THE PRIMARY PHASE OF URBAN GROWTH IN THE KIRINDI OYA IRRIGATED SETTLEMENT AREA

ARTI

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A STUDY OF THE PRIMARY PHASE OF URBAN GROWTH IN THE KIRINDI OYA IRRIGATED SETTLEMENT AREA

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FOREWORD

This study by Prof. B L Panditharatne and Mr. M D Nelson seeks to interpret the urban growth process in the Kirindi Oya Irrigation and Settlement Project (KOISP). The study is located also within a theoretical framework that enables projections to be made on how the process of urbanisation is likely to develop in the study area.

This would no doubt be valuable for a post-hoc analysis of how in fact it has proceeded, say, a decade or two into the future. The logical development of economic activity within this region however would accommodate changes that have already taken place in the design parameters both for human settlement and for the crop regimes. They would also be influenced by a factor which has received less attention than was required at the planning stage of the project: the pre-existing regime of livestock production in the area that has been taken over for crop production under the KOISP. This is a feature which has not been addressed even in the implementation stage, with consequent impacts on the current viability of both crop and livestock production in the new areas developed under the project. It is a problem that is not easy of solution and the net cash flows to the new settlers on which the services of urban centres would depend for their growth have thereby been adversely affected.

The cash incomes of those who are engaged in paddy cultivation and for which the irrigation system based on the Lunugamvehera reservoir is as yet unable to provide a sufficient volume of water with an acceptable degree of probability has made cash income generation from paddy cultivation highly variable. The guaranteed price for paddy itself has been determined at a level which is well below the trend in world market prices. This too has implications for cash income generation and the prospects for urban growth in the project area. It also has implications for household food security within the KOISP. A significant decline in food intake in the project area was observed over the period 1981-86. Food supplementation provided by WFP was also of limited duration.

All these factors have led to a change in the composition of the population that is settled in the newly irrigated areas. The authors of

the study assume the desirability of developing a cash income in which certain goods and services which are not produced on the farm would be provided by the urban centres. While human needs are many, the foundation of human life lies in the security of food supply at the minimum levels required for sustenance. The prolonged uncertainties that have occured in the supply of the infrastructure for the human settlement in the new areas, particularly water for crop production, has had a destablizing effect on the new settlers resulting in many of them leaving the project area. Hidden land transactions in the project area are to be the subject of another study to be undertaken by this Institute but it is evident that they have already taken place. This in turn has implications for income distribution within the project area and for the kinds of goods and services from the urban centres that would have an effective demand. That demand might not follow the logic of the spatial distribution of the population.

These are matters that need to be reviewed once again by the end of this decade. Possibly such a review would lead to a modification of the model employed in the present study.

D G P Seneviratne
DIRECTOR.

ACKNOWLEDGMENT

The Director, ARTI, requested us in September 1987 to undertake a research study on the Urban Development of Kirindi Oya Irrigation and Settlement Project (KOISP). We accepted this assignment and were hopeful that we will be able to complete this assignment and forward the report on it within a specific time frame.

However, the unsettled conditions and occasional outbreaks of violance in the Hambantota district, particularly in the Kirindi Oya Project area, and the consequent fear psychosis that prevailed delayed our field programme and prevented us from completing our report in time.

The Kirindi Oya Irrigation and Settlement Project area is on the frontier which borders the so called 'arid zone'. The project provides the basic infrastructure for the settlement of 8400 settlers in two phases: phase I - 4200 settlers, and phase II another 4200 on irrigable paddy and homestead lots of one hectare size each.

This study interprets the urban growth process in the KOISP to be one of the concentration of facilities such as collecting, storing, processing, trading and marketing of agricultural produce, and of the development of services-oriented functions at predetermined sites and other specific locations to serve specific residential areas. The needs of an improved infrastructure (water, electricity, roads) will emerge with the development of agro-industries within the project area and thus increase the level and tempo of this process of concentration and urban growth.

This study considers the relevant factors in this process of urban growth at an early and pioneering phase and attempts to indicate the future trends both spatially and functionally.

In this study, we are happy to acknowledge the advice and help given to us on certain matters by Dr. Ranjit Wanigaratne, Senior Researcher, ARTI.

We also wish to acknowledge the courtesies extended to us by Mr. K.D.P. Perera, Director, and Mr. E.P. Wimalabandu, D.D. (M.C.) of the Irrigation Department and their staff by providing us with base maps, ground plans and residential facilities in the project area.

We thank Ms. Dharshanie Fernando of the ARTI for typing this report despite difficulties in reading our rather illegible script. We also thank Ms. Anula Indrani Pathirana of the ARTI for typing the final report.

We are pleased to submit our report which we believe has direct relevance to settlement morphology, growth, development and future planning.

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Chapter One

KIRINDI OYA IRRIGATION AND SETTLEMENT PROJECT: AN URBAN DEVELOPMENT STUDY

1.1 Scope and Purpose

The Kirindi Oya Irrigation and Settlement Project (KOISP) is located in the south east lowlands of Sri Lanka (Fig. 1). The landscape is relatively flat. Climatically it is a part of the 'arid zone' with a low annual rainfall around 25 inches which is very variable. This is a relative concept because 25 inches subject to high evapotranspiration rates have resulted in conditions of aridity.

The project (KOISP) was designed to be a joint venture of the Government of Sri Lanka and a group of international agencies (ADB, KFW, IFAD) almost of increasing agricultural production through a new irrigation system (Lunugamvehera scheme), and the settlement of 8400 families in 8400 hectares programmed in two phases In this developmental planning process, the distribution of basic infrastructural facilities namely irrigation channels, roads and a settlement system of hamlets and villages supplied with community facilities were predetermined.

