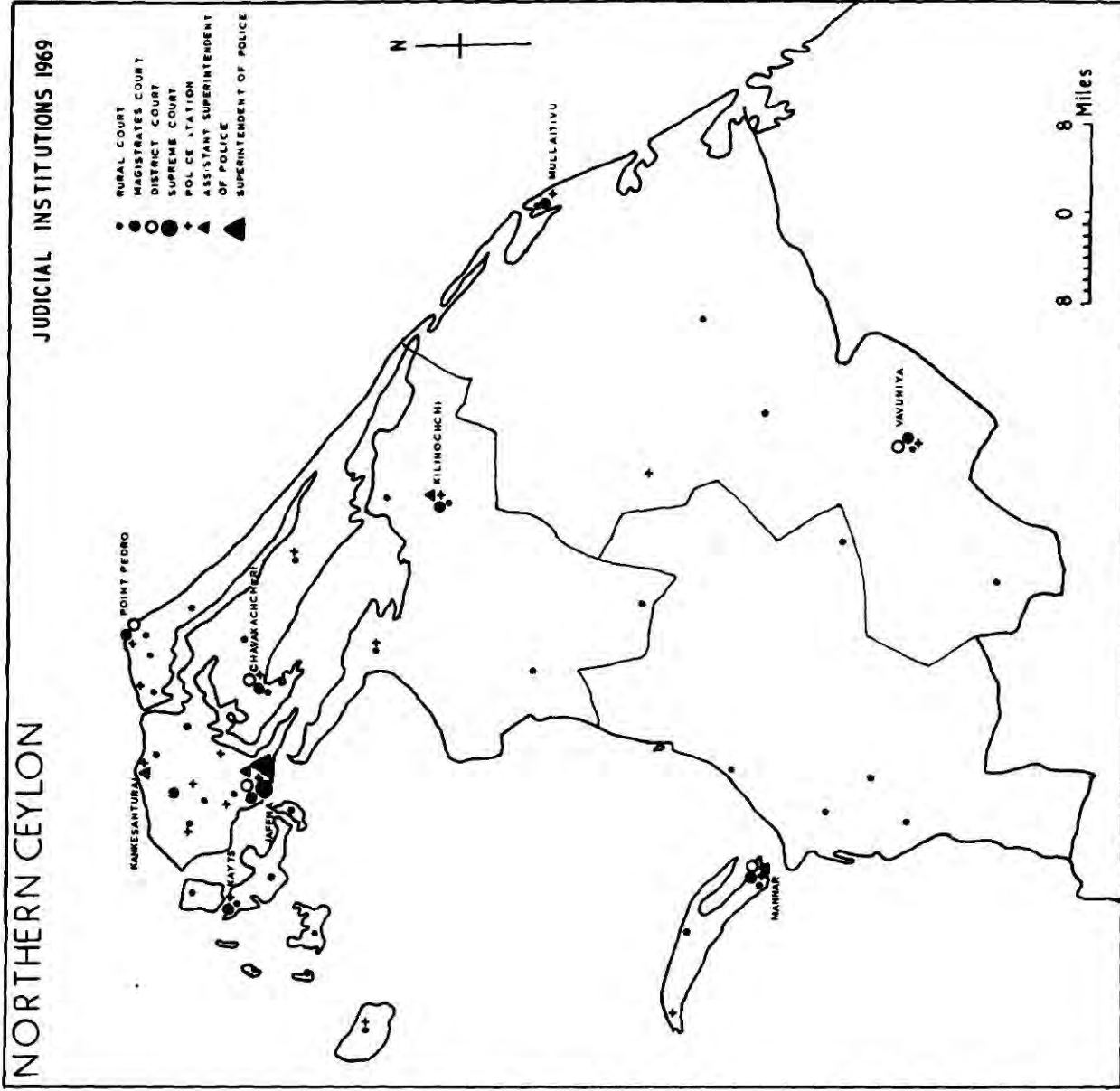


FIG. 5.4



The distribution of selected central functions is shown on Figures 1.1, 3.1, 4.1, 4.2, and 5.1 - 5.4. The distribution of functions is important, because if they are not rationally distributed, there is a tendency for areas of surplus and deficit to be created. In the case of the geographical distribution of central functions there is a concentration around Jaffna City and other major towns. On the whole, the Peninsula has a greater concentration of functions than the Mainland, and this reflects the population distribution. Primary schools, co-operatives, retail stores, and tea and coffee boutiques are uniformly distributed because they have to satisfy a frequent demand. The distribution of central functions shows which part of Northern Ceylon is lacking in service provision.

The development of central places is closely linked with the consumption of central goods and services. The availability of different types of central goods, and the number and size of central functional units are all reflections of the consumption pattern of central goods. This consumption is lower in subsistence agricultural and rural societies than in more developed countries. They produce for themselves many of the goods needed to satisfy their demands, whereas in industrial urban societies a high per capita income contributes to a greater dependence on central places for the consumption of central goods. The development of central places and their variety depends on the stage of economic development of the area. In the study area the consumption of central goods is highest in the Jaffna Peninsula because of a higher population and greater purchasing power. On the Mainland higher order

functions are found only in a few places where the population thresholds for these activities are reached.

Availability of central goods is another important factor in the appearance of central functions in central places. In the case of Ceylon the Government has severely restricted the availability of many consumer durable and manufactured goods in order to overcome the shortage of foreign exchange. Local production of many consumer goods is not sufficient to meet the demand. Because of this the demand for many central goods is suppressed. At the same time the Government has taken over the distribution of some goods through co-operatives in order to beat the Black marketeers and to allow fair distribution. Though the scarcity of goods hinders the growth of some functions, the overall situation of the economy did improve in the 1960's. The improvement in agriculture and in fishing and the rising per capita income and consumption of central goods, together with better educational opportunities has created more demand. Because of this, several functions such as textiles, hardware, electrical goods and photographic studios, once found only in Jaffna City have now spread to Mannar, Vavuniya, Point Pedro and Chavakachcheri. The average Ceylonese family spends 60 per cent of his income on food purchased in local co-operatives, retail stores and markets but still the main problem preventing greater consumption is low income, high costs and scarcity of goods.

In the distribution of central functions, central goods offered at large central places generally have a larger range than the same goods offered at a lower order central place.

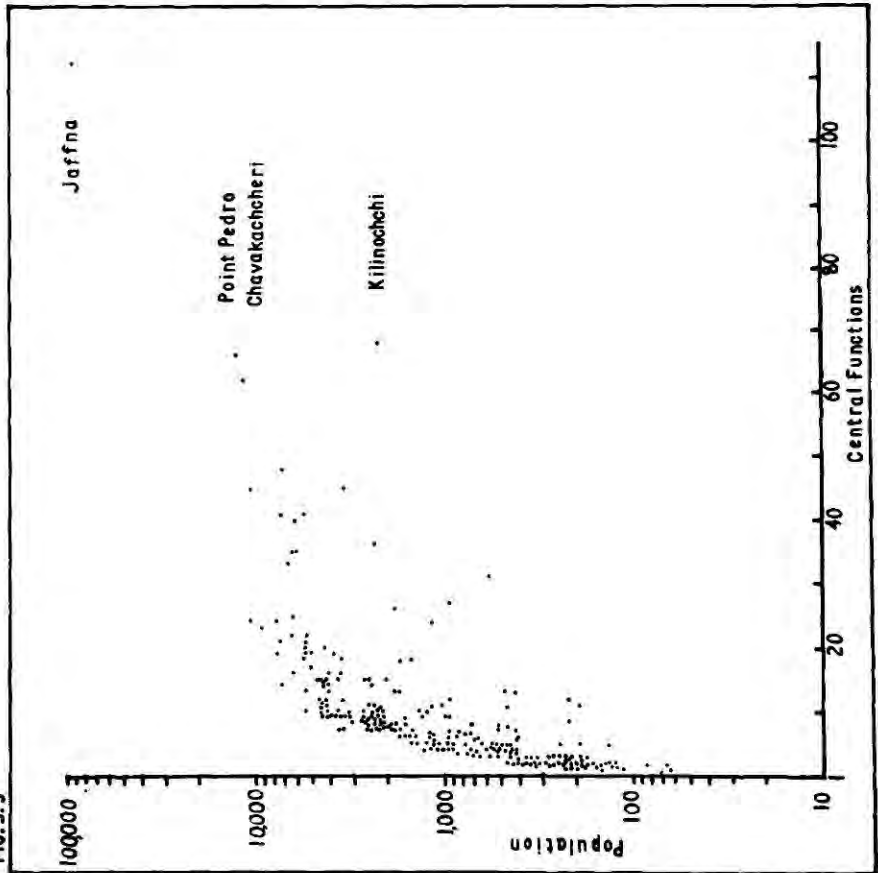
This is because the determination of the prices of goods in higher order places is different from that in smaller places. In higher order central places a person on a single trip can purchase different goods and also utilize various services. This has an effect on the price of goods and services, for large central places can offer goods at lower prices than smaller centres. This is one of the main reasons why Jaffna City has many central functions and functional units. A low order central place with little turnover has to sell at a higher price in order to make a profit.

Social custom also determines the different types of goods sold. For example, the 53 jewellery shops in Jaffna City is a high figure when compared with other towns of Ceylon. The social customs of the Hindu Tamils leads to the investment of a large proportion of their savings in the form of gold jewellery. Also government intervention in the form of price control, rationing, channelling of central goods through co-operatives and spatial restriction on use of a particular function, i.e. choice of school, all affect the free movement of the population to purchase goods and services. The abolition of many control systems, government subsidies and concessions will alter the present distribution of functions in favour of higher order centres.

Central Functions and Settlement Size Relationships

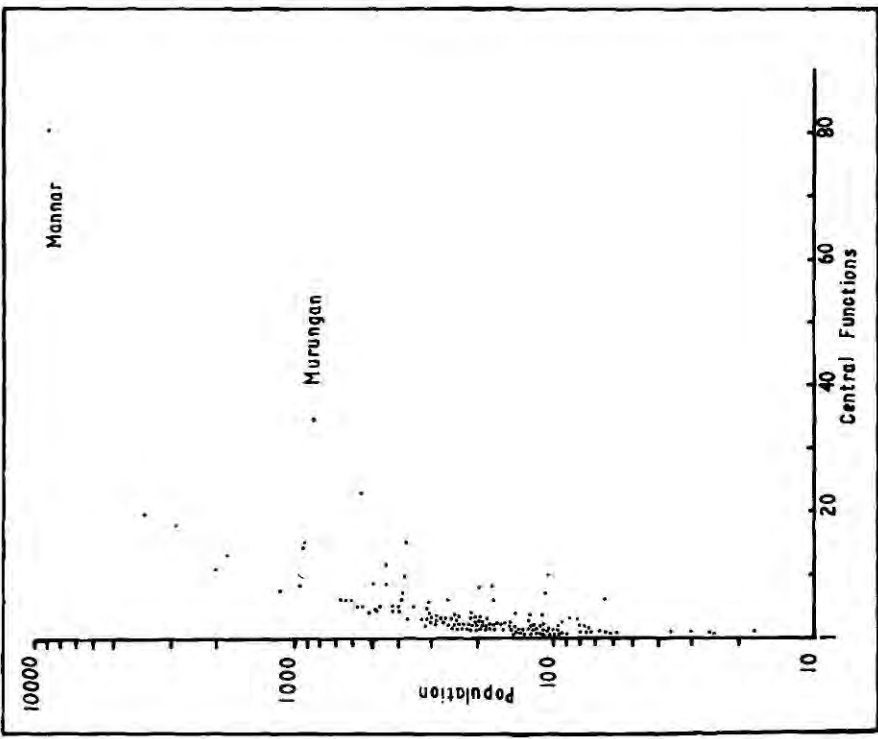
"As central places increase in population they are expected to show increases in the numbers of central functions, increases in total business establishments, increases in the size of trade areas and therefore increases in the number of

FIG. 5.5



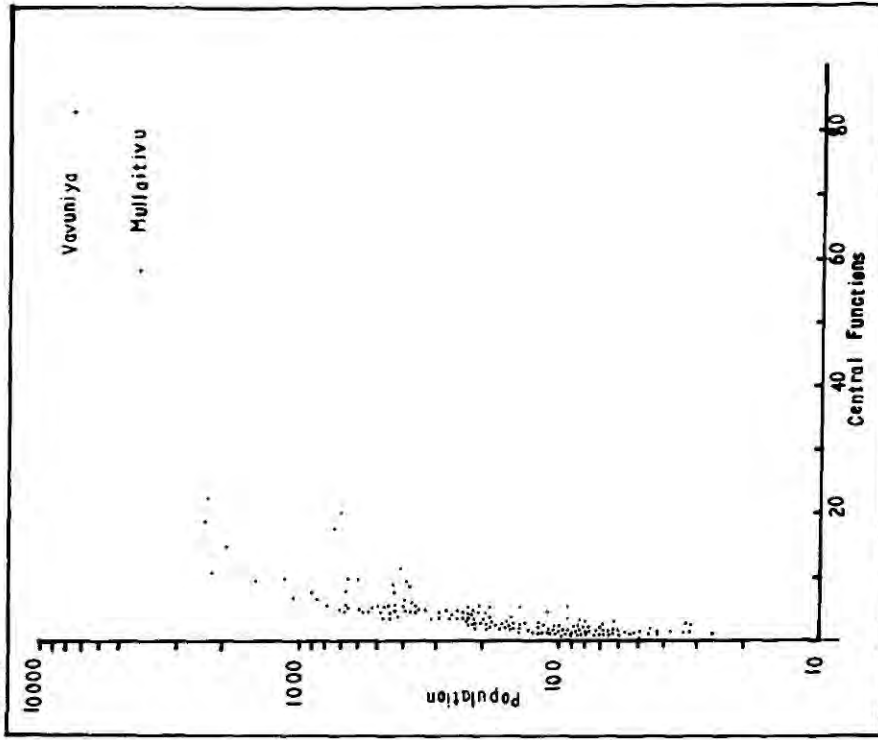
Relationship Between Population and Central Functions in the Jaffna District

FIG. 5.6



Relationship Between Population and Central Functions in the Mannar District

FIG. 5.7



Relationship Between Population and Central Functions in the Vavuniya District

people they provide with central goods and services."² This section is concerned with examining the relationship in Northern Ceylonese settlements of population size and number of functions, population and functional units and function and functional units. The grouping of settlements according to the number of functions shows that 474 of the 569 central places have less than ten central functions. (see Table 5.3) This indicates that many settlements are small in their functional status. There are only six central places that have more than fifty central functions and except for a few higher order centres the functional basis of other central places is not complex.

Relationship between Population and Central Functions

Jaffna City, Mannar and Vavuniya are the largest settlements and have more central functions than any other places within their districts. The relationship between population and central functions for the three districts is shown on Figs. 5.5, 5.6 and 5.7. The overall relationship between the number of functions and population size of settlements is very close. In Jaffna district the largest places such as Jaffna City, Point Pedro, Chavakachcheri, Kankasanturai and Chunnakam have a normal relationship between population size and number of functions. Though there is a positive relationship between the two factors in the Jaffna district settlements, there are a few anomalies. Central places such as Kilinochchi, Kayts, Kodikamam, Palai, and Nallur have more central functions in relation to the population of their settlements. In some of these cases it can be explained by the census figures which give a misleading

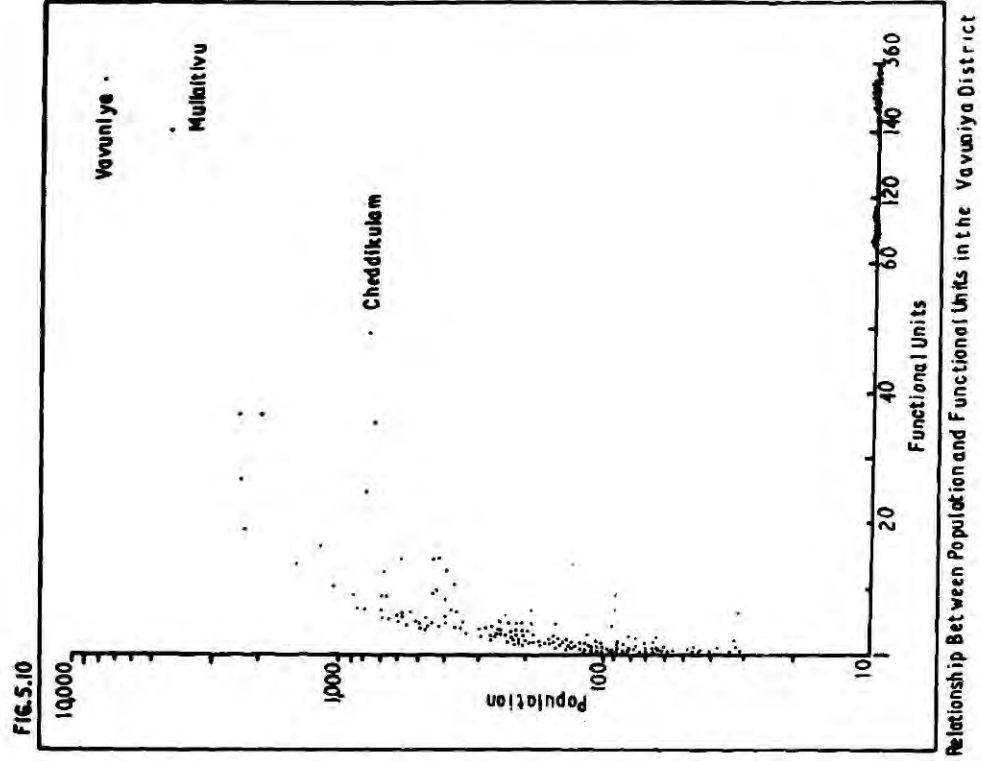
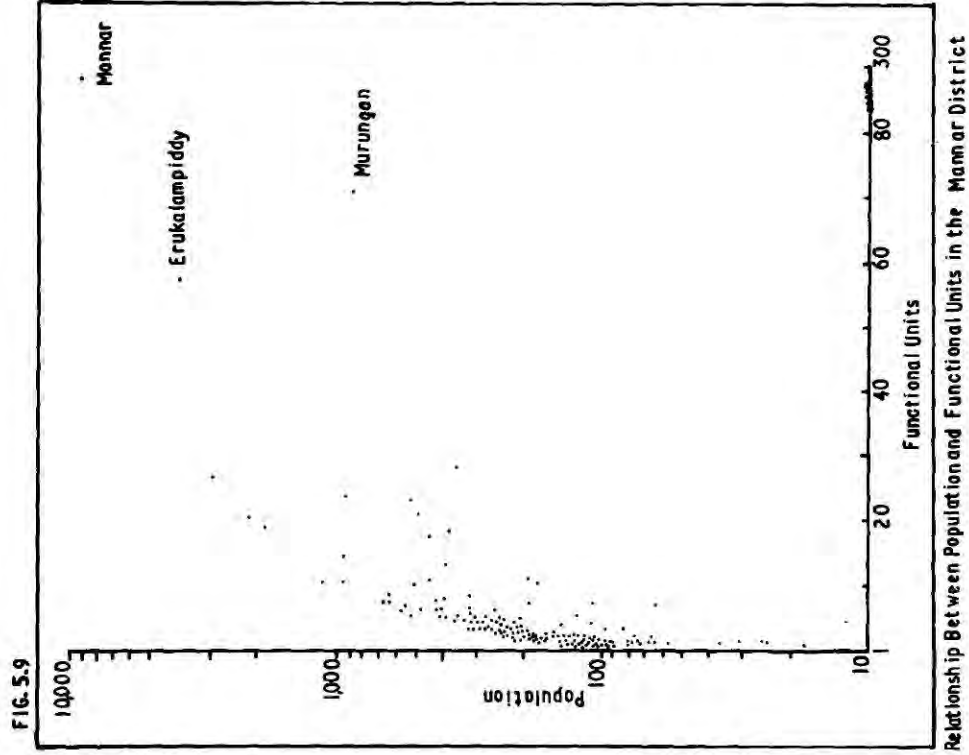
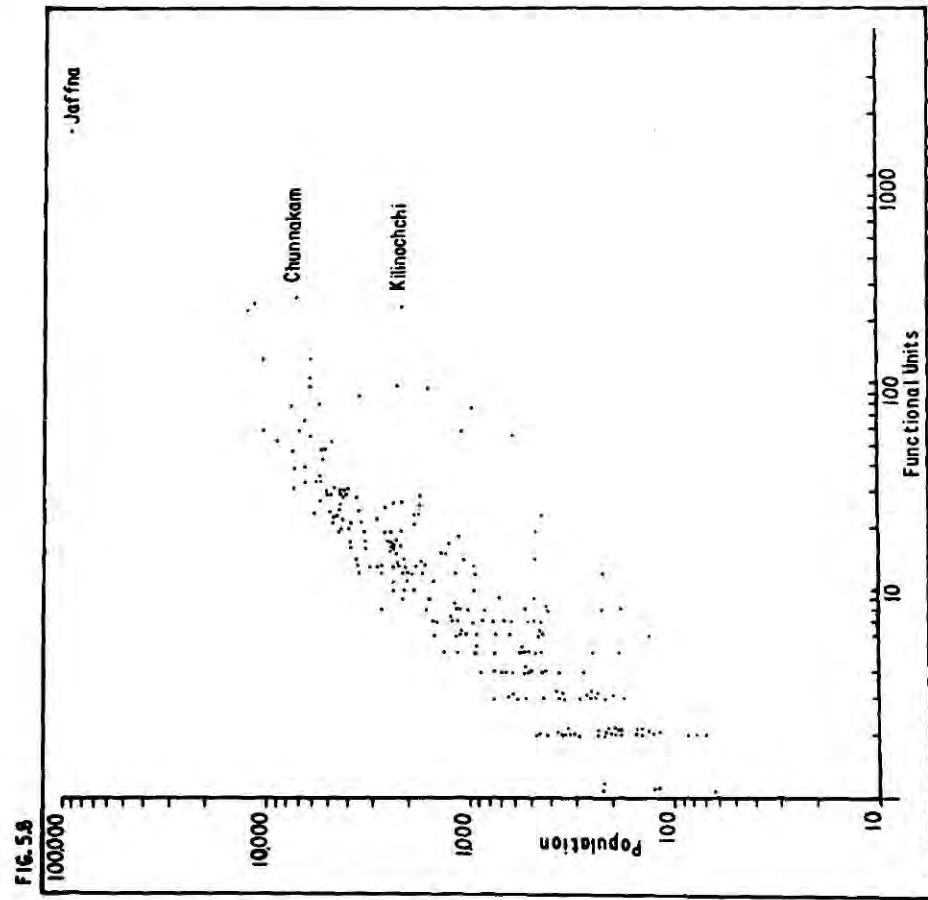
impression of settlement size. Some of the urban centres are very small in physical size and because of this they have less population. As pointed out earlier, there is no population criterion of urban status in Ceylon. (see pp.75-77) Townships with small core areas generally have small populations, for example, Kayts. In some cases two or more settlements became agglomerated but according to the census these settlements are treated independently. When we consider the greater township area, or agglomerated settlements, these places have relatively more population. For example, Kilinochchi headman division had a population of 7975, Kodikamam 2118 and Palai 2020 in 1963. Nallur had a low population because a large portion of the village is under the jurisdiction of Jaffna Municipality. In to these factors, all these places are service centres on major highway junctions which assist functional growth. Kilinochchi is the main service centre for the Southern part of Jaffna district, Palai for Pachchilapallai division, Kodikamam for Eastern Tenmaradchy and Kayts for the Islands. The support of the hinterland population is the main factor for the growth of these centres.

Many island settlements have more functions than one might expect because of their isolation, i.e. islands such as Iranaitivu and Eluvaitivu with populations of less than 500, have a village council, a sub-post office and other lower order functions.

There are a few settlements on the Jaffna Peninsula within the market gardening belt with a high population and comparatively few central functions such as Elalai, Kadduwan,

Kuppilan and Navakkeeri. These are mainly interior, agricultural settlements between mainroads or near to higher order central places. On the Jaffna Peninsula, the size of settlements largely depends on water resources. Since villages are close to each other and agglomerated the central functions tend to develop on mainroad junctions which are favourably located for several surrounding settlements. Except for the above anomalies, the remainder of the settlements have a normal relationship between population and central functions.

For Mannar and Vavuniya districts, population and functional relationships overall are much smoother than for Jaffna district. However, Murungan, in the Mannar district, is functionally the second most important centre, but 14th in the population rank. In this case, the census figures give a wrong impression of the settlement size of Murungan because the population figure only shows the original settlement. Murungan Grama Sevaka division had a population of 3629. The location of Murungan is on a transport junction and it has a railway station. These transport facilities assisted its growth as a central place. Except for a few "junction" central places, all the other settlements have a close population and functional relationship. Transport junctions such as Uyilankulam, Adampan and Nanaddan have relatively more functions because these places function as service centres for surrounding settlements. Smaller places, with a population between 100 and 250 usually have two functions; the primary school and the retail store. The best correlation between population and central functions is found in Vavuniya district.

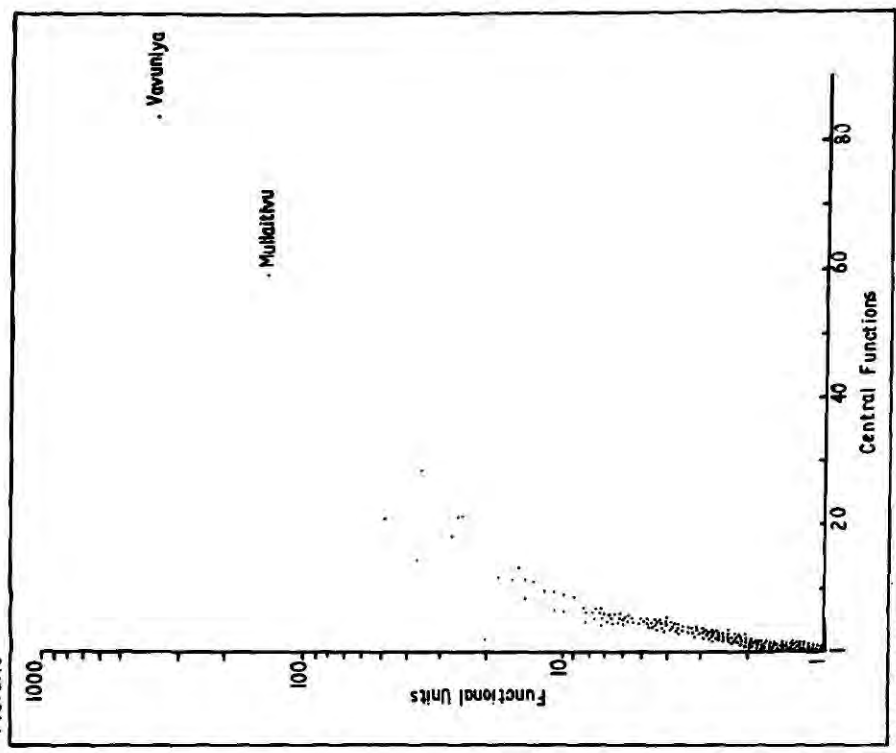


Vavuniya and Mullaitivu being the two largest places in terms of population and number of functions. Some of the colonization settlements in the Pavatkulam and Chemmamadukulam schemes have a limited number of functions because they are recently developed settlements.

Relationship between numbers of functional units and population

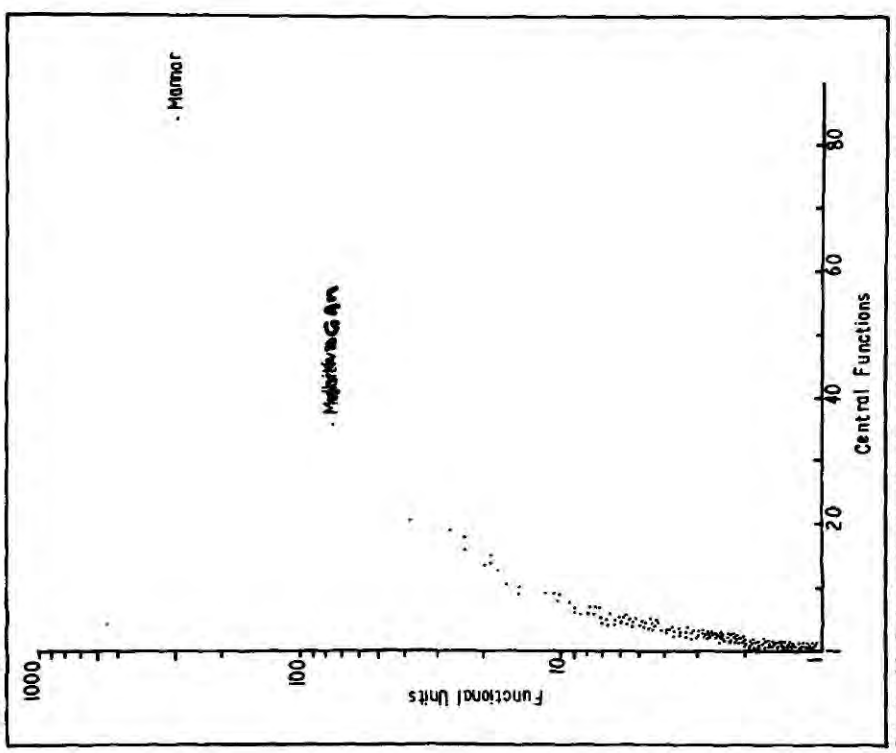
The number of functional units found in settlements varies from 1 to 1,617 and it is obvious that settlements will have more functional units than functions. The relationship between population and functional units in each centre is far closer than in the previous section. The relationships between population and functional units for the districts are shown in Figures 5.8, 5.9 and 5.10. The intermediate centres have proportionally more functional units than higher and lower order centres. In lower order centres, the population threshold prevents the appearance of more functional units. The settlements on the Mainland are small and because of this, the number of functional units are few. The number of functional units, particularly of lower order functions such as primary school, retail store, and tea and coffee boutiques are found in large numbers in the large settlements on the Peninsula. The existence of a high population threshold in large settlements is the reason for the multiplication of functional units. In higher order places, higher order functions are found in fewer functional units. Economic scale of functional units also reduces their number. The places with more commercial significance for example, Chunnakam, Atchuvveli, Murungan and Kodikamam have relatively more functional units than Kayts or Kankesanturai,

FIG. S.13



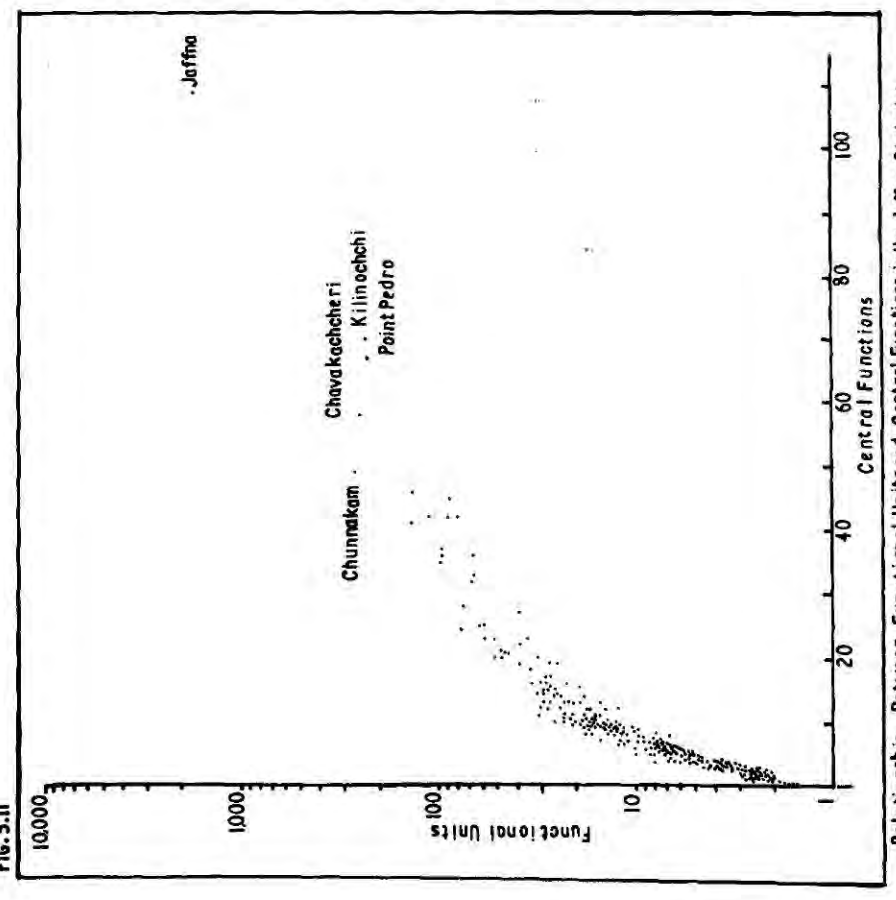
Relationship Between Functional Units and Central Functions in the Vavuniya District

FIG. S.12



Relationship Between Functional Units and Central Functions in the Mannar District

FIG. S.11



Relationship Between Functional Units and Central Functions in the Jaffna District

where government functions, large or small occur in one unit. At the same time, higher order places such as Jaffna City, Mannar and Vavuniya have more commercial units than other functions.

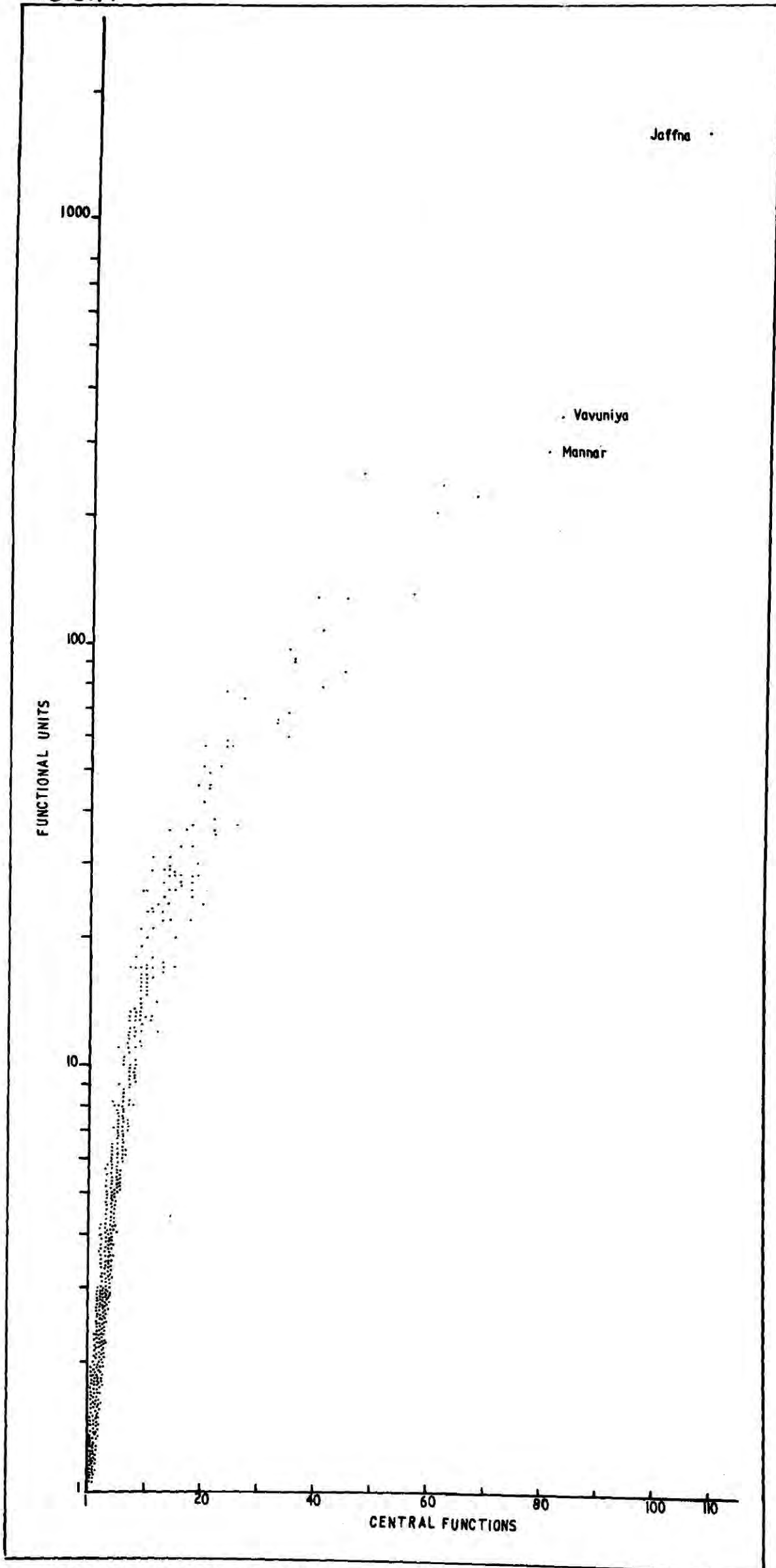
Relationship between functions and functional units

The relationship between functions and functional units for the three districts is shown on Figures 5.11, 5.12 and 5.13. They show a far better relationship than those shown on Figures 5.5 - 5.10 Scott³ ~~Stafford~~⁴ and Barnum⁵ also identified the same improved relationship between functional units and functions than the respective relationships with population. On these figures several different hierarchical levels can be identified. A comparison of the Mannar and Vavuniya districts show the patterns of the graphs to be very similar. These two districts have both similar sized settlements and geographical backgrounds when compared with the Jaffna district. Whereas the settlements have a larger population in the market gardening belt and their size decreases towards the Mainland. The functions and functional units for the whole study area are shown on Fig. 5.14. On this figure, the relationship shows clearly the functional variation of centres.

Problems in Distribution of Central Functions

There are many problems when trying to explain the distribution of central functions such as the (1) absence of central functions in appropriate central places, (2) an over-concentration of functions in some central places, (3) the location of central functions in unsuitable places in terms of a region or an administrative area (4) the

FIG. 5.14



RELATIONSHIP BETWEEN FUNCTIONAL UNITS AND CENTRAL FUNCTIONS IN NORTHERN CEYLON

scattered nature of the distribution of central functions in central places, (5) the overuse or underuse of existing facilities, (6) the shortage of staff in underdeveloped areas, (7) the low productivity of staffs in underdeveloped rural areas. Each problem will be the subject of a more detailed analysis.