However, it will be necessary to observe the concentration of activities and services in these predetermined central places. Following on the growth process, the possible emergence of several other secondary or minor central places as lot of facilities in response to the changing needs of the settler community is expected.

The term 'urban' in this context is applied merely to portray a growth process: the nature of the process of increasing a concentration of activities at favourable locations in a planned agricultural community.

In many of the rural development schemes in developing countries the planners are engaged in the process of selecting new locations for providing basic human services to the rural population. Since the

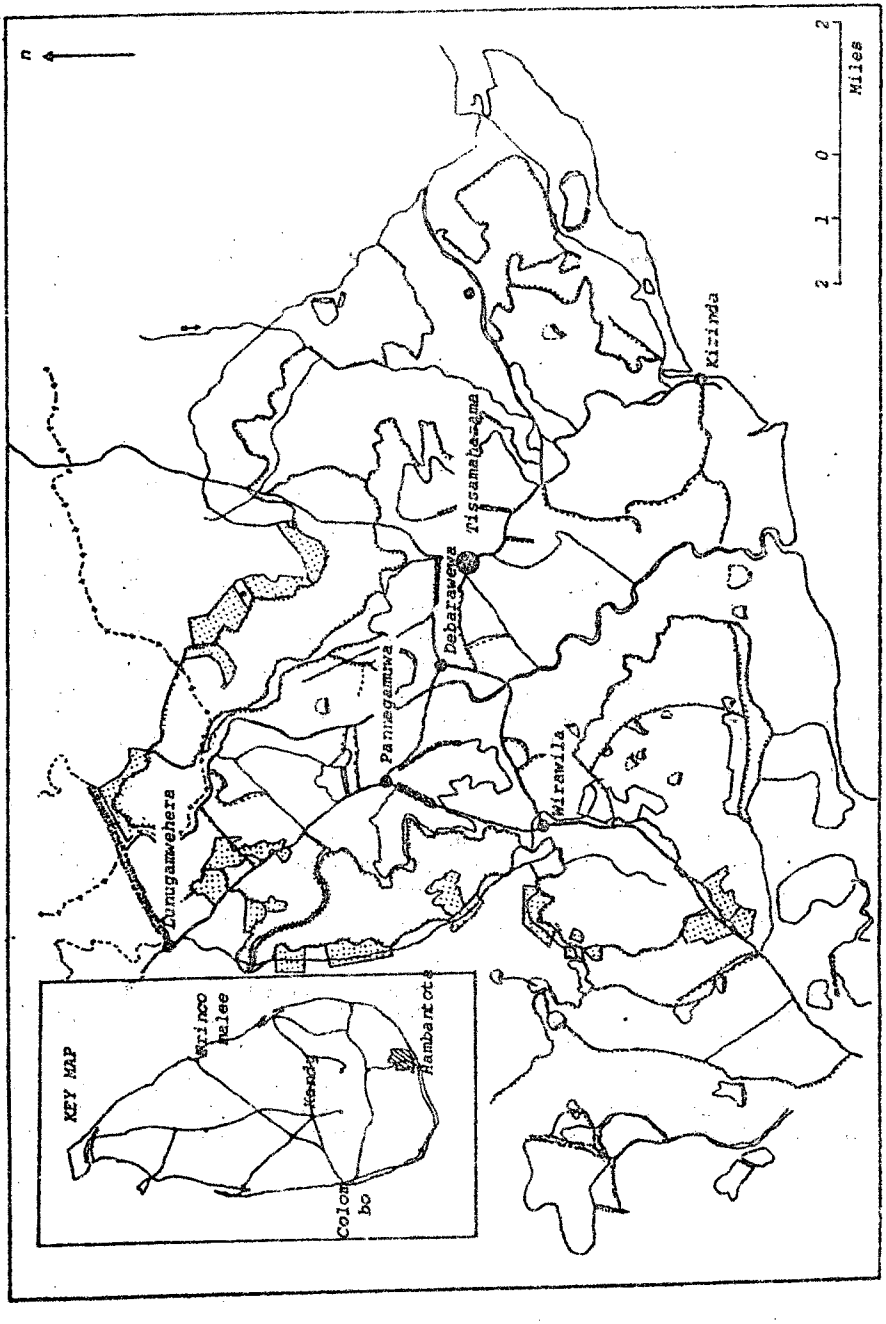


Fig.1.1 Location of Kirindi Oya Irrigation & Settlement Area.

majority of the population in developing countries is rural and infrastructural facilities are inadequate, new location decisions in the planning process are crucial and should not be ignored, because it will be difficult to modify the structure of the settlement pattern once they are established (Rushton 1984; Fisher and Rushton 1974).

In the early part of the 20th century, several concepts and theories in settlement planning and regional development have been advanced, but one most popularly and readily applied in planning efforts was the 'Central Place Theory' (Crystaller; 1930, Alonso; 1960, 64 Losch; 1954, Friedman; 1980). Along with the application of this theory, several other methods, (eg., location - allocation methods) have been developed to identify the optimal location of functional activities such as retail trade and services for which many alternative locational choices exist (Taylor: 1977). These location - allocation methods involved two basic considerations: (a) a set of consumers distributed spatially over an area, and (b) a set of facilities and services to serve them. The consumers may be farmers and urban residents while facilities and services comprise a wide range: basic, intermediary and higher needs associated with schools, retail outlets, markets, health care facilities, advisory services in agriculture, industry, trade, religion and culture. In this context, several relevant questions may be posed.