The distribution pattern of central functions reflects the hierarchical grades of centres. This unbalanced distribution of central functions or settlement levels affects the growth of less favoured parts of the area and creates more problems for the developed part. In the regional context the balanced growth of different areas depends on a balanced distribution of central functions. The rectification of the present relative inequality, in the provision of central functions between the Mainland and the Peninsula will assist in planning for balanced regional growth in the future.

The absence of central functions in some settlements is a major factor perpetuating backwardness, and makes the Mainland area unattractive to people from the Peninsula. When we say absence of functions we mean that a settlement, or neighbouring settlements, individually or collectively, fail to have a central function, yet, at the same time have a population threshold for that central function. For example, contiguous settlements such as Thavady, Inuvil, Suthumalai and Kondavil in the Peninsula with a total population in 1963 of 22,343 were without a secondary school until 1968. In 1969 a primary school in Kondavil was raised to secondary school status but without proper facilities. Even now (1972) the

three remaining villages with a population of 13,241 are still without a secondary school. This is the main reason for the population of these villages being comparatively low in education attainment compared with other settlements. There are several other settlements on the Jaffna Peninsula and Mainland without central functions where population threshold could justify a particular function.

On the Mainland there is only one Madha Maha Vidyalayam but even that is found on Mannar island at Erukampiddy. On the Mainland, the majority of secondary schools were established in the 1960's. Though the school / population ratio is low compared with the Peninsula the school / catchment area ratio is very high. For example, the Vavuniya North division of 650 square miles has only two secondary schools. From the point of view of population threshold the area cannot support more than these but the physical size of the area demands more secondary schools for these settlements. The same type of problem is also found in health and commercial functions. In the case of commercial functions the locations of facilities are chosen by private enterprise using purely economic criteria whereas the state gives greater consideration to social factors.

The overconcentration of central functions is another factor affecting the growth of settlements in rural areas. For example, secondary schools, health and social institutions and many commercial functions such as textiles, photographic studios, jewellery shops, electrical shops, book shops, printing presses and motor garages are overconcentrated in Jaffna City. Functionally, Jaffna is a regional primate city.

The situation improved slightly in the 1960's for before that date Jaffna City had an extreme concentration of these central functions. This overconcentration stifles the growth of other areas. In the 1960's, central functions found exclusively in Jaffna City spread outwards to Chavakacheheri, Point Pedro, Kilinochchi and Chunnakam and this diffusion will assist the growth of their respective divisions. The reduction in importance of Jaffna City is essential for the balanced growth of lower order towns.

Some of the reasons for the overconcentration are to be found in past policies and historical growth. For example, many schools in the study area were established by different religious bodies and the state. Because of this some villages have an overconcentration of schools. Since the takeover of schools by the state there has been a uniform system of school administration but there is still an excess of schools in Delft, Punkudutivu and many settlements on the Peninsula. Through school reorganization schemes some small schools offering limited facilities could be closed down for the benefit of students, and resources directed to other underdeveloped settlements.

The distribution of petrol in Ceylon was handled by the Caltex, ESSO and Shell oil companies. After nationalization of the importing and bulk distribution of petroleum, all petrol filling stations were brought under the control of the Petroleum Corporation. In many places such as Jaffna City, Palai, Pandatharippu and Vavuniya two or more petrol filling stations face each other but competition does not exist in either quality or in name. At the same time there are many places which are without a petrol filling station but which

need one. Some of these petrol stations could be moved to new locations without further capital investment in installation.

The location of central functions in unsuitable locations with poor transport facilities is another reason why people are unable to make use of existing facilities. When the problem of the siting of a central functions occurs personal and political pressures (such as local leadership rivalries) are often considered more important than rural/urban or intersettlement relations. This is a major problem, particularly in state functions. In some cases rivalries between villages leads to the separate provision of institutions operating at uneconomic levels.

In some places development occurred based on its previous favourable location which now no longer exists. These places have become unsuitable locations for present and future central place functions. Kayts had a very important position in the Islands division as an administrative, commercial and transport centre but since the completion of the causeway between Punkudutivu and Velanai and Jaffna City its favourable position no longer exists. Since the development of transportation links, the people of Velanai, Punkudutivu, Nainativu and Delft go to Jaffna City and other places via Velanai. In the new circumstances Velanai is more suitable as a service centre than Kayts for administrative functions. If administrative functions, especially the Divisional Revenue Office were transferred to Velanai from Kayts, Velanai would develop as a main service centre for the islands. This is the main problem currently under discussion by the Kayts electorate.

The argument goes that if the administrative offices remain in Kayts this will prevent the growth of Velanai, causing hardship to the majority of the people and doing nothing to solve Kayt's problem. This is the only town in the study area that had a growth of less than fifty people, between 1953 and 1963. There are many places similar to Kayts that have certain functions which could be better transferred to a new location. The transfer of functions is very easy because most of the state functions operate from rented houses.

Another problem in the distribution of central functions is that functions are scattered throughout an area rather than being centralised. The concentration of central functions in one or two places helps a place to develop at a discrete level as a main service centre for the area. For example, some central functions in the Valikamam East division are as follows: D.R.O. office, Public Health Office at Kopay South, Multi-Purpose Co-operative Societies union depot at Neerveli, Co-operative Bank at Avarankal, main commercial centre and market at Atchuveli and leading school with G.C.E. Advance level Science and Arts classes at Puttur. This type of distribution pattern of central functions not only prevents the growth of a central place at a discrete functional level but also causes inconvenience to the public. One cannot attend several functions or shops for different goods on a single trip. This problem could be avoided if the central functions were located in one or two places to serve the area.

The poor quality of services is due to the shortage of staff, or to inadequate institutional facilities. In the

distributional pattern of central functions the places with and without different functions were indicated. There are cases where, because of an uneconomic scale of operation, the services rendered are of poor quality, such as in many establishments concerned with central functions like retail stores, Co-operatives, tea and coffee boutiques and primary schools. There are for example, cases of too many schools with too few students, and here the quality of services is poor. On the Mainland particular schools with small number of students are only permitted to have a limited number of staff because of the student-staff ratio policy. For example, a school with 50 students is able to employ only two teachers according to the student-staff ratio, but a school with 500 students could have more than fifteen teachers. In the small school the two teachers have to teach from the 1st to 6th standard classes and this means that one teacher has to take three classes simultaneously. If one teacher is absent the other teacher has to manage the whole teaching load together with all the administration. But the school with 500 students has plenty of staff and is able to provide a better standard of education because of economics of scale. This is the main problem on the Mainland and the main difference between it and the Peninsula.

The shortage of staff in some areas on the Mainland, Delft and a few parts of the areas within the Peninsula, is another factor preventing development. Though the situation is changing rapidly it takes a long time to recruit local staff for specialist posts. Because of this problem most of the staff in institutions on the Mainland are from the Peninsula.

But due to the poorer facilities most of them work on the Mainland and are separated from their families on the Peninsula. The efficiency of the staff is generally very low compared with other areas such as Jaffna City or the Peninsula and there is a high absenteeism amongst employees. Unlike the local people the outsiders are very reluctant to spend money at an 'outstation' and this does not help the local economy.

The government generally recruits state employees on an "all Ceylon" basis and everyone has the right to work in any part of the country. In practice this leads to overstaffing in developed areas and generally understaffing in rural and backward areas. In the study area the peninsula is overstaffed and the Mainland is understaffed. Government servants in underdeveloped areas often get transferred, by various means, to a comparatively good place. Recently the government recruited more new employees to various state jobs (teaching and transport board) at district, divisional or electoral levels. This, it is hoped, will eventually lead to balanced employment opportunities and help to solve the understaffing problems.

The overuse and underuse of existing central functions is another problem. In some cases even existing facilities in rural and small order places are not effectively used by the people in both the private and state sectors as they prefer to utilize the big urban centres. In the case of private commercial functions such as textile shops, jewellery, photographic studios and other functions, the people go to Jaffna City or other large centres. This problem might be

overcome by the establishment of chain stores selling the same trade goods and charging similar prices or by the improvement of service facilities in smaller places. For example, Jaffna co-operative stores have branches in five towns, and there are six branches within Jaffna City. In the case of sewing machine shops there are 24 branches found in 12 centres under the trade name of Singer and Usha. At the state level several institutions such as local Village Councils, rural schools, Maternity Homes and Central Dispensaries could be used in a more effective way to prevent the overcrowding of similar types of urban institutions.

Population Threshold

One important concept in central place theory is that of the range of a good. A good has both upper and lower limits. The upper limit is the maximum radius of sale beyond which the price of the good is too high for it to be sold. The upper limit may be either an ideal or real limit.⁶ The number of people required to support a function is called the population threshold and if this is not maintained the function may cease to operate. This is called the lower limit of the range of a good.

In this section the detailed analysis of population thresholds for different central functions will be analysed. The lower limit of the range of a good or population threshold level is essential for the existence of various functions. The population thresholds are expressed in minimum or in median threshold levels. Berry and Garrison determined the minimum population thresholds for the central functions identified in the Snohomish county, U.S.A.⁷ Haggett and Gunawardena look

upon the functional threshold as being equivalent to the median population.⁸ Empirically, from the frequency of occurrences of central functions and the number of functional units in different size of settlements, it is possible to estimate the importance and population threshold level for various functions. For instance, in the study area, functions such as retail shops, tea and coffee boutiques and sub-post offices are found in 511, 320 and 199 settlements respectively. Whilst jewellery shops, photographic studios Western pharmacies and furniture shops are found in only 20, 17, 14 and 6 settlements. From the number of occurrences, and the presence or absence of central functions in different size of settlements, the population threshold can be assessed. The former central functions need lower population thresholds, whilst the latter ones need higher population thresholds.

The population threshold of a central function or a firm also reflects the status of a central place. (see Table 5.4)⁹

Table 5.4

Estimated population requirements of several well-known firms in United Kingdom

Boots the chemists	-	10,000	
Macfisheries	-	25,000	
Barratts	-	20,000 - 30,000	
Sainsbury	-	60,000	for a medium sized self service store
Marks and Spencer	-	50,000 - 100,000	
John Lewis	-	50,000	(a supermarket)
John Lewis	-	100,000	"

Source: M. Collins, Field work in urban areas
(Chorley and Haggett, 1965, p.227)

From these figures one is able to assess the importance of the towns which possess these functions, and predict their complementary areas. For example, Durham, a city with a

population of 25,000 has a Marks and Spencer branch; but this firm requires 50,000 - 100,000 people to support a branch and this shows the extent to which this firm depends on the city's hinterland population.

The central functions found in the study area belong to different categories such as commercial, administrative and social. The determination of population thresholds in the study area is mainly concerned with commercial, social and low order administrative functions. The higher administrative and other functions are found in Jaffna City, Mannar and Vavuniya. The reasons for the existence of some non-commercial functions in these three towns are historical and political rather than economic. Thirty-four functions are not taken for calculation because some of them are only found in one to three places, while the occurrence of some in the settlements is not directly related to population threshold.

"The search for some quantitative estimate of the "population threshold" or "entry level" of the various central functions remain the forefront of research in settlement geography."¹⁰ The assessment of a quantitative population threshold for the central functions is one of the main aspects of central place theory. The quantitative values are necessary to explain the centrality level of a function. Different methods have been used by researchers to determine population thresholds. Barnum determined the population thresholds for 300 commercial functions in the central places of Baden Wuttenberg, Germany, from an incidence matrix.¹¹ In the incidence matrix he arranged the central places in rows and central functions in columns. After the arrangement of central places and central functions in a matrix, the level of entry

of the functions were noted according to the smallest centre in which the functions first occurred. This method of determining the population threshold is perhaps too simplified, and it is not possible to assess the real population threshold. The problem in the method is that the presence or absence of functions in all population strata is not considered. For instance, the number of settlements may be without a function above the smallest settlement at which the function first occurred in a region. The hinterland population is also ignored.

Berry and Garrison determined the population thresholds for the central functions by least squares averages technique.

They determined the minimum level of population thresholds from the size of centres in relation to the functional basis.¹² In their calculation they omitted the population of hinterlands of the centres and the important effect of highways and Bunge has criticised Berry and Garrison's determination of population threshold. "One of Christaller's fundamental assumptions was that some lower limit of number of consumers was required before a given type of function could come into existence. This lower limit has since come to be known as the "threshold size". Some experimental work has been done on threshold sizes. The economist, Bain, has attempted to measure the thresholds of large or medium sized activities. Berry and Garrison have attempted to study thresholds of small activities. However, their work is not actually concerned with thresholds for they do not deal with the total number of consumers necessary for the existence of an activity, but rather with the population of the centre where these activities appear. They ignore rural and highway consumers which contributes to the geometric

drop in the number of people per activity in small towns where the rural and highway users make up a large percentage of consumers. Similarly, largely inadequate studies of small centres have been made by rural sociologists and others."¹³

The Reed-Muench method was used in this study to determine the median population thresholds for the central functions. This method was put forward in 1938 for calculating median values for the zone of tolerance. In the 1960's, this method was used by settlement geographers to calculate population thresholds for various central functions. The determination of population thresholds by this method is better than other techniques, and the results can be compared with similar functions found in Southern Ceylon.¹⁴

The population thresholds were determined for 78 functions at three levels. For 21 lower order central functions the population threshold is calculated at settlement level; for 47 central functions belonging to the next highest order functions at a local council level (Village, Town, Urban and Municipal Councils), and the highest order functions, at a divisional level.

The entire threshold analysis in this chapter was done on the University of Durham's IBM 360/30 Computer System, by using the FORTRAN programming language; the programme was written by Kunaratnam, Department of Physics, University of Ceylon. To calculate the median population thresholds for different functions, especially for lower order functions, the 1015 settlements of the study area were grouped into 32 population strata (see Appendix 4A), the lowest stratum (settlement with less than 99 people) and the highest stratum (settlement with

Table 5.4. A sample population threshold calculation for low order functions

50 PRIMARY SCHOOL

GROUP NO=	NS	NWFP	NWFA	NWFPS	NWFAH	PERWFP
1	502	75	427	75	551	11.0
2	131	66	65	141	124	53.0
3	124	79	45	220	59	79.0
4	63	54	9	274	14	95.0
5	28	23	5	297	5	98.0
6	18	18	0	315	0	100.0
7	16	16	0	331	0	100.0
8	6	6	0	337	0	100.0
9	6	6	0	343	0	100.0
10	7	7	0	350	0	100.0
11	9	9	0	359	0	100.0
12	7	7	0	366	0	100.0
13	14	14	0	380	0	100.0
14	9	9	0	389	0	100.0
15	5	5	0	394	0	100.0
16	2	2	0	396	0	100.0
17	8	8	0	404	0	100.0
18	10	10	0	414	0	100.0
19	11	11	0	425	0	100.0
20	9	8	0	433	0	100.0
21	6	6	0	439	0	100.0
22	4	4	0	443	0	100.0
23	7	7	0	450	0	100.0
24	15	15	0	451	0	100.0
25	11	11	0	456	0	100.0
26	11	11	0	457	0	100.0
27	11	11	0	458	0	100.0
28	11	11	0	459	0	100.0
29	2	2	0	461	0	100.0
30	1	1	0	462	0	100.0
31	1	1	0	463	0	100.0
32	1	1	0	464	0	100.0

THRESHOLD POPULATION FOR THIS FUNCTION=

141

94,670 or more inhabitants). Table 5.5 illustrates a sample population threshold calculated by computer for the primary school function. There are 7 columns in Table 5.5, (1) number of population stratum (see Appendix 4A for group number and population details) (2) number of settlements in each stratum (NS), (3) number of settlements with function present (NWFP), (4) number of settlements with function absent (NWFA), (5) number of settlements with function present at this and smaller level (NWFPS), (6) number of settlements with function absent at this and higher level (NWFAH), (7) percentage of settlements with function present (PERWFP). The population threshold derived through the process in Table 5.6 shows the population thresholds of 21 central functions determined at the settlement level. The median population threshold (PT50) values vary from 111 to 6741.

Table 5.6

Median population thresholds for low order functions

<u>Function</u>	<u>PT 50 population</u>
Retail stores	111
Primary schools	141
Tea and coffee boutiques	341
Co-operative stores	349
Grama sevakas	565
Sub-post offices	636
Barber saloons	1,170
Bicycle lending and repair shops	1,432
Maha vidyalayams	2,234
Registrar of Births and Deaths	2,465
Laundries	2,465
Rural and urban neighbourhood markets	2,499
Central dispensaries	2,599
Maternity homes	2,599
Village councils	2,699
Ayurvedic pharmacies	3,749
Ayurvedic dispensaries	3,749
Bakeries	4,084
Eating houses	4,374
Firewood depots	5,024
Urban status for settlements	6,741

Retail and primary school are the lowest in the threshold hierarchy of functions and these functions are widely distributed in the settlements. Provision stores, primary schools tea and coffee boutiques and co-operatives are the basic necessities in any small settlement and can be regarded as primary functions. Some of the threshold values are comparable with the threshold values of the functions found in the settlements of Southern Ceylon which were determined by Gunawardena. Table 5.7 shows the pattern of sample functions of settlements in Southern and Northern Ceylon.

Table 5.7

Median Population thresholds (PT 50 values) for sample functions of settlements in Southern and Northern Ceylon

<u>Function</u>	<u>PT50 population</u>	
	<u>S. Ceylon</u>	<u>N. Ceylon</u>
Secondary schools	2137	2234
Market places and village fairs	1662	2499
Dispensaries	1277	2599
Post offices	950	636
Co-operative stores	663	349
Primary schools	660	141

Source: For Southern Ceylon, Haggett and Gunawardena, Professional Geographer, Vol. XIV, No. 4, p.6-9. For Northern Ceylon, calculated.

The calculation of PT50 values for Southern Ceylon was based on a sample of 130 settlements drawn systematically from the lists of villages and towns. In the case of Northern Ceylon, all the settlements are taken into consideration in the PT50 calculations and are based on the 1963 census. It is important to note however that the Southern Ceylon figures are taken from the 1953 census and the number of functional units may have increased with increase of population between 1953-1963. The population thresholds for the secondary schools are similar

in both areas, but market and fairs and dispensary PT50 values in Northern Ceylon are higher than those in the South. However, in the case of sub-post offices, co-operative stores and primary schools, the Northern Ceylon PT50 values are lower. The reason for the low PT50 values for primary school, co-operative stores and sub-post offices in Northern Ceylon lie in the larger number of smaller settlements. The Mannar and Vavuniya districts have 95 and 172 schools respectively and even the smaller settlements have school facilities. The frequency distribution, size and number of settlements in Southern Ceylon, shows that the number of settlements does not increase continuously in lower population groups and the number of settlements actually decreases with smaller size.¹⁵ But in Northern Ceylon the number of settlements increases with decrease in size of settlement. This is the main reason for the low PT50 values for primary schools.

The main problem with population threshold is that the exclusion of complementary areas of population will give a low population figure. The population thresholds for all levels of central functions cannot be determined at the settlement level. For example, population thresholds for shoe shops, police stations, motor spare-parts stores, cinema halls and watch repair shops in Northern Ceylon are 6,249, 6,342, 6,749, 5,749 and 7,749 respectively of settlement level. But in actuality, more people are needed to support these functions than the figures suggest. In order to try to overcome this problem, the population thresholds for 45 central functions have been calculated at administrative level (i.e. Village, Town, Urban and Municipal Councils). Except for Village

GROUP NO=	NS	NWFP	NWFA	NWFPS	NWFAH	PERKFP
1	1	0	1	0	72	0.0
2	3	0	3	0	71	0.0
3	3	0	3	0	63	0.0
4	1	0	1	0	65	0.0
5	9	0	9	0	64	0.0
6	3	0	8	0	55	0.0
7	7	1	6	1	47	2.0
8	6	2	4	3	41	6.0
9	7	4	3	7	37	15.0
10	2	0	2	7	34	17.0
11	7	2	5	9	32	21.0
12	6	4	2	13	27	32.0
13	3	4	2	14	25	35.0
14	4	1	3	15	23	39.0
15	2	1	2	15	20	42.0
16	4	1	3	16	18	47.0
17	7	3	4	19	15	55.0
18	3	0	3	19	11	63.0
19	3	0	3	19	8	70.0
20	2	1	1	20	5	80.0
21	3	1	2	21	4	84.0
22	1	0	1	21	2	91.0
23	1	0	1	21	1	95.0
24	1	1	0	22	0	100.0

THRESHOLD POPULATION FOR THIS FUNCTION= 11061

Table 5 10 A sample population threshold calculation for higher order functions

12 ASSISTANT SUP OF POLICE

GROUP NO=	NS	NWFP	NWFA	NWFPS	NWFAH	PERKFP
1	1	0	1	0	16	0.0
2	1	0	1	0	15	0.0
3	4	0	4	0	14	0.0
4	1	0	1	0	10	0.0
5	2	0	2	0	9	0.0
6	3	1	2	1	7	12.0
7	1	1	0	2	5	28.0
8	2	0	2	2	5	53.17
9	2	0	2	2	3	75.08
10	1	1	1	3	1	100.0
11	1	1	0	4	0	100.0

THRESHOLD POPULATION FOR THIS FUNCTION= 83570

councils, all others are individual urban settlements. In the case of rural settlements one or more are grouped into Village Councils and these can be considered as enlarged settlements. These Urban and Village Councils reflect an enlarged population base for the analysis of thresholds. The 94 urban and Village Council settlements are grouped into 24 population strata, (see Appendix 4B) the lowest stratum having less than 500 inhabitants, and the highest 94,670 inhabitants. Table 5.8 shows a sample grouping pattern and the calculation of the population threshold at this level for the cinema halls'. Details of the other population thresholds are shown in Table 5.9. In this group the population thresholds extend from 5,851 to 21,999. The largest threshold is four times greater than the smallest, although in the previous calculation the difference between the two extremes was far greater.

Table 5.9

Median population thresholds for intermediate functions

<u>Function</u>	<u>PT50 population</u>
Textiles	5851
Petrol filling stations	6221
Rural courts	6499
Tailors	7249
Rural hospitals	7374
Post-offices	7479
Motor garages	8273
Hardware stores	8374
M.P.C.S. union depots	8499
Cinema halls	11061
Urban and agricultural markets	11453
Police stations	11453
D.R.O.s	11453
Madha Maha Vidyalayams (central colleges)	11499
Jewellery shops	11652
Tile shops	11652
Printing presses	11841
Meat stalls	11841
Proctors and advocates	11841
Glass and picture framing shops	11841
Bus stations	11999
Electrical stores	12665
Co-operative banks	12665
Book shops	12999
Department of Excise	12999

Photographic studios	12999
Timber depots	13499
Commercial banks	13599
District hospitals	13599
Department of marketing and C.W.E.	13663
Shoe shops	13665
Western doctors	13999
Western pharmacies	13999
Foreign liquor bars	14599
Motor spare parts shops	14599
Sewing machine shops	15427
Rest houses	15427
Radio shops	17332
Technical and higher institutions	17532
Miscellaneous stores	18999
Wholesale provision shops	18999
Private tutorials	19898
Furniture shops	19999
Ice factories and sales	19999
Water pumps and agricultural implement stores	20665
Industrial and trading corporation sales branches	21665
Veterinary surgeons	21999

At the third level, the divisions are taken to calculate the population threshold for the highest order functions. These functions cover large areas. From the presence or absence of functions at a divisional level, the population thresholds can be determined. For 10 central functions (i.e. Magistrate's Court, District Court, Assistant Superintendent of Police) population thresholds were calculated. The 20 divisions in the study area, are grouped into 11 population strata, (Appendix 4C) the first stratum having less than 2,999 people, and the last stratum 124,203 people. Table 5.10 shows the sample of divisional level PT50 calculations. The PT50 values for the 10 functions are shown in Table 5.11.

Table 5.11

Median population thresholds for some higher order functions

<u>Function</u>	<u>PT50 values</u>
Public health offices	18999
Magistrate courts	21999
C.T.B. Bus depots	44999
Arrack taverns	44999
Department of Forestry and Fisheries	55999
District courts	74999
Department of Public Works	74999
Medical officer of Health	74999
Assistant Superintendent of Police	83570
Department of Labour	83570

From the analysis of population thresholds there is clear evidence of a hierarchy of functions. PT50 values vary greatly from 111 for retail provision stores to 83570 for the Assistant Superintendent of Police. The population threshold figures are low, particularly for retail stores, primary schools, co-operative stores and tea and coffee boutiques. The retail stores and tea and coffee boutiques are well distributed because they have to satisfy frequent demands for their services. The underemployment in the area and the low capital expenditure to establish these functions allows the smaller settlements to have these functions. Apart from these low order functions, population thresholds for other commercial functions are fairly high when compared with the settlement function population thresholds of Snohomish county, U.S.A.¹⁶ Baden - Wurtemberg, Germany;¹⁷ Natal, South Africa.¹⁸ The low per capita income and low consumption of goods are the main reasons for higher PT50 function values. The 78 central functions are grouped into 10 divisions based on population thresholds. The grouping is based on Clark's definition.¹⁹ Table 5.12 shows the PT50 values and number of functions in each group.

Table 5.12

Grouping of Functions by Population Thresholds

<u>Group</u>	<u>PT50 values</u>	<u>Number of functions</u>
A	111-141	2
B	341-349	2
C	565-636	2
D	1170-1432	2
E	2234-2699	7
F	3749-5024	5
G	5851-8499	10
H	11061-15427	28
I	17332-21999	12
J	44999-83570	8

The PT50 value of settlement functions on the Mainland and Peninsula differ greatly and the size distribution of settlements differs between these two parts. Gunawardena also found similar contrasting threshold values for the functions between the Wet Zone and the Dry Zone of Southern Ceylon.²⁰ The differences of population threshold for a few functions between the Peninsula and Mainland are shown in Table 5.13.

Table 5.13

Median population threshold for sample functions on the Peninsula and Mainland

<u>Function</u>	<u>Peninsula</u>	<u>Mainland</u>
Co-operative stores	384	354
Primary schools	358	135
Maha Vidyalayam	2729	888
Sub-post office	1641	443
Market	3279	1191

Source: Calculated

By this method population thresholds for more than one functional unit in a given place can be calculated. For instance, the PT50 value for one primary school is 141 which is the population threshold for the existence of a primary school. The PT50 values for two primary schools or a second primary school is 1499, and for the third 3320 people. The median population threshold of 1499 indicates that a settlement is likely to have two primary schools and 3320 people will have three primary schools. From these figures the PT50 values for second unit primary schools are nearly ten times more than the first unit PT50 values. For the third unit, the figure was 23 times greater than the first unit figure. When the population of the settlement increases, it has an effect on the service area and the schools expand to meet the demand.

The population thresholds for the second, third and further units have a greater population threshold over successive units. Berry and Garrison identified this pattern in Snohomish county, U.S.A.²¹

Conclusion

A continuous functional relationship between size of the settlement and number of central functions is identified in the study area. However, there are a few anomalies in this pattern due to their functional characteristics and locations. The tendency to agglomeration of central functions particularly in Jaffna City is to take advantage of scale economies. However, the spatial distribution of functions is related to hierarchical population thresholds. The determination of threshold level of functions by purchasing power or sales turnover is better than by the numbers of population.

"Strictly speaking, the concept of threshold refers to purchasing power rather than numbers of people; however, data on purchasing power are rarely easy to obtain, and the areas occupied by most central place systems are of sufficient economic homogeneity to justify the use of population data as a substitute."²²

The growth and consumption of central functions is mainly related to economic factors, although other factors are also responsible for the existence of different functions in settlements, political, historical, inertia and long term prospects being the main ones. In some places, though population or economy declines, certain functions may survive because of inertial. When the entrepreneur considers his invested capital, existing business premises and business

contacts, he may prefer to stay with marginal profit rather than move to another place or close down. In some cases, an entrepreneur or a firm may carry on business below the population threshold requirements but for long term rather than short term gain. When firms open branches in new towns they adopt this policy. Factors such as the absence of business premises of a suitable size or the lack of a site may also prevent the development of functions. For example, some major firms have no branches in certain towns mainly because of the absence of suitable premises rather than because of a low population threshold. In Ceylon the opening of new bank branches in small towns and rural settlements was severely restricted by the absence of suitable buildings. Political factors often play a major role in siting schools, hospitals, post offices and other functions since social factors may dominate. Government subsidies, price control and monopoly trade are further reasons for the anomalous existence of some central functions.

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CHAPTER SIX

NODALITY AND CENTRALITY CRITERIA

Nodality and centrality criteria form the basis of the functional approach to settlement studies. These terms represent related, but quite different, concepts of settlement importance and are often not clearly differentiated. Nodality refers to the importance of the place as a provider of tertiary goods and services both for its own residents and for other consumers, whilst centrality refers to the importance of a place as a provider of such goods and services in excess of the needs of its own residents.¹ It is important to include both concepts in a functional settlement study.

Firstly, the functional importance of settlements will be analysed according to nodality. To calculate the functional importance of settlements, various functional indices such as total population, number of functions, number of retail employees and sales volumes, establishments and functional units, and indicator functions, have been used. These functional indices were used to calculate centrality, but in fact most of them only indicated nodality, the techniques often failing to express the centrality level.

In the study, the number of central functions and functional units is taken to calculate or assess the nodality of places. In order to calculate the absolute importance of places all the functions recognized in the study are considered. The weighted number of functions and functional units shows the nodality of a place. The calculation of

number of functions or functional units in a settlement is not a problem, but assessing the importance of functions is. Population sizes also serve as an indication of the functional level of places, but there are usually some discrepancies. The trade area of the settlement's population and functions shows a better relationship than do settlements and their functions.²

In this study, in order to assess the functional nodality of settlements, two different techniques are used. These are:

1. Direct measurement methods.
2. The functional index method.

1. Direct measurement methods

Direct measurement can be assessed by two methods. (a) Direct counting method, (b) Relative scoring method. (a) Direct counting method: This is based on the direct measurement of central functions in the settlements. This measure involves the simple addition of different functions. The settlements and their number of central functions are shown in Appendix 5 Column C. The total number of functions and their absence or presence indicates the nodality of the settlement. But the total number of central functions is not always an indicator of a settlement's functional level, for with this method the main problem is that the relative importance of different functions is completely ignored. The higher and lower levels of central functions (see pages 175-80) are treated equally. Each central function is given the same weight, for example, a tea boutique, a cinema hall, or a bank,

But in reality this is not correct and one can evaluate the level of importance of a central function from the frequency of its occurrence or from population threshold levels. In this method evaluation of the "relative social value" of a central function is ignored, and the assessment of the nodality of settlements is therefore not effective. Bracey³ adopted this method for the grading of rural settlements in Somerset. The method is useful only for an initial assessment of settlements. To improve the direct counting method, selected urban indicator functions with functional units were used to rank urban settlements by Smailes,⁴ Hartley,⁵ Duncan,⁶ Brush,⁷ Carter⁸ and Ullman.⁹ But the selected indicator functions are not suitable to analyse the functional structure of the settlements. However, the validity of the method depends on the selection of the indicator functions, to express the urban significance.

(b) Relative scoring method:

To improve the direct counting method, and overcome its discrepancies, variable grading and weighting is used to assess functional importance. In this method the functions are assessed and given scores according to their values. This weighting system has been used in Ghana,¹⁰ Natal,¹¹ Nigeria¹² Tamilnad in India,¹³ Greater London¹⁴ and the Midlands in England.¹⁵ In this method each central function is given scores according to its importance in the context of the study area. Appendix 6 shows the relative importance of functions and grading scores. Scores from 1 to 25 are awarded to different central functions, and scores increase with increasing number of functional units. Central functions are only

considered in some studies but in others both central functions and functional units are considered together to give scores. For example, if the functional units are not considered then Jaffna City with 15 photographic studios is equal to Manipay town with only 1.

District administration, Provincial Hospitals and Supreme Courts are given the highest scores of 25 and retail stores and tea boutiques the lowest. It is possible to distinguish functions such as post office and sub-post office or primary or secondary schools. For example, there are seven types of state health institutions: Provincial, Base, District and Rural Hospitals, Central Dispensary, Maternity Home and Visiting Dispensary. Depending on the importance of institutions measured by factors such as number of beds, in and out patients treatment such as Dental facilities, each institution is given a different score. Some district hospitals such as Delft have fewer beds than Rural Hospitals, although they have more medical facilities and all are under the District Medical Officer. Generally the District Hospitals are more important than the Rural Hospitals because Rural Hospitals are in charge of apothecaries with fewer facilities. In the same manner each central function is weighted by different factors according to its regional importance. Taking several factors into account, personal local knowledge is used in allocating scores within the study area.

The main criticism of this method is how a researcher should give different weightings to functions. The method cannot be tested objectively, because the scoring decisions are considered as arbitrary. Functionally, differences between

post office and sub-post office exist but the problem is how to assess this difference in the scores. However, the method is better than the direct counting method. (see Appendix 5 column D) The relative scores of the settlements based on the scoring method shows the differences between central places clearer than in the previous method. The settlements with the same number of central functions may have different scores because different functions are given different scorings. In the study area, the centres of Nellyady and Atchuvely, for example, have 41 central functions and are in 12th position based on number of functions. In the scoring method, Nellyady has 286 points in 10th position while Atchuvely has 231 in 14th position. When we consider the results of both methods several changes take place because of the relative scale of importance given to functions by the latter method.

2. The functional index method

A ranking method used by Wayne Davies to rank central places in the Rhondda Valley in Wales involved calculation of the location co-efficient, centrality and functional index for each central place. It was assumed that the study area was a closed system and the degree of focality or centrality, for each function varied with the total number of outlets of that particular type of function. Therefore, the greater the outlet of any particular function the lower its degree of focality. Since the satisfaction of the demand is spread over a number of outlets, the following calculation was used by him to arrive at a location co-efficient (a measure of centrality or degree of focality) of a single outlet of any

functional type in the whole system:-¹⁶ (Davies used the term centrality to express nodality)

$$C = \frac{t}{T} \times 100$$

C = Location co-efficient of the function t,

t = One outlet of function t,

T = Total number of outlets function t,

Since the location co-efficient reduces all functions to a common base, each functional type is made objectively comparable. Multiplication of the relevant location co-efficient by the numbers of outlets of each functional type presented in a central place gives the degree of centrality imparted to each settlement for every different type of function. A functional index is derived by the addition of nodality values attained by the central places. In order to avoid the discrepancies involved in the assumption that all outlets are equal, Davies weighted each outlet by the total number of employees in the outlet.

The location co-efficient for central functions recognized in the study area is shown in Appendix 7. In this method it is necessary to group similar functions in order to avoid the unrealistic or over nodality value for certain functions. Davies grouped the central functions into seven fold and 22 fold groups to calculate the nodality values. For example, there are 3 rural banks, 8 co-operative banks and 12 commercial banks in the study area. If we take these three individually, the location co-efficient for a rural bank is 33.33, for a co-operative bank it is 12.50, and for a commercial bank it is 7.692. But the functional importance

of the commercial banks is greater than either rural or co-operative banks. The functional importance of the rural bank is limited to village level and the co-operative's limited functions serve mainly rural and urban co-operative societies. To overcome this problem all types of banks were grouped together for calculation of their location co-efficient. Even after the grouping, commercial, co-operative and rural banks remained equal in location co-efficients. But the location co-efficient of a rural bank unit was reduced from 33.333 to 4.167, whilst for a commercial bank it was reduced from 7.692 to 4.167. This proportional reduction justifies the reduction of the location co-efficient of the rural bank.

To calculate the location co-efficient for some other functions, related higher grade functions are taken together. In the case of secondary schools two levels exist, known as Madya Maha Vidyalayam and Maha Vidyalayam. For the calculation of the location co-efficient for Maha Vidyalayam, the superior Madya Maha Vidyalayam also perform Maha Vidyalayam functions, and are taken together with the ~~Maha Vidyalayam~~. There are 35 Madya Maha Vidyalayams and 100 Maha Vidyalayams in Northern Ceylon. The location co-efficient of Maha Vidyalayams was calculated for a total of 135 institutions. In the same manner the location co-efficient was calculated for the different grade markets, health institutions, post office with sub-post offices and express railway stations with ordinary railway stations.

The location co-efficients for different functions are grouped into 10 grades. This grouping is based on co-efficients shown in Table 6.1.

FIG. 6.1

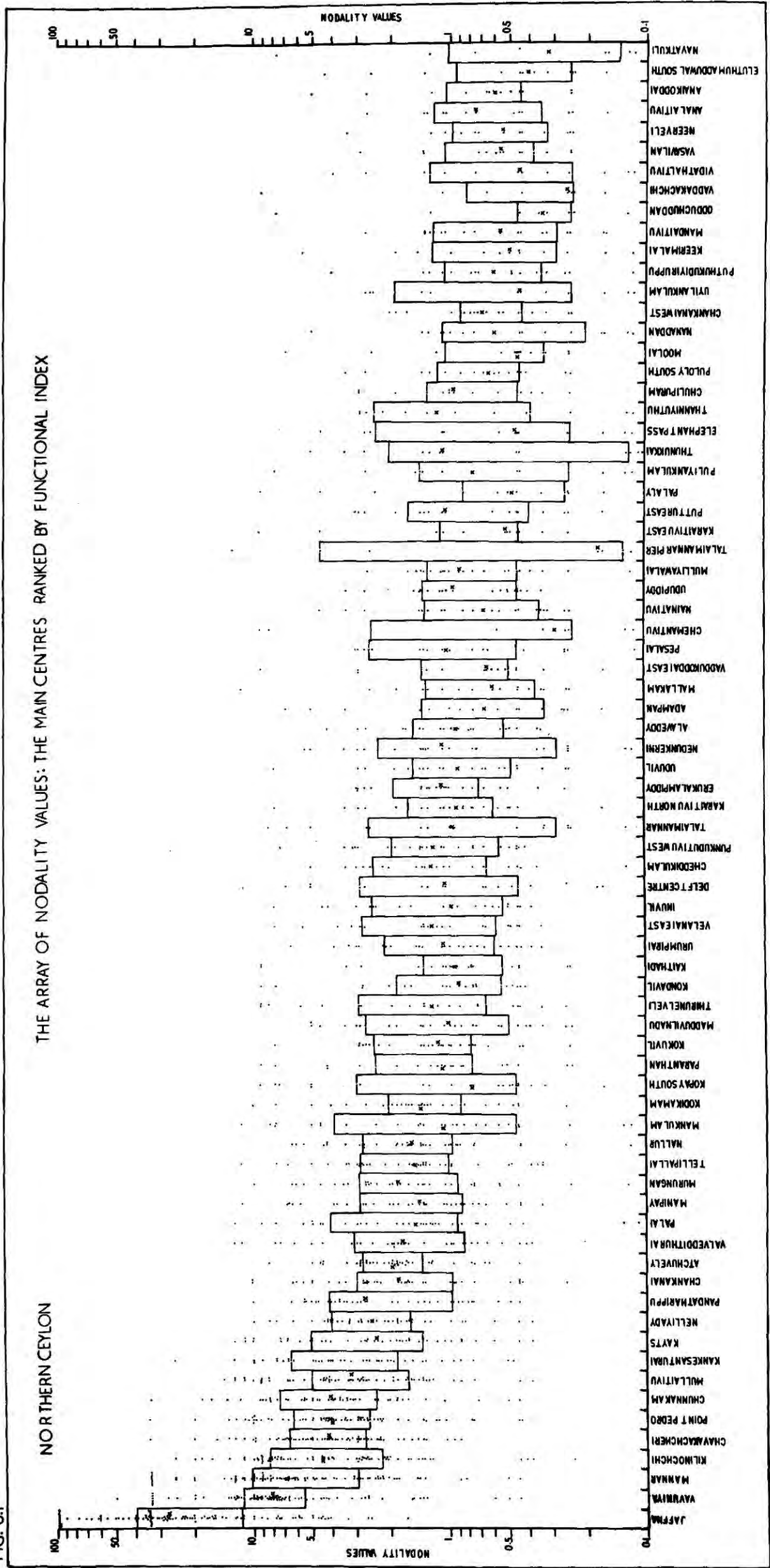


Table 6.1

Location co-efficients for functions

<u>Location co-efficient</u>	<u>Number of functions</u> [*]
100	9
50	3
33.33	10
25.00	2
20.00	3
10-19.9	10
6-9.9	16
3-5.9	16
1-2.9	25
Less than .99	20

Source: Field survey, 1968/1969. Calculated

All 100 per cent location co-efficient functional units are found in Jaffna City. Higher location functional units, particularly above 20 per cent, are found in Jaffna City, Mannar, Kilinochchi, Point Pedro and Chavakachcheri. A location co-efficient functional unit above 10 per cent belongs to administrative and social group functions. Forty-five central functions have location co-efficient values for a functional unit of less than two per cent. The lower location co-efficient functions are mainly composed of retail and commercial functions. Higher order commercial functions have location co-efficients for a functional unit of between 3-10 per cent; only a few administrative functions such as ~~Grave~~ ~~De~~ ~~Vaka~~ and Registrar of Births and Deaths have low values.

The array of nodality values is shown on Fig. 6.1. The centres are ranked by functional indices. In this technique it is possible to calculate the nodality value, statistical median and quartiles. The upper and lower quartiles of nodality values are shown for the central places on Fig. 6.1. The

* including sub-divisions.

distribution pattern array of nodality values in each central place is important in understanding the overall functional position of the central place. Though the functional index is an aggregate of nodalities of central places, the distribution of nodalities shows when the functional index is made up by only a few or many central functions. Some central places achieve a higher functional index with one or two higher centrality values. This type of place depends entirely on one or two functions, Palaly, Valalai and Vaddakachchi for example, have functional indices mainly made up of two or three central functions.

The functional index derived through the nodality value for all the central places is shown in Appendix 5 Column E. The method is better than the former because the functional index is derived objectively. In the scoring method, though the scores were based on several factors the decision theoretically is arbitrary. In this method all outlets of each function are considered in calculating the location co-efficient. The main problem however in the functional index method is that if lower order functions are found in a fewer number of outlets, or higher order functions in a larger number of outlets, this alters the general assumptions regarding the location co-efficient of higher and lower order functions. In this situation the location co-efficient for a functional unit expresses either higher or lower values than the due value. For example, the proctors and advocates function is a high order function found in few places. But there are a large number of proctors and advocates in the study area and because of this the function has a low location co-efficient for a functional unit. This function needs a higher population threshold

for its existence. Another deficiency of the method is that it is not possible to have sub-systems within a closed system. All functions are treated as a single closed system. For example, in some cases one function may be important in one part of the system and not in another part. These differences can be brought out by sub-systems within the total system. Because of this the hierarchical concept of functions is not fully integrated in this method.

The functional index method has been used in several recent central place studies in Wales¹⁷ Canada¹⁸ and in Manchester Conurbation¹⁹. This method is better than the scoring method. The scoring method is particularly suitable in some underdeveloped areas where full details are not available particularly regarding the number of establishments or functional units.

Centrality and Centrality Methods

From the above methods the centrality values of functions of central places cannot be calculated. These methods are only suitable for the measurement of the functional importance of the settlement. The word centrality is often used by settlement geographers to mean nodality as well as centrality.

Central functions and central places only become important when they serve neighbouring or complementary areas.

Christaller defined the centrality of a place as follows:-

"One can say that if the town has an aggregate importance B, of which BZ represents the town population then $B - BZ =$ the surplus of importance for the surrounding region. The surplus of importance shows which settlement is the central place."²⁰

In a functional approach (centrality) whether a central place has a large or small population, or even whether it possess more or less central functions is not important, but what is important is the extent to which the central place influences or supplies central goods to its complementary area. For example, a place may have 20 secondary schools but needs 25, whilst another place may have 5 secondary schools but need only 3. According to centrality, in the context of the complementary area, the second place is more important than the first. In the first case, although the place has more schools than the second centre it is in a deficit position, whilst the second place though having fewer schools is in a surplus position. The population size, number of functions and functional units in a place cannot fully explain the centrality position of that place. The size of a settlement and its number of functions is a reflection of rank size, based on population and nodality rather than centrality.

There are cases of suburban, or satellite towns, which perform mainly residential functions, and have large populations than some district administrative or service centres. For example, in Ceylon, the suburban centres of Colombo such as Dehiwela-Mt. Lavinia (11073), Kotte (73795), Moratuwa (77632) and a few towns have larger populations than district administrative centres such as Anuradhapura (29397), Mannar (8988) and Vavuniya (7159), but the latter towns have higher order administrative functions and act as the main central places for their respective districts. In big cities, the central business district has a surplus of central goods and services to supply the town and region, whereas suburban or neighbourhood shopping places mainly satisfy the local demand.

In the study area, there are many non-farm, intensive agricultural and coastal fishing settlements which have large populations, but their importance in service functions is very limited.

The degree of centrality reflects both the status of a central function and a central place. The centrality of a place is the surplus total value of all functions found in that place above its requirements. The number of occurrences of a central function in settlements shows some empirical level of centrality. For example, in the study area, insurance corporation offices, banks, administrative and social functions have a relatively higher centrality than retail functions. In some cases certain functions have no centrality value in one area but may have such a value in another area. For example, the primary school function has a centrality value among the settlements on the Mainland but not on the Peninsula, excluding the Pachchilapallai division.

Christaller calculated the centrality of places in Southern Germany in the 1930's by the number of telephone connections of a place in relation to the region. He used the following formula to calculate the centrality of a place:-

$$Z_z = T_z - E_z \left(\frac{T_g}{E_g} \right)$$

Z_z = The centrality of a place (that is the services it performs over and above the local needs of its inhabitants).

T_z = The number of telephone connections at the central place.

E_z = The number of inhabitants of the central place.

T_g = The number of telephone connections in the region.

E_g = The number of inhabitants in the region.

He defined the expression $E_z(T_0/E_0)$ as the expected importance and T_z as the actual importance. The differences between them is the importance-surplus or the centrality.²¹

A general criticism can be made at the present time as to the degree the telephone shows the centrality of a place or its relation to its complementary area. At present a large number of telephones are used for private purposes and from the telephone densities it is very difficult to assess the true centrality. In the context of Northern Ceylon, telephone facilities are very inadequate and a large number of settlements and institutions have no telephones at all. There are only 1398 telephones found in the study area and only 50 settlements have telephone facilities. The limited telephone facilities that exist are found mainly in government offices. Except in Jaffna City (735 connections), very few commercial establishments have telephone links. Thus in this case the telephone is not suitable to assess the centrality of central places.

The measurement of the centrality of a place is the most difficult but important part of central place studies. Ullman²² and Bracey²³ emphasized the importance of centrality and the difficulty of calculating it. Various functional indices such as total population, number of functions, functional units and establishments of indicator functions, number of retail employees and total sales, were used to measure centrality. The methods used to quantify these indices were unable to express centrality, but showed the nodality or aggregate importance of a centre.

A few functional studies have attempted to calculate true

centrality, such as Fleming,²⁴ Siddal,²⁵ Johnson²⁶ and Preston.²⁷ Johnson and Siddal measure centrality within a metropolis based on the principle of supply and demand. Fleming's study in 1954 was based on centrality principles about shops and service trades in Scottish towns. He calculated the internal and external trade of these towns based on census data on the volume of retail sales. The procedure is to multiply the population of the town by a national or regional figure for annual retail sales per capita and then subtract the result from the actual yearly sales of the town as recorded in the census. The remaining "excess" retail sales are claimed to represent the centrality of the town.

Marshall pointed out several discrepancies in Fleming's method. "This claim of excess however is unjustified, for the method implies that each town has an identical proportion of its retail expenditures. Clearly, this assumption is very unrealistic. The proportion of the retail expenditure which a town's people actually allocate to their home town is not fixed, but increases with the size and functional complexity of the hometown. The apparent excess of retail sales obtained by Fleming are thus not comparable from town to town, nor is there any obvious way in which they could be approximately adjusted."

"In the case of villages and hamlets, the amount of money spent "out of town" by the centre's own residents may not even be fully equalled by the money spent in the centre by the consumers from outside. Such a centre would have a "Negative Excess" of retail sales. The fact that Fleming found no such case serves to point out the non-availability of census data

on retail sales for towns below a certain size."²⁸

Although there are some shortcomings in Fleming's method the concept has recently been used by Preston.²⁹

He defined the centrality as follows:-

$$C = N - L$$

C = The surplus of importance, a place's relative importance or centrality.

N = The importance of a place plus its complementary region, absolute importance or nodality.

L = The importance of a place as a unit consuming central goods and services or local consumption.

He stresses very clearly the differences between centrality and nodality, (so vital in central place theory), to find whether or not a settlement is a central place. He used the following formula to calculate or measure the centrality of places:-

$$C = R + S - aMF$$

C = Centrality.

R = Total sales in retail establishments.

S = Total sales services.

a = Average percentage of median family income spent on retail items and selected services by families in a central place.

M = Median family income.

F = Total number of families in a central place.

There are problems in applying this method to Northern Ceylon. All central functions, cannot be measured in purely monetary terms and a retail census is not available. In this study, government, commercial, social, professional, educational and health functions are included, and because of this the study is more a combined study than just a retail one. It is concerned

primarily with small rural settlements in an underdeveloped area for which retail census reports are not available. Even if the government produces a retail census in the future it will take a long time to produce, especially if it is to include very small hamlets and village settlements.

In order to overcome this problem, and to find a suitable way of calculating the centrality of the central places, the following formula is suggested.

$$C = \left(\frac{PS}{TU} \times CU \right) - PC$$

C = Centrality.

PS = Population of the service area of a central function found in a place, or population of a closed system for a central function found in the central places within the defined closed system.

TU = Number of functional units in the service area.

CU = Number of functional units in the central place.

PC = Population of the central place.

The method leads to the calculation of dependent population for a function and cumulative population for a central place. The dependent population shows the centrality of a function, and the cumulative dependent population shows the centrality of a place.

The basic problem with the method is in identifying the service or administrative areas of the central functions found in central places; demarcating the service areas and creating closed systems for the functions found in central places which do not have clear service areas. Some central functions found in the central places have well defined service areas. For these functions a shortened version of the formula can be used

to calculate dependent population. In the case of the defined service areas PS-PC expresses the dependent population. There are 32 government orientated central functions which have well defined services areas as follows:-

Grama Sevaka

Village Council

Rural Court

Registrar of Births and Deaths

Urban Local Authorities

Police Station

Divisional Revenue Office

Department of Excise

Department of Agriculture and Agrarian Services

Department of Forestry and Fisheries

Magistrate's Court

Department of Labour Exchange

Assistant Commissioner of Co-operative Development

Assistant Superintendent of Police

District Education Office

Department of Post and Telegraph

Assistant Commissioner of Local Government

Superintendent of Police

Regional Education Office

Department of Inland Office

District Head Office

Supreme Court

Superintendent of Health

Medical Office of Health

School Health Office

Public Health Office

Ceylon Transport Board Regional Office

Commercial functions

Multi Purpose Co-operative Societies Union Depot

Co-operative Bank

Co-operative Stores

Co-operative Federation Office

Insurance Corporation Office

These administrative and commercial functions have defined service areas. There are also some central functions found only in one place at Jaffna City such as Air Ceylon booking office, opticians, Dentists, sports stadium, funeral services, accountancy firms, architectural firms, National political parties and Trade union offices which serve Jaffna district and the whole study area.

For some central functions the complementary areas of central functions can be demarcated with the help of field work: Railway stations, health institutions such as Provincial, Base, District and Rural Hospitals, Central Dispensary, Maternity Homes and Visiting Dispensaries. The complementary areas were determined with the help of information gathered from the railway station, distances between the stations and villages and connecting bus service pattern.

In the case of central functions with unrestricted or undefined service areas, several types of closed system were created to calculate the average population per functional unit. Mainly commercial, social and educational central functions are found within this group. To obtain the

centrality of the above groups, dependent populations were calculated from the closed systems population. Creation of sub-systems according to the hierarchical level, is essential to calculate dependent population for different functions. The existence of hierarchies of central functions was noted in the last chapter. Central place theory is built upon hierarchy of functions and central place. In commercial functions there are no clear cut service areas existing as in administrative functions. Similar levels of central places overlap in their marginal areas and higher order central places are superimposed over the lower order places.

The definition of service areas for different central functions was therefore calculated as follows:

1. There are defined service or administrative areas for government and some social and commercial functions.
2. Parliamentary constituencies were used to calculate the average population for Maha Vidyalayams in the Peninsula. In the case of the Peninsula the parliamentary constituencies were suitable to calculate the average population per school. On the Mainland, D.R.O. divisions were used for the calculation.
3. In the case of primary schools nearest neighbour analysis was used between the settlements without primary schools with those possessing primary schools on the Mainland and on Pachchilapallai division. All large settlements have primary schools, but if an average is taken for them the smaller settlements with schools will gain unreal cumulative dependent population. In order to avoid this the settlements with and without primary schools were grouped based on nearest neighbour

analysis.³⁰

4. Four sub-divisions in the Jaffna district (Valiamams-Jaffna - the Islands, Vadamaradchy, Tenmaradchy - Pachchilapallai, and Kilinochchi - Punakari) were created to calculate the centrality values for low order functions such as retail stores, tea and coffee boutiques barber saloons and other functions.
5. The districts were considered for intermediate commercial functions, such as hardware stores, photographic studios, textiles, tailors and readymade garments shops, Western pharmacies and other functions.
6. The whole study area was taken for calculating higher order and Mobile functions, such as higher educational institutions, proctors and advocates, printing presses, air office and other functions.

By this method the surplus of central functions was assessed in terms of the dependent population. For example, if we take the district administrative function, this is found in three district capital administrative centres. The service area of this function comprises the district population, and in the case of functional units there is only one found in the district; the central place population is the town population.

The centrality of this function in Jaffna City, Mannar and Vavuniya is as follows:

$$C = \left(\frac{PS}{TU} \times CU \right) - PC$$

$$\text{Jaffna City} = \frac{612596}{1} \times 1 - 94670 = 517926$$

$$\text{Mannar} = \frac{60124}{1} \times 1 - 8988 = 51186$$

$$\text{Vavuniya} = \frac{65621}{1} \times 1 - 7159 = 58462$$

For example, for the commercial function of jewellery shops, the centrality of the function in Jaffna City is as follows:

$$\frac{748341}{140} \times 53 - 94670 = 185980$$

For this function the whole study area is taken as a closed system for calculating the centrality value.

The surplus of centrality of a function in a central place is expressed in terms of the population, living outside the central place, which is dependent on the functions of that central place. When one calculates this figure the importance of the function becomes clear through the size of the dependent population. The functional importance of the central functions decrease with the increase in the number of central places with the function. If there is no dependent population for a function in a place then there is no centrality for the function at that place.

In the second stage all the dependent populations for all of the central functions in the central places were added together. The addition of all the dependent populations in the central places shows the cumulative dependent population for that place in all central functions which it possesses.

(see Appendix 5 Column F) The cumulative population derived by this method expresses the centrality level of a place.

By this method the centrality of a place could be expressed in true centrality terms and one is able to identify which settlements are central places.

In this method, there are certain advantages which overcome the deficiencies of the previous nodality methods and at the same time preserve the qualities of the earlier methods.

1. The centrality level of functions and central places can be calculated in different places. For example, from the point of view of centrality the Municipal Council and Municipal Court functions are disregarded as central functions because these are limited to the settlement itself, but remain as central functions in the context of the central places within the town.

2. Identification of **true** central places. All settlements with central functions (with one or more) are not necessarily central places. Fifty-two settlements with central functions which have no dependent population are disqualified as central places, whilst another 53 settlements with central functions have (less than 100) a cumulative dependent population of less than 100 and another 211 with less than 1000. These places may be considered as ancillary central places.

3. By this method, the overall centrality of the region can be calculated. The total cumulative dependent population derived from all qualified central places is (54,887,732) 54.88 million. The 54.88 million cumulative functional dependent population are dependent for various functions outside their own settlements. Jaffna has 48.11 per cent, nearly half of the cumulative population. The first seven places represent

72.91 per cent, the first 15 places represent 84.12 per cent and the first 62 places represent 96.42 per cent of the total cumulative population (centrality) of the region. The remaining places represent only 3.58 per cent of the total cumulative population.

Conclusion

The assessing of functional importance and the ranking of central places in an objective manner is one of the most important aspects of central place studies. There are several techniques which have been used by researchers in central place analysis to weight functions and central places. The main problem with a majority of the techniques is that they have been devised to suit particular areas and have utilised personal knowledge of the study area. Because of this, a technique used in one area may not be suitable in another area.

In this study, four techniques were used to weight functional importance of the places and for comparative comparisons of the results of different techniques. The results of the first two techniques are subjectively derived and the latter two are objectively derived. When comparing the results of all four techniques, one can notice several changes between the results. The functional index method and cumulative dependent population method shows nodality and centrality differences more clearly than the first two methods. Though the different techniques show noticeable changes in low order places, in higher order places the results of different techniques are very similar. However, one can see the differences of the small scale. Every technique has its advantages and disadvantages, and the

quality and usefulness of a particular technique depend on the application of the technique, the nature of the study area, types of settlements, and the scale and intensiveness of the study.

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CHAPTER SEVEN

THE HIERARCHY OF CENTRAL PLACES IN NORTHERN CEYLON

Settlements may normally be classified as hamlets, villages, towns and cities. These categories imply the existence of broad classes of settlements that differ in their functional complexity. The differences between settlements are not only a matter of physical size, but also total population variety and level of central functions and these show the existence of hierarchical patterns. These functional aspects are the main subject of study. Generally, higher order places with large population have more central functions, functional units and command larger complementary areas than lower order places. The main idea in the concept of a hierarchy, the idea of definite orders of central places, is directly opposed to that of a smooth continuum of urban places. Berry has argued however, that there is ample evidence for the existence of a hierarchy, but on the other hand there has been no satisfactory evidence provided that would suggest that a hierarchical class system does indeed exist.¹

Characteristics of the Hierarchy

"The hierarchical class system is an integral part of the spatial model of central places developed by Christaller. It is the generic base and single most important statement of central place theory. The model states that central places belong to one or another class of subsets. Each class possess specific groups of central functions and is characterised by a discrete population level of centres."² Marshall pointed out that there are seven fundamental characteristics found

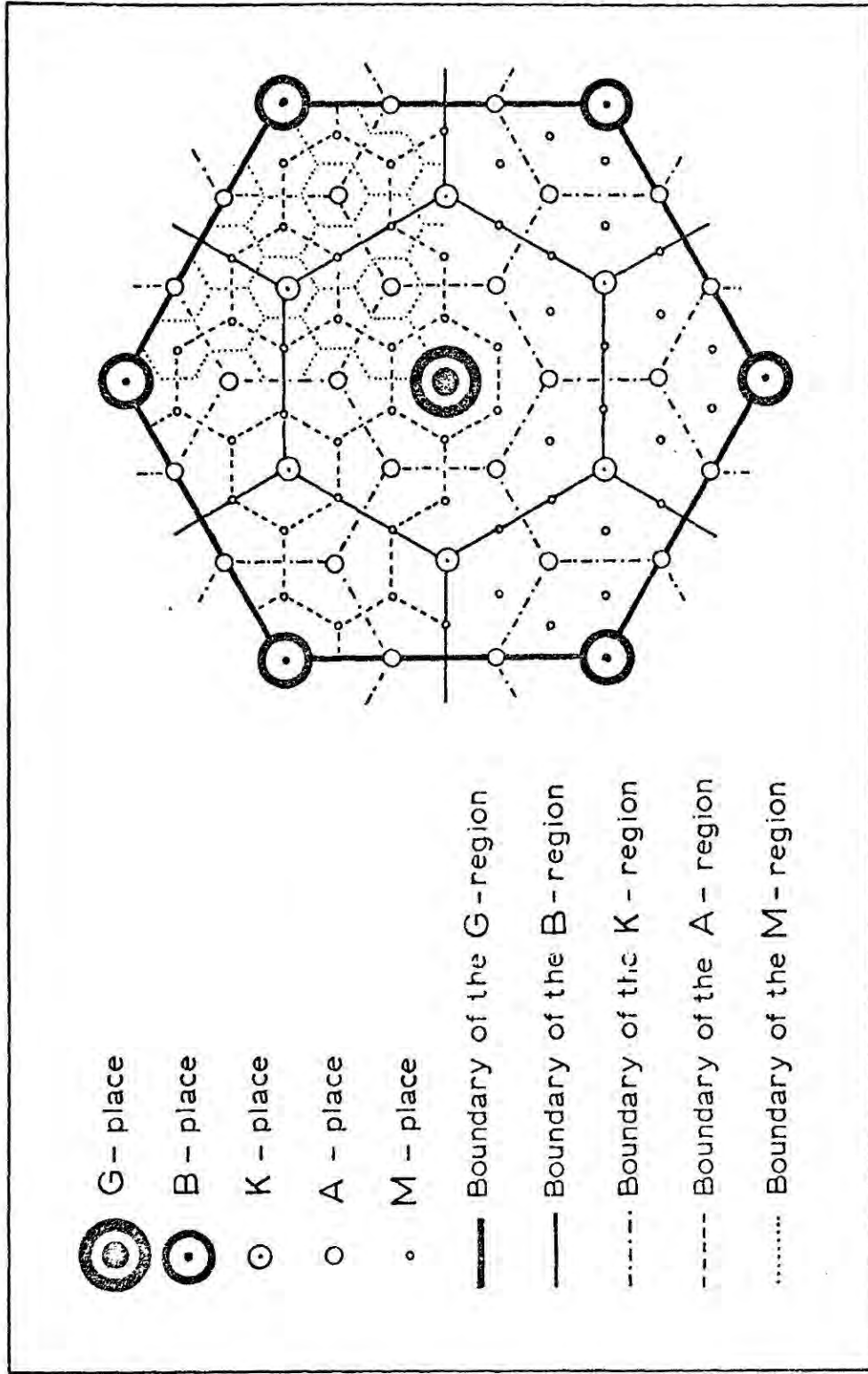


Figure : The central place system after Christaller.

in an ideal central place hierarchy developed by Christaller as follows:-³

1. Spatial interdependence of centres.
2. Functional wholeness of the system.
3. Discrete stratification of centrality.
4. Interstitial placement of orders.
5. Incremental basket of goods.
6. A minimum of three orders.
7. A numerical pyramid in order membership.

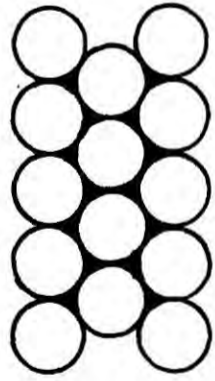
The central place after Christaller is shown on Fig. 7.1 but the seven fundamental characteristics may not be found in reality. These characteristics may be distorted in the real world because of topographic, economic and social factors.

Central place theory attempts to explain the location, size, number and spacing of towns based on spatial economic structure. Up to Christaller's time spatial structure had only been examined on the basis of spatial irregularities, difference in climates, the location of natural traffic routes and a wide range of non-economic and historical factors. By contrast, in Christaller's theory, all these factors are neglected and a spatial structure is determined on the basis of purely economic factors that lead to spatial differentiation.⁴ The theory explains the growth of central places through consumption of central goods, order of central goods (lower and higher), central place hierarchy and complementary areas.

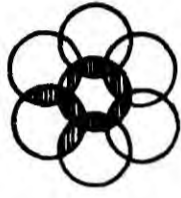
Christaller starts his analysis of the structure of the economic landscape with a homogeneous plain. At each point of this plain, the amount and quality of natural resources, the production function, the population density, the consumer

FIG-7.2

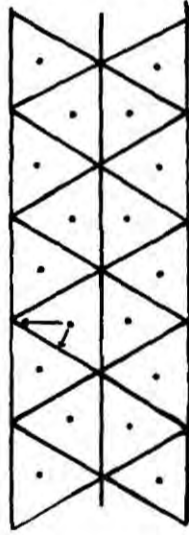
NETWORK OF TRADE AREAS BY SHAPE



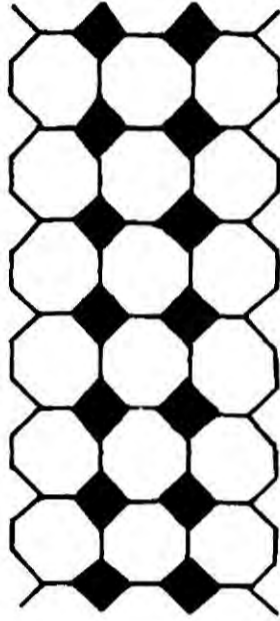
TANGENT CIRCLES



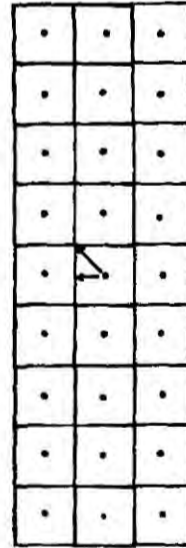
OVERLAPPING CIRCLES



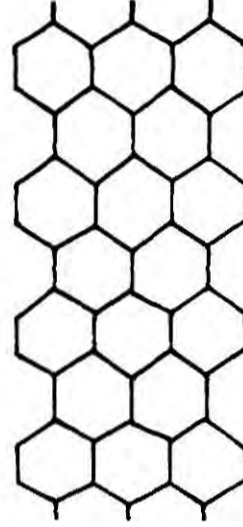
TRIANGLES






OCTAGONS



SQUARES



HEXAGONS

-  Lost areas between centres
-  Areas of competition
-  Unequal distances from the centre

preferences and all other economic and non-economic factors are considered to be identical.

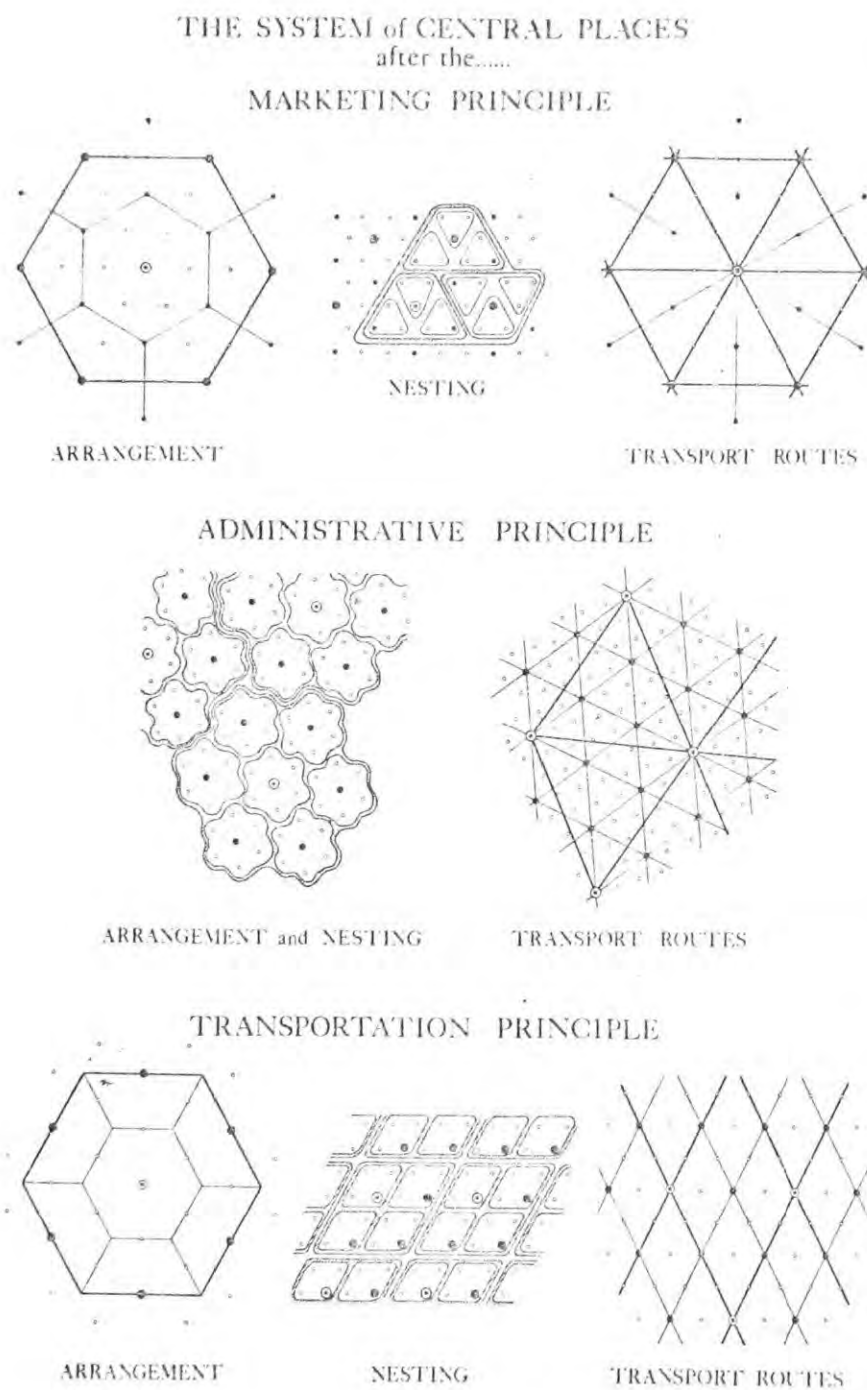
In addition to these assumptions, there are certain other conditions adopted for the development of central places. These are (1) where the threshold level for a function exists, that function will be found in the central place, (2) the income of the people offerings the goods and services will be maximized, (3) the distances moved by consumers to purchase the goods and services should be minimized, (4) the number of central places should be the minimum possible.

If these assumptions and conditions are not found in reality the characteristics of Christaller's hierarchical principle will be distorted. The socio-economic pattern changes very rapidly with changing economic conditions. These changes affect or influence the population threshold for different goods and ultimately influence the central place system.

Central places form a hierarchy with respect to central goods and services. Higher population threshold functions are found in higher as well as lower order places. This is the base for the existence of the hierarchy of central places.

A hexagonal service area for each function and place is the main characteristic of the system. Hexagonal service areas are better arranged and served and more efficient than tangent circles overlapping circles, triangles, square or octagons. In tangent circles and octagonal form of service areas, there are lost areas between the tangent circles and octagons. But in the case of overlapping circles, there are areas of competition. But in the case of triangular and square forms of service areas, there are unequal distances from the centre. The different network of

The system of central places after the marketing,
administration and transportation principles



AFTER : CHRISTALLER BERRY AND PRED

FIG.7.3

trade areas by shape are shown on Fig. 7.2.

Based on the three principles of marketing, transport and administration, central places were grouped into hierarchical orders. In each system a value K equalled the order of the central places, varying in the marketing system $K=3$, transport $K=4$ and administrative system $K=7$. Fig. 7.3 shows the system of central places on the three principles and their spatial arrangement, nesting and their transport routes. In the case of the administrative principle, hexagonal trade areas and six subsidiary places are grouped around a major place. This grouping is the most efficient for the factors of defence and administration. In the case of the marketing principle, however, the circular arrangement, as in administrative principle, did not continue to develop. In nesting, each centre has two lower order centres subsidiary to it within its trade area. This nesting, based on $K=3$, was assumed to be because population threshold for commercial functions is different from administration. In the marketing principle, the trade areas of the centres become triangular assymmetrically distributed around the major centres. In the transport principle, efficient and minimum transport routes and costs are involved. In this case, three lower order centres are found subsidiary to a major centre and in a rectangular form.

Few functional classifications of settlements were made before the second half of the 20th century. Apart from Christaller's and Losch's classifications, Kolb, Dickinson and Smailes made important contributions during this period. Kolb identified five orders of centres in Wisconsin. Dickinson identified three hierarchical order grades of centres among

the smaller urban settlements of East Anglia in the 1930's such as rural villages, urban villages and towns.⁵ In the 1940's, Smailes' classification of the towns of England and Wales was based on a six index central functions (i.e. bank, chain stores, secondary school, hospital, cinema and weekly newspaper) and as a result he identified a six order hierarchy of central places.⁶ This comprised three higher order central places above the town status (major cities, cities and minor cities). He further subdivided the settlements below the town level into suburban and urban villages. In this classification, Marshall's first four basic central place hierarchical characteristics were not fully taken into consideration.

In the 1950's, there were several hierarchical orders of central places identified by researchers in different parts of the world. The most important studies were Brush,⁷ Berry and Garrison,⁸ Scott,⁹ Kar,¹⁰ Bracey,¹¹ Davis,¹² Carruthers,¹³ and Smount.¹⁴ These studies were all essentially based on nodality rather than centrality. Because of this the classifications reflect the aggregate importance rather than relative importance of the settlements. Marshall pointed out that in most of these studies the criteria of spatial interdependence of centres, functional wholeness of the systems, discrete stratification of centrality and interstitial placement of orders was not given proper attention. In particular, Marshall in his work emphasized the importance of the interstitial placement of orders. The spatial distribution pattern of the hierarchy of centres is essential to explain the central place system. From this point of view, the discrete

stratification of centrality and interstitial placement of orders must always be taken into consideration in classifying and analysing the central place system.

Evidence in the study area show that varying sizes of settlements exist. The largest, Jaffna City, had a population of 94,670 in 1963 and 158 settlements had less than ten people. (see Table 5 in chapter V for the size of settlements with and without functions). The differences between settlements in population, functions, functional units and their distributional pattern emphasizes the functionally interdependent nature of settlements. Jaffna City is 7.4 times larger in population than the second largest town of Point Pedro and functionally superior to Mannar and Vavuniya. Mannar and Vavuniya are linked with Jaffna City for higher order functions. In the Jaffna district Kilinochchi, Point Pedro, Chavakachcheri and Chunnakam are linked with Jaffna City for all types of higher order functions. Within the three districts and the region, as a whole central places are interdependent at different levels.

In terms of functional wholeness the study area is treated as a closed system. As pointed out earlier, the study area is a functional region under Jaffna City for higher order administrative, cultural and educational functions. For the above category of higher order functions the whole study is under the Jaffna City system. Along the southern border of Vavuniya district, the Sinhalese population who belong to the four Grama Sevaka divisions of Mamaduwa, Madukanda, Iraperiyakulam and Ulukulama, prefer to go to Anuradhapura (which is 30 miles south of Vavuniya) than to Jaffna City because of the cultural divide. Anuradhapura has higher

Sinhala medium schools, Buddhists and Sinhala cultural institutions and organizations whereas Jaffna City offers higher Tamil medium schools and Tamil and Hindu cultural institutions and organizations. The Mainland people are in several ways affiliated to the Peninsula and this helped to give connections with Jaffna City. Although the provincial administration was abolished, several regional administration functions cover the whole study area.

There are only three outlets connecting the study area with the rest of the country. The southern part of the study area, (except close to Vavuniya and Cheddikulam), is very sparsely settled on both sides of the study area boundary, with forested, uninhabited and unmotorable areas. If we consider Colombo as the first order central place for the whole of Ceylon, Jaffna, Kandy and Galle can be considered as second order central places for the whole country. From this analysis the Jaffna City system completely covers the whole study area.

In the last chapter, the importance of nodality and centrality were discussed. In the classification of central places both aspects will be considered in turn. Firstly, it is intended to group the central places using the criteria of nodality. The functional importance of the settlements was quantified by three nodality and centrality methods which are shown in Appendix 5, Column C,D,E and F. The grouping of nodality and centrality values into different grades is essential to form hierarchical grades. In theory the groups were naturally discrete and within the groups differences in centrality were zero.

The criterion of a discrete stratification of centrality

or nodality is adopted as follows: The nodality and centrality values calculated for the central places are in Appendix 5. The values are arranged on a linear pattern, and the differences between centres calculated by subtraction. The differences between places were treated as "distance" measurements along a line, and nearest neighbour analysis was applied in order to divide the array of points (places) into groups. The "group" should be a set of points such that each member of the set is closer to other members of the set than to any other point outside. This definition is based on the work of Clark and Evans.¹⁵ The method was used by Berry and Garrison to classify the hierarchy of settlements in Shohomish County, U.S.A.

There are other techniques, used by Tarrant¹⁶ and Preston¹⁷ to group the settlements which are considered here. At some stage all these methods involved arbitrary decisions. Tarrant's method of grouping provides for a progression from complete definition to complete generalization. In this case, the ungrouped individual settlements are a complete definition while a group comprising all the settlements makes up a complete generalization. Some definite stage between the two is needed as a measure of the loss of accuracy inherent in the grouping. The method is not suitable for the analysis of a large number of settlements with great differences in centrality and nodality. The grouping was only achieved by this technique with a high percentage of generalization.