How can we allocate facilities to serve the consumers in the best possible manner? Will all the facilities have the same capacity as regards thresholds or will some services or functions serve more consumers than others? Answers to the above questions are linked with the location - allocation problem.

The location - allocation models have in recent years been adopted in the planning of settlements projects in developing countries namely India, Indonesia and Sierra Leone (Patel 1979: Kusumdewa 1977; Harvey 1974). These researchers argued that the problem of identifying certain settlements to be developed as local service centres could be solved by the application of 'optimal location - allocation' methods. For example in India, by the application of this method, it was possible to identify a spatial hierarchy of potential service centres that would meet the spatial requirements defined by the agencies responsible for the development of agriculture, industry, and service sectors so that it was possible to serve the basic needs of the rural population effectively (Rushton : 1984). The issue of spatial efficiency of locations as regards services and functions also has been

examined through the application of the optimal location-allocation methods. For example, in a district in Western India, the spatial efficiency of several locations was computed by comparing the average distances measured through a grid of hexagons to the closest service centre in the region. This was taken to be the average distance in an optimal spatial system.

It has also been pointed out that the existing services in a typical rural area differ in regard to their geographical accessibility to the rural population. Therefore the need for intervention to correct this differential accessibility to services varies according to activity to activity and from area to area. The location-allocation methods are also considered relevant in this process of evaluating the accessibility of locations and thus in suggesting remedial action.

1.2 The Objective of the Study

The overall objective of the study is to identify a spatial hierachy of potential service centres for effectively serving the basic needs of the settler population in KOISP in particular and to what extent the other service centres and towns in the neighbouring environs (Hambantota District) serve them in regard to intermediate and higher needs. We examine the effectiveness of services located in this area by the application of a location method and attempt to make a tentative forecast regarding the future facilities and services and their optimal locational concentrations in the context of the development of the KOISP.

1.3 Justification

While promoting urban development (interpreted rather loosely) in the KOISP, the rationale as could be gathered from ADB appraisal (1977) seems to be that with limited resources it would be inefficient and ineffective to sprinkle development investments thinly over most of the project areas. Rather, key urban growth locations (central places) are to be selected (after establishing) a rational settlement - hierarchical system) for concentrated investment that would benefit from (economies of scale and) economic agglomeration. Through a consequent linking of these functional economic central places by transportation and communication, an effective spatial diffusion of commercial and service activities catering to intervening hinterland areas within the KOISP was apparently envisaged. Such a strategy of concentrating investments and activity in selected centres combined

with the ongoing developments in agriculture was expected to bring in balanced regional development in the KOISP.

In order to fulfil these expectations a hierarchy of towns and service centres, new village centres, old village centres, and a series of new hamlets were planned for the KOISP. Tissamaharama occupied the apex of this settlement complex followed by the lower order centres developed at the food junctions of Wirawila, Lunugamvehera, Weligatta, Kirinda and Bogahapalessa.

Since the implementation of Phase I of the development programme, Tissamaharama showed the largest urban expansion and recorded an urban population growth rate which was more than 4 percent per year (Census 1971, 1981). From a small market town and religious centre, it has expanded into a bustling commercial centre drawing in surplus investments from the new and old areas of the project which are experiencing considerable agricultural development. As a commercial centre it has expanded to be the 'commercial capital' of the KOISP. In contrast, the junction of Debarawewa has developed as an administrative centre that is mainly connected to the project. Its central location alongside the trunk road between Tissa, Wellawaya and Hambantota explains its rapid growth inducing the setting up of several processing and produce marketing units and service establishments. The overall development of Tissa town and its effects on the hinterland, both on old and new settlements, coupled with the functional linkages with Debarawewa town have created an imbalance in the measure of commercial services and functional activity within the project area. This should be remedied by counter-growth strategies in balanced regional development.

Due to the prevailing drought in 1986/87 and the resultant inability of the Lunugamvehera reservoir based irrigation system to provide adequate water for cultivation, the agricultural development of the Kirindi Oya area has reached a low ebb. The mobility of agriculture which was expected has its effects on all other activities connected with it and it slowed down considerably both planned and unplanned commercial and urban development. Once conditions improve and agriculture becomes more productive multiplier effects on urban growth would invariably set in.

1.4 Method of Study

This study consists of several stages.

Stage I

1. Firstly, the existing hierarchical system of service centres in and around the Hambantota District is evaluated. This exercise covers all the functional activities agglomerated in the service centres. A town attractiveness index will be adopted as the basis of identifying the hierarchical order of the service centres in relation to their functional activities.

2. Secondly, the actual distance and the travel pattern of the population in the study area in relation to the hierarchical order of the service centres will be analysed. To do this, a questionnaire survey of a random systematic sample of settlers will be employed.

Stage II

1. Thirdly, a hypothetical arrangement of services and the functional system in the district will be derived. In addition, a hypothetical travel/mobility pattern of the population based on the minimum travel distance and the maximum utilization of the services offered by the hypothetical functional centres will be done.

   In addition, the hypothetical travel/mobility patterns of the people in the study area will be derived to assist identification of hypothetical optimal locations.

Stage III

Fourthly, on the basis of the existing settlement system, the possible future places of agglomeration will be determined by employing simulation models.

Chapter Two

HIERARCHICAL ORDER OF 'CENTRAL PLACES' IN THE HAMBANTOTA DISTRICT

This chapter discusses the hierarchical order of the 'central places' in the macro region of the Hambantota district in order to indicate the nature of functional linkages and relationships to the central places in our study area. The application of the centrality index provides a basis to assess the nature of 'spatial efficiency or deficiency' of the catchment areas served by the 'central places' in the district, as well as those of the KOISP.

2.1 Data for Hierarchical Order

Data were collected in the field in respect of the functional attributes and characteristics of the 'central places', for example, in respect of the public sector services in agricultural extension, research, marketing, agro-industries, educational services (schools; vocational and technical) health care services (hospitals, maternity homes and dispensaries), post offices, police stations, courts of law, central bus stands, and bus depots. Data from secondary sources namely census reports, governmental publications and unpublished material available at the local town/urban council offices were also obtained.

As regards private sector activities and functions it was only through field inquiry, that data were collected as regards site considerations, locational decisions, choice of specific trades, their thresholds as regards range and effectiveness. Quantitative data on trade and commercial transactions were difficult to gather. Some of the owners of these outlets (locally referred to as kada) or those who did not own these but operated them either on rental or leases were not registered as traders. Thus their names did not appear in the Registers of commercial and trade establishments which were available in a few town/urban council offices.

Informal sector functions played a significant role in the town economy of small towns and central places. But data were very scanty and difficult to collect and required a high degree of rapport of the researcher or interviewer with several petty traders, itinerant hawkers and salesmen and observational skills and progmatism.

A central place in our survey is any location or place where 5 retail functions or service establishments were agglomerated. Those places or locations with less than 5 functions or services are disregarded. Data were collected for each centre according to the size and number of establishments and their respective functions.

The size of the establishments is determined by selected criteria such as nature of management, frontage space, items displayed, number of employees, cash outlay and internal arrangement. Those establishments which fulfilled the above mentioned criteria are classed as A and given a maximum of 5 points, whereas classes B,C,D,E which by comparison had a lower rating in our assessment are given 4,3,2,1 points respectively. For example, the hawker stall (petty trade) is classed in E and given 1 point whereas a super market category enters A class and is given 5 points. On this assessment an hierarchical order of central places of the district is established.

2.2 Hierarchical Order

The 'centrality index, is one of the popular means employed in an identification of the hierarchical order of the central places. This index is based on the notion that the centrality of a function is assumed to vary with the number of outlets. If a large number of outlets perform that function, the centrality of each outlet is necessarily said to be lower than in a situation where a single outlet or a few outlets monopolized the performance of that function. Based on this reasoning and the outcome of several relevant research applications, the location coefficient of a function is calculated by using the following equation:

$$C = \frac{t}{T} \; 100 \qquad \text{---------- (1)}$$

where C = location coefficient of the function
t = a single outlet of function t
T = the total number of outlets of the function t in the study area

Accordingly, the locational coefficient of a centre is the sum of centrality values of all the functional activities occuring in the centre. This is the functional index of that specific centre. By considering these values, the hierarchical order of the central places is established.

Our study covered 38 central places distributed in the Hambantota district. The method employed to derive at the functional index of each centre is shown in Table 1 (See Appendix). The highest values are indicated in 2 centres, Ambalantota - (1780.69) and Tangalle - (1145.81) whereas the lowest scores are recorded at Debaralle, Debokkawa, Koggalle and Meegaswewa. Further as reflected in Fig. 2.1 the centres fall into the following orders:

First-Order	- Centres of Ambalantota and Tangalle
Second Order (intermediate)	- Tissamaharama, Hambantota, Beliatta, Walasmulla
Third Order	- Those central places which coincided with the road junction centres and few developed village trading centres

Related to this macro-regional hierarchical order of the district, a similar order of the central places in the KOISP is presented as follows:

Table 2.1
Hierarchical order of Centres in the KOISP

Centre	Rank	Value (centrality)
Tissamaharamaya	1	889.7
Debarawewa	2	192.3
Wirawila	3	78.71
Yodakandia	4	73.72
Pannegamuwa	5	65.74
Pallemalala	6	39.92
Kirinda	7	24.12

Source : Field surveys (1987).

Tissamaharamaya emerges as the major centre, the apex of the central place system in to the KOISP.