Preston used a technique called "cumulative average of differences" which is similar to the "moving average" commonly employed to detect trends in the study of time series. The

technique's strength lies in its ability to eliminate (or at least markedly reduce) random variations and thereby aid in determining whether or not discrete groups of observations exist in a set of data. The centrality values were ranked, differences between successively greater observations were determined, and a cumulative average of differences calculated. The technique shows that if the hierarchical conditions do not exist, the cumulative average of differences when graphed will assume a constant slope. For more than one group to be recognized, the graph must exhibit more than one slope. If a discrete group of values do not exist in an array, marked displacements and slope changes will not appear.

However, this method is not suitable for the analysis of smaller settlements. In a larger number of settlements the differences between the groups in low orders are expressed by smaller values. Because of the cumulative averages, the technique eliminates the valuable small differences. For example, as the differences between hamlets and village level functional groups are very small, these differences will be eliminated by the cumulative average. Again the decision regarding the cumulative differences is an arbitrary one and the grouping idea basically involves Clark's definition.¹⁸ From this, we conclude that the method used by Berry and Garrison is suitable for the study area, which covers a large number of settlements.

The hierarchical classification of settlement is based on the nodality or centrality principle taken together with the interstitial placement of orders. The other aspects of hierarchical characteristics were also taken into consideration

to justify the divisions and compare them with the theoretical model. In addition, to nodality and centrality quantified indices, the following factors were considered in the classification: (1) population thresholds for different functions, (2) the relationship between population and function, (3) functional units and population, and (4) functions and functional units.

Hierarchy of Central Places (Nodality Principle)

In all seven grades of central places are identified using three nodality methods. The classification of central places based on Number of Functions, Functional Scores and Functional Index methods are shown in Table 7.1 - 7.3.

Table 7.1

Hierarchy of central places based on number of functions

<u>Grade</u>	<u>Number of settlements</u>	<u>Number of functions</u>
A	1	108
B	2	84
C	4	58-70
D	26	22-49
E	63	11-21
F	152	5-10
G	322	1-4

Source: Field Survey 1968/69

Table 7.2

Hierarchy of Central Places based on relative functional scores

<u>Grade</u>	<u>Number of settlements</u>	<u>Number of scores</u>
A	1	3172
B	2	867-994
C	3	586-672
D	14	169-406
E	70	40-146
F	134	10-38
G	345	1-9

Source: Field Survey 1968/69.

Table 7.3

Hierarchy of Central Places based on functional index

<u>Grade</u>	<u>Number of settlements</u>	<u>Functional index</u>
A	1	3956
B	2	756-846
C	5	258-426
D	15	59-198
E	52	11-41
F	171	1.003-10
G	323	-.986

Source: Field Survey 1968/69.

Using the three methods, seven types of central places have been identified. The number of central places in each grade varies according to the different classification. The differences between the first four grades are evident in all three classifications whilst there are fewer differences between the lower grades. The validity of different functional grade centres depends on the validity of its nodality technique. Davies functional index method is better than the other two techniques in the weighting of nodality.¹⁹ In all three classifications Jaffna City is in the first place and the differences between Jaffna City (A grade) and Vavuniya and Mannar (B grade) settlements are very clear. In these two grades the numbers of settlements remain the same although differences become significant in lower order groups. The discrete pattern of the hierarchy is dominant in A, B, C and D centres, but in the lower orders a continuum of declining importance is visible.

These settlements can conveniently be termed as city, major towns, towns, townships, large villages, villages and hamlets. The functional index method is chosen for the detailed analysis of the central places. The result of the other two methods will be taken where necessary for comparative

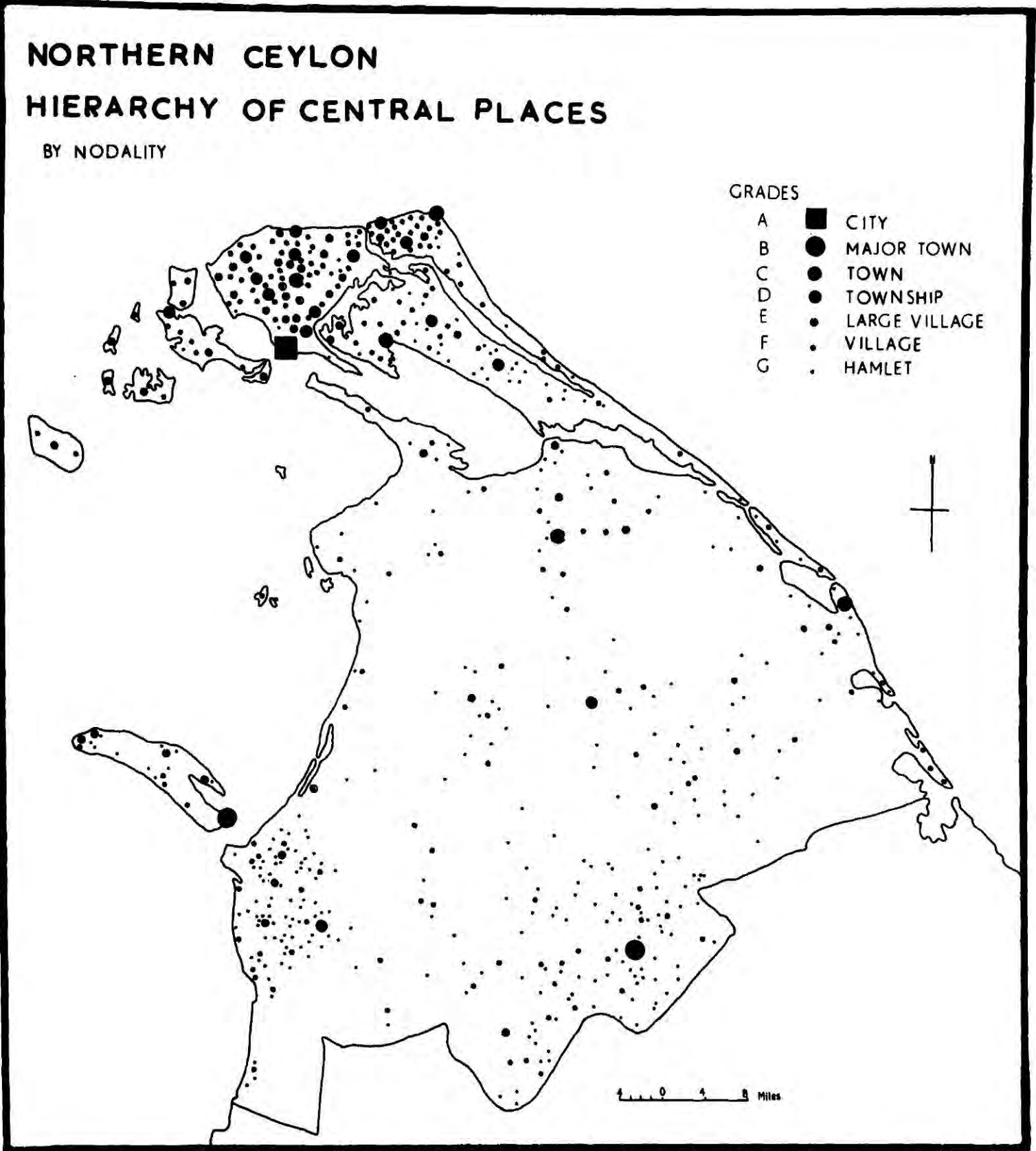
FIG.74

NORTHERN CEYLON HIERARCHY OF CENTRAL PLACES

BY NODALITY

GRADES

- A ■ CITY
- B ● MAJOR TOWN
- C ● TOWN
- D ● TOWNSHIP
- E ● LARGE VILLAGE
- F ● VILLAGE
- G ● HAMLET



analysis. The hierarchical distribution of central places based on the functional index is shown on Fig. 7.4.

City

Jaffna is the only city level central place and a regional primate city (see Fig. 2.17 for rank-size) in population as well as in functional importance. It has 36.1 per cent of the nodality of the region and in Northern Ceylon, and there is no other place closer to Jaffna City in functional importance. In all three nodality measurements, there is wide gap between Jaffna City and Vavuniya, the second ranked central place. Jaffna City is the only place which has most types of central functions recognized in the study. It has 108 functions out of 112 central functions, and nine functions are found only in Jaffna City. Regional district level functions have high centrality values. Jaffna City has a high nodality value, because higher location co-efficient functional outlets and low location co-efficient functional outlets are found in large numbers. The structure of centrality values for central functions is shown on Fig. 6.1. The statistical median of nodality of functions is 27, upper quartile is 47 and lower quartile is 11 nodality values. The lower quartile values of Jaffna City is above the upper quartile level of Vavuniya. Only four functions have nodality values of less than four. The city has a dominant position in higher order administrative, social, political and commercial functions. It has 24 more central functions than Mannar and Vavuniya and compared with Peninsula towns, has 43 functions more than Point Pedro and Chavakachcheri.

Major Towns

Vavuniya and Mannar are termed major towns. Though they have a similar or even lower population than Peninsula towns such as Point Pedro or Chavakachcheri, in functional terms they are far more important. These centres function as district capitals, and both have between 25-30 government functions relating to district administration, justice, health and commerce. In addition to the district level functions, these places have important commercial functions. These two places have 84 central functions and are linked with Jaffna City for higher order functions. The nodality structure of these places is shown on Fig. 6.1. The statistical median for the function is 8 for Vavuniya and 6.9 for Mannar. For Mannar the lower quartile nodality value is 2.9 and upper quartile nodality value is 10. Though the two places have the same number and similar functions, Vavuniya has more nodality values for its functions than Mannar.

Towns

In this grade the number of centres is either 4,3 or 5 according to the three different nodality classification. Kilinochchi, Point Pedro and Chavakachcheri occurred in the same grade in all three methods, Mullaitivu in two and Chunnakam was present in one. In the functional index method. Chunnakam improved its position from the earlier method because the commercial outlets were fully weighted through the location co-efficient. Kilinochchi leads this group with a score of 426 in the functional index, whilst Mullaitivu is last in the group with 251 scores. Chavakachcheri and Point Pedro have similar functional indices.

Kilinochchi is a small place in terms of population compared with Chavakachcheri and Point Pedro, but it is the main administrative and service centre for the southern part of the Jaffna district. Colonization schemes have been developed in Karachchi, Thunukkai and Punakari which have assisted the demand for central goods and services. Because of the developing character of its hinterland and consumption of central goods is far greater than in developed areas such as Vadamarachy and Tenmarachy. In the new colonization areas, the colonists have to go to various government departments to obtain services and buy certain goods. Because of this, and its potential prospects, the centre has attracted a fair number of migrant workers in irrigation and agricultural works and this has assisted the growth of certain specific functions such as cinemas, tea and coffee boutiques and eating houses. The statistical median for nodality values is 4.5 and lower quartile nodality values is 2.2 and upper quartile nodality values is 8.4. Only four functions have less than one per cent value of location co-efficient and seven functions have more than 10.

Chavakachcheri, Point Pedro and Chunnakam are the second order towns within the Jaffna Peninsula. These three towns are leading market centres, but the market and commercial functions are far more numerous in Chunnakam than in the other two. In commercial functional units, Chunnakam has proportionately more nodality value than Chavakachcheri or Point Pedro. Point Pedro and Chavakachcheri have balanced administrative, commercial, educational and other functions. These places are divisional centres and contain a D.R.O.

office, District and Magistrates' Court, police station, Department of Excise, health centres and a variety of commercial functions. The statistical median for Chavakachcheri is 4.2, for Point Pedro 4 and for Chunnakam 4.1. The upper and lower quartile nodality values for Chavakachcheri are 6.6 and 2.6, for Point Pedro are 6.6 and 2.5 and for Chunnakam are 7 and 2.4. The nodality structure of these places shows their similar functional status.

Mullaitivu is the last centre in this group. This is a secondary important centre in the Vavuniya district. It has 58 central functions. Administrative functions are far more important than commercial functions. Unlike the previous centres, this centre is small in population and serves a sparsely populated area. The statistical median of the functions is 3.2, upper quartile nodality values is 5.5 and lower quartile nodality values is 1.7. It has more central functions than Chunnakam, but nodality values are less.

Townships

In this group, there are central places with and without urban status. Townships are the main service centres at the divisional level on the Mainland and sub-divisional level on the Peninsula. The number of centres varies from 26, 14 and 15 by the three classifications. The last two quantified nodality measurements are very similar. These centres have between 24 and 46 central functions. Some of the townships are divisional administrative centres and possess divisional level administrative functions. Commercial, educational and health functions are more significant in this category. Market and commercial functions are more important in Atchuvveli,

Murungan, Kodikamam and Nellyyady. Manipay, Urumpirai and Uduvil are important because of social functions such as schools and health institutions, in addition to their commercial functions.

The statistical median varies from 3.5 for Kankesanturai to 175 for Kopay South. Ten centres have statistical median between 1-2 nodality values.

Large Villages

These places are mainly rural settlements with populations between 2500-4000 and have between 11-21 central functions. These are main rural service centres. The statistical median of the nodality values varies between .5-1.25. The higher nodality values within these centres represent administrative, health and educational functions and lower order nodality values represent primarily commercial functions.

Villages

In this group, there are 171 settlements found in the study area. The functional index of these places are comprised of lower nodality values. The functions found in villages have less than one per cent nodality value. Lower order commercial and social functions are the two main categories found. Villages are widely distributed on the Peninsula. On the Mainland the number of villages is not great, but they are important in the functional hierarchy because of the large number of hamlets below this category.

Hamlets

In this group, there are 343 settlements in Northern Ceylon. The average population size of the hamlets is less than 500 people. These places have a functional index of less

than .9. Hamlet central places usually have two central functions: a primary school and a retail store. In addition to these functions, tea and coffee boutiques and co-operative stores are sometimes important. These central places are mainly found on the Mainland.

Hierarchy of Functions in Successive Ranks of Central Places

Incremental function in the successive ranks of central places is another aspect of central place theory. Population threshold requirements determine the occurrence of central functions. Population and the regional importance of the central places reflect the incremental nature of functions. Table 7.4 shows the incremental function in successive ranks of central places.

Table 7.4

Incremental functions in successive ranks of Central Places

<u>Rank</u>	<u>Incremental functions</u>	
Hamlet	Retail provision store Primary school Tea and coffee boutique Co-operative store	
Village	Sub-post office Barber saloon Central dispensary	Bicycle renting and repairs Grama Sevaka Secondary school
Large Village	Village council Maternity home Rural court Village market Textile shop Ayurvedic dispensary Rural hospital	Registrar of Births and Deaths Laundry Petrol filling station Bakery Hotel and eating house Tailors and ready-made garment stall Railway station
Townships	Town council Rest house D.R.O. Ayurvedic pharmacy Firewood depot	Motor garage Bus station Police station Cinema hall Timber and lumber depot

Township	Jewellery shop Hardware store Sewing machine shop Meat stall Market District hospital Foreign liquor bar Printing press	Photographic studio Central college Co-operative bank Public health office Proctors and Advocates Arrack tavern Glass and picture framing shop Book shop
Town	Magistrate court Western doctor Furniture shop Commercial bank Vet. surgeon Tile store Express train Motor spare parts Surveyor Shoe shop	District court Western Pharmacy Water pump and tractor shop Wholesale provision store Medical Office of Health Radio and watch repair shop Dept. of Electricity Tutory Library
Major town	Kachcheri District Education Office Insurance corporation Superintendent of Health Office Dept. of Labour	Assistant Commissioner of Local Government Assistant Commissioner of Co-operative Development Dept. of Post & Telegraph Co-operative federation Industrial trading corporation office
City	Superintendent of Police Dept. of Inland Revenue Dentist Optician School Medical Office Sports stadium Political party office Architect C.T.B. Regional office Urban; Municipal council	Regional Education Office Supreme Court Religious and social inst. Provincial hospital Local newspaper Funeral service Accountant Air booking office Municipal court

The distribution pattern of central places reflect the distribution of population and settlements. (see Fig. 7.4)

Since the Peninsula has large settlements and is heavily populated, the central places tend to agglomerate there. The degree of agglomeration is high in Valikamams and Vadamaradchy divisions. On the Peninsula the average distance between

fourth and higher order centres is less than five miles. In central areas of Valikamams the distance between the centres is less than three miles. However, in Tenmaradchy and Pachchilapallai, the space between the centres is about five miles. Lower population and smaller size settlements are the reasons for the small number of higher order places in these divisions. The average distances between the large villages and the higher grade centres is less than 2.5 miles on the Peninsula.

On the Mainland, the central places are evenly distributed but the distances between fourth and higher order places is much greater than on the Peninsula. The distances between Mannar and Vavuniya are 48, Kilinochchi - Vavuniya 52, Mullaitivu - Kilinochchi 25 and Vavuniya-Mullaitivu 42 miles. The average distances between large villages and higher order places are five miles. However, the distances between centres around Mannar and Mullaitivu are less than five miles. Higher order centres such as Adampan, Uyilankulam, Murungan, Nanaddan and Chemmantivu lies closer to each other because of population concentration under the Giant's tank irrigation scheme.

Thiessen Polygons

Space filling polygons are one of the most suitable quantitative methods for an analysis of the distribution of central places. This method was used by the U.S. Weather Bureau in generalizing the rainfall of a given water catchment from a network of meteorological recording stations.²⁰ In Thiessen Polygons, the areas between centres are divided at mid point equally in all directions.

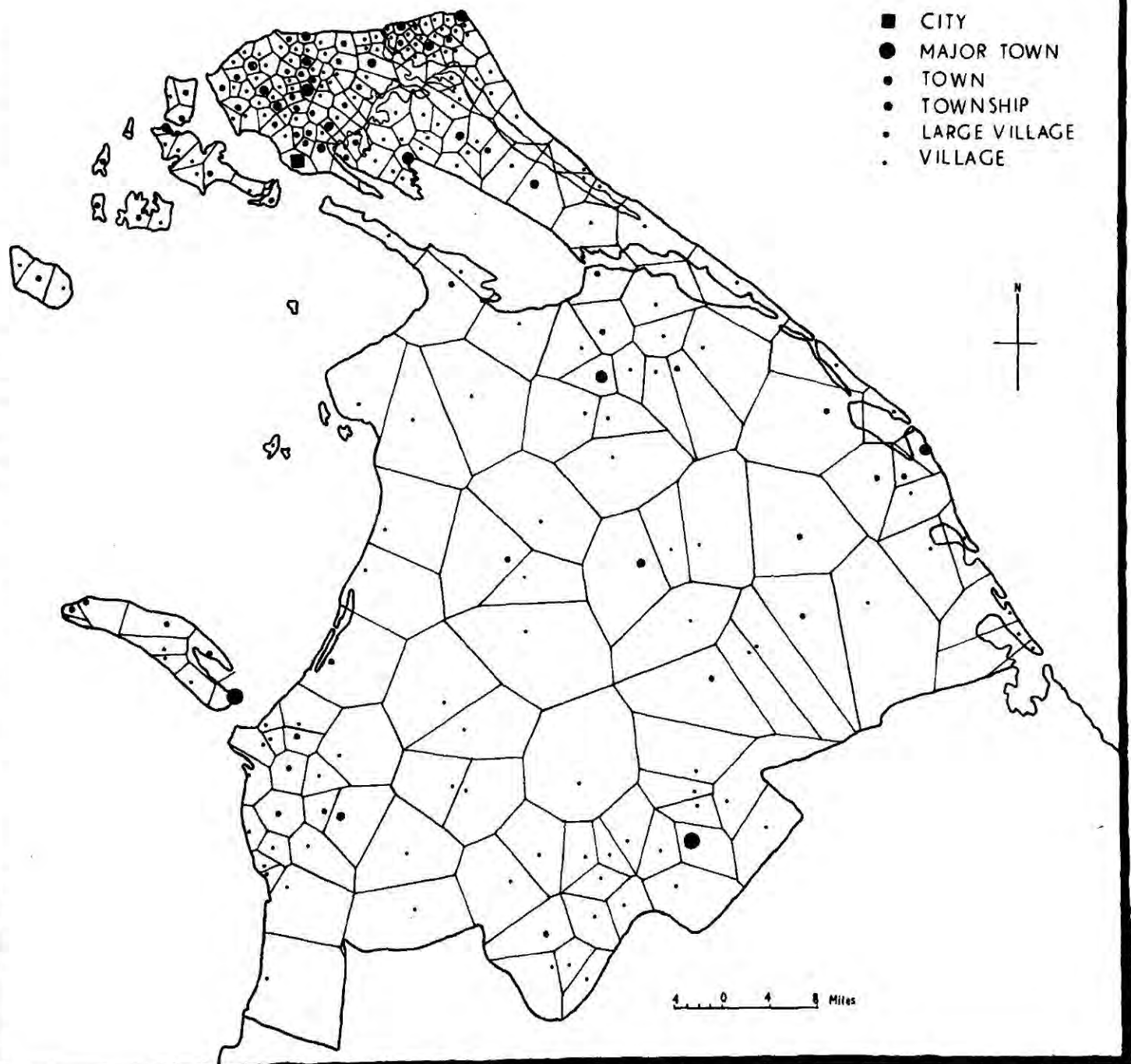
For the analysis of central place pattern, the first six

FIG.75

NORTHERN CEYLON

PATTERN OF CENTRAL PLACES

THIESSEN POLYGONS



order centres are taken for the construction of Polygons. Polygons are constructed based on the Kopec alternative method of construction.²¹ The arcs of circles of the same radius are drawn from adjacent points and the side of a polygon is located by drawing a line through the points of intersection on the arcs. The size of the Polygons and the number of sides depend on the density of centres and its location. Three types of centres are found in Northern Ceylon.

1. Internal centres which have neighbours in all sides.
2. Peripheral centres: which do not have neighbours in all sides. These are found along the peripheral areas of Northern Ceylon.
3. Outer centres which are mainly islands settlements and not considered here for the construction of Polygons.

There are 246 central places in the first six grades. There are 131 internal centres, 84 peripheral centres and 31 outer centres. The first two are taken for discussion. (see Fig. 7.5) The number of neighbours for these centres are counted separately for internal and peripheral centres in reflexive turns. For the internal centres the number of neighbours varies from 4 to 9. The centres found in central Valigamam area and Central Mainland have more neighbours. All total number of sides in the internal polygons are 752, and these give an average of number of neighbours of 5.7 for internal centres. According to central place systems, in a hexagonal pattern the average number of neighbours should be 6. When comparing both figures the internal polygons are very close to the hexagonal pattern. The peripheral centres have less

neighbours, because they are located along the coastal areas and study area's boundary. The number of neighbours for the peripheral polygons varies from 3 to 8. However, 3 and 4 are the most common number of neighbours for these centres. The total number of sides for all peripheral polygons is 360 and these give an average of 4.28 neighbours per centre. Most important centres such as Jaffna City, Point Pedro, Chavakachcheri, Valveddithurai, Kankesanthurai and Mullaitivu are found in the peripheral category. The important centres such as Mannar, Kayts and the island settlements are not considered because of their island locations and the difficulty of constructing polygons.

Hierarchy of Central Places (Centrality Criteria)

In the previous section classification of central places was based on nodality principles. This classification reflects the aggregate importance of central places. The differences between centrality and nodality principles were discussed in an earlier chapter. In a functional settlement study both concepts are important in order to assess the hierarchy on the aggregate and relative importance of the central places. One of the main aspects of central place study is the identification of true central places. In previous methods, all places having one or more central functions are taken as central places. In terms of relative importance however, some of these places do not qualify.

The cumulative dependent population of central places reflects their centrality level. A hierarchical classification of central places based on cumulative dependent population is shown in Table 7.5.

FIG-76

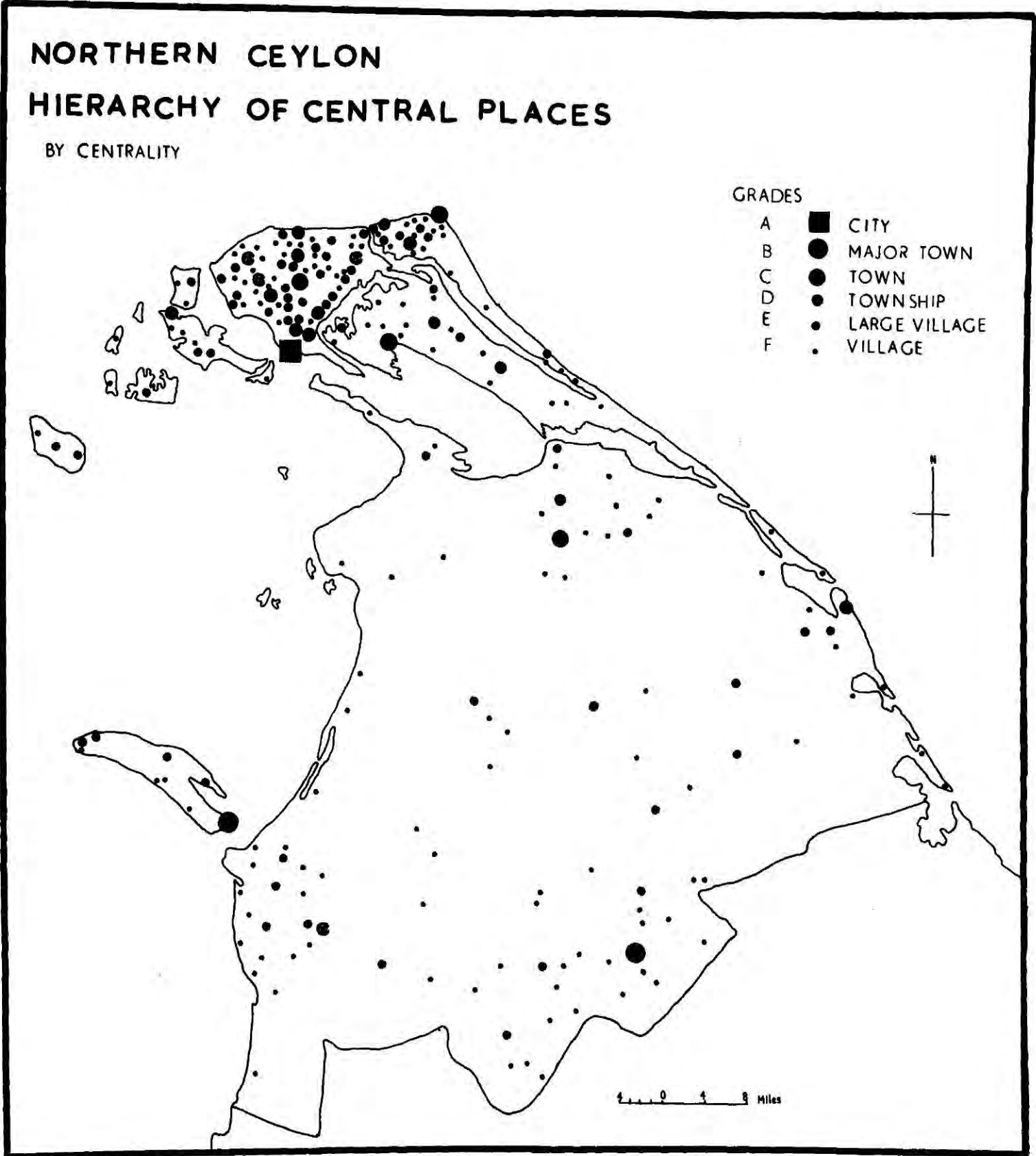


Table 7.5

Hierarchy of central places (Centrality) based on Cumulative dependent population

<u>Grade</u>	<u>Number of places</u>	<u>Cumulative dependent Population</u>
1 City	1	26.4 million
2 Major town	2	2.8-3.2 million
3 Town	4	1.7-2.1 "
4 Township	17	26952-1.03 "
5 Large village	62	20000-213,000
6 Village	169	1000- 18,000

Source: Field survey, 1968/1969, calculated.

There are 50 settlements with one or more functions, which have been disqualified as central places because they have no dependent population. Whilst another 53 settlements have less than 100 cumulative dependent population and another 211 settlements with less than 1,000 cumulative dependent population. These places are not significant in the central place hierarchy. They have functions of lower order categories which have small ranges. These goods are not important because they are available in most of the settlements. Retail stores, primary schools and tea and coffee boutiques are the main lower order goods. The central places with less than 1,000 cumulative dependent population are considered as auxiliary central places.

Excluding the auxiliary central places, there are six hierarchical grades of central places identified in the classification. The distribution of central places by centrality principles is shown on Fig. 7.6. The comparison of central places by nodality and centrality shows some noticeable differences. Though the number of grades in the hierarchy remains the same, there are changes in ranking and clear differences between places. For example, Nainativu is in 47th

place (Dgrade) according to the functional index method, but in centrality, moved down to 156th place (Egrade) in the hierarchy. There are changes in ranking even within the first 15 higher order central places in nodality. The first four (Jaffna City, Mannar, Vavuniya and Kilinochchi) remain the same in both methods. Chavakachcheri moved down from 5th to 7th position, Mullaitivu from 8th to 11th, Chankanai from 13th to 10th, and Tellipalai from 19th to 13th positions. This shows the refinement of their centrality positions.

The island settlements such as Nainativu, Analaitivu, Iranaitivu and Eluvaitivu and a few other island settlements, lost importance by the centrality principle. These places have a relatively large number of functions because of their isolation. However the functional importance of these places is not significant in centrality terms. Similar to these, isolated large and small fishing settlements and interior agricultural settlements moved down to lower order positions. The Peninsula agricultural settlements have a large number of functions because of their population. However, these places moved down from their former positions. In the centrality principle, residential settlements become less important though they have more central functions.

City

Jaffna City is the only place in this grade. Some aspects of the hierarchical characteristics of the city have already been noted. The relative importance of the city is reflected more clearly than in any other classification. In other classifications, Jaffna City's relative position or its regional primate character is not clearly expressed. The city

has 26.4 million cumulative dependent population for all functions. The overall centrality of Northern Ceylon is expressed by the total cumulative dependent population found in the central places. The total cumulative dependent population derived from all quantified central places is 54.55 million and Jaffna City has 48.11 per cent of the regional centrality. In other words, the city supplies nearly half of the goods and services of Northern Ceylon. This shows the city's regional primate character. In the functional index method, it has only 36.1 per cent of the total regional nodality and this shows how its relative position is not clearly expressed by the nodality method.

Major Towns

Vavuniya and Mannar town belong to this group. The two centres have 3.2 and 2.8 million cumulative dependent population. Like Jaffna City, their relative importance is clearer than that achieved by the other methods. These centres have 5.84 and 5.11 per cent of the regional centrality, and continued supply 10.95 per cent of the regional goods and services. Although they have small populations in their service areas because of the concentration of higher order functions they have a large cumulative dependent population.

Towns

There are four places in this grade: Kilinochchi, Point Pedro, Chunnakam and Chavakachcheri. Mullaitivu, which was in this grade in the nodality classification moved down a grade. These places have 2.13, 1.96, 1.80 and 1.71 million cumulative dependent population. In regional centrality, their

shares are 3.99, 3.59, 3.30 and 3.12 per cent. Kilinochchi, is similar to Vavuniya and Mannar, but it has a small population in its service area. However, the developing nature of its hinterland is assisting its growth, and the consumption of goods is high because of colonization schemes. This high degree of consumption of goods and services is reflected in the cumulative dependent population. This method not only expresses the actual dependent population of a central place but also indicates the intensity of use of its central function by the service area's population. If the service area's population is small, then the cumulative population of a central place is expected to be low, but when the consumption of goods is high, the cumulative dependent population figure has a higher value. This is the reason for the large cumulative dependent population for Kilinochchi.

Point Pedro, Chunnakam and Chavakachcheri are all on the Peninsula. When compared with Kilinochchi, these places have a large population in their service areas. Of these three places, Chunnakam's position is the most favourable. It is located in the heart of the market gardening belt and in a central position in relation to the three Valikamam divisions. The service area of Chunnakam has over 200 thousand population. Its service area of Central Valikamam is more densely populated, and this has assisted the greater growth of the town. Point Pedro and Chavakachcheri are the leading central places in Vadamarachy and Tenmarachy. Though they have less population in their service areas than Chunnakam, they have more administrative functions, and this is helping their development.

Townships

There are 17 places in this grade and the cumulative

dependent population ranges from 269,000 to 1 million with Kankesanturai being the most important. There are 2 subdivisions within this group. Group 4A includes Kankesanturai, Kayts, Chankanai, Nellyady, Mullaitivu, Tellipalai, Pandatharippu and Valveddithurai. These places, except for Tellipalai, have urban status and all have over 550,000 cumulative dependent population. In administrative and commercial functions, these places have more importance than 4B centres. The 4B centres, except for Manipay, are non-urban settlements, and are mainly important for commercial functions. Nallur, Atchuvveli, Manipay, Murungan, Palai, Kopay South, Paranthan and Thirunelveli are in this grade. Of these Manipay and Kopay South are significant in the provision of service and administrative functions. All townships are markedly different from the next order of centres which comprise large villages and they have a significant role at sub-divisional level in the distribution of goods, and services.

Large Villages

The 62 places in this group are important in providing convenience goods to rural areas. The cumulative dependent population ranges from 20,000 to 213,000. These places are the main service centres for the villages and hamlets. The social and administrative functions are significant in the structure of cumulative dependent population.

Villages

There are 169 places in this grade, and they play a minor role in the central place system of the area. They have local importance for the hamlets and farmsteads but their range of influence is limited.

Systems of Central Places

Three basic systems of central places resulted from Christaller's theoretical model of central places. These are nesting of centres according to the rule of $K=3$, $K=4$ and $K=7$ based on marketing, transport and administrative principles. In each system the number of central places in successively lower order classes increases by three times in marketing principles, four times in transport and seven times in administrative principles. Table 7.6 illustrates the system of central places in Northern Ceylon. Table 7.6.

The system of central places in Northern Ceylon

Size-grade of centres	<u>Actual and Theoretical</u>			
	Theoretical number of places when $K=3$	Theoretical number of places when $K=4$	Actual number of places (nodality)	Actual number of places (centrality)
A	1	1	1	1
B	2	3	2	2
C	6	12	5	4
D	18	48	15	17
E	54	192	52	62
F	162	768	171	169
G	486	3072	323	314 (auxiliary central places)

As minimum of three orders and a numerical pyramid in order membership of settlements are an important aspect of central place theory. On the basis of the Table 7.6 the system of central places of Northern Ceylon corresponds closely with the theoretical pattern of $K=3$ and since the study area is mainly an agricultural region, this marketing principle is more appropriate than other principles. Transport and

administrative principles have little effect on overall central place development.

The Table 7.6 shows that there is a continuous increase of settlement in successive lower order grades. A numerical pyramid of hierarchical settlements exist in Northern Ceylon. The relationship between number and size of settlements is already noted in Chapter 2. Christaller and Loschs' functional hierarchy of settlements are built up on a pyramid pattern of settlements. (city, town, large village, village, hamlet and farmstead). The Northern Ceylon settlements are found in a pyramidal nature not only in population but also in the central place system.

The present pattern of settlements are not static but may undergo changes with population growth and socio-economic developments. The rapid population growth, particularly on the Mainland, together with colonization schemes may bring changes in the present pattern of central places. These changes may assist further development of smaller settlements which will become central places in lower orders. The development of second and third order central places will reduce the present primate character of Jaffna City. At present, the first seven places supply 73.91 per cent and the first fifteen places 84.12 per cent of the goods and services. Though a large number of places are involved in the central place system, the first sixty-two places supply 96.42 per cent of the goods and services of Northern Ceylon. In other words, these are the real central places in centrality terms.

Intra-Urban Hierarchy of Central Places in Jaffna City

In the previous section, we have analysed the hierarchy

of central functions and central places in a regional context. From the analysis there is evidence of the existence of a hierarchy of central functions and central places. In this section, the central place concept is used to analyse the functional hierarchy of central places within Jaffna City (The total data of Jaffna City now spatially analysed within the City). The concepts of central places have been generally used by researchers to identify hierarchies of centres in regions and countries, but few central place studies have been made within cities in the developing world.

A hierarchy of service centres within large cities has been identified in Zurich, Calcutta, Melbourne and in the cities of America and Britain. Proudfoot identified five types of retail centres within cities in United States: (1) central business districts, (2) outlying districts, (3) principle thoroughfares, (4) neighbourhood business streets and (5) isolated store clusters.²² His study was made in 1937; central place theory was not used to explain the hierarchical pattern.

Hans Carol used central place theory to identify a hierarchy of central functions within Zurich.²³ He distinguished four types of centres: (1) central business district, (2) regional business district, (3) neighbourhood business district, (4) local business district. Berry identified a five order hierarchy of centres within Chicago.²⁴ They were (1) central business district, (2) regional business centre, (3) community business centre, (4) neighbourhood business centre and (5) isolated convenience stores and street corner developments. Garner identified six orders in Chicago²⁵ and Dutt four orders in Calcutta.²⁶ Burns distinguished a four tier hierarchy in

the urban centres of Britain: (1) central business district, (2) district centre, (3) neighbourhood centre and (4) sub-centres.²⁷

The increase of both population and area in urban settlements contribute to the growth of a hierarchy of centres within urban areas. When a city centre specializes in higher order goods on a regional or national basis, lower order places within cities meet the demand of local town population. The rapid transport developments and sub-urbanization processes assist the horizontal expansion of urban areas. Hierarchies of centres develop within large urban centres, although such centres are insignificant in small towns. An increase of consumer shopping and frequency of visits and traffic congestions and parking problem in big city centres also assist the growth of service centres throughout the city. In recent years modern town planning and policies of decentralization have emphasized the need for local consciousness and interdependence within the city area and have made clear the value of the neighbourhood unit as a concept in urban development.

In this section a case study of the hierarchy of centres in Jaffna is attempted. Jaffna City is the primate central place of Northern Ceylon. The city covers 7.75 square miles and had a population of 94670 in 1963. Because of its physical size and population, the city possesses a noticeable hierarchy of centres. However, compared with international cities, this is still a small urban centre. The present Jaffna City Municipal Council area originally consisted of Jaffna and 15 other villages, with their sub-villages. The

city is an agglomeration of developed rural settlements. Social factors such as caste, religion and ethnicity have assisted the growth of social areas within the city. For the analysis of functional hierarchy, the contiguous suburban settlements of Nallur and Thirunelveli are included with Jaffna City as parts of these villages are within Jaffna City Municipality. These villages were closely linked with Jaffna City, particularly after the 1960's because of suburbanization processes. Jaffna City and the above villages had a population of 103,125 in 1963.