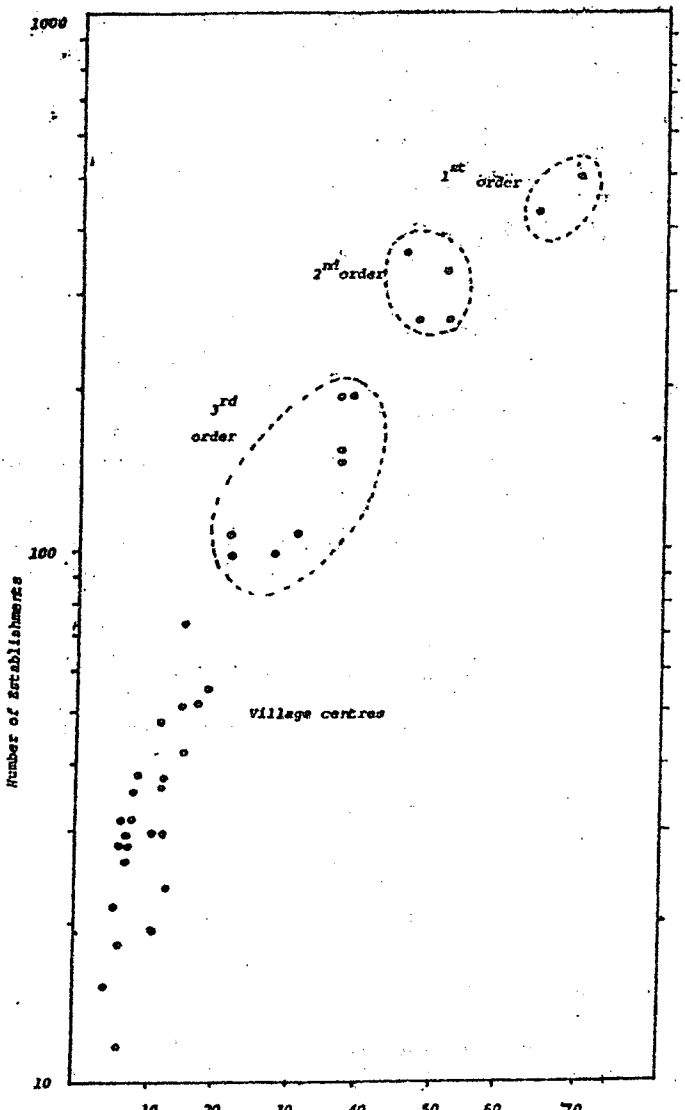


Fig.2.1 Classification of Central Places in Hambantota District

2.3 Central Places and their Catchments: Criterion of Minimum Aggregate Travel Distance

Consumers (population) who live in the surrounding areas of central places (the so called catchments or fields) have to travel to them either to purchase certain goods or to avail themselves of certain services and facilities. If the consumers have to travel 'minimum distances' from their locations to the central place, that population in relation to its closest central place is said to be efficiently located in space. Thus the criterion of minimum aggregate travel distance among a set of central places provided a useful index in the study of spatial patterns and to differntiate space into spatially efficient and deficient areas. The minimum distance values were computed for central places in the Hambantota district. Following steps explain the application of this method.

On the scale of 1 inch to 1 mile base map of the Hambantota district.

Step : 1. The map is gridded into one inch squares.

2. Central places are located in the base map.

3. 8 major places (towns) and their hypothetical catchment areas are demarcated according to the Thyson Polygon technique and location-allocation method, the basis to compute the minimum aggregate travel distance from the respective catchments to their central places (Appendix).

4. The population of each square in the respective polygon spaces is ploted. (Population data obtained as of Grama Sevaka divisions in Census, 1981 (See fig. 3, Appendix).

5. The population of each square (P) X minimum distance from the centre of the square to the closest central place (D).

6. The sum of P X D of all the squares or cells in the Thyson Polygon (catchment space demarcated for each central place respectively) is the aggregate minimum population distance. Based on this data the aggregate population mileage (distance) for 8 major central places in the Hambantota district is presented in Table 2.2.

Table 2.2
Aggregate Population Mileage Distance for 8 Major Central Places (Hambantota District)

Major Centres	Aggregate Population Mileage (in thousand miles)
1. Tissamaharamaya	250
2. Tangalle	230
3. Ambalantota	225
4. Walasmulla	224
5. Middeniya	206
6. Bellatta	184
7. Suriyawewa	63
8. Hambantota	63

Source: Field Studies (1987). Computations derived from Calculations on Base Map.

Tissamaharama, the major central place of the KOISP has the highest mileage which points to the fact that the consumers in its catchment have to travel for their goods, services and facilities more than the consumers of the other catchments of the central places in this area, a measure which indicated its spatial deficiency.

Chapter Three

KIRINDI OYA IRRIGATION AND SETTLEMENT PROJECT: AN ANALYSIS OF THE SETTLEMENT

The settlement pattern in the Kirindi Oya Project exemplified two systems, namely those of Ellegala and Bandagiriya (referred to as Old Irrigated Area - OIA), and the newly settled settlements which stretched continuously along the left and right channel banks of the Lunugamvehera reservoir (New Irrigated Area - NIA).

3.1 The Old Irrigated Area (OIA)

This area occupied the southern parts of the project and had as its focus on the historic city of Tissamaharama with secondary centres developed at Yodakandia, Kirinda and Pallemalala.

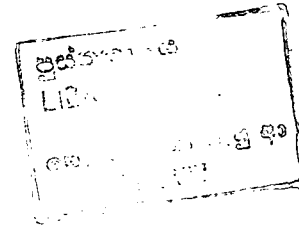
Historically the economic base of this area was strengthened by the expansion of the irrigable areas made possible by the construction of dams, reservoirs and canals particularly Tissawewa and Yodawewa making it a rich agricultural settlement which declined during the colonial period. In the 19th and 20th centuries under the British regime, it had been administered as a part of a backward district in the southern province.

3.2 Population and Demographic Characteristics

The census of 1981 enumerated on the basis of the Grama Sevaka divisions of the old settled areas indicated populations in Grama Sevaka Divisions.

Population distribution showed a threefold pattern: (a) an aggregation of population along the irrigation channels connected to the wewas; (b) a linear spread along the major roads and (c) concentrations at Tissamaharama and several junction centres.

The population was predominantly rural, around 85% and average density below 100 per square kilometer. The urban population was



confined to Tissamaharama with a population of 6237 in 1981, with a relatively high growth rate of 4.9% per year.

Table 3.1
Population on 'Grama Sevaka' Divisions (G.S.) of the KOISP (Old) 1981

No.	G.S. Divisions	Population
597 B	Debarawewa	4745
601	Kirinda	2120
602	Magama	1152
599	Ranakeliya N	4314
599 A	Ranakeliya S	6853
597	Tissa N	4332
597 A	Tissa	1944
603 A	Uduwila	4043
603	Wirawila	7363

Source : Census and Statistics, 1991.

In 1971, the population density of the AGA division of Tissamaharama was 40 persons per square kilometer which increased to 60 in 1981. The urban density of Tissamaharama was 113 persons per hectare which indicated a change of 47.4% in the 1971-81 period. Change in rural population in this division during the same period was however even higher at 52.1%.

The Census of Ceylon in 1971 (the first census enumerated) recorded the population of this area, Magam Pattu to be around 3651. The people of this area was mainly associated with the construction of irrigation schemes, namely the Kirindi Oya left bank (1872-77) and right bank (1903-07). From 1921, large scale migration to Magam Pattu was evident mainly from the Matara district. Between 1936-46, the population of Magam Pattu more than doubled because of migration consequent on the availability of irrigable lands with the extension of irrigation networks based on Kirinid and Walawe rivers. Two colonization schemes namely Bandagiriya and Bogahapalessa also brought in an increase of population.

3.3 Irrigation and Settlement

The old settlement of traditional villages was supplied with water by six reservoirs and their distributory channels namely Tissa, Yoda, Debarawewa, Wirawila, Pannegamuwa and Bandagiriya.

During 1872-77, a small dam (anicut) was constructed across the Kirindi Oya at Ellegalla which provided water to the left bank area and a 11 kilometer long canal augmented the water supply to the old wewas of Tissa, Yoda and Debarawewa. A second 6.4 Kilometer long canal along the right bank of the Kirindi Oya was completed in 1917. The drain water from Ellegala anicut fed the Pannegamuwa and Wirawila wewas.

The Bandagiriya colony begun to be established in 1957 but completed in 1973 comprised of 429 families and was different to the traditional villages. Recently a fishermen's colony, mainly of Malays, has also been created in the harbour area after the construction of the fishery harbour at Kirinda.

3.4 Land Use

Land forms and associated land use in the traditional villages exemplified a duality; the wet lands (madabima) cultivated with rice, the higher dry lands (godabima) occupied by homesteads cultivated with tree crops, pulses or vegetables. The paddy tracts (yayas) stretched along the river banks, mainly along the lower part of Kirindi Oya and the catchment of the major reservoirs. The arable land and the associated irrigation system are shown in Table 3.2.

Table 3.2
Arable Land and Irrigation System in the KOISP

Source of water	Arable land (in hectares)
Kirindi Oya:	
Left bank canal	2634.59
Right bank canal	972.50
Malala	426.96
Total	4034.05

Source : ADB (1977) Appraisal of Kirindi Oya Project, P. 1.

Non agricultural uses found were chiefly in urban land and in lands that were underutilized; eg. salt, marsh and scrub.

3.5 Urban Land Use : Tissamaharama Township

Tissamaharama is ranked as the third largest urban center in the Hambantota district. It occupies a central position in the old settled area in relation to the other centres namely Wellawaya, Kirinda, Kataragama and Yala.

The topography is relatively flat, and most of the surface area is occupied by paddy tracts irrigated by the canal system associated with the three wewas of Tissa, Yoda and Wirawila.

Tissamaharama was raised to urban status according to the local government classification in 1963 (Census Report 1963). Its urban population was 4126 in 1963. In 1971 the population was 4343 which indicated a very low numerical increase of 217. In 1981, the population was 6402 which showed an intercensal numerical increase of 2059, indicating a growth rate of 4.7% per year.

Land Use

Agricultural land use mainly seen in paddy lands and home gardens predominated the urban land surface and emphasized the occurence of a typical agro-base oriented urbanization. Commercial uses occupied less than 2% of the surface. The building density of the built up areas was lower than in the other towns of the district. Built up areas which were loosely woven stretched along the road system in a linear pattern.

Table 3.3 provides a detailed breakdown of land uses in the Tissamaharama town in 1986.

3.6 Functional Analysis

The functional dynamics of Tissamaharama town indicate a two fold division - those of services and trading. Services are predominently public sector functions with direct state investments namely those of health care, education, postal services, and transport. Housing and utilities were administered by the town council. Private sector enterprises dominated trading activities. These varied in sizes, ownership, types of business and scales of operation.

Table 3.3
Land Use : Tissamaharama, 1986

Type	Percentage of land Under each category
1. Agriculture	
- Paddy lands	44.3
- Home gardens	31.8
2. Residential and mixed Residential	13.6
3. Commercial	1.9
4. Religious and cultural	1.1
5. Utilities	0.9
6. Archaeological	0.4
7. Industrial	0.3
8. Public offices	0.1
9. Educational	0.1
10. Open spaces (formal)	0.1
11. Water bodies	4.5
12. Scrub	0.9
	100.0

Source : Tissa Town Development Study - 1986. University of Moratuwa

Table 3.3 presents the classification of services and trade functions in relation to their relative size and functional characteristics. Dry groceries account for 19% of the trading units. These are mostly medium size and owner operated. Green groceries (vegetables and fruits) account for 13% and are one man small scale operations confined to the central market. Fancy goods, textiles, garments and tailoring account for 16% and show considerable variation particularly as regards ethnicity, ownership, and employee composition. Hotels, restaurants, tea boutiques, eating houses account for 10%. Automobile repairs, garages, welders, mechanics, petrol depots, rice milling, timber depots, photographic studios operate as medium to small scale industrial establishments. Although few in numbers personalized services rendered by dental clinics, doctors, cinemas, photographic studios, record bars, and libraries indicate high centrality.

According to the size of these establishments, these are grouped into A,B,C,D and E (see page 8, Chapter 2). None is large enough to be included in the A group and only a few could be included in a group (See Fig. 3.1). Most of the trading units belong to the C group (Medium size operations) and 52 units are included in the D group. Street vendors and hawkers are placed in group E.