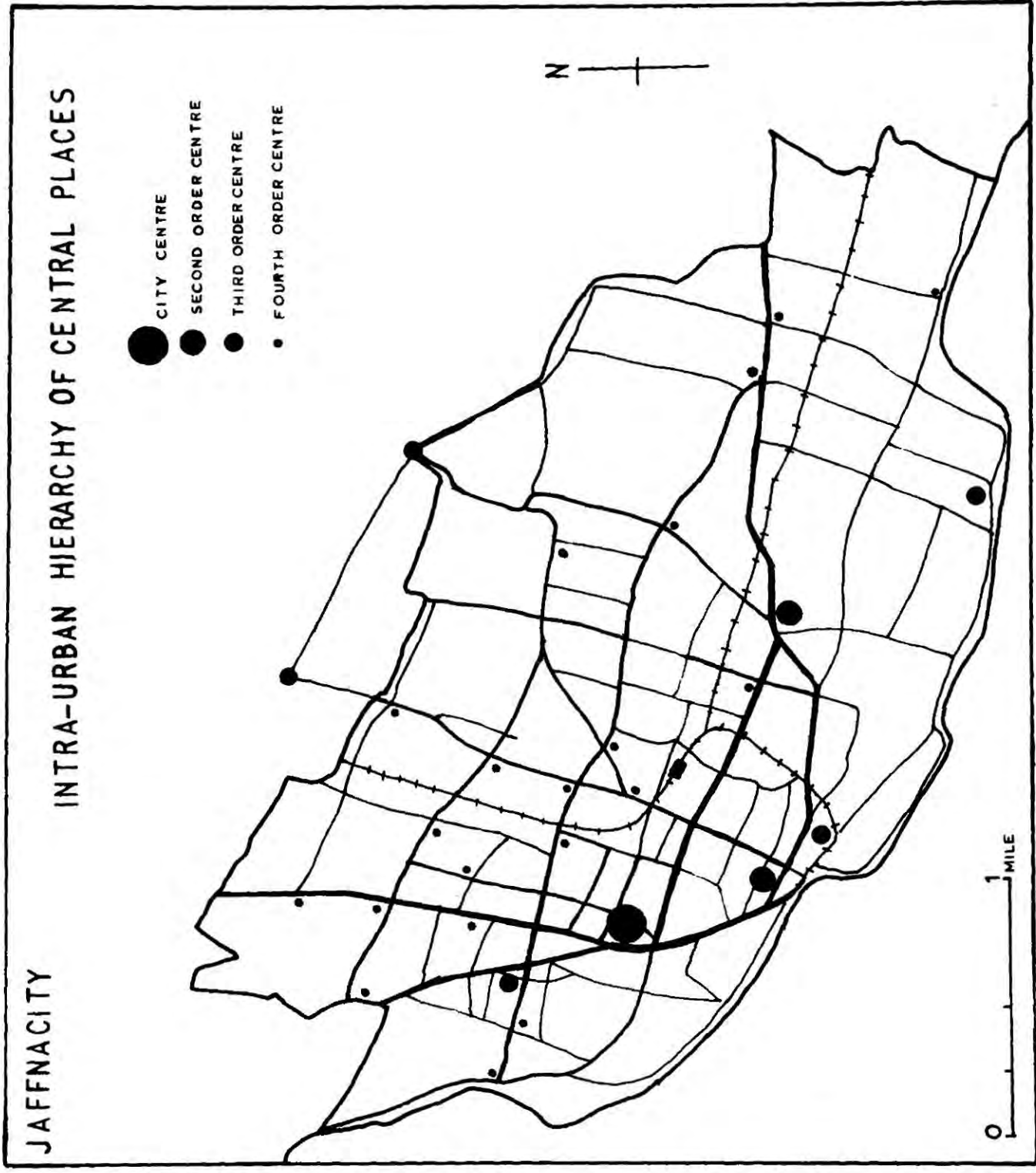
There are 28 service centres identified in the City and the two suburban villages. The service centre or a central place may be defined here as a group of central functions separated from any similar group by an open space or residential area in which such functions are absent. The hierarchy of centres have been identified from the comparative analysis of functional structure of the service centres. The functional index method is used for the weighting of functions and assessment of centres. The cumulative dependent population method is not used here because the population details within the city are available only at ward level and these do not truly reflect settlement patterns. Based on functional index scores, four level of centres have been identified. Table 7.7 shows the grades of centres.

Table 7.7 The hierarchy of service centres in Jaffna City

<u>Grade</u>	<u>Number</u>	<u>Functional Index</u>
A - City centre (C.B.D.)	1	2300
B - Secondary centres	2	410-660
C - Third order centres (Neighbourhood centres)	5	50-125
D - Fourth order centres (Localized centres)	20	1-35

Source: Field Survey, 1968/1969.

FIG. 7.7



The spatial distribution of service centres in Jaffna is shown on Fig. 7.7. The present distribution of service centres has evolved as an integral part of the overall process of urban growth. In the process of urbanization, coastal areas were important in the European periods. The present secondary centres and in particular the Fort-Main Street centre had an important role in the past and the present city centre has been developed mainly in the 20th century. The third and fourth order centres were associated with residential development. The third order centres are found in peripheral areas of older settlement. The fourth order centres are recent ones and have been developed on main road intersections and the main road nodes reflect the distribution pattern of the localized centres.

The Local Centres

This is the fourth order centre in the hierarchy within the city and 20 centres are identified. These places mainly contain convenience functions such as retail stores, co-operative stores, tea and coffee boutiques, primary school, bicycle renting, laundry, sub-post office, secondary school. Except for the secondary school, other functions are used by the neighbouring residents. In case of secondary schools they have students from different parts of the city as well as from outside the city. Table 7.8 shows the list of localised centres in the city.

Table 7.8. Localised centres in Jaffna City

Anaipanthy	Nachchimakovil KKS junction
Ariyakulam	Nallur Kandasamy kovil junction
Ariyalai market	Navalar Temple junction
College lane-Kasthuriyar junction	Navalar Tower Road Junction
College lane KKS Road junction	Navanthurai
Colombuthurai	Oddumadam
Illupaiyady junction	Parameswara College junction
Kantharmadam	Railway station junction
Ladies College junction	Taffs Road-Navalar Road junction
Mampalam junction	Thaddatheru junction

Third Order Centre (Neighbourhood Centre)

There are five places in this category: Karaiyoor, Pasaiyoor, Nallur, Thirunelveli and The Five Road Junction. These places have more functions than the previous category. Karaiyoor and Pasaiyoor are the main fishing centres and have fish markets whilst Nallur and Thirunelveli markets are important for agricultural products. However, there is no big market at the Five Road Junction. These places have functions in addition to the functions of the localised centres, large retail stores, textile shops and motor garages and repair shops. Nallur has more higher order functions than the others. It is the main service centre for Irupalai, Kopay South and North Eastern part of the city. Thirunelveli is the main market and shopping centre for Thirunelveli and North Central area of the city. Karaiyoor is important because it has one of the two arrack taverns of the city this being the main attraction of the centre. The Five Road Junction is the main neighbourhood shopping centre for the Western part of the city and in particular the Muslim Wards of the Old and New Mosques. When compared with other four centres, Pasaiyoor has less functions but is significant because of the big fish market.

Second Order Centres and the City Centre

There are two centres in this category: Fort-Main and Chundikul (Kachcheri) together with the City Centre. Certain functional aspects are briefly noted here and detailed aspects of the city centre will be discussed in the functional areas of the city. The Fort-Main Street centre is the second most

important centre in the functional hierarchy of the city. This used to be the primate centre but it has now declined from its former importance. Institutional and administrative functions are significant in the functional structure. In terms of commercial functions, this is the secondary shopping centre. Chundikuli is a major centre for administration. State administrative offices and educational institutions are concentrated here. However, this centre has no commercial importance.

Periyakadai or the city centre is the highest order in the functional hierarchy of the city. It has 57 per cent of the city's central functions. Accessibility is the dominant factor in its functional growth. This centre has most of the recognised central functions and in particular higher population threshold functions. In commercial functions, it has a dominant position in the whole of Northern Ceylon.

In conclusion therefore Christaller's central place theory is not only applicable to study settlements on a regional basis but also for the study of intra-urban hierarchical patterns. Though Jaffna is a small urban centre, it has four levels of hierarchy of service centres. The locations of commercial functions are clearly associated with population threshold size. The distribution of the hierarchy of centres is also associated with socio-economic characteristics of city areas.

Functional Areas in Jaffna City

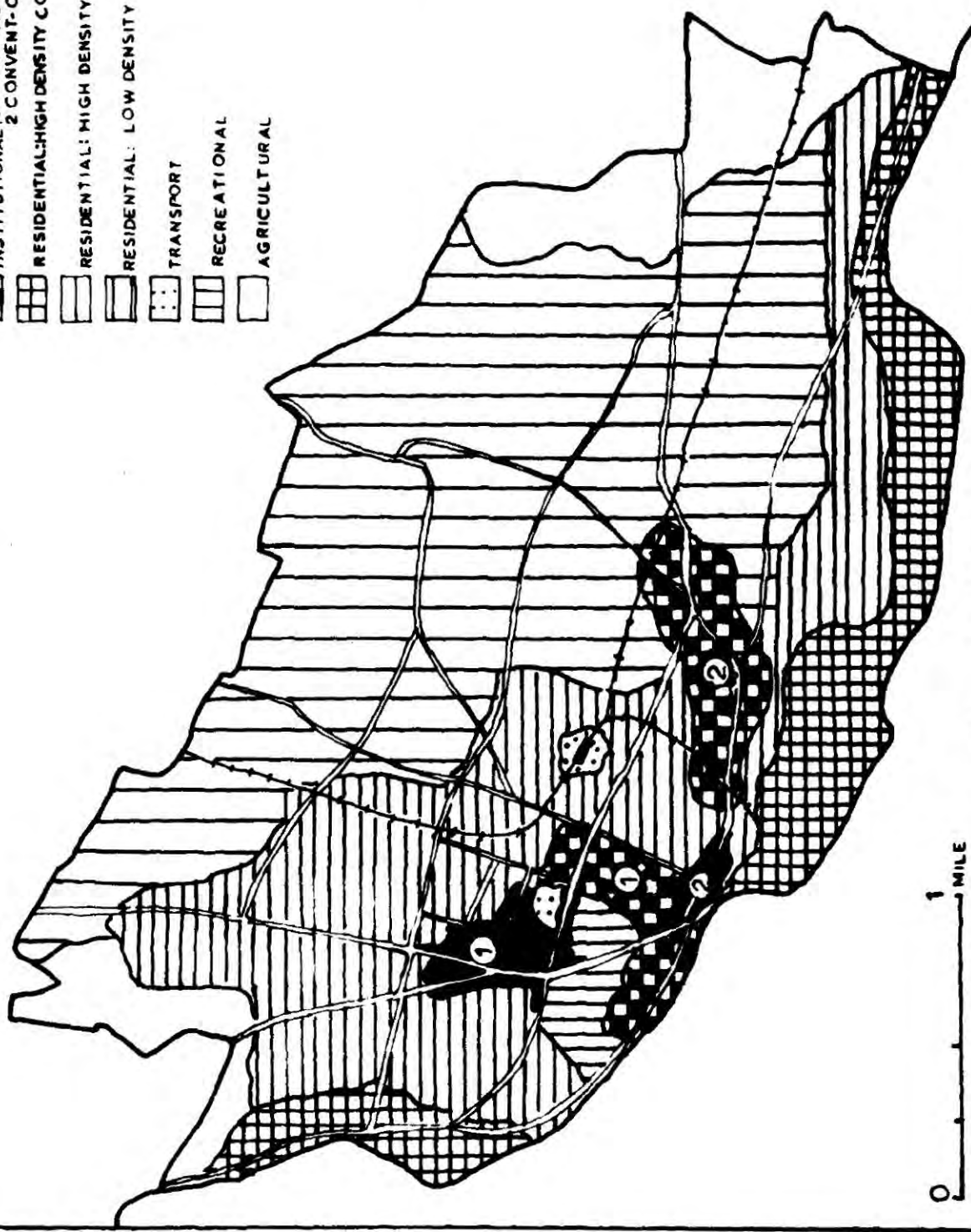
Functional areas show the synthesis of spatial interrelationships of individual land use patterns and

FIG. 7.8

JAFFNA CITY

FUNCTIONAL AREAS

- 1 CITY CENTRE
- 2 MAIN STREET-SINNAKADAI
- COMMERCIAL: 1 HO SPITAL → FOR T
- 2 CONVENT-CHUNDIKULI
- RESIDENTIAL: HIGH DENSITY COASTAL AREAS
- RESIDENTIAL: HIGH DENSITY INNER AREA
- RESIDENTIAL: LOW DENSITY OUTER AREA
- TRANSPORT
- RECREATIONAL
- AGRICULTURAL



concentration and segregation of functions by certain associations of land use. Commercial, institutional (administrative socio-civic), industrial, recreational, transportational and agricultural are the main functional areas within the town. They show which parts of the town have a high centrality level in terms of functions, land values and intensity of land uses. In some cases, land is multifunctional, but at others it is characterised by only one function or specialized area. In planned towns functions are well demarcated as industrial, shopping, residential or recreational areas, but in towns which have experienced an unplanned growth, the creation of functional areas is determined by economic forces.

In the study area, except for Jaffna City, centres do not contain any special functional areas apart from the central cores of the towns. The small core area may cover a few thousand square yards and contain most of the functions of the towns. The centres are small in physical size and urban functions tend to be associated with road junctions. But in the case of Jaffna City, because of its history, population, physical size and corresponding functional importance, the town has marked functional areas.

There are several theories about city structure such as Burgess's concentric zone theory,²⁸ Hoyt's sector theory²⁹ and Harris and Ullmans' multiple nuclei concept,³⁰ which attempt to explain the land uses and functional zones of cities. When a town grows functional segregation and specialization develops. The functional areas of Jaffna are shown on Fig. 7.8 and include commercial, institutional, residential,

recreational, and agricultural functions. There are no industrial areas illustrating the absence of large scale industry within the city. The residential functions are also important in commercial and institutional functional areas.

In the absence of industries the commercial functions are important in the city forming processes. There are two types of commercial areas found within the city.

1. Periyakadai (Grand Bazaar) - multifunctional but predominantly a commercial area and part of the city centre.
2. Main Street-Sinnakadai (Small Bazaar) secondary importance as a commercial area.

Periyakadai is the central business district of Jaffna City. This is the main commercial area with specialized trades. There is a high concentration of commercial functions; a typical pattern of intensive land use; a high density of tall buildings and high land values. Periyakadai includes the area between Kankesanturai Road and Punnalai Road on the west, Navalar, Kannathiddy Lane and Stanly Road in the north, Clock Tower Road on the east and Circular Roads on the south. The core area is not compact because of inadequate frontal space. Sizeable non-frontal areas are not effectively used within the city centre because of narrow streets and an absence of short distance grid patterns of roads. The low lying areas around Vannankulam and Pullukulam also prevented an intensive commercial land use pattern from developing. The Main Street section of Jaffna City is well developed with short distance patterns of roads.

The city core is not a homogeneous region, for functional

FIG.7.9

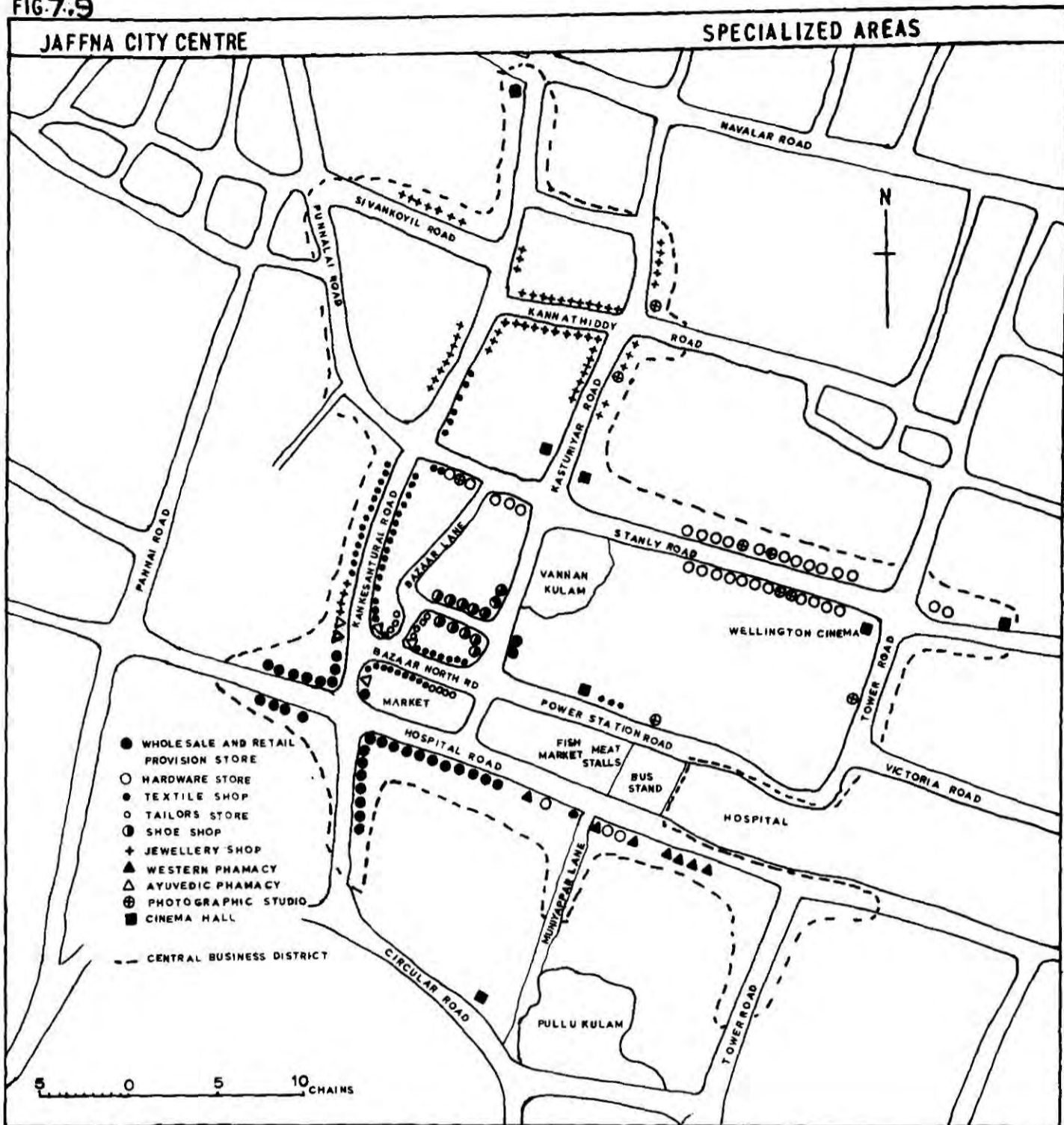
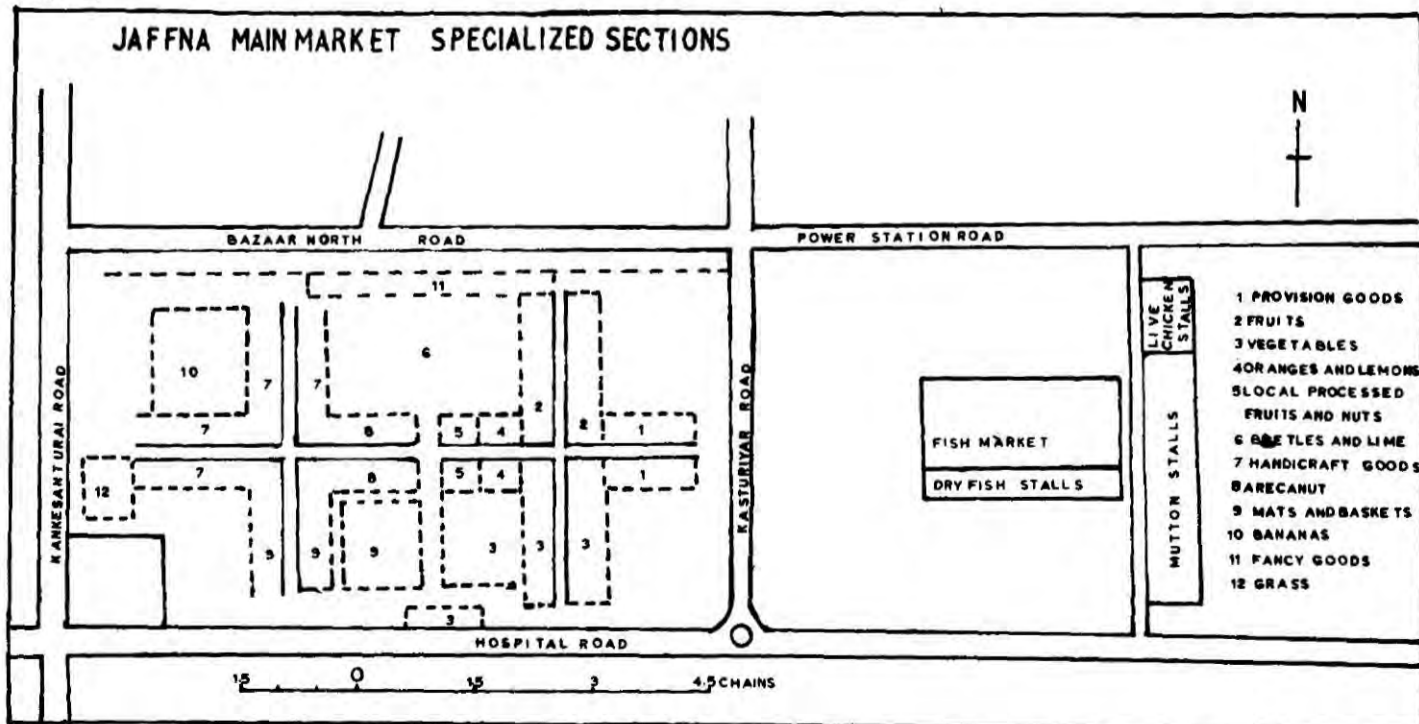


FIG.7.10



specialization within the city centre is an important urban phenomena. This has been identified by other workers in most large cities. Economic factors are the main reason for the segregation of functions. Areas of specialization exist in (Periyakadai) the city centre of Jaffna and Fig. 7.9 shows areas of internal specialization in the city centre where the differentiation of functions is noticeable by streets. The vegetable and fish markets are found in the core of the central area. Within these markets there are several specialized sections (see Fig. 7.10) for the provision of goods, bananas, other fruits, vegetables, beetles and arecanuts and palmyra products and there are different qualities of shops found within the market. The fish market, which is separated from the vegetable market, also has specialized trade areas for fresh fish, dry fish, goat meat and live chickens. Since the market is closer to the bus stand, there are many pavement traders selling goods such as fruit and clothes. The market is a petty retail trade functional area of vegetables, fruits, fish, meat and others.

The specialized areas within the C.B.D. are one of the main characteristics of cities. There are specialized areas notably for textiles, tailors and ready-made garments, wholesale and retail shops, shoe shops, jewellery shops, Western and ayurvedic pharmacies, metal and hardware shops, sack works and motor garages within the city. Some of these activities are segregated because they originated from caste or occupational segregation within the city. For example, the street names such as Kannathiddy (Brass smith area) and Chemma Street (Cobblers street) reflect this specialization of activities.

Textile shops are found in the North Bazaar Road and in Kankasanturai Road close to Muddaskadai Junction. The number of textiles shops increased in North Bazaar Road in the 1960's and declined in the Kankasanturai Road. Tailors and ready-made garment stalls are found opposite textile shops on the Bazaar North Road. Shoe, repairing, manufacturing and retailing is concentrated on Kasthuriyar Road and Bazaar Mosque Lane sections. The main centre of the jewellery trade is on the Kannathiddy Road between Kankasanturai and Kasthuriyar Roads where the leading jewellery merchants are clustered. The jewellery shops found on Kankasanturai and Kasthuriyar Roads near to the Kannathiddy jewellery shops are small and carry out pawn broking business in addition to jewellery making and sales. Wholesale and retail provision stores are found on the Hospital and Kankasanturai Roads near to Sathiram Junction. On the Hospital Road these shops are found between Muniyappar Lane on the east and Ponnammah mill on the west, on the Kankasanturai and Hospital Roads these shops are found opposite the vegetable market. The Stanly Road area specializes in hardware, tyre tubes and electrical goods. The Stanly Road shops developed very rapidly in the 1960's and most of the buildings are multistorey. Closer to Wellington Cinema there are concentrations of photographic studios and motor repair garages.

In addition to the above, there are several functions found in segregated form such as sack works, book shops, Western and ayurvedic pharmacies. In addition to the commercial functions this area is very important for entertainment; all six cinema halls of the city are found within the core. Administrative offices, mercantile and

other functions were not significant until recently. In the late 1960's the Departments of Inland Revenue and Post and Telecommunication and District Co-operative Federation office were established. The administrative offices have been in Kachcheri area from the Dutch period and it later became a specialized area for administration. Absence of office premises within the city centre also prevented the growth of large numbers of non-commercial functions. The number of multi-storey buildings is limited and these buildings are used by shop owners or shop assistants for residential purposes. Lack of city pipe-borne water and sewerage schemes made it difficult to use upper floors for other functions.

Main Street-Sinnakadai Commercial Area

The Main Street of Jaffna was formerly in the European part of the city, and had high quality shopping facilities. After the decline of the European population the importance of this location diminished in favour of Periyakadai, which formerly served the local population. The functional area covers Main Street and the small Bazaar of Fourth Cross Street. Along Main Street, from First Cross Street to Fourth Cross Street, several types of shops are found such as retail provision stores, bakeries, optical goods, textile shops, banks, book shops, printing presses and eating houses. Unlike the Periyakadai commercial area, there is no specialized area for different commercial functions. The shops are housed in larger premises with big verandhas. These buildings were built by the Dutch. Some of the large premises are used as ware houses. In Sinnakadai, adjacent to Main Street, there is a big market, which specializes in fish and meat trades.

The functional area is of secondary importance as a commercial and shopping centre for the eastern part of the city; it has specialized goods to cater for the Christian population.

Institutional Areas

There are two locations where institutional functions are found:-

1. Hospital - Fort area
2. Convent - Kachcheri area.

The first is found between the main commercial areas of Periyakadai and Main Streets. This part includes the area between Point Pedro and First Cross Street on the east, Clock Tower Road on the west, Victoria Road on the north and the coast on the south. This functional area consists of prisons, Magistrates', District and Supreme Courts, a number of Proctors' and Advocates' offices, Police station Superintendent of Police office, Municipal Council offices and Customs offices on the southern side, secondary schools, primary schools, Wesleyan church and other religious institutions in the centre, and Provincial Hospital and School of Nursing on the north. In addition to these functions, the area includes a few residential quarters in the centre. This area has remained the main institutional sector since the Dutch period.

The other institutional area is located along Main Street between Jaffna Holy Family Convent on the west and Kachcheri on the east. This area is the main district administrative centre of Jaffna City. The area includes a large number of government district level administrative offices, Jaffna district secretariat, Government Agent's residency, School Medical Office, N.D.A.P. office, leading colleges, primary school, seminary,

Bishop's House and Catholic and Christian old churches. In Jaffna City administrative functions are segregated from the commercial centre. The Kachcheri area has been the centre of provincial and district administration since the Dutch period.

Residential Functional Area

There are three sub divisions identified in the residential functional area: (See Fig. 7.8)

1. High density coastal fishing population area.
2. High density inner residential area.
3. Low density outer residential area.

High density coastal area

This sub-division includes Navanthurai, Pasaiyodur, Pannai, Colombutturai and part of Eachchamaddai areas. The population is mainly clustered closer to the fish market and the church centre, and mainly engaged in fishing activities. The residential units are very small, often with one or more families living in one house. Most of the compounds are very small and do not have a toilet or well. The drinking water is provided by standing pipes. Some of the residential units along the main roads perform dual functions: retail trade in front and residential functions at the back.

High density inner residential area

This covers Old and New Mosques, Station and Bazaar Wards and parts of Koddady and Eachchamaddai. The area's residents are mainly working class employed as toddy tappers, petty business traders, shop assistants, etc. The ethnic social structure of this area is composed of Ceylon Moors, Indian Tamils and lower caste Tamils. The houses and compounds are

small but larger than those of the coastal area. Though there exists a generalized pattern, some high class residential pockets are found within the zone. The low level of ownership of motor vehicles and business interests encourage the rich people to stay within the zone. Pockets of high density clustered settlements are noticeable. Slums are found along the railway adjacent to Theviorkulam and Rasavinthodam Road and are occupied by the Paraya caste. Slum housing conditions exist in the Ariyakulam, Aynchalanthai and Koddady areas.

Low density outer residential area

The outer residential area covers Chundikuli, Nallur, Kailaya Pillayar, Kantharmadam and Vannarpannai. The houses in this part are not contiguous and most of them are situated in groves of trees. The houses and compounds are large and most of the compounds contain wells. The houses are surrounded with high fences which are made of "olas" or walls. The fences comprise two portions:- one is a live part and the other is dead. The live part is mainly composed of Kiluvai and Poovarasu. The dead part is composed of cadjan or olas (palmyra leaves).

The outer residential area is considered to be a better residential zone and some areas in Temple Road and Chundikuli are settled by professional and business classes. Though this area has relatively better lower density housing, there are pockets of high density low quality developments also. These pockets are mainly settled by lower caste people. Rural characteristics are found in the Ariyalai, Nayanmakadu, Kantharmadam and Nallur neighbourhoods.

Transport Functions

The main bus stand is in the city centre. Its adjacent areas are used for transport functions. There are bus, taxi and lorry and pushcart stands. Most of the public transport originates in this area. Jaffna City railway station is also found in connection with other functions. The station and goods shed cover a large tract of land. (See Fig. 7.8)

Recreational Area

The recreational function covers the areas south of the commercial core and west of the institutional area (See Fig. 7.8). This part contains Muththaveli (Esplanade), Municipal park and Pannai beach. In addition to these, there is a library and an open air theatre. Though the library is not a recreational institution, people visiting the park or beach often visit the library as well.

Conclusion

The problem about the existence or non-existence of hierarchical arrangement of centres has been widely discussed. Christaller, Losch, Berry and Garrison and several others identified the hierarchy of centres in different parts of the world. Vining stressed that discrete levels of central places only express convenient moods of expression but they do not refer to structurely distinct entities, and he preferred a continuum of centres.³¹ Beckman has shown how the hierarchical and continuum concepts can be combined with the addition of random elements.³²

There is evidence in Northern Ceylon for the existence of hierarchical grades of central places. Seven grades of central

places are identified. The quantified nodality and centrality measures, the different size of population thresholds for central functions, number of functions, functional units, the size of complementary areas of functions indicate the existence of different grades of centres. The discrete stratification of nodality and centrality values is clearly visible in the first four grades of centres. However, a continuum trend is evident in low order centres. Though Jaffna City is small, four types of hierarchy of centres are noted. This shows that whatever the size of urban centres the different hierarchy of centres exists within the centres at different scales. Though the growth of Jaffna City has been unplanned, the city has different functional zones. The city-forming processes play an important role for the specialization of functions within the city. The absence of broad grid road pattern and fragmentation of city centre land ownerships prevent the emergence of an intensive land use pattern.

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CHAPTER EIGHT

THE TRAVEL PATTERN AND SERVICE AREAS

In this chapter the themes of transport structure, travel patterns and service areas will be discussed. The hierarchy of centres described in the last chapter was expected to be influenced by consumer travel patterns and the size of the service areas of central places. The travel patterns and service areas of centres also show their nodality of centrality positions. The centrality or nodality of places may be measured directly by assessing movements to and from central places or indirectly by assessing movements to and from central places or indirectly by appraising settlement characteristics, especially functional characteristics, which are presumed to reflect movements. The concept of centrality and nodality were discussed and the functional characteristics of settlements were quantified by scoring, functional index and cumulative dependent population methods. However, the analysis of transport structure and travel patterns are taken here in order to demarcate the urban sphere of influence with other factors.

Transport structure

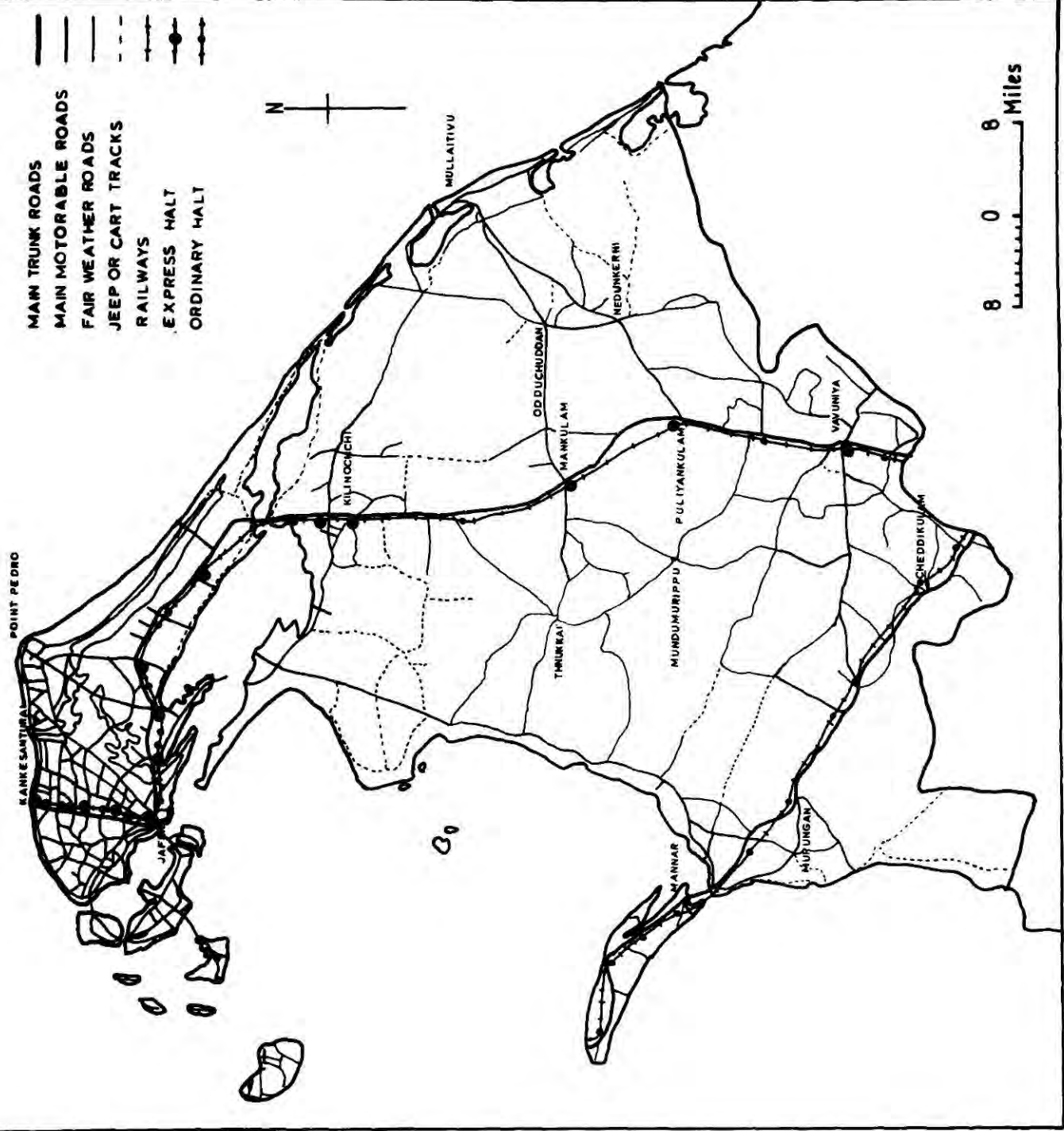
The transport facilities and mobility of population of an area are the indicators of the degree of economic and social development. Transportation routes are essential for the flow of goods, people and information around the central place system. The movements connect the several elements of the system into an integrated whole, whilst transport facilities assist the growth of centres and increase the

FIG-8-1

NORTHERN CEYLON

TRANSPORT NETWORKS

- MAIN TRUNK ROADS
- MAIN MOTORABLE ROADS
- FAIR WEATHER ROADS
- - - JEEP OR CART TRACKS
- RAILWAYS
- EXPRESS HALT
- ORDINARY HALT



movements of people. The structure and the means of transport are the essential factors determining travel patterns.

Fig. 8.1 shows the transport network of the area. The difference in density of roads between the Peninsula and the Mainland is very clear. On the Mainland, except for a few main roads such as Jaffna-Kandy, Talaimannar-Anuradhapura, Mullaitivu-Mankulam and Parayanalayankulam-Vavuniya, the majority are impassable and not open to traffic at certain times of year. A large number of small settlements on the Mainland are not served by roads. This affects the mobility of their population. But on the Peninsula, the road network is fairly well developed and most settlements are connected to main or secondary roads. There are two railway systems. One is in the centre, between Kankesanturai-Iraperiyakulam and the other is in the South West, between Talaimannar and Neriyakulam. Both railways meet at Madawachiya nearly 14 miles from the study area's southern boundary.

The structure of the transport network of the area is analysed by graph theory. Garrison¹ and Kansky² used graph theory to analyse transport structure in the U.S.A. and in Sardinia. For the analysis of network structure the main trunk roads and main motorable roads are taken into consideration. The network refers to a geographic location interconnected in a system by a number of routes. This suggests three fundamental building blocks: origins, routes and destinations. The term structure denotes the layout, geometry or network pattern of transportation systems. These expressions, which may be used synonymously, imply a set of spatial relations between distinguishable elements of transportation networks in respect to each other and to the organized whole. By

measuring such relationship we can quantify the notion of structure.

Graph theory, as a branch of combinatorial topology provides us with an appropriate language suitable for the measurement and analysis of the structure of transportation networks. Graphs, defined as sets of systematically organized points and lines, are similar visual representations of abstract concepts and relations. Christaller's K=4 system of central places is based on transport principles.