Public service functions providing by the hospital, police, law courts, postal and bus services enjoy a district status and command considerable areas as their service fields, whereas those of education, irrigation, electricity and archaelogy are linked to specific special projects. The administration of the town's utilities, institutional and community services and functions are entirely the responsibility of the town council.

3.7 The New Settlement Area (KOISP)

The Kirindi Oya Irrigation and Settlement project implemented in 1982 occupied the lower basin of Kirindi Oya adjacent to the old settled areas around Tissamaharama. The surface terrain is relatively flat and gently rolling. The project was planned in two phases to provide irrigable water to about 8400 hectares by the construction of two main canals on the left and right banks of the Lunugamvehera reservoir.

The overall oojectives were the settlements of the landless peasant families in new settlements supplied with the necessary infrastructure to increase agricultural productivity by the adoption and application of improved crop management practices; develop crop diversification in home steads; combine livestock farming and social forestry with the aim of increasing farmer incomes, their nutritional levels and living standards.

Phase I was devoted to the construction of the Lunugamvehera reservoir and the irrigation infrastructure needed for the settlement of 4200 hectares. Development changes were to follow in three new tracts No. 1,2 and 5 in the left bank of the canal and two tracts No. 1 and 2 on the right bank (See Table 3.5 below and Fig. 3.2).

Table 3.4

Distribution and Size of Trade Functions in Tissamaharama Town

Functions	Groups A	B	C	D	E	Total
1. Grocery traders	-	1	38	8	-	47
2. Fancy goods	-	2	14	2	-	18
3. Hotels, Restaurants, tea boutiques etc.	-	-	14	11	-	25
4. Mineral waters, Beverages	-	-	4	2	-	06
5. Vegetable and fruit sellers etc.	-	-	5	5	22	32
6. Saw milling, Rice sellers and Purchases	-	1	5	-	-	06
7. Building material and Hardware	-	-	2	-	-	02
8. Agro-chemicals and Fertilizers	-	-	2	-	-	02
9. Radio and Watch repairs	-	-	4	3	-	07
10. Studio and Photographers, Colour printers	-	1	2	-	-	03
11. Textile and Tailoring	-	2	16	2	3	23
12. Western and Ayurvedic Dispenseries	-	-	3	2	-	06
13. Pharmacies (West and Indigenous)	-	-	3	2	-	05
14. Dentists	-	-	1	-	-	01
15. Lanunries	-	-	2	1	-	03
16. Saloons	-	-	3	3	-	06
17. Jewellery and Antiques	-	-	2	-	-	02
18. Shoe shops, makers and repairers	-	1	2	-	-	03
19. Bakeries	-	-	1	-	-	01
20. Record bars, Cassette sellers	-	-	1	-	-	01
21. Cinemas	-	-	1	-	-	01
22. Banks	-	-	2	1	-	03
23. Insurance Corporation	-	-	3	-	-	03
24. Furniture, Timber and Wood sellers	-	2	2	-	-	04
25. Bicycle and Motorcycle repairers	-	-	4	1	-	05
26. Motor spare part dealers	-	-	6	-	-	06
27. Garages, Motor Engineers and Blacksmiths	-	1	13	3	-	17
28. Lottery ticketsellers	-	-	3	-	-	03
29. Curd sellers	-	-	-	-	3	03
30. Pots, coir and mat dealers	-	-	1	3	-	04
31. Tyre rebuilders and dealers	-	-	-	1	-	01
32. Service and Gasoline	-	-	2	-	-	02
33. Postal service	-	-	-	-	-	15
34. Local Govt. Administration	-	-	-	-	-	10
35. Hospitals	-	-	-	-	-	12
36. Govt. Warehouses, paddy marketing	3	-	-	-	-	30
37. Rural fairs (Pola)	-	-	-	-	-	15
38. Police	-	-	-	-	-	10
39. Courts	-	-	-	-	-	10
40. Water supply schemes	-	-	-	-	-	10
41. Religious/cultural	-	-	-	-	-	30

Source : Urban Field Survey, 1987.