Some important measures of Kansky's proposals are examined here to analyse the fundamental structure of the network. For the fundamental measures of network of the study, the Peninsula and the Mainland are treated separately. In graph theory, the cyclomatic number (or first Betti number), Alpha, Beta and Gamma are important. The formula to μ is as follows:³

$$\mu = e - V + P$$

e = edges or routes

V = vertices or nodes

P = number of subgraph

The cyclomatic number of Jaffna Peninsula and the Mainland road network is as follows:

$$\mu = e - V + P$$

Peninsula 226-140+1 = 87

Mainland 68-53+1 = 6

The cyclomatic number shows the transport network differences between the Peninsula and the Mainland. The Peninsula centres are more connected than the Mainland centres.

The Alpha measure is an adjusted form of cyclomatic number μ . The formula α is for planar graph.⁴

$$\alpha = \frac{\mu}{2V} - 5$$

Alpha measure for Peninsula

$$\alpha = \frac{87}{280} - 5 = 0.31$$

Alpha for Mainland

$$\alpha = \frac{8}{106} - 5 = 0.079$$

The Alpha index for the Peninsula is six times greater than for the Mainland. On the Peninsula, the graph is not connected to a maximum level. The absence of diagonal connections is the main reason for the low Alpha index. The road pattern of the Jaffna Peninsula reflects rectangular and quadrangular patterns.

The measure of the degree of connectivity of a transport network is given by the Beta index.⁵ This expresses the relationship between two individual elements in the network. The connectivity of the network increases with the decreasing number of vertices. The degree of connectivity depends on the number of edges. The connectivity index of the Peninsula and the Mainland is as follows:⁶

$$\beta = \frac{e}{V}$$

$$\text{Peninsula} = \frac{58}{53} = 1.09$$

$$\text{Mainland} = \frac{226}{140} = 1.61$$

The Gamma index (α) is a ratio between the edges and vertices of a given transportation network. The formula is as follows:

$$Y = \frac{e}{3(V-2)}$$

The Gamma index for the Peninsula is .52 and for the Mainland .036. The value of 1 expresses a complete network. This analysis shows that the Peninsula has a developed network. However, the network is not fully developed and the low value for the Mainland represents a poorly developed transport network.

Frequency of Travel

The frequency of travel patterns depends on the nature of employment, income and other service facilities. The commuter population in the study is very small except in Jaffna although even here the numbers are small. The absence of industries in towns, and limited travel opportunities clearly restrict the commuter population. The general absence of a large scale commuter population therefore means that the movement of people are mainly for the purchase and consumption of central goods. Social visits such as visiting relatives and attending social events are also significant. The main purposes of travel therefore are for shopping, going to cinema or hospital or attend a court or offices or social visits.

Owing to the absence of large scale private car ownership, the public depends almost entirely on bus services for travelling. The train service is used mainly for long distance journeys but the inflexibility and unavailability of train service for many villagers restricts their use. Bicycles are used but mainly for short distance movement. From the foregoing, it can be seen that the bus service pattern largely reflects consumer movement and the urban sphere of influences.

Bus services were used by Green⁷ in United Kingdom and

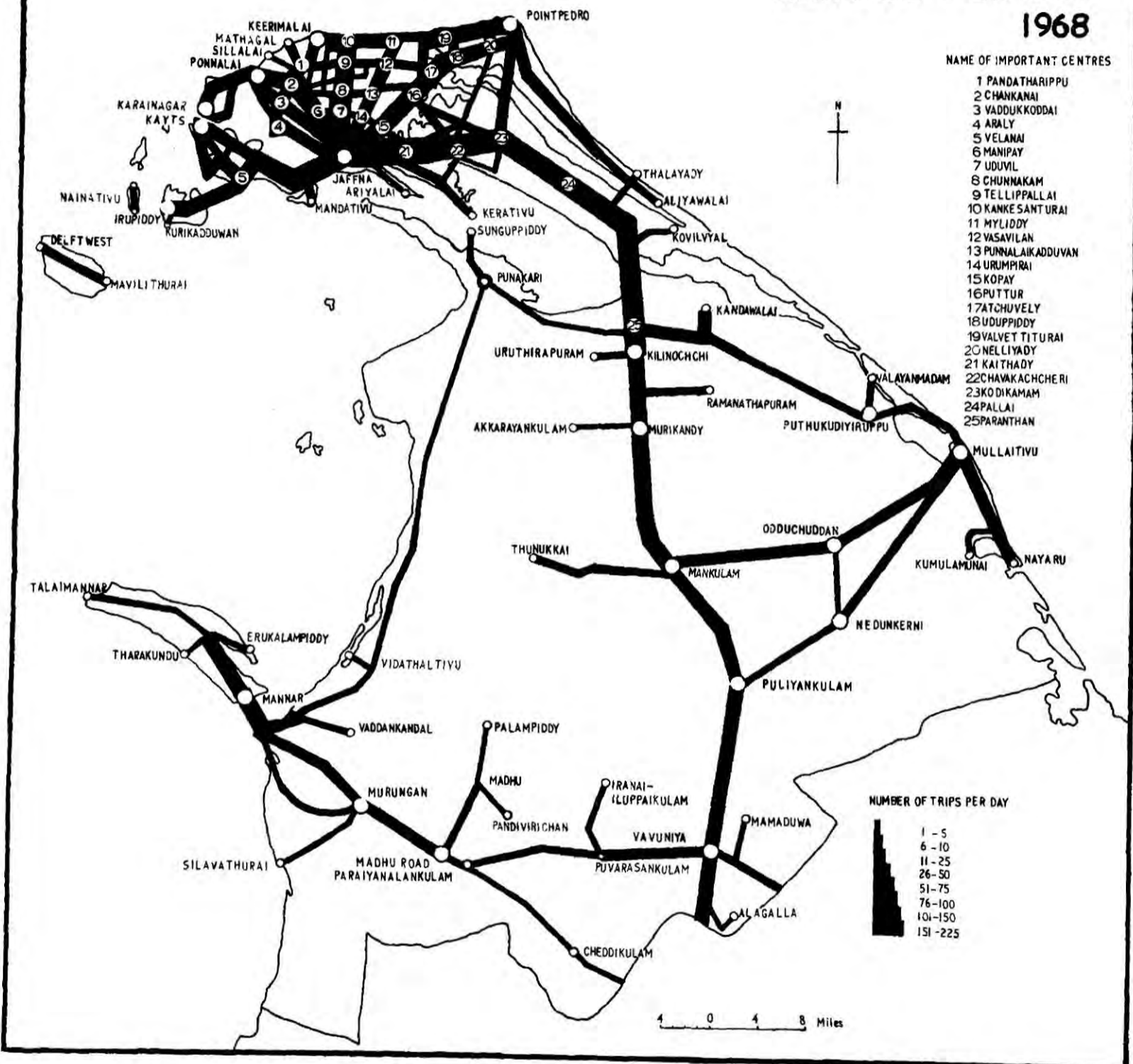
Europe and Sven Gunlund⁸ in Sweden to demarcate the urban sphere of influence of community interest areas. Carruthers⁹ used bus service pattern for the classification of service centres in England and Wales and to study the relationship between town and country. He used public transport not only to demarcate the hinterland areas but also to determine the higher order service centres. The service areas of the service centres within Greater London were demarcated based on the public transport system.¹⁰ However, the importance of bus and train services in the U.K. has declined particularly since the 1960's, as a result of the increase in private car ownership. The present role of bus service in public transport in Ceylon is very similar to the bus transport pattern of U.K. in late 1940's and 1950's.

Detailed analysis of bus services in the study area helps to explain the travel patterns and service areas of central places. In Ceylon, the national bus service is under the state owned establishment of the Ceylon Transport Board. Before 1958, the bus service was operated by private companies: there were five companies on the Peninsula, one in Mullaitivu and another in Mannar. A few bus routes were operated by co-operative societies and travellers' associations. The government's nationalization of all private bus companies in 1958 was a step towards the improving of the service. Through reorganization and the division of the Island into different transport regions. The northern region covers most of the study area.

There are three main bus depots: Jaffna City, Point Pedro and Mannar and sub-depots at Vavuniya, Karainagar, Kilinochchi

FIG. 8.2

CUMULATIVE FREQUENCY OF SCHEDULED BUS AND TRAIN SERVICE PER DAY 1968



- NAME OF IMPORTANT CENTRES
- 1 PANDATHARIPPU
 - 2 CHANKANAI
 - 3 VADDUKODDAI
 - 4 ARALY
 - 5 VELANAI
 - 6 MANIPAY
 - 7 UDUVIL
 - 8 CHUNNAKAM
 - 9 TELLIPPALLAI
 - 10 KANKE SANTURAI
 - 11 MYLIDDI
 - 12 VASAVILAN
 - 13 PUNNALAIKADDUVAN
 - 14 URUMPIRAI
 - 15 KOPAY
 - 16 PUTTUR
 - 17 TACHUVELY
 - 18 UDUPIPPIDY
 - 19 VALVET TITURAI
 - 20 NELLIYADY
 - 21 KAITHADY
 - 22 CHAVAKACHCHERI
 - 23 KODIKAMAM
 - 24 PALLAI
 - 25 PARANTHAN

- NUMBER OF TRIPS PER DAY
- 1 - 5
 - 6 - 10
 - 11 - 25
 - 26 - 50
 - 51 - 75
 - 76 - 100
 - 101 - 150
 - 151 - 225

0 4 8 Miles

and Mullaitivu. The number of services expanded in the 1950's with the metaling of roads. Before 1958, regular bus services were only operated on a few profitable routes. After nationalization, new routes were inaugurated, particularly on the Mainland, and the services were expanded. However, this expansion was restricted between 1958 and 1965 due to an inadequate number of buses, and the opposition of local people to the use of Sinhala registration number plates on vehicles. Since 1965, opposition has diminished and new buses have been added to depots in Jaffna City and other places. Even so, the general shortage of buses is still the main factor preventing the opening of new bus routes and increasing the frequency of services in many areas. Motorable roads and the population size of settlements are now the two determining factors in the development of bus services but the small number of passengers and the poor roads on the Mainland prevent the development of services and except for a few interior routes, the distribution of bus services is restricted to main roads on the Mainland.

The frequency of services and the average number of people travelling routes are the two most important criteria in identifying urban spheres of influence. Fig. 8.2 shows the cumulative frequency of scheduled bus services per day in 1968 and indicates the distribution pattern of bus routes and their importance. The frequency of services is low except on the main central routeway. Some of the bus routes have only two services per day. On the Peninsula the density of bus routes and frequency of services are high except in

a few isolated, interior settlements. There are between 101-150 bus services per day on Jaffna City - Palaly-Keerimalai, Jaffna City-Kodikamam, Jaffna City-Kankesanturai-Keerimalai, Jaffna City-Manipay-Karainagar, Jaffna City-Point Pedro and Jaffna City - Islands routes with Jaffna City having a prominent position in the bus and train transportation system. Bus services link it with the whole of the Peninsula, and all the important centres on the Mainland. In addition, long distance bus services operate to Trincomalee, Baticaloa, Matale and towns in East and Central Ceylon. The frequency of services to places on the Peninsula varies from ten minutes on the main routes to an hour on the minor ones. On minor routes services ranges from one to three per day.

Point Pedro is the main bus service centre in the Vadamaradchy division. There are 22 bus routes and the town is connected with all the major settlements in the Vadamaradchy division. Short distance bus services link Valveddithurai and Nellyyady with Point Pedro. Point Pedro and Jaffna City are linked by three separate routes. Other important routes are Point Pedro-Kodikamam, and Point Pedro-Aliyawalai and Kodikamam is the main express railway station for Vadamaradchy division.

Atchuvveli, Chunnakam, Chankanai, Chavakachcheri and Kayts are the next most important bus service centres on the Peninsula and from one to ten services operate from each of these centres. Chavakacheheri is located on the main route linking Jaffna City to the southern part of the Peninsula. Twenty-one services operate through or originate from this centre. Atchuvveli, Chankanai and Chunnakam are bus service centres at divisional level in the Valikamam area. Services originating from these

centres are of a short distance nature. Kayts is a terminal town, and five services operate to and from it. Kodikamam and Palai have express train halts and bus service centres for Eastern Tenmaradchy and Pachchilapallai. Kodikamam is linked with Point Pedro and Atchuveli. All Jaffna City - Mainland and long distance buses pass through these centres and this affects their importance.

On the Mainland, the bus service centres are Mannar, Vavuniya, Kilinochchi, Mullaitivu, Murungan, Mankulam and Punakari. Of these, Mannar is the main centre and twenty-six bus services operate from it. The centre is connected by long distance services with Jaffna City, Vavuniya and Anuradhapura. The western coastal area of the Mainland is connected to Mannar by bus services and most of the services are found in the area from Mannar to Erukampiddy in the west to Murungan in the east. The frequency of services on other routes is low, ranging from one to three per day. Murungan is the other bus service centre in Mannar district, operating services to Silawathurai, Madhu Road, Madhu Church, Palampiddy and Pandivirichchn. This centre is also second in the functional hierarchy in the Mannar district. Punakari is a small bus service centre, operating four services.

Kilinochchi, Mankulam and Vavuniya are the main bus service centres in the central part of the Mainland. Except for some long distance services, these centres developed short distance services in the 1960's as part of the colonization Schemes. From Kilinochchi ten services operate to neighbouring colonization settlements e.g. to Uruthirapuram, Tharmapuram, Vaddakachchi and Ramanathapuram. Since the

FIG-83

NORTHERN CEYLON

PASSENGER MOVEMENTS BY BUS PER DAY
NOVEMBER 1968

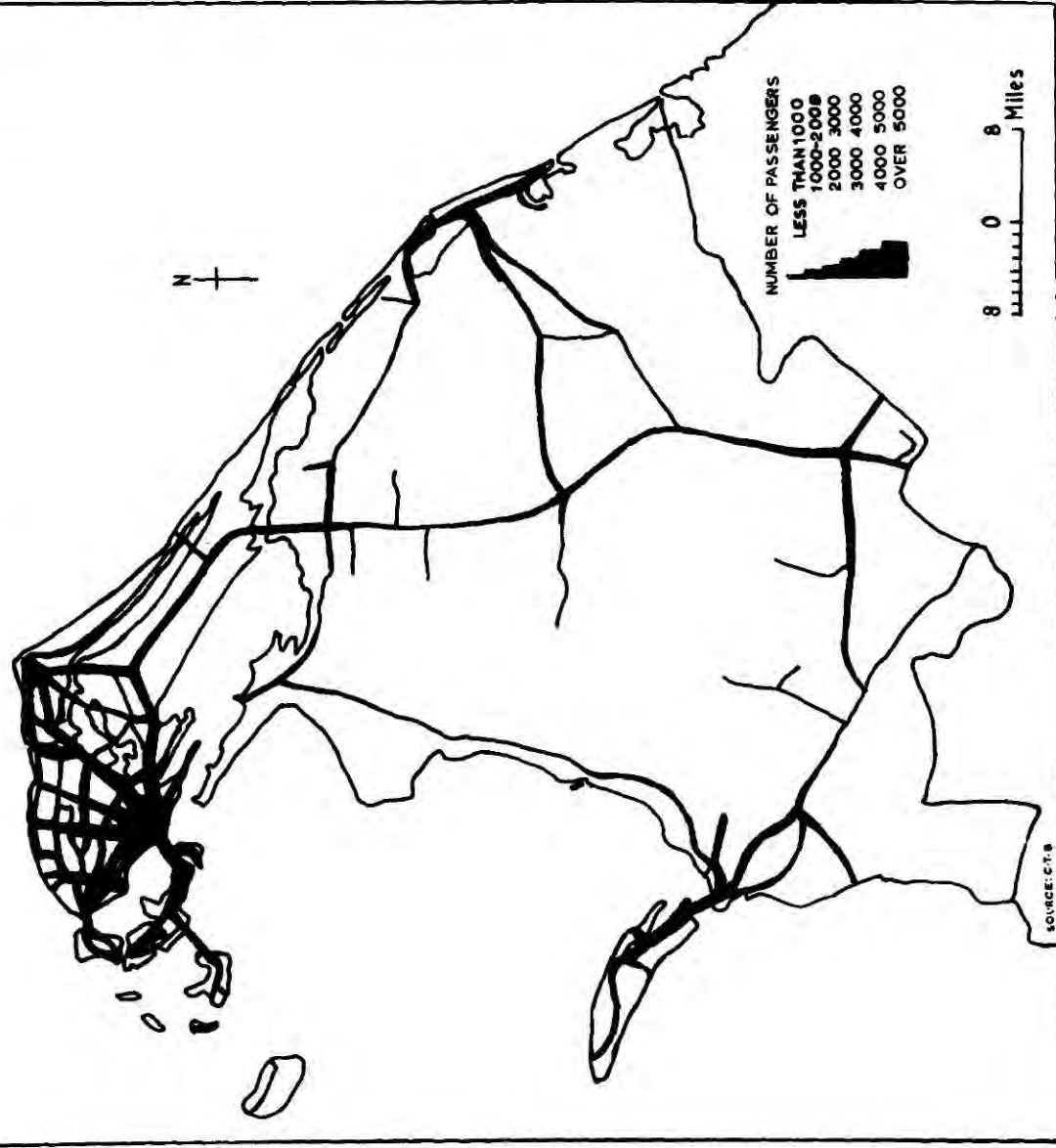
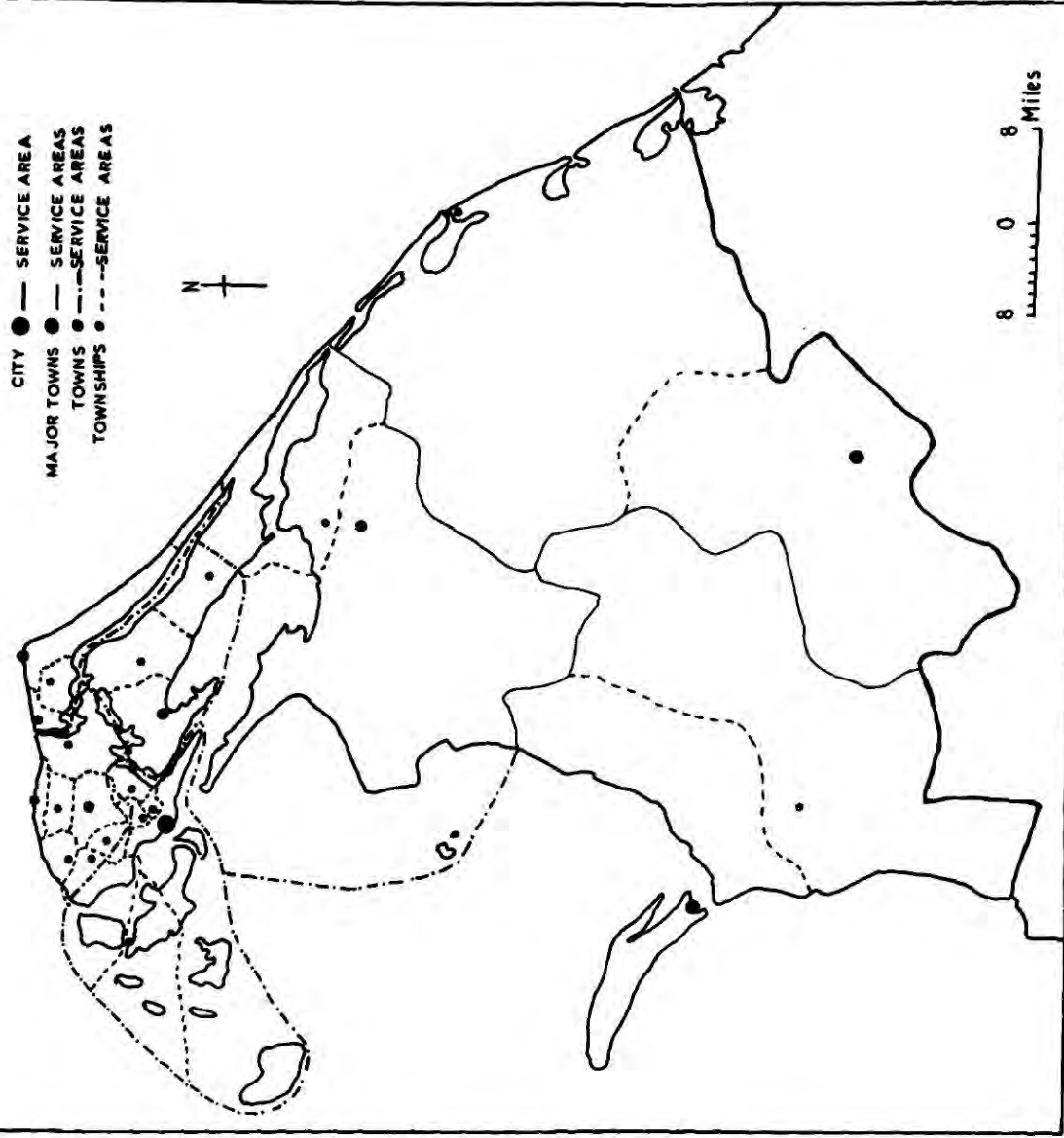


FIG-84

NORTHERN CEYLON

HIERARCHY OF CENTRAL PLACES AND THEIR SERVICE AREAS



establishment of a sub-bus depot in Vavuniya in 1968, the bus services have increased. Vavuniya South Sinhala and Tamil and Cheddikulam division settlements are all connected with Vavuniya by a low frequency of services. Eastern coastal area and Vavuniya North division are served by Mullaitivu.

Fig. 8.3 shows the bus passenger movements in the area and reflects the importance of bus routes and central places. More than 20,000 people visit Jaffna City daily. The people go there to obtain various central goods and services. However, nearly 5,000 commuting population is included in this figure. Because it is regional centre, the people come from all parts of Northern Ceylon although, the majority of the people are from the Islands, Valikamams, Tenmarachy and Vadamarachy. For low order functions the Islands' and Valikamams' people visit more frequently than the Mainland people.

Over 6,000 people visit the second order centres of Mannar and Vavuniya daily. These centres attract people from a large area of the Mainland. In the case of third order centres between 3,000-6,000 people visit Kilinochchi, Point Pedro, Chavakachcheri and Chunnakam. The number of people visiting Point Pedro remains more or less constant but in the other centres the daily figure fluctuates because of periodic market functions. Small townships such as Kayts, Chankanai, Mullaitivu, Kodikamam, Palai, Murungan and Pandatharippu have between 1,000-3,000 visits per day whilst the smaller places are visited by less than 1,000 people daily.

Concept of Range and Service Areas

Service areas of central functions and central places is

one of the most important aspects of central place theory. The range of a good or service is determined by the distance the dispersed population will travel to purchase the good from a centre. "..... a product of the simultaneous spatial effects of all the factors of demand and supply involved in the purchase of central goods and services. 'The good has both upper and lower limits to its range. The upper limit is the maximum possible radius of sales beyond which the price of the good is too high for it to be sold, either because of the increase of price with distance until consumers will no longer purchase the good (the ideal limit where demand becomes zero), or because of the greater proximity of consumers to an alternate competing centre (the real limit)".¹¹ The minimum is called the population threshold which was discussed in chapter five.

Each central function found in a central place has its own complementary area. The size of the complementary area depends on the hierarchical level of functions. Lower order functions such as primary schools or retail stores or co-operative stores have small complementary areas, whereas higher order functions have large complementary areas, such as district administration and provincial hospitals. There are two types of functions which can be defined based on their complementary areas. The first type of functions such as administration and certain commercial functions have defined complementary areas and there are 32 central functions of this category found in the study area. The second type of functions are mainly commercial and social functions which do not have defined complementary areas. In the first type of central functions it is possible to demarcate their exact complementary

areas, but in the second type of central functions the complementary areas can only be determined only through analysis.

The service areas of central places are an aggregation of service areas of central functions. The lower order places with lower order functions have a small service area, the higher order places with higher and lower order functions command large service areas. In this study, in order to demarcate service areas of higher order central places, the following factors are taken into consideration; Bus service analysis, the central functions with defined service areas, population threshold sizes of functions and the information gathered from field survey. These factors give valuable information about town and country relationships.

The consumer movement and the service areas of the central places are well expressed by above factors. As pointed out earlier, there was no consumer survey carried out. A field survey was made of the jewellery, furniture, shoe industries, motor garages and printing presses to establish their trade areas. However, the information about consumer movements and consumption of goods was gathered from traders, administrative offices, local authorities and the people involved in central goods supply. The consumer behaviour and movements are not complex in the study area as in western countries. Basically, Northern Ceylon is not a mass consuming society. It is a peasantry society with a very low per capita income and an average income per year of less than 600 Rupees and on average each Ceylonese family spends 60 per cent of ~~his~~ income on food items and this money goes directly to the local co-operatives, retail stores and local markets.¹²

Most food commodities have to be bought at local co-operatives because of the subsidised ration scheme. In addition to this, acute scarcity of durable consumer goods and extraordinary high prices restrict the purchasing power of the people. The dowry system also prevents people from purchasing durable goods. This assists thriftiness in the society and people prefer to keep their savings in the form of money or gold. For travel purposes, non-commercial functions play a vital role. Ordinary people visit central places mainly not for shopping but to visit a hospital or a court or government offices or to go to a cinema or social and cultural event.

In the last chapter we recognized the hierarchy of centres, i.e. cities, major towns, towns, townships, large villages, villages and hamlets. The complementary areas of the first four classes of central places based on centrality criteria are shown on Fig. 8.4.

The First Order - Jaffna

The service area of Jaffna covers the whole of the study area. In the last chapter reasons which explain the 'functional wholeness' of Jaffna City were given. The entire area is embraced by Jaffna City for specialized and higher order functions, particularly administrative, educational and social functions. The cultural differences between the study area and the area to the south also limits the sphere of influence of the city. Bus service patterns show all the important centres of the area which are linked with Jaffna City.

The Second Order - Mannar and Vavuniya

Mannar and Vavuniya service areas cover a large part of the Mainland. The extent of the service areas is very similar

to the administrative boundaries of the districts. The service areas of these two places are relatively easy to define, because of their role in administration and other higher order functions. When compared with Peninsula towns, these places have little competition from low order places and there are no town status central places in Mannar or Vavuniya district.

The Third Order - Kilinochchi, Chavakachcheri, Point Pedro and Chunnakam

Third order centre service areas are more difficult to demarcate. The first and second order centres complementary areas are similar to the study area and the district areas. But in third order centres, in addition to the above factors, physical factors also influence size. Kilinochchi's complementary area covers the whole of the Mainland part of the Jaffna district and the southern part of Pachchilapallai division. It functions as a main central place for Southern Jaffna district. Its influences became more dominant after the creation of Kilinochchi parliamentary constituency and township. Before the 1960's, the Punakari area was more affiliated with Chavakachcheri but today is more strongly linked to Kilinochchi. The development of bus services between Punakari and Kilinochchi and other colonization settlements explains the growth of its sphere of influence.

Chavakachcheri's service area covers the whole of Tenmaradchy and Pachchilapallai except Mullipattu. Thondamanaru and the Upparu lagoons divide Tenmaradchy from the rest of the Peninsula. Tenmaradchy is physically a peninsula within the Jaffna Peninsula. Bus service patterns and functional areas of the D.R.O., the Magistrate Court, the District Court, the Department of Excise and hospital functions cover the whole

of Tenmaradchy and Pachchilapallai.

The Vadamaradchy area is covered by Point Pedro. Similar to Tenmaradchy, Thondamanaru lagoons separate Vadamaradchy from Valikamam, Tenmaradchy and Pachchilapallai. Bus services, transportation networks and administrative functions for Vadamaradchy are focused on Point Pedro. The Divisional Revenue Office area, the Magistrate's Court and the police service area all cover the same complementary area.

This is the main centre for the Valikamam division. The service area of Chunnakam covers the most populated and fertile market gardening area. The centre functions as a prime agricultural market centre. Bus service facilities from this centre also indicate its sphere of influence. The influence of Jaffna City restricts the influence of Chunnakam on the southern and western side. The number of fourth order centres such as Kankesanturai, Chankanai, Tellipalai, Pandatharippu, and Atchuvveli restrict competition in the supply of agricultural goods. The absence of administrative functions in Chunnakam puts it at a disadvantage when compared with Point Pedro, Chavakachcheri and Kilinochchi.

The Fourth Order - Centres

There are 17 places in this category. They are all important townships and play a major role in providing goods and services at divisional or sub-divisional level. Towns like Mullaitivu and Murungan play a role in supplying goods and services at sub-district level whilst Peninsula towns such as Kayts, Chankanai, Palai are mainly divisional level towns. Places like Kankesanturai, Tellipalai, Pandatharippu, Valveddithurai and Kodikamam are mainly sub-divisional level. The size of the service areas and the distance between towns

are mainly determined by population. On the Mainland, the size of the service areas is larger, because of the scanty distribution of population. On the Peninsula, the average distance between fourth and higher order towns is less than four miles.

The service centres of the area are mainly associated with state orientated functions. The functions have defined service areas. These reflect the size and shape of the service areas of the centres. The size of the service areas differs between the Peninsula and Mainland, because of the distribution of the population. The public transport pattern reflects the real travelling pattern in the area. Even in fifth order settlements, Village Council areas reflect the service areas of the fifth order centres. The sixth order places on the Mainland are associated with Grama Sevaka divisions.

Conclusion

The transport structure of an area reflects the pattern of economic and social development. The differences between the Peninsula and Mainland are noticeable. In all quantified transport indices differences existing between the two regions reflect their economic productivity. In underdeveloped countries, public transport plays a significant role in the movement of people. This is evident in Northern Ceylon. Ceylon has not yet become a country of large scale private ownership of cars or mass consuming society. The public transport pattern and the defined service areas of administrative and other functions reflect the service areas of the central places. These factors with other general information about town-country relationships are found effective in demarcating service areas

of higher order centres. However, one might be able to observe very small anomalies in this general pattern with an exhaustive consumer survey.

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CHAPTER NINE

CONCLUSION

Berry emphasized the importance of central place theory in regional planning as follows: "The basic argument supporting the use of central place ideas in regional planning is that a system of centres arranged in a hierarchy provides an efficient way of articulating distributing to, and administration of regions. A proper system can avoid duplication and waste, and make possible realization of social benefits accruing from economics of scale. Identification of network of centres and the scale of activities appropriate to each level makes possible the proper location of new facilities, or where the scale of enterprise is changing rapidly, a systematic base for rationalization. Where an existing system is an integral part of the social and economic life of an area, it must be considered in any replanning efforts, or the efforts are doomed to failure. Conversely, it can be argued that the very leadership of major central places, as growth poles, sets the pace of progress of their regions".¹

The concept of central place systems has been used by planners in the planning of rural settlements, shopping centres, town and country relationships and rural neighbourhoods and communities.² Central place concepts were adopted in the planning of settlements in the Lakhish region of Israel and in the North Eastern Netherlands.

The Lakhish Regional Plan constituted the first attempt at regional settlement on a wide and comprehensive scale.³ The settlements were not planned as single entities but as a

combined, integrated network of economic and social units connected to common centres and divided into rural settlements, rural service centres and urban centres.

The rural settlements (Moshavim, Kibbutzim, Co-operative Moshavim) are the lowest in a three order hierarchy. These settlements have basic social and economic institutions such as clinics, kindergartens, elementary schools, co-operative stores and synagogues. The rural centre serves a group of 4-5 rural settlements located around the centre. These centres have more and better service facilities than rural settlement and function as a service centre for them.

The urban centre, which is a country town of several thousand inhabitants, includes rural service industries, living quarters built on urban densities and a generally higher standard of services; it serves as an administrative and service centre for the whole region. There are some problems however such as the rapid population growth of Qiryat Gat (the Lakhish regional centre), slow growth of some rural settlements and the development of Ashqelon and Ashdod on the west coast which have distorted the ideal hierarchial relationship of settlements.

Similarly the concept of a settlement hierarchy has been adopted in the creation of new settlements in the North Eastern Netherlands.⁴ The two order hierarchy, known as village and town, reflects the hierarchial functional level. In Canada the central place idea was taken to improve the central functions in the changing agricultural communities of Saskatchewan Province,⁵ and in Ghana⁶ and Poland⁷ for the rational development of service centres in a regional and

national basis. In various countries particularly in South and South East Asia (India, Ceylon, Pakistan, Malaysia, Indonesia and Philippines) considerable attention is given to the development of agricultural colonization on new lands recovered by the eradication of malaria and other endemic diseases, irrigation and forest clearings.⁸ However the concept of central places or urban hierarchy has not been seriously taken into consideration in their establishment.

It could be argued therefore that inadequate service and marketing facilities are main reasons for the slow ~~development within~~ agricultural colonizations in the Dry Zone of Ceylon. Though the Government have taken various measures to improve the central functions of settlements in the rural areas the results are not effective. The improvement of central functions has not kept pace with population growth and its rising expectations. Due to the education and social improvement of the rural population there are rising demands for even more facilities. In general the service facilities are inadequate and inefficient particularly in rural areas. The reasons for this lie in the uncoordinated action of different departments, the unsuitable location of central functions, shortage of staff and low productivity. These factors were analysed in the context of the study area in chapter V.

In previous chapters the general geography of the area, population and settlement patterns, commercial and service organizations, central functions and settlements, nodality and centrality level of functions and places, hierarchy of centres and travel patterns and service areas of the centres

were analysed. Through detailed survey and analysis of this nature the hierarchy and types of central functions will indicate how future development should be planned for the present distribution of central functions in the central places and the hierarchy of these places has been determined by geographic, economic and social factors. Economic developments assist the growth of central places and at the same time the existence of central functions in a place will assist the towns and regions' economic development. Tertiary functions such as schools, hospitals, commercial stores and types of central function are doing more and more to attract economic activity. In order to develop industries in an underdeveloped area where the infrastructure is lacking the government must build townships with associated facilities. In a developing area, rapid socio-economic changes at the regional, national or individual scale with rising levels of income tend to stimulate the consumption of central goods will take place not only through economic change but also from natural increase or immigration.

In this section, the author wishes to explore the prospects for regional economic development from the point of view of both employment opportunities for the population and the spatial aspect of development within the area. There are many questions that can be asked and for which solutions must be sought. How are socio-economic changes in the settlement pattern in the study area going to take place? What are the main problems in the present distribution of central functions and the hierarchy of central places? What measures are

needed to overcome these problems and direct future growth along the correct path? To what extent can central place ideas be taken into consideration in overcoming these problems for the future development of new settlements on the Mainland?

In Ceylon there is no clear cut national or regional planning policy. In the case of national planning few economic plans were mooted by different Governments: a report of a World Bank Mission, two six-year plans, a ten-year plan, and a three-year Implementation Programme. Neither of these plans were fully implemented for financial allocations in the national budget were meagre. Apart from these national plans there has been no regional or local plan formulation except for the Galoya and Walawe Ganga River Valley Schemes. Moreover, Except for the National Planning Department, no regional or local planning bodies exist.

At the district level there is a co-ordinating committee under the chairmanship of a District Government Agent, which consists of Members of Parliament of the district, Divisional Revenue Officers - and other senior district officials. Their function is to discuss or co-ordinate the Government development programmes and the socio-economic problems of the population. The committee is not a planning body. Its main function is to discuss the current problems of the people but the power of these bodies is very limited. Apart from the district co-ordinating committee there are no other committees tackling the area's problems. The local authorities such as Municipal, Urban and Town Councils regulate the buildings of houses and

other constructions, such as roads and sanitation development. The role of the planning section in the urban administration is very limited because of lack of revenue and power. The local councils (urban) are basically responsible for the functioning of public utilities such as water supply, electricity, sewerage and refuse collection. The Village Councils have no power to regulate the building of premises and their functions are extremely limited. Indeed in rural areas there are no restrictions on building activity or the conversion of land or buildings to different uses.

A regional plan is essential and becomes more and more important as a method of solving spatial economic differences within countries.⁹ Specific regional problems cannot be tackled within the framework of a National Plan. The regions in a country have different problems related to their geographic, socio-economic, and political characteristics. In order to overcome the special problems of each region different priorities should be given according to the needs of balanced regional development; this is essential in any country to maintain harmony between regions. For example, the recent political problems between East and West Pakistan and the emergence of Bangladesh^{sprang} from unbalanced economic growth of both parts of the country after independence. Even in developed countries as for example, in Britain and Common Market countries there are special economic regions and regional planning bodies for regions below the national level.

From the various proposals and plans one thing is clear, there is no immediate future for large scale industrial development within the study area. There are a few industrial units in the study area such as cement, chemicals, salt, fish

canning and tiles and bricks (see chapter I) and even though some of these are undergoing expansion their total importance is small. At Atchuveli an industrial estate will be set up at a cost of 9 million Rupees which will consist of 35 factory buildings which will cover 1,800 square feet - 15 units with a floor area of 3400 square feet and 10 units with a floor area of 1700 square feet. The Atchveli estate will lay emphasis on small scale production of industrial goods as well as the canning of fruits, vegetables and sea fish.¹⁰ This is the only project which is encouraging private investment and providing employment opportunities. Except for these projects and a few small scale private sector investments in Jaffna, there are no other major developments. Since Jaffna is 250 miles away from Colombo, the main market of South West Ceylon and lacks a good harbour the chances of attracting industries in large numbers to the peninsula or the study area is difficult due to its unfavourable position in terms of industrial location.¹¹ After the Kankesanturai harbour developments prospects may improve, but the industrial location factors are not favourable when compared with the Colombo region, the growth pole of Ceylon.

In the past, the educated Jaffna Tamils were able to get Ceylon and Malaysian government service jobs in large numbers.¹² But the chances of getting government jobs in Ceylon in large numbers, or going abroad has diminished and will continue to do so. The reasons for the decline of Jaffna Tamils in government service in the late fifties and sixties has been caused by several factors. In the past Jaffna Tamils were able to get state jobs in large numbers because of their superior English education compared to other parts of Ceylon

mainly as a result of Christian missions schools in the Jaffna Peninsula. The change of medium of instruction in schools from English to Sinhala and Tamil, and the change of the official language from English to Sinhala, with only limited use of Tamil, affected the Jaffna Tamils and lost them their favoured position.

In the 1950's and 1960's the increase of educational facilities in many parts of Ceylon led to a decrease in the educational differences between ethnic and religious groups and regions, and this created further competition. Because of these changes Jaffna Tamils, Christian religious groups and Matara and Galle district Sinhalese lost their dominant position in government service. Furthermore the government has taken action to improve the Kandyan Sinhalese and Muslim communities' share in government service. The creation of Muslim schools offered a large number of teaching posts to the Muslims in the sixties and removed the previous dominance of jobs in this profession by Jaffna Tamils. For several other posts the government is recruiting on a district, division or constituency basis with the aim of eliminating regional disparity and creating fair chances for all. Because of these changes and the equal facilities in education in many parts of Ceylon the chances of getting government jobs for the Jaffna Tamils, are more or less limited to the study area and a few other Tamil language parts of the country.

The petty trading activities by the Jaffna Tamils in South Ceylon are decreasing after the communal disturbances and the competition of local traders. Tamils now lacking confidence or in a state of uncertainty are very reluctant to invest in trade, particularly in the interior areas or

away from Colombo. Because of this lack of investment and an ever increasing state role in imports of goods and retail trade distribution through co-operative or special trading organization, the Jaffna Tamils are now facing severe competition.

From the above analysis the employment prospects of the Peninsula people as well as for the entire population of the study area, are becoming more and more difficult. After the communal riots in 1956 and 1958, the Jaffna people are keen on investing in agriculture rather than in any other sector for they have no tradition or confidence in branching into other activities. Therefore the future development pattern particularly for people on the Peninsula is dependent on agricultural developments on the Mainland.¹³ For there is no scope for developing agriculture in an extensive form on the Peninsula.¹⁴ Agricultural development on the Mainland is based on peasant colonizations, Middle Class Highland Development Schemes, Educated Youth Agricultural Schemes and hundreds of small tank villages which will to some extent help to solve the landless peasants' problem in the Jaffna Peninsula. Agricultural and fishing activities along the East and West coast of the Mainland, and tertiary opportunities on the Mainland as a result of agricultural expansion, are possible solutions to the population pressure on the peninsula.

The Jaffna Peninsula had 77 percent and the Mainland 23 per cent of the total population of the study area in 1963. From 1881 to 1953 the distribution of population in the Peninsula and Mainland an average stood at 84 percent and

FIG-9-1

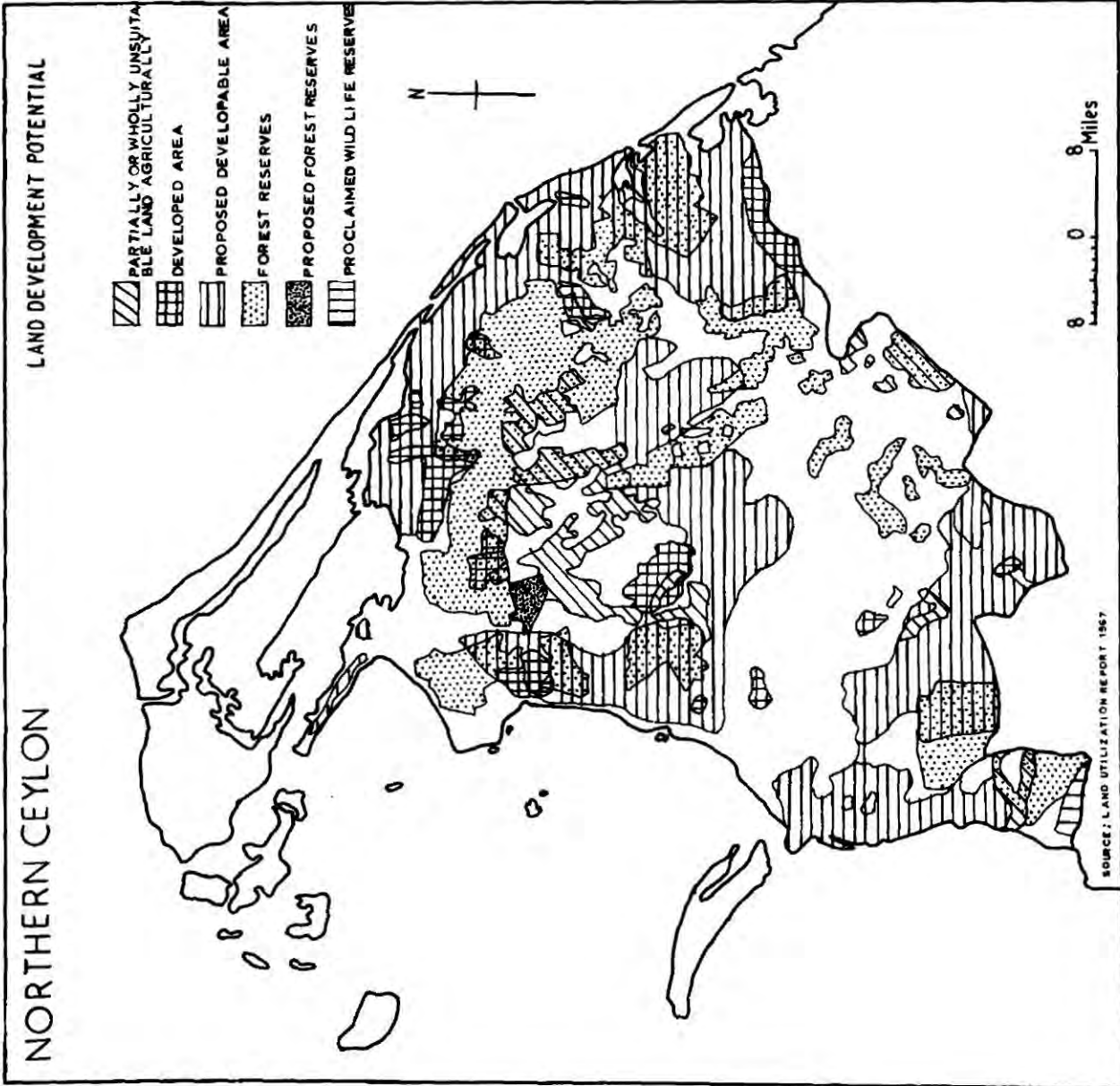
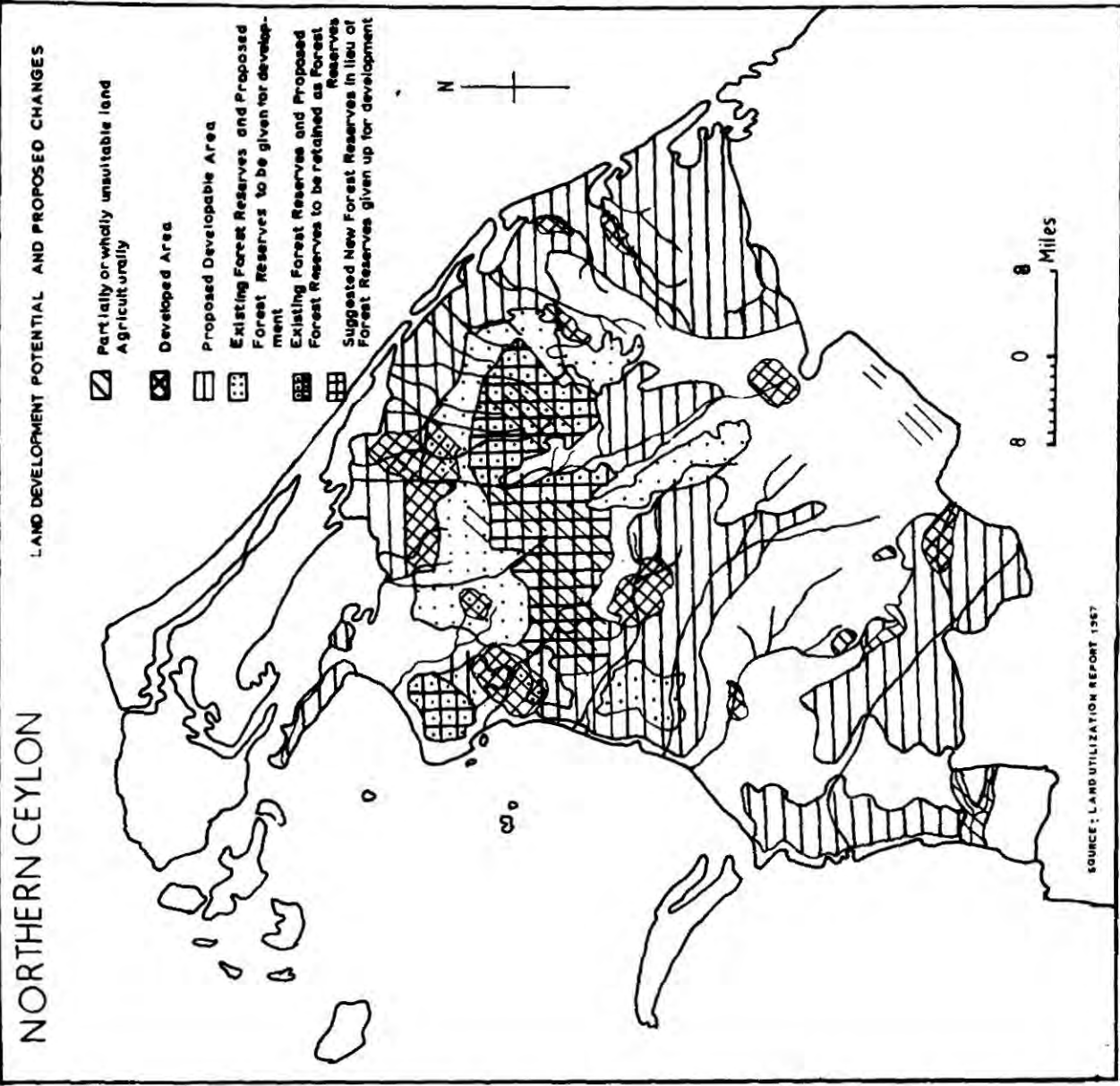


FIG-9-2



16 per cent respectively. After the eradication of malaria on the Mainland the population increased very rapidly (see Figs 2.4, 2.5 and 2.10 for population density and changes). During the 1950's and 1960's several small tanks and major irrigation works were developed. There are several irrigation projects under construction, and others are planned. The landless peasants and other job-seekers, particularly petty traders from the Peninsula, were settled on the Mainland. The recent rapid population growth on the Mainland is noticeable by the time of the 1971 census. Vavuniya, Mannar and Jaffna districts had a growth of 38.6, 28.6 and 14.6 per cent respectively for the period 1963-1971, and their annual growth was 4.3, 3.1 and 1.6 per cent.

The Land Utilization Committee's general proposals for the allocation of underdeveloped land for different uses are shown on Fig. 9.1 and 9.2. Except for a few areas around Vavuniya, Giant's Tank, Punakari and Mullaitivu all the other areas on the Mainland are regarded as underdeveloped lands except for a few recently developed islands. From the map, the vast tract of coastal lands along the three coastal plains, the interior area around Mankulam and land along Anuradhapura - Mannar Road in Cheddikulam division and several scattered areas are regarded as areas for potential development. In the heart of the Mainland above Karachchi division irrigation works, the lands are under forest. Fig 1.10 shows the existing tanks, tanks under construction and tanks sanctioned for construction and proposed reservoirs. Whilst the inset in Fig 1.3 shows detailed aspects of water resources of the study area.

With the land and water resources there is plenty of scope for agricultural development. Though large scale irrigation is limited because of small seasonal streams, there are hundreds of small tanks which are not yet fully utilized. Table 9.1 shows the irrigation development potential for district schemes over 500 acres.

Table 9.1

Irrigation development Potential (acres) by districts

	<u>Paddy</u>	<u>Highland</u>
Jaffna	5950	3820
Mannar	6536	4362
Vavuniya	1800	1200

Source: Land Utilization Report 1968.

Table 9.2 shows irrigation development potential (acres for schemes under the proposed Mahavali Ganga Diversion Project:-

Table 9.2

Irrigation development Potential (acres) by schemes

Kanagarayan Aru Reservoir	19,400
Pali Aru	49,200
Paranki Aru	
Pavatkulam	<u>75,800</u>
	<u>144,400</u>

Source: Land Utilization Report 1968.

The first stage of the Mahavali Ganga Scheme started in 1970 but the Northern Province will not benefit until the final stages of the projects in 1980's. In the case of the study area the Government is giving more priority to the development of small tanks. The present settlements on the Mainland can absorb more population through village

expansions. There are 501 settlements on the Mainland with a population of less than ninety-nine people. The irrigation facilities could be improved through use of ground water resources.

In addition to the agricultural development there is vast potential for the fishery industry in the study area. There are seasonal migrations of fishermen from the West coast of Ceylon mainly from Negombo and Chilaw to the East coast of the study area. Fishing settlements on the east and west coasts of the Mainland have great potential. Already there are many temporary fishing camps established on the west coast by Peninsula fishermen. Some of these could become fully developed settlements which could absorb fishermen from overcrowded fishing settlements from the Jaffna Peninsula particularly from Karaiyoor, Pasaiyoor and Navanthurai fishing settlements within Jaffna City.

From the above analysis it is clear that different types of agricultural and fishing settlements will comprise the future pattern of settlements on the Mainland. But on the Peninsula the present settlements are going to expand due to population growth and some will achieve urban status. The provision of sewerage facilities and water supply have encouraged this horizontal expansion of settlements.

The colonization schemes on the Mainland as in other parts of Ceylon failed to develop satisfactorily over the expected periods. B.H. Farmer and Fonseka pointed out several problems regarding the land use problems in the peasant colonies of the Dry Zone.¹⁵ The reasons vary for this slow growth rate, and in some cases failure.

They include physical, economic and social factors: the influence of unfavourable soil and micro-relief, poor financial situation of the peasants, misuse of state assistance, inattention to the development of lands and crop failure due to flood or drought or destruction by wild animals; the new environment, the mixture of different allottees, the separation of families and the interest of settlers in new and formally settled places. All the above factors and the lack of central functions such as education, health and marketing and shopping facilities are the main reasons for the slow growth of new settlements and the lack of attraction for the Peninsula people. The Government is giving more attention to agriculture, land development and irrigation in the colonization schemes but does not give proper attention to the service facilities. Lack of proper facilities in quantity as well as in quality and the isolation of settlements with poor transport system (poor roads and low frequency of bus service) are the main problems on the Mainland. There are several settlements on the mainland without any transport facilities which are up to four or five miles from main roads. The population threshold factor prevents the development of functions by private enterprise. In this context the state should pay greater attention to the provision of central functions in the early stages of development.

There are many problems in the present distribution of central functions such as (1) the absence of central functions in appropriate central places, (2) an overconcentration of functions in some central places, (3) the location of unsuitable places in terms of an area or in an administrative area, (4) the scattered nature of the distribution of central

functions in central places, (5) the overuse or underuse of existing facilities, (6) the shortage of staff in backward areas, and (7) the low productivity of staffs in the backward areas. These are the main problems in the distribution pattern.

The development of the planned land settlement schemes and other small settlements on the Mainland is essential in order to accommodate the natural growth of population and relieve the population pressure in the peninsula. The author has discussed the various aspects of problems in the present distribution of the central functions and central places. Inadequate transport and service facilities are the main reasons for the slow growth of economy and settlements. In this section the author wishes to put forward some suggestions which would help overcome these problems and might assist the future development of settlements. In the context of spatial development the Mainland and a few selected areas on the Peninsula should be given the greatest priority.

Urban values are spreading into rural areas and this means more and more service facilities are demanded by a large percentage of the population. Since the area consists mainly of a large number of rural settlements, the development priority should be given to the rural sector. The main purpose in rural plans is to bring changes in the pattern of settlements that will increase the range of social, commercial, public services, educational and transport facilities in addition to the overall economic improvements.

To create a healthy climate for economic development the improvement of infrastructure such as public utilities (water electricity, sewerage, telephone, postal services and social

services, school, clinic etc), roads and public transport services, rural centres for convenient shopping is essential. The development of transportation, particularly the rural networks of roads, should be given top priority. The inadequate rural transportation on the Mainland is a major factor for its underdevelopment and unattractiveness to the people of the Peninsula. Except for a few main roads (see Fig. 8.1) all other roads are not motorable throughout the year. There are no fully developed roads along the east and west coasts. With the exception of the east coast road between Nayaru and Mullaitivu, all the other portions are unsurfaced and interrupted by several lagoons. On the west coast there is no surfaced road south of Silawathurai and in the northern part of the Mainland the Jaffna lagoon separates Punakari and Jaffna Peninsula. The absence of all weather roads along the east and west coasts inhibits intraregional movement between the coastal settlements and other parts of Ceylon. Because of the absence of fully developed roads along the coasts, the entire incoming and outgoing road and rail traffic has to pass through Vavuniya to the north and Cheddikulam to Mannar in the west. The centres on the two main traffic lines such as Jaffna-Vavuniya and Madawachiya-Talaimannar are progressing but other settlements on the east and west coasts, and on the interior parts are more or less stagnant. From the point of future development of agriculture and fisheries, the two coastal main roads are essential. Agricultural land for potential future development is found along the two coastal plains (see Fig. 9.2). In addition to facilitating local development the roads will help to improve the inter-regional movements of goods, the west road will reduce the distance

between Colombo-Mannar and Jaffna and the east road will shorten the distance between Trincomalee to Mullaitivu and Point Pedro. In addition to the two North-South mainroads the development of East-West main roads is essential to improve the transport connectivity. The existing undeveloped roads such as Mullaitivu-Paranthan, Mankulam-Vellankulam, Murikandy-Pallavarayankadu and Madhu-Andankulam should be improved.

Apart from the above main roads, the development of rural feeder roads is essential for economic and settlement growth. Most of the rural roads are unsurfaced and unfit for all weather transportation. The rural roads vary in size from a one lane road, to a footpath. These roads are without any base or sub-base, rarely having a hard crust, and are hardly ever maintained. The result is that major parts are composed of fine dust which forms mudpools at the onset of the first rain, rendering them slippery and difficult to use by human, mechanical or animal transportation. The rural unsurfaced roads are maintained by Village Councils. These councils are very small institutions and have little experience, resources or technical knowhow. The local authorities on the Mainland have pointed out several times the importance of rural roads and the problems of maintenance due to lack of finance. They need more grants for construction, improvement and maintenance of rural roads such as Fisheries Roads, Village Councils Roads and Food Production Roads etc. In addition to these problems the councils need co-operation from villagers to get free land to construct the lanes. The rural roads, particularly in settled villages cannot be

developed without getting this free land from the people on the route of the proposed lane.

Transportation facilities are essential to improve the rural economy, urban-rural hierarchical relationship and the quality of life. The smaller settlements in Mantai, Musali, Vavuniya North, Thunnukkai, Punakari and the southern part of Mullaitivu divisions suffer from a lack of proper rural roads and this prevents the progress of the economy. Better rural network roads and connections with main roads will increase rural mobility. This increase in mobility will assist the development of the economy as well as facilitate the diffusion of better ideas. The service radius of settlements will be enlarged and attract new economic or service functions based on greater population thresholds. If many villages are joined together with a central place that place can offer better facilities to the neighbouring villages. Because of the inadequate transportation facilities the isolated settlements are unable to use the existing social and economic facilities. At the same time unconnected small settlements, for economic reasons, are unable to have some essential service facilities. Improvements in rural transport permit some smaller settlements to share jointly some service functions which individually they would be unable to possess. The present existing facilities could be used effectively in some cases without creating new ones. It is very difficult to improve the rural sector of the economy without a reliable rural network of roads. In the absence of such an effort the radius of interaction of the rural population will remain limited and unresponsive to change. A more reasonable solution might have been brought about by

making carefully detailed local investigations of the economic growth potential of individual settlements and then deciding on a priority for linking such settlements by all-weather roads to other regions. Road developments which increase the interaction of men and materials help in the overall development process. In urban areas particularly in Jaffna City opening of new roads will assist to bring new lands within the city for housing development.

Rural electrification is an important factor in the rapid economic progress of the rural areas. Since a large number of rural settlements in the study area are without electric power rural electrification schemes will bring many great changes in several fields of rural socio-economic patterns. These are power for irrigation, industry, home lighting, street lighting. This will increase recreational outings by the people and improve village security, and availability of new central goods such as butter, ice-cream, frozen foods. This further assists the opening of village shops until late evening, and longer working hours through lighting facilities. The use of electrical machines for different type of household work will increase productivity, and all these changes will help to raise the living standards in rural as well as urban communities.

The development of different grade of central places is essential for the provision of service and marketing facilities for settlements. With an increasing population and social changes the role of different sizes of central places is very important. This type of centre is essential on the Mainland

because of new colonization schemes and the rapid expansion of population. As far as spatial considerations are concerned, these types of towns could be developed in two ways. Firstly, by selecting a few existing important rural centres and improving their service facilities and rural roads. And, secondly, by establishing new planned central places wherever necessary in terms of economic growth potential. But in the case of the Peninsula the present distribution of central places is more satisfactory, although more rationalization is needed in the distribution of central functions. In other words, it is better to have graded levels of centres than non-graded levels because the first type is more convenient for consumers.

These centres are not only expected to function as centres for rural goods but also to serve the basic service facilities of the people living in complementary rural settlements. These centres will assist the growth of the regional system of urban centres. The essential requirement is accessibility to both complementary areas and higher order centres. These centres should be sited where fresh water, adequate land for present and future development and electric power for economic development are all available. Development of electricity is already given priority but the Government must take the necessary steps to increase the feeder system for the impact of rural electrification will bring many side developments. The medium central places can play a major role between the higher order centres and villages or hamlet level centres. These centres can supply higher order functions above village level and below city or

town levels. In the absence of such centres several functions are distributed in one or more centres - a school in one place, a dispensary in other place and so on. If all similar level functions are grouped in one place at the same time the particular place is well connected with the complementary settlements and will be more efficient than the present pattern. These types of centres and other infrastructures such as water supply and electricity will help to improve the condition of areas. In this context, rural development could bring quick changes if the infrastructure were improved.

The shortage of staff in rural or backward areas is limiting their development. To maintain and improve the productivity in schools, hospitals and other institutions in those areas has been difficult due to the reluctance of trained people from developed areas to go to rural areas where most day-to-day amenities are completely lacking. Medium sized central places can greatly help in overcoming this difficulty. Trained people are needed in rural settlements who will take up residence rather than working there during the day and returning to their own town in the evening. In due course, these central places, in addition to their service functions, will attract industries based on agricultural products and raw materials from the local area. These industries include the following: food processing, grain milling, processing plants, handicrafts, light wood work, cloth printing and dyeing, mats and basket manufacturing. In addition to their industrial potential, the development of these central places can play a major role in the provision of service functions such as health and education. As a

response there is bound to be a greater incentive for growing vegetables and fruit crops, which bring better cash returns and previously have not been farmed due to inaccessibility to markets. Increased returns from dairy farming through increases in milk production may also result.

There are large number of small settlements found on the Mainland. This type of small scattered settlement has disadvantages for economic progress and in providing central functions. These settlements should be either discouraged or populated to an optimum level. The clustering of housing and service facilities should be encouraged in the settlements. This is essential to provide water, electricity and other service functions economically.

In the earlier section the main aspects of regional economic prospects and problems, and future developments were discussed. In the same section the importance of the need for rationalization of service functions in developed areas and new planned central places in developing areas in the study area were stressed. In addition to these phenomena, the other economic problems affecting settlements' developments also have to be tackled for harmonious growth. The problem of the developed and underdeveloped nature of the Peninsula and Mainland respectively were already noted. The rapid land development and other economic programmes on the Mainland are essential to relieve the population pressure on the Peninsula. At the same time in the name of progress one should not neglect the ecological conditions of the area. If the ecological conditions are neglected then the agricultural developments are doomed to failure in a short period.

On the Peninsula there is an important problem, that year by year valuable agricultural lands, particularly on the red soil belt, are converted to non-agricultural land uses. There are no land use regulations to prevent this type of conversion. There should be a strict control of land use to prevent this wastage. If it is not controlled, then within a very short period the best remaining agricultural lands on the Peninsula will be converted to non-agricultural use. Though higher land suitable for residential developments is available in many parts of the Peninsula, the absence of readily available drinkable ground water means that people prefer to build houses on agricultural areas where the ground water is potable. This can be changed by increasing pipe borne water schemes.

The population characteristics of the Peninsula and the Mainland show different patterns; high density, urban population and balanced sex ratios are found on the Peninsula. On the Mainland low density, unbalanced sex ratios and migrant labourers are the main characteristics. Reduction of male-female ratio differences on the Mainland by creating permanent settlements is essential for development. Further urban growth on the Peninsula is not desirable because these centres are developing as parasitic centres rather than generative centres.¹⁶ These towns cannot offer their inhabitants modern urban employment. In addition, these centres did not have proper urban facilities and amenities such as water, gas and sewerage system and housing facilities, similar to other developing countries' urban centres.¹⁷ The urban growth has not therefore a response to rapidly rising productivity in either agriculture

or industry.¹⁸ The rapid progress of the region and country largely depend on effective comprehensive planning and giving priority to the solution of specific spatial problems. This will solve not only economic but also social and political problems. Developments will involve structural transformation and this will create a new spatial organization of the economy and socio-cultural patterns. In this context, central place ideas can be incorporated into planning the growth of settlements.

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Addendum

Appendices

Bibliography

ADDENDUM

Ceylon is now known as the Republic of Sri Lanka. The Island is called by the local inhabitants, the Sinhalese, as Sri Lanka and the Tamils, as Ilam or Ilankai. The names Ceylon, Sri Lanka and Ilankai were used as the official names of the Island in English, Sinhala and Tamil respectively. From May, 1972 the name Sri Lanka is used in place of the name Ceylon. In this study, the name Ceylon was used, because the research topic was registered in this name and most of the maps were drawn and photographed before the change. Though the country's name is changed, the name Ceylon will continue to be in use in commercial and other fields.

The 1971 census was taken place in October, 1971 and the population figures are available only for the total population of the districts and towns with over 50,000 inhabitants. The data was included in the study.

சேவை நிலையத்தின் பெயர்:
 அமைந்துள்ள மாவட்டம்:
 காரியாதிகாரி பிரிவு:
 கிராமசேவகர் பிரிவு:
 உள்ளூராட்சி மன்றத்தின் பெயர், தரம்:
 மக்கள் தொகை:
 அண்மையிலுள்ள நிலையங்களின் தரம்:
 நிலையத்திலுள்ள கடைகளின் மொத்த எண்ணிக்கை:

உப-பிரிவுகளில் கடைகளின் எண்ணிக்கை

பலசரக்கு
 அரிசி
 உப-உணவுப்பொருட்கள்
 காய்கறி வகை
 பழவகை
 வெற்றிலை

மீன்
 கருவாடு
 கோழி இறைச்சி
 கட்டி இறைச்சி
 பன்றியிறைச்சி
 மாட்டிறைச்சி

உறாட்டல்கள்
 பாஷா போறனைகள்
 தேனீர்/கொப்பி கடை
 குளிர் பாணிகள்
 கடலெக் கடைகள்

தவறான: கள்ளு
 சாராயம்,
 சீமைக் குடி
 பால்சாலை

புடைவைக் கடைகள்
 புடைவை/தையல் கடைகள்

சப்பாத்தி
 நகை
 தளமாடம்
 ஆகுப் பொருள்

குடும்பச் சாமான்
 வீட்டுப் பாவனைப் பொருட்கள்
 தீந்தை
 சீமந்து/கட்டிடப் பொருள்
 சாக்ரு

மருந்தக் கடை/ மருந்தியல்
 ஆயுர்வேதம்

பின்சாரப் பொருட்கள்
 கண்ணாடி
 மோட்டார் மாற்றலுப்பு
 ரையர் ரியூப்
 வாடுவி
 மரக்காலை
 வீற்காலை
 வைக்கற் கடை

புத்தகக் கடை
 அச்சுக்கூடம்
 செய்திப் பத்திரிகை ஏஜன்ட்
 ஸ்ரூடியோ
 படம் பிடிப்பு/படக்கருவி
 சைக்கிள் திருத்தல்
 தையல்
 சிகையலங்காரம்
 சலவைத் தொழிற்சாலை
 மோட்டார் திருத்தல் (கராச்சு)
 கடிக்காரம் திருத்தியிடம்
 பெற்றோல்/மண்ணெண்ணெய் விற்பனை நிலையம்.

தொழிற் சேவையரிக்கும் நிறுவனங்கள், தனியார்களின் எண்ணிக்கை:

புறக்டர்கள்
அவ்வகைக்டர்கள்
கணக்காளர்கள்
கட்டிடக் கலைஞர்

பணம் வழங்கும் ஸ்தாபனங்களின் எண்ணிக்கை:

இலங்கை வங்கி.
மக்கள் - வங்கி
கட்டுறவு வங்கி
சிராம வங்கி
நடை அடைவுக்கடை
ஏலைய வங்கிகள், பணம் கொடுக்கும்
தனியார் ஸ்தாபனங்கள்

சேவை நிலையத்திலுள்ள மத்திய உள்நூராட்சி அரசாங்க அலுவலகங்கள்.

சேவைநிலையத்திலுள்ள பாடசாலைகளின் எண்ணிக்கைகளும், அவைகளின் தரம்
இருக்கும் வகுப்புகள் மாணவர் ஆசிரியர்களின் எண்ணிக்கை.

நியூட்டன்களின் எண்ணிக்கை
சிவ்வர் பாடசாலைகள்

மருத்துவ வசதி: ஆஸ்பத்திரிகளின் எண்ணிக்கை
ஆஸ்பத்திரிகளின் தரம்
பாட்/கட்டிடங்களின் தொகை
- டாக்டர்களின் எண்ணிக்கை
சிறப்பு டாக்டர்களின் எண்ணிக்கை
மருத்துவ - வசதிகள்
சித்த ஆயுள்வெத வைத்தியசாலைகளின்
எண்ணிக்கை

தனியார் ஆஸ்பத்திரி மருத்துவ நிலையங்கள்
ஆயுள்வெத வைத்திய நிலையங்கள்

பொழுதுபோக்கு வசதிகள்:
தியேட்டர்கள்
மொத்த காட்சிகள்

APPENDIX 2

List of central functions recognized in the study.

1. Grama Sevaka
2. Village Council
3. Rural Court
4. Registrar of Births and Deaths
5. Urban local authorities: Town Council, Urban Council and Municipal Council
6. Police station and police post
7. Divisional Revenue Office
8. Department of Excise
9. Departments of Fishery and Forestry
10. Departments of Agriculture and Agrarian Service
11. Departments of Electricity and Water Supply and Drainage
12. Departments of Land Development and Irrigation
13. Magistrate Court
14. District Court
15. Departments of Public Works and Surveyors
16. Department of Labour
17. Assistant Commissioner of Co-operative Development
18. Assistant Superintendent of Police
19. District Education Office
20. Department of Post and Telegraph
21. Assistant Commissioner of Local Government
22. Superintendent of Police
23. Regional Education Office
24. Department of Inland Revenue
25. District Head Office
26. Supreme Court
27. Primary school
28. Maha Vidyalayam (High School)
29. Madhya Maha Vidyalayam (Central College)
30. Private tutoring (commercial, dancing, needle work and motoring)
31. Religious and social institution
32. Technical, training, higher and special educational institution
33. Library and museum
34. Western doctor

continued ...

35. Optician
36. Dentist
37. Veterinarian and Veterinary hospital
38. Ayurvedic dispensary
39. Provincial hospital and Special clinic
40. Base hospital
41. District hospital
42. Rural hospital
43. Central dispensary
44. Maternity home and Visiting dispensary
45. Superintendent of Health and Engineers office
46. Medical Office of Health
47. Public Health Office
48. School Medical Office
49. Local newspaper and national newspapers regional office
50. Rest house and hotel
51. Sports stadium
52. Foreign liquor bar
53. Arrack tavern
54. Funeral service
55. National political party and Trade Union office
56. Cinema and theatre hall
57. Member of Parliament office
58. Proctor and Advocate
59. Surveyor and Auctioneer
60. Accountant and accounting firm
61. Architect firm and consultant
62. Co-operative store
63. Retail provision store
64. Tea and Coffee boutique
65. Hotel and eating house
66. Bakery
67. Higher grade market(urban and agricultural)A,B and C grades
68. Lower grade market(rural and urban neighbourhood)D grade
69. Meat stall
70. Firewood depot
71. Timber, lumber and sawpit depot
72. Textile shop
73. Tailor and ready-made garment shop
74. Hardware, cement and paint store

75. Jewellery shop
76. Shoe, shoe manufacturing and repair shop
77. Western pharmacy
78. Ayurvedic pharmacy
79. Furniture shop
80. Printing press and book binding
81. Book and stationary shop
82. Glass, picture framing and small scale tin work shop
83. Sewing machine and assessory shop
84. Photographic studio, supplies and services
85. Electrical goods, repair and contractor shop
86. Motor spare parts, tyres and tubes shop
87. Water pumps, tractors and agricultural implements shop
88. Tile store
89. Ice factory, ice sale and aerated water manufacture and sales
90. Miscellaneous shop
91. Industrial and trading corporation sales bulk depot
92. Department of Marketing, Co-operative Wholesale Establishment
and Laksala branch
93. Wholesale shop in provision goods, coconut and coconut oil
94. Multi-Purpose Co-operative Society's union depot
95. Commercial bank
96. Co-operative and rural bank
97. Insurance Corporation
98. Co-operative Fedration office
99. Radio and watch repair shop
100. Motor garage and metal work shop
101. Barber saloon
102. Laundry
103. Post and telegraph office
104. Sub-post office
105. Railway station(Express halt)
106. Railway station(ordinary halt)
107. Bus station and passenger jetty
108. Department of Customs and Harbours
109. Air Ceylon booking office
110. Bus depot and C.T.B. regional office
111. Petrol filling station
112. Bicycle renting and repair shop

APPENDIX 3

Population density by D.R.O. divisions, 1911-1963.

<u>Divisions</u>	<u>1911</u>	<u>1921</u>	<u>1931</u>	<u>1946</u>	<u>1953</u>	<u>1963</u>
Delft	202	210	219	343	324	321
Islands	572	578	654	687	850	1028
Jaffna	2926	3058	3341	4456	5448	6714
Valikamam West	1265	1287	1375	1615	1804	2136
Valikamam North	1433	1501	1594	1946	2206	2726
Valikamam East	687	717	811	972	1136	1377
Tenmaradchy	505	441	448	498	581	715
Vadamaradchy	904	925	1003	1124	1279	1469
Pachchilapallai	95	89	72	72	101	147
Karachchi	16	19	18	24	56	144
Thunukkai	2	2	2	2	2	17
Punakari	25	25	25	25	33	41
Mantai	8	9	9	9	14	23
Mannar Island	163	160	157	211	292	349
Musali	26	28	30	33	43	66
Vavuniya South(Tamil)	18	20	19	28	46	105
Vavuniya South(Sinhala)	22	27	29	37	50	107
Vengalacheddikulam	12	10	9	13	22	46
Vavuniya North	5	5	5	8	13	62
Maritime Pattu	19	21	22	26	36	62

Sources: Calculated from Censuses of Ceylon, 1921, Vol.2,
1931, Vol.2, 1953, Vol.2 and 1963.

APPENDIX 4(A)Population strata for low order functions

		(Settlement Level)					
Group	1	1-	99	Group	17	3000-	3499
Group	2	100-	199	Group	18	3500-	3999
Group	3	200-	399	Group	19	4000-	4499
Group	4	400-	599	Group	20	4500-	4999
Group	5	600-	799	Group	21	5000-	5499
Group	6	800-	999	Group	22	5500-	5999
Group	7	1000-	1199	Group	23	6000-	6499
Group	8	1200-	1399	Group	24	6500-	6999
Group	9	1400-	1599	Group	25	7000-	7499
Group	10	1600-	1799	Group	26	7500-	7999
Group	11	1800-	1999	Group	27	8000-	8999
Group	12	2000-	2199	Group	28	9000-	9999
Group	13	2200-	2399	Group	29	10000-	10999
Group	14	2400-	2599	Group	30	11000-	11999
Group	15	2600-	2799	Group	31	12000-	12999
Group	16	2800-	2999	Group	32	13000-	94670

APPENDIX 4(B)Population strata for intermediate functions

		(Local Authority Level)					
Group	1	1-	2499	Group	14	11000-	11999
Group	2	2500-	2999	Group	15	12000-	12999
Group	3	3000-	3499	Group	16	13000-	13999
Group	4	3500-	3999	Group	17	14000-	14999
Group	5	4000-	4499	Group	18	15000-	15999
Group	6	4500-	4999	Group	19	16000-	16999
Group	7	5000-	5499	Group	20	17000-	17999
Group	8	5500-	5999	Group	21	18000-	18999
Group	9	6000-	6999	Group	22	19000-	19999
Group	10	7000-	7999	Group	23	20000-	21999
Group	11	8000-	8999	Group	24	22000-	27999
Group	12	9000-	9999	Group	25	28000-	94670
Group	13	10000-	10999				

APPENDIX 4(C)Population strata for higher order functions

		(Divisional Level)					
Group	1	1-	99	Group	7	25000-	29999
Group	2	3000-	5999	Group	8	30000-	59999
Group	3	6000-	8999	Group	9	60000-	89999
Group	4	9000-	12999	Group	10	90000-	119999
Group	5	13000-	18999	Group	11	120000-	124203
Group	6	19000-	24999				

APPENDIX 5

Nodality and centrality values of the central places.

Column

number

Description

- A Numerical order.
 B Names of central places.
 C Number of central functions.
 D Relative scores.
 E Functional indices.
 F Cumulative dependent population.

A	B	C	D	E	F
1	Jaffna	108	3172	3956	26406489
2	Vavuniya	84	994	856.84	3204483
3	Mannar	84	867	756.40	2806025
4	Kilinochchi	70	673	426.27	2231510
5	Point Pedro	65	615	343.28	1968384
6	Chunnakam	49	374	274.20	1809893
7	Chavakachcheri	63	586	349.28	1710490
8	Kankesanturai	46	350	198.98	1035766
9	Kayts	46	277	148.52	945315
10.	Chankanai	42	245	107.67	924208
11	Mullaitivu	58	406	251.66	756723
12	Nelliyady	41	286	118.40	721098
13	Tellipallai	36	190	84.17	639464
14	Pandatharippu	37	219	108.09	599713
15	Valveddithurai	34	180	91.10	551859
16	Nallur	36	169	75.90	497589
17	Atchuvveli	42	231	94.95	478780
18	Kodikamam	28	146	62.26	433382
19	Manipay	35	245	86.75	367943
20	Murungan	36	180	84.27	359003
21	Palai	32	178	88.25	354125
22	Kopay South	23	116	49.14	325885
23	Paranthan	23	110	41.17	275614
24	Thirunelveli	22	100	40.23	269592
25	Mallakam	17	67	24.19	213249
26	Kokuvil	25	130	40.80	179328
27	Uduvil	20	96	27.51	162432
28	Inuvil	20	104	36.03	161263
29	Mankulam	28	138	71.31	157771
30	Karaitivu North	19	96	30.01	144250
31	Kaithady	22	97	38.38	139979
32	Puttur	18	69	19.26	136246
33	Udupiddy	21	80	21.56	131814
34	Madduvilnadu	27	118	43.16	114792
35	Vaddukoddai	17	66	28.17	113951
36	Velanai East	20	93	36.99	113643
37	Palaly	12	60	19.08	113269
38	Adampan	23	92	24.74	98690

A	B	C	D	E	F
39	Elephant Pass	15	59	16.97	94571
40	Cheddikulam	21	116	33.38	91774
41	Punkudutivu West	25	125	34.50	89190
42	Urumpirai	25	112	37.98	84166
43	Myliddy South	11	32	8.31	81362
44	Kondavil	23	113	40.50	78237
45	Mulliyawalai	23	86	21.32	69603
46	Chemmantivu	10	46	21.64	69235
47	Moolai	14	55	15.07	68234
48	Nanaddan	15	55	14.35	59731
49	Uyilankulam	14	50	14.13	59550
50	Nedunkerni	21	96	25.48	55998
	<u>Delft Division</u>				
51	Delft West	8	17	2.90	2381
52	Delft Centre	19	95	34.73	47160
53	Delft East	13	41	10.27	20867
	<u>Island Division</u>				
54	Nainativu	20	74	21.62	5160
55	Punkudutivu East	10	30	6.53	1398
56	Analaitivu	14	52	11.40	2025
57	Eluvaitivu	7	20	3.97	-
58	Karaitivu West	11	48	8.85	10819
59	Karaitivu East	12	52	20.58	15635
60	Karampan	11	43	8.65	10390
61	Narathanai	10	31	5.24	12731
62	Saravanai	14	43	8.80	10599
63	Suruvil	5	9	.84	-
64	Velanai West	11	36	7.25	22083
65	Allaipiddy-Mankumban	8	19	4.92	-
66	Mandaitivu	17	59	13.48	10525
	<u>Jaffna Division</u>				
67	Ariyalai	3	4	.37	438
68	Vannarponnai N.W.	2	2	.16	699
69	Vannarponnai S.W.	8	13	2.79	7536
	<u>Valikamam West Division</u>				
70	Suthumalai	10	26	5.35	5181
71	Anaicoddai	12	48	12.85	46337
72	Navali	11	35	5.91	1684
73	Sandilipay	13	41	7.68	17286
74	Mahiyapiddy	5	9	1.69	3684
75	Araly North	10	34	4.68	8693
76	Araly West	9	34	5.55	20040
77	Araly East	4	6	.61	410
78	Vaddukoddai West	13	43	7.88	6879
79	Tholpuram	8	22	3.23	1108
80	Chulipuram	16	66	15.75	56175
81	Chankanai West	18	68	14.28	26337
82	Chankanai East	8	16	2.84	7022
83	Sillai	7	13	2.42	1016

A	B	B	D	E	F
84	Mathagal	14	45	8.95	15955
85	Periyavilam	8	17	3.34	4882
86	Siruvilan	9	28	5.12	15501
<u>Valikamam North Division</u>					
87	Sankuveli	4	6	.53	-
88	Thavady	9	21	7.89	36188
89	Kantarodai	9	30	5.16	22439
90	Elalai	14	48	9.71	17971
91	Suravattai	5	9	1.05	584
92	Kuppilan	9	17	3.69	14993
93	Ivinai	5	8	.94	1159
94	Punnalaikadduwan	15	49	8.87	46216
95	Alaveddy	21	91	24.55	24195
96	Tellipallai N.W.	7	15	1.85	4136
97	Tellipallai S.W.	9	32	5.32	18011
98	Keerimalai	13	41	13.46	47422
99	Maviddapuram	12	35	8.39	15721
100	Veemankamam	12	35	8.49	9783
101	Kadduwan	8	17	2.30	776
102	Varuttalaivilam	5	8	.73	1655
103	Vasavilan	15	57	11.85	57434
104	Myliddy North	9	19	3.26	11046
105	Mulavai	1	1	.16	379
106	Palai	1	1	.16	171
<u>Valikamam East Division</u>					
107	Idaikkadu	6	19	1.67	9092
108	Katirippai	4	6	.53	417
109	Pattaimeni	7	15	1.19	4417
110	Tampalai	6	10	1.06	1774
111	Valalai	9	27	8.82	60371
112	Navakkeeri	5	8	.81	1190
113	Avarankal	13	24	6.24	51409
114	Puttur West	8	15	2.43	3565
115	Achchelu	5	8	.98	1202
116	Chiruppiddi	7	14	1.87	1279
117	Neerveli	15	66	11.82	59738
118	Urelu	7	14	1.98	470
119	Kopay North	15	51	9.72	25288
120	Irupalai	10	23	4.33	12007
<u>Tenmaradchy Division</u>					
121	Koyilakkandi	4	6	.41	267
122	Navatkuli	9	35	10.81	14380
123	Kaitadi Navatkuli	4	10	2.96	919
124	Maravanpulavu	6	11	1.29	489
125	Tanankilappu	7	11	1.37	371
126	Kaitadi Nunavil	4	6	.41	128
127	Madduvil North	8	19	3.29	8476
128	Sarasalai	8	22	3.42	16325
129	Madduvil South	9	21	3.19	1865
130	Meesalai North	10	31	6.20	7051

A	B	C	D	E	F
131	Mwesalai South	10	22	4.38	15314
132	Allarai	5	8	.86	1042
133	Kachchai	6	15	2.56	9691
134	Palavi	2	2	.20	272
135	Vellampokkaddi	2	3	.21	-
136	Thevasikulam	4	7	.99	1609
137	Karampakam	2	3	.21	-
138	Ketpeli	3	5	.41	219
139	Ussan	6	18	1.55	7879
140	Vidattalpalai	3	5	.33	-
141	Eluthumadduval North	2	3	.21	-
142	Eluthumadduval South	12	40	11.08	19693
143	Mirusuvil	11	27	7.72	7416
144	Kudamian	2	3	.21	-
145	Navatkadu	7	13	1.61	2651
146	Varani North	7	8	1.06	77
147	Idaikkurichchi	13	42	8.16	48021
148	Karampaikkurichchi	3	4	.37	586
149	Varani Iyattalai	3	5	.33	-
150	Tavalai Iyattalai	6	13	2.42	7721
151	Mantuvil	8	18	2.52	319

Vadamaradchy Division

152	Antanantidal	2	3	.20	388
153	Kappithoo	3	6	.64	565
154	Karanavai South	9	28	3.49	1495
155	Kalluvam	1	1	.16	426
156	Tondaimanar	11	36	6.87	31067
157	Kerudavil	7	12	1.62	1092
158	Samarapakutewan	6	9	1.18	854
159	Valveddi	7	14	1.83	431
160	Polikandi	8	18	2.96	1330
161	Imaiyanan	6	12	1.22	-
162	Karanavai North	4	8	.65	540
163	Kottavattai	6	10	1.12	1246
164	Navindil	14	37	8.59	49307
165	Karaveddy West	9	28	3.98	1011
166	Thunnalai South	9	23	3.68	6975
167	Thunnalai North	7	11	2.44	682
168	Vallipuram	2	3	.20	259
169	Karaveddy North	10	41	6.45	5056
170	Alvai South	14	49	9.03	44190
171	Alvai West	9	20	4.26	12428
172	Alvai North	9	34	4.43	4331
173	Puloly West	10	30	4.26	6065
174	Puloly East	9	16	3.22	8011
175	Puloly South	16	53	15.65	46594
176	Thumpalai	7	13	2.45	5511
177	Varattuppalai	3	4	.28	625
178	Katkovalam	6	10	1.89	3600
179	Kudattanai Karaiyur	5	9	1.81	785
180	Manatkadu	3	5	.33	498
181	Ampan	8	21	4.10	7627
182	Kudattanai	12	32	8.34	17876
183	Kudarappu	2	2	.16	641

A	B	C	D	E	F
184	Nakar Koyil	10	27	4.05	7781
<u>Pachchilappallai Division</u>					
185	Chempiyanpattu	15	42	9.78	28110
186	Aliavalai	5	8	.85	2344
187	Maruthankeni	5	8	1.53	3844
188	Udutturai	5	16	1.15	2817
189	Vattirayan	4	6	.41	30
190	Mulliyar	8	21	4.28	5081
191	Periyapachchilappallai	2	2	.24	825
192	Pokkaruppu	3	4	.33	343
193	Chundikkulam	4	7	1.04	311
194	Chankattarvayal	1	1	.08	87
195	Iyakachchi	8	18	3.78	11885
196	Kottandarkulam	1	1	.08	181
197	Koyilvayal	2	3	.25	1315
198	Malvil	1	1	.08	175
199	Mukavil	2	2	.21	509
200	Umanikanpattu	2	3	.60	641
201	Ittavil	4	7	.77	1410
202	Tampakamam	2	3	.21	389
203	Vannankeni	2	3	.28	511
204	Mukamalai	6	13	2.11	2374
205	Kilali	5	8	.85	745
206	Vempotukeni	2	3	.21	89
207	Puloppalai	4	6	.82	1359
208	Tanmakkeni	2	2	.24	633
209	Masar	2	3	.27	373
210	Soranpattu	4	7	.89	802
<u>Karachchi Division</u>					
211	Kurinchattivu	2	2	.24	771
212	Tadduvankoddi	4	6	.41	1012
213	Navarkokkaddiyan	1	1	.08	87
214	Umayalpuram	2	4	.25	213
215	Kurakkankaddu	1	2	.12	261
216	Murasumoddai	13	42	5.71	13426
217	Kunchupparantan	2	5	.65	881
218	Kumarapuram	3	4	.36	641
219	Uruthirapuram	9	28	3.86	4890
220	Akkarayankulam	6	19	.81	1220
221	Konesapuram	3	4	.28	72
222	Iranamadu	4	6	.53	169
223	Jayanthinakar	6	11	.25	1781
224	Skanthapuram	3	7	.68	-
225	Kandawalai	7	16	2.35	9326
226	Pandisuddan	2	2	.24	459
227	Vaddakkachchi	9	32	12.39	69526
228	Ramanathapuram	6	17	1.79	8669
229	Kalavedditidal	2	4	2.45	2484
230	Tharmapuram	8	19	3.26	1492
231	Puthukadu	1	1	.08	194

A	B	C	D	E	F
<u>Punakari Division</u>					
232	Alankenai	2	3	.21	-
233	Nallur	4	10	1.33	968
234	Karakkaitivu	3	5	.33	309
235	Cheddiyakurichchi	8	11	1.20	1426
236	Chittankurichchi	2	3	.21	121
237	Gnanimadam	2	5	.25	-
238	Kavutarimunai	5	10	1.20	1183
239	Chinnankundu	1	2	.13	52
240	Kollakurichchi	4	7	.08	474
241	Maravakurichchi	2	4	.25	-
242	Kiranchi	3	7	.68	11
243	Ponnaveli	2	3	.21	154
244	Vallaipadu	2	5	.33	-
245	Veravil	8	25	4.38	7627
246	Kumbamunai	2	3	.23	163
247	Kunchukkulam	2	3	.21	215
248	Nachchikuda	3	4	.29	550
249	Pallavarayankaddu	6	14	5.11	7124
250	Iranaitivu	8	18	3.94	-
251	Vanneriyankulam	8	24	2.81	3079
<u>Thumukkai Division</u>					
252	Alankulam	2	3	.21	81
253	Kakkilankulam	3	5	.33	330
254	Mallavi	3	6	.64	328
255	Vavunikkulam 1	4	6	.41	42
256	Thunukkai	12	53	16.99	19615
257	Vavunikkulam 11	6	19	1.66	4574
258	Uyilankulam	2	5	.96	272
259	Puttuvedduvan	5	10	1.21	889
260	Palayamurikandi	2	7	2.63	213
261	Aninchiyankulam	2	3	.21	93
<u>Mantai Division</u>					
262	Ilupaikadavai	7	19	3.84	3167
263	Vellankulam	7	14	2.65	1629
264	Thekampiddy	3	4	.29	140
265	Vannivilankulam	3	5	.65	673
266	Vavunikkulam 111	5	8	.97	1081
267	Ramiyankulam	1	2	.13	42
268	Pandiyankulam	1	2	.13	-
269	Naddankandal	9	26	5.07	6051
270	Mundumurippu	1	2	.13	35
271	Puvarasankulam	1	2	.13	47
272	Chiraddikulam	1	2	.13	-
273	Chinnavalayankaddu	1	2	.13	-
274	Kalladukkulam	2	2	.24	330
275	Kakaiyankulam	5	8	.73	3175

A	B	C	D	E	F
276	Vilathikulam	2	3	.21	79
277	Iranai Ilupaikulam	9	24	7.98	10424
278	Palampiddy	5	13	2.12	1998
279	Sinnapandivirichan	3	4	.37	326
280	Thatchamaruthamadu	2	2	.24	200
281	Periyapandivirichan	6	14	1.83	777
282	Sulaimanmaruthamadu	11	23	4.38	13792
283	Periyamadhu	8	27	3.08	3951
284	Attamoddoi	3	6	.64	278
285	Vidattaltivu	14	53	12.23	13555
286	Koyitkulam	2	4	.25	288
287	Nedunkandal	6	10	1.16	5257
288	Veppankulam	2	2	.16	250
289	Malikaiittidal	1	1	.08	66
290	Karukkakkulam	1	1	.08	100
291	Kandal	1	2	.12	552
292	Parayakulam	1	1	.08	113
293	Periyavilankuli	1	2	.13	120
294	Parappankandal	3	4	.37	376
295	Chettukulam	1	1	.08	176
296	Chalampan	1	1	.08	84
297	Andankulam	4	7	.71	1885
298	Kumanayankulam	1	1	.08	79
299	Marattikannaddi	2	3	.21	234
300	Karunkandal	1	2	.13	323
301	Alkaddiveli	1	2	.13	1063
302	Maruthodduvan	2	4	.25	64
303	Vaddakandal	5	10	1.02	2281
304	Palayadikulam	2	3	.23	230
305	Parappukkadanthan	4	4	.29	312
306	Karunkandal Vannakulam	2	2	.16	298
307	Alankulam	2	3	.20	551
308	Kattankulam	3	4	.27	2782

Mannar Division

309	Parappankandal	5	8	1.32	2390
310	Vannamoddoi	2	3	.21	137
311	Illupaikulam	1	1	.08	136
312	Palaitalavu	1	1	.08	141
313	Sirukulam	1	1	.08	61
314	Uthuvayankulam	3	4	.37	534
315	Adaikkalamoddoi	2	2	.24	438
316	Kalmoddoi	2	2	.16	212
317	Kallikkaddaikadu	2	3	.20	370
318	Manatkulam	2	2	.24	246
319	Nochchikulam	2	2	.21	346
320	Puthukamam	1	2	.13	54
321	Muthalaikutti	1	1	.08	105
322	Nakattalavu	1	1	.08	135
323	Echupitiya	2	3	.20	150
324	Periyanavatkulam	5	8	1.60	1620
325	Malachenai	3	4	.29	338
326	Thirukethiswaram	6	14	2.33	6789

A	B	C	D	E	F
327	Talladi	3	7	2.66	3678
328	Talvupadu	5	10	1.16	459
329	Erukalampidi	21	111	27.13	52815
330	Samputhurai	1	1	.08	113
331	Pesalai	19	74	22.41	27995
332	Tullukuddiyiruppu	4	7	.73	836
333	Talaimannar Village	6	11	1.29	2906
334	Chirutoppu	2	2	.16	74
335	Kaddukkarankudiyirupu	1	3	.22	78
336	Pavupaddankaddi	1	1	.08	121
337	Talaimannar	16	75	31.50	30777
338	Talaimannar Pier	8	38	20.13	29115
339	Olaittoduvai	2	3	.21	71
340	Karisal	5	9	.85	928
341	Konnayankudiyiruppu	4	6	.78	2553
342	Konarpannai	1	1	.08	137
343	Kosukuvadi	2	2	.16	218
344	Putukkudiyiruppu	5	9	.93	533
345	Tharakundu	8	31	3.47	7096
346	Thoddaveli	3	8	2.71	2718

Musali Divisiom

347	Vankalai	13	43	7.92	5879
348	Alavakkai	1	2	.12	150
349	Suriyatevarkaddaikadu	2	3	.04	653
350	Attikuli	1	2	.12	221
351	Puttirankandam	1	2	.12	912
352	Malaiyiddam	1	1	.08	106
353	Semantivu	1	1	.08	87
354	Vannakulam	2	3	.52	1980
355	Ilanthaomoddai	1	1	.08	97
356	Palaikuli	2	4	.25	929
357	Kankanitivu	1	1	.08	48
358	Pallankoddai	1	1	.08	165
359	Purandiveli	1	1	.08	132
360	Moddaikadai	2	3	.21	335
361	Umaneri	2	3	.21	38
362	Ollimadu	3	4	.29	243
363	Vanchiyankulam	2	3	.21	-
364	Naruvilikkulam	5	8	.97	1252
365	Achchankulam	2	2	.13	-
366	Arippu	6	14	2.61	2782
367	Alavakkaisirukkulam	1	1	.13	77
368	Manalkulam	1	1	.08	86
369	Pandaraveli	5	9	1.25	1521
370	Periyapullaichchi	7	19	5.16	11625
371	Vannakulam	2	2	.16	145
372	Koddaikulammaviakeni	2	3	.21	703
373	Veppankulam	3	4	.29	402
374	Akattimurippu	2	3	.29	368
375	Pichaiavanivedukulam	1	1	.08	125
376	Silavaturai	8	27	6.79	10890
377	Musali	2	11	1.13	6881
378	Kokkuppadayam	4	8	1.08	2565
379	Kulankulam	2	2	.24	364
380	Putuveli	4	6	.59	925

A	B	C	D	E	F
381	Tampattamutalikkattu	2	3	.16	142
382	Kondachi	3	3	.21	52
383	Kondachikuda	1	1	.08	-
384	Karadikkuli	3	4	.37	236
385	Marichchukkaddi	7	19	3.76	3159
386	Mullikkulam	4	7	.72	304
387	Palaikkuli	2	3	.29	14
388	Nalavankulam	2	2	.24	200
389	Pariyarikandal	4	6	.70	2324
390	Chirukkandal	3	4	.37	264
391	Pontivukandal	2	6	.20	551
392	Pichchaikulam	1	1	.08	123
393	Vakkappaddankandal	1	1	.08	114
394	Isamalaittalvu	4	6	.80	428
395	Katkidentakulam	3	4	.29	368
396	Irattaikulam	3	4	.36	852
397	Kattaiadampan	2	3	.21	145
398	Madhu Road	9	25	5.74	22470
399	Periyakankulam	4	11	1.99	684
400	Periyamurippu	3	6	.69	126

Venkala Cheddikulam Division

401	Kannaddi	1	2	.13	-
402	Paraiyanalankulam	4	6	.81	1753
403	Periyathampanai	5	9	.84	967
404	Kurukkalputukkulam	5	6	2.14	4526
405	Putukkulam	1	1	.08	159
406	Valaivaittakulam	2	2	.16	251
407	Pavatkulam 1	8	19	3.16	3031
408	Pavatkulam 10	4	6	.49	-
409	Chinnachchippikkulam	2	3	.29	123
410	Mukathankulam	6	10	1.38	2842
411	Pavatkulam 1	4	6	.49	-
412	Pavatkulam 11	4	6	.41	-
413	Illupaikulam	1	2	.13	-
414	Muttaliyarkulam	5	11	2.09	4790
415	Andiyapuliyankulam	4	9	1.65	4042
416	Mankulam	2	3	.21	35
417	Periyapuliyankulam	2	3	.21	140
418	Nedunkaraichenai	1	2	.13	-
419	Pavatkulam 111	3	5	.33	307
420	Sinnaththampanai	1	2	.13	-
421	Neriyakulam	6	17	4.49	6214
422	Periyanochchikulam	1	2	.13	-

Vavuniya South Tamil Division

423	Pandikketakulam	1	2	.13	180
424	Pandarikulam	4	6	.78	1276
425	Murtodai	2	5	.73	427
426	Arumukkattanputukkulam	2	4	.25	310
427	Koyilpuliyankulam	1	2	.13	-
428	Kotandarnochchikulam	1	2	.13	-
429	Wannansinnakkulam	1	2	.13	145
430	Palaomoddai	1	2	.13	-

A	B	C	D	E	F
431	Koliyakulam	1	2	.13	19
432	Mundumurippu	5	8	.91	1566
433	Suduventhapulavu	4	7	.47	1921
434	Veemankallu	1	2	.13	46
435	Chemmamadu I	2	2	.16	456
436	Chemmamadu II	3	5	.33	1066
437	Chemmamadu III	2	2	.24	820
438	Koyilkunchukulam	1	2	.13	-
439	Maraiyadittakulam	3	5	.64	797
440	Chemmamadu IV	4	7	.77	1185
441	Marukkarampalai	1	2	.13	-
442	Matappanikkarmakilakula	4	7	.77	1623
443	Nochchikulam	1	2	.13	151
444	Tavasikulam	1	2	.13	107
445	Vedamakilankulam	1	2	.13	147
446	Koyilmoodaikulam	1	2	.13	21
447	Sonakasalampaikkulam	6	18	1.47	5322
448	Puthukkulam	3	6	.68	832
449	Parayar Sinnakulam	1	2	.13	-
450	Kal madu Unit I	3	5	.33	310
451	Kal madu Unit II	1	2	.13	-
452	Chekkadippulavu	1	2	.13	15
453	Kattarasinnakulam	1	2	.13	-
454	Nelukkulam	6	14	2.13	9140
455	Karunkaikkulam	2	3	.23	387
456	Veppankulam	3	4	.37	-
457	Ilamarutankulam	2	3	.21	139
458	Iyankaravur	1	2	.13	-
459	Pampaimadu	4	9	1.58	5596
460	Rasentirankulam	2	4	.25	864
461	Samalankulam	2	3	.21	206
462	Kontakkarankulam	2	4	.25	57
463	Paranaddakallu	1	2	.13	-
464	Kidachchuri	1	2	.13	-
465	Puliththarithapuliyakul	2	4	.25	150
466	Poovarasankulam	9	26	4.71	24699
467	Nochchimoddai	4	13	1.69	6029
468	Koyilputhukulam	4	6	.49	572
469	Periyakamarasankulam	2	3	.21	228
470	Omantai	11	42	8.48	22863
471	Paddanichipuliyankulam	3	4	.29	23
472	Velikkulam	2	3	.21	165
473	Periyakulam	4	10	1.89	7020
474	Kallikulam	1	2	.12	235
475	Asikulam	5	9	.85	2991
476	Kalnaddinakulam	1	2	.13	-
477	Thaichankulam	5	12	.91	2669
478	Ukulankulam	1	1	.08	108

A	B	C	D	E	F
<u>Vavuniya North Division</u>					
479	Unchalkaddi	2	4	.25	367
480	Katkulam	1	2	.13	17
481	Paddikkudiyiruppu	3	6	.69	501
482	Vedivaittakallu	1	2	.13	29
483	Koramoddai	1	2	.13	38
484	Nochchikkulam	1	2	.13	13
485	Manadupalampasi	1	2	.13	114
486	Marailuppai	2	3	.21	75
487	Velankulam	1	2	.13	-
488	Kalathasuddan	2	3	.21	61
489	Sinnadampan	1	2	.13	22
490	Ayiladi	2	3	.21	253
491	Paranthan	1	1	.08	309
492	Anantar Puliyankulam	1	2	.13	22
493	Nainamadu	6	14	2.56	4806
494	Matiyamadu	3	6	1.04	854
495	Sinnappoovarasankulam	1	2	.13	19
496	Periyamadu	1	2	.13	60
497	Karappukkutti	1	2	.13	34
498	Puliyankulam	12	42	17.08	22347
499	Putur	1	2	.13	56
500	Palaiyavadi	1	2	.13	-
501	Mannakulam	1	2	.13	-
502	Putuvilankulam	1	2	.13	-
503	Pulumachchinathikulam	1	2	.13	-
504	Terumurikandi	4	10	3.34	3895
505	Kanakarayankulam	8	26	3.36	4568
506	Panikkankulam	1	2	.13	-
507	Periyapuliyankulam	1	2	.13	135
508	Ampakamam	1	2	.13	-
509	Olumadu	4	10	1.93	1700
510	Karuppaddamurippu	5	10	1.21	1140
511	Manavalanpaddamurippu	1	1	.08	198
512	Otiyamalai	5	10	1.20	1788
513	Periyakulam	1	2	.13	-
514	Tanduvan	1	2	.13	141
515	Periyattimadu	1	2	.13	46
516	Thatchadampan	1	1	.08	171
517	Oddusuddan	11	35	12.41	29508
518	Kachchilamadu	4	8	.78	848
519	Kataliyarsamalankulam	2	3	.21	111
520	Kulamurippu	1	2	.13	-
<u>Maritime Pattu</u>					
521	Vattappalai	5	8	.81	1288
522	Keppapulavu	2	3	.21	190
523	Tanniyuttu	14	56	16.26	36262
524	Andankulam	2	3	.21	194
525	Alampil	5	9	.96	2104
526	Chemmalai	4	9	1.52	3432

A	B	C	D	E	F
527	Kumulamunai	6	15	2.73	5755
528	Tannimurippu	2	4	.59	158
529	Kokilai	9	20	3.08	2180
530	Chilavattai	3	4	.32	195
531	Mulliyaikal	7	23	4.90	5273
532	Nay Aru	4	6	.86	2147
533	Karaiyamullivaikkal	5	8	.73	1233
534	Vedduvaikkal	4	6	.41	216
535	Puttukkudiyiruppu	18	68	14.05	18052
536	Anandapuram	3	6	.64	-
537	Uppumaveli	2	2	.16	223
538	Thevipuram	3	7	.68	64
539	Mamulai	3	4	.37	115
540	Valayanmadam	2	3	.21	373
541	Putumattalan	3	5	.25	1689
542	Ampalavanpokkanai	3	6	1.89	867
543	Palamattalam	3	5	.60	747
544	Karavetti	1	1	.08	123
545	Kokkuttoduvai	6	11	1.45	1036
546	Kanukkeni	6	12	1.19	1263
547	Karuvaddukkeni	4	9	1.59	226
548	Kumarapuram	1	1	.08	189
549	Iranaipalai	3	4	.29	173
550	Pepprapitty	1	1	.08	120

Vavuniya South Sinhala Division

551	Ulukulama	7	29	4.51	12223
552	Pavatkulam	10	20	3.08	4816
553	Arugampuleliya	2	3	.13	302
554	Paleuruwa	2	3	.22	224
555	Madukanda	8	26	3.47	5511
556	Nedunkulama	2	3	.21	379
557	Pirappammaduwa	2	3	.21	181
558	Etambagaskada	2	2	.24	219
559	Ambalagodalla	2	2	.16	70
560	Alagalla	1	2	.13	237
561	Iratperiyakulama	7	16	3.87	8608
562	Kalukundamaduwa	3	4	.29	320
563	Kokkuveliye	4	6	.47	685
564	Mamaduwa	11	37	6.90	15453
565	Mahakachchakodiya	4	6	.41	828
566	Mahamailankulama	2	3	.21	175
567	Kaddumankulama	2	3	.21	358
568	Varikuttiyuruwa	2	3	.13	206
569	Maradammaduwa	3	4	.29	166

APPENDIX 6

Relative importance of functions and grading scores

Central FunctionsFunctional Unit

	1-2	3-5	6-10	11-20	21-40	41-50
1. Grama Sevaka	2					
2. Village Council	55					
3. Rural Court	5					
4. Registrar of Births and Deaths	5					
5. Urban Local Authorities						
(A) Town Council	8					
(B) Urban Council	10					
(C) Municipal Council	15					
6. Police station and Police post	10					
7. Divisional Revenue Office	15					
8. Department of Excise	10					
9. Departments of Fishery and Forestry	10					
10. Departments of Agriculture and Agrarian Service	10					
11. Departments of Land Development and Irrigation	10					
12. Departments of Electricity and Water Supply and Drainage	10					
13. Magistrate Court	10					
14. District Court	15					
15. Departments of Public Works and Surveyors	10					
16. Department of Labour	10					
17. Assistant Commissioner of Co-operative Development	10					
18. Assistant Superintendent of Police	15					
19. District Education Office	10					
20. Department of Post and Telegraph	15					
21. Assistant Commissioner of Local Government	15					
22. Superintendent of Police	20					
23. Regional Education Office	15					
24. Department of Inland Revenue	15					
25. District Head Office	25					
26. Supreme Court	25					
27. Primary Schools	2	4	8	16	24	
28. Maha Vidyalayam	10	20	40			
29. Madhya Maha Vidyalayam	15	30	60			
30. Private Tutoring	5	10	20	40		
31. Religious and Social institutions	10	20	40			

32.	Technical, Training, higher & special institution	15	30					
33.	Library and Museum	15	30					
34.	Western doctor	5	10	20		40		
35.	Optician	10	20					
36.	Dentist	10	20					
37.	Veterinarian and Veterinary hospital	10	20					
38.	Ayurvedic dispensary	3	6	12		24		
39.	Provincial and Special Clinics	25						
40.	Base hospital	20						
41.	District hospital	15						
42.	Rural hospital	10						
43.	Central dispensaries	5						
44.	A. Maternity home	5						
	B. Visiting dispensary	3						
45.	A. Superintendent of Health Service	15						
	B. Superintendent of Health and Engineers Office	15						
46.	Medical Office of Health	10						
47.	Public Health Office	5						
48.	School Medical Office	5						
49.	Cinema and Theatre	10	20	40				
50.	Local Daily Newspaper and national newspaper regional office	15	30					
51.	Rest houses and hotels	5	10	20				
52.	Sports stadium	15						
53.	Foreign Liquor bar	5	10	20		40		
54.	Arrack tavern	10						
55.	Funeral service	15						
56.	National Political Parties and Trade Unions Office	10	20	40				
57.	Member of Parliament Office	10						
58.	Proctor and Advocat	3	6	12		32	64	126
59.	Surveyor and Auctioneer	5	10	20				
60.	Accountant and Accounting firm	20						
61.	Architect firm and consultant	20						
62.	Co-operative store	2	4	8		16	32	64
63.	Retail Provision Store	1	2	4		8	16	32
64.	Tea and Coffee Boutique	1	2	4		8	16	32
65.	Hotel and eating house	3	6	12		24	48	
66.	Bakery	3	6	12		24	48	
67.	Higher Grade Market (urban & agric.)	20						
	A Grade	15						
	B Grade	10						
	C Grade	10						
68.	Lower Grade Market (rural and urban neighbourhood)	2	4	8				
	D Grade							
69.	Meat stall	2	4	8		16		
70.	Firewood depot	2	4	8		16		
71.	Timber, lumber and Sawpits	3	6	12		24		
72.	Textile shop	5	10	20		40		

73.	Tailor and ready-made garment shop	3	6	12	24		
74.	Hardware, Paint and Cement	3	6	12	24		
75.	Jewellery Shop	5	10	20	40	80	
76.	Shoe, shoe manufacturing and repairs	3	6	12	24	48	
77.	Western Pharmacy	5	10	20	40		
78.	Ayurvedic Pharmacy	3	6	12	24		
79.	Furniture shop	5	10	20			
80.	Printing Press and Book Binding	5	10	20	40		
81.	Books and Stationary shop	5	10	20			
82.	Glass, picture framing and small scale tin works	3	6	12	24		
83.	Sewing machine and accessory shop	10	20				
84.	Photographic studio, supplies and services	10	20	40	80		
85.	Electrical goods, repairs and contractor shop	5	10	20			
86.	Motor spare parts, tyres and tubes shop	5	10	20	40		
87.	Water pumps, tractors and agricultural implement store	10	20	40			
88.	Tile store	5	10	20			
89.	Ice factory, ice sale and aerated water manufacture and sales	10	20	40			
90.	Miscellaneous store	3	6	12	24	48	
91.	Industrial and Trading corporation sales bulk depot	15	30				
92.	Dept. of Marketing, D.W.E. and Laksala branch	10	20				
93.	Wholesale shop in Provision goods, coconut and Coconut oil	10	20	40	80	160	
94.	Multi-Purpose Co-operatives Society's union depot	10					
95.	Commercial Banks	15					
96.	Co-operative and rural banks	10					
97.	Insurance Corporation	15					
98.	Co-operative Federation Office	15					
99.	Radio and watch repairs	5	10	20			
100.	Motor garages and metal works	5	10	20	40		
101.	Laundry	2	4	8	16	32	
102.	Barber saloon	2	4	8	16	32	64
103.	Post and Telegraph Office	5	10				
104.	Sub-Post Office	3	6	12			
105.	Railway Station (Express halt)	10					
106.	Railway Station (Ordinary halt)	5					
107.	Bus Station and Passenger jetty	5					
108.	Dept. of Customs and harbour	10					
109.	Air Ceylon Booking Office	15					
110.	Bus Depots and C.T.B. regional office	10					

111.	Petrol filling station	5	10	20		
112.	Bicycle renting and repairs	2	4	8	16	32

The calculation of location co-efficients for each central function.

<u>Central Functions</u>	<u>Functional units</u>	<u>Location co-efficients</u>
Grama Sevaka	226	.442
Village Council	78	1.282
Rural Court	38	2.632
Registrar of Births and Deaths	76	1.316
Urban local authorities (Town, Urban and Municipal)	16	6.250
Divisional Revenue Office	20	5.000
Police station and police post	20	5.000
Department of Excise	10	10.000
Departments of Fishery and Forestry	12	8.333
Departments of Agriculture and Agrarian Service	10	10.000
Departments of Electricity and Water Supply and Drainage	11	9.090
Departments of Land Development and Irrigation	11	9.090
Magistrate Court	9	11.111
District Court	5	20.000
Departments of Public Works and Surveyors	8	12.500
Department of Labour	4	25.000
Assistant Commissioner of Co-operative Development	3	33.333
Assistant Superintendent of Police	4	25.000
District Education Office	3	33.333
Department of Post and Telegraph	3	33.333
Assistant Commissioner of Local Government	3	33.333
Superintendent of Police	1	100.000
Regional Education Office	1	100.000
Department of Inland Revenue	1	100.000
District Head Office	1	100.000
Supreme Court	1	100.000

Primary school	788	.126
Maha Vidyalayam and Madhya Maha Vidyalayam	135	.741
Madhya Maha Vidyalayam	35	2.857
Private tutoring (commercial, dancing, needle work and motoring)	24	4.166
Religious and social institution	11	9.090
Technical, training, higher and special educational institution	11	9.090
Library and museum	8	12.500
Western doctor	27	3.703
Optician	3	33.333
Dentist	3	33.333
Veterinarian and Veterinary hospital	11	9.090
Ayurvedic dispensary	72	1.388
Provincial hospital and Special clinic	1	100.000
Base hospital and Provincial hospital	3	33.333
District hospital and higher grades hospital	15	6.667
Rural hospital and higher grades hospital	34	2.941
Central dispensary and higher grades hospital	94	1.063
Maternity home, Visiting dispensary higher grades institution	120	.833
Superintendent of Health and Engineers office	3	33.333
Medical Office of Health and School Health Office	9	11.111
School Medical Office	17	5.882
Public Health Office, Medical Office of Health and School Health Office	14	7.143
Cinema and theatre hall	41	2.439
Local newspaper and national newspapers regional office	5	20.000
Rest house and hotel	22	4.545
Sports stadium	1	100.000
Foreign liquor bar	42	2.380
Arrack tavern	9	11.111
Funeral service	1	100.000

National political party and Trade Union office	15	6.667
Member of Parliament office	13	7.692
Proctor and Advocate	226	.442
Surveyor and Auctioneer	21	4.761
Accountant and accounting firm	2	50.000
Architect firm and consultant	2	50.000
Co-operative store	831	.119
Retail provision store	1236	.080
Tea and coffee boutique	1158	.086
Hotel and eating house	224	.446
Bakery	103	.970
Higher grade market(urban and agricultural) A grade	3	33.333
B grade	10	10.000
C grade	23	4.347
Lower grade market(rural and urban neighbourhood)D grade	96	1.041
Meat stall	75	1.315
Firewood depot	127	.786
Timber, lumber and sawpit depot	71	1.408
Textile shop	186	.538
Tailor and ready-made garment shop	138	.725
Hardware, cement and paint store	114	.877
Jewellery shop	140	.714
Shoe, shoe manufacturing and repairs shop	51	1.851
Western pharmacy	30	3.333
Ayurvedic pharmacy	50	2.000
Furniture shop	11	9.090
Printing press and book binding	62	1.613
Book and stationary shop	31	3.226
Glass, picture framing and small scale tin work shop	81	1.235
Sewing machine and assessory shop	24	4.167
Photographic studio, supplies and services	37	2.703
Electrical goods, repair and contractor shop	36	2.778

Motor spare parts, tyres and tubes shop	34	2.941
Water pumps, tractors and agricultural implements store	11	9.090
Tile store	24	4.167
Ice factory, ice sale and aerated water manufacture and sales	14	7.142
Miscellaneous shop	38	2.631
Industrial and trading corporation sales bulk depot	5	20.000
Department of Marketing, Co-operative Wholesale Establishment and Laksala branch	15	6.667
Wholesale shop in provision goods, coconut and coconut oil	75	1.333
Multi-Purpose Co-operative Society's union depot	30	3.333
Commercial bank	13 24	4.167
Co-operative and rural bank	11	
Insurance Corporation	2	50.000
Co-operative Federation office	3	33.333
Radio and watch repair shop	44	2.273
Motor garage and metal work shop	116	.862
Laundry	179	.558
Barber saloon	404	.247
Post and telegraph office	35	2.857
Sub-post office and post and telegraph office	230	.434
Railway station(Express halt)	13	7.692
Railway station(ordinary and Express halts)	38	2.631
Bus station and passenger jetty	22	4.545
Department of Customs and Harbours	8	12.500
Air Ceylon booking office	1	100.000
Bus depot and C.T.B. regional office	10	10.000
Petrol filling station	55	1.818
Bicycle renting and repair shop	307	.325

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NORTHERN CEYLON

IDENTIFICATION MAP OF IMPORTANT CENTRES