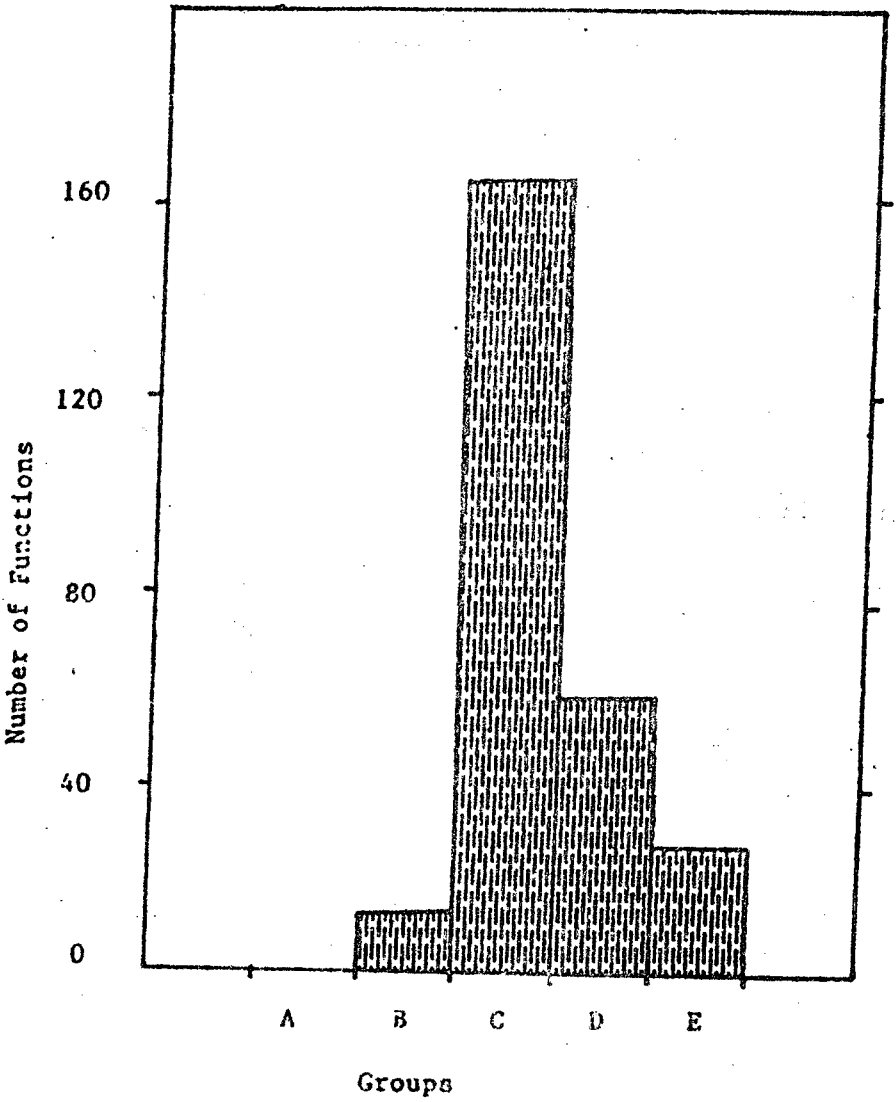


Fig. 3.1 Distribution of the Size of Trade Establishments in Tissamaharamaya Town

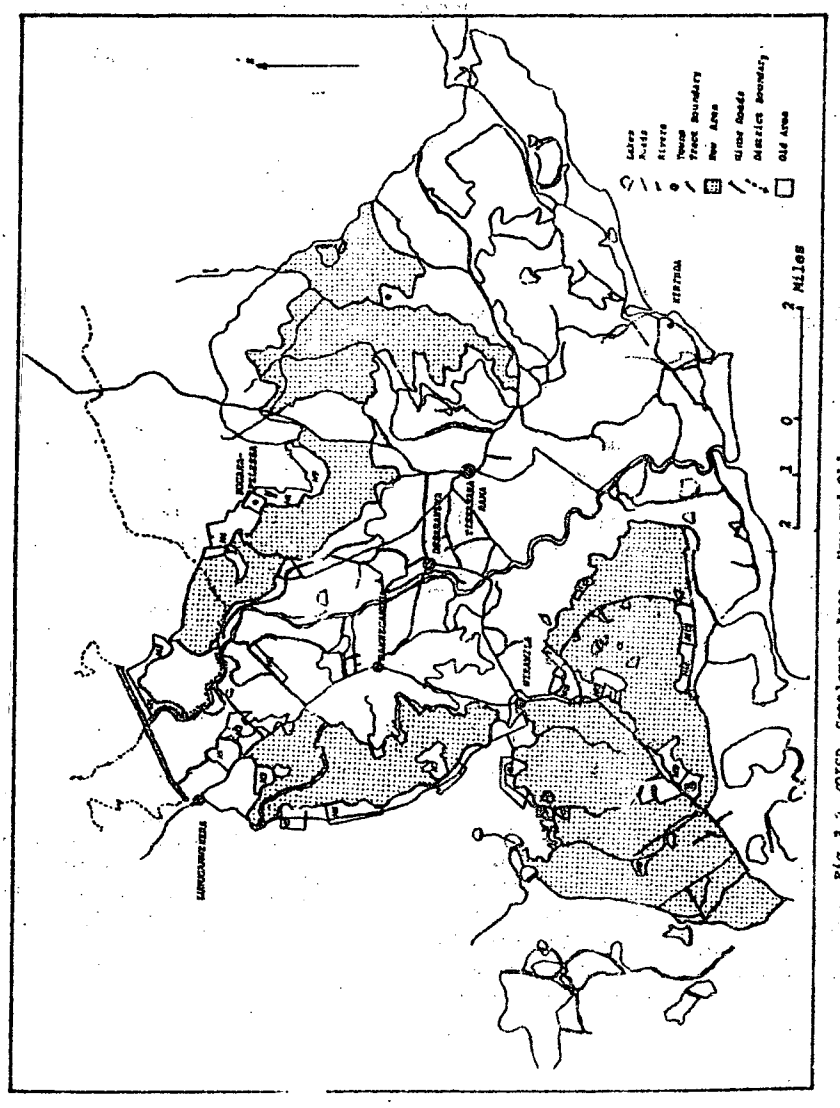


Fig.3.4 KOISP Settlement Area : New and Old

Table 3.5
Phase I - Development Programme
(in hectares)

New Area	Area RB	Area LB	No. of Hamlets R.B.	L.B.
Tract 1	850.0	702.5	H-1,2,3,4	1,2,3,4
Tract 1	889.0	886.5	H-5,6,7	H 5,6,7
Tract 5	1001.0	-	H-8,9	
	2743.0	1589.0		

Old Area
Bandagiriya scheme 85.0 ha
Ellegala system 3754.0 ha
4584.0 ha

Table 3.6
Phase II - Development Programme
(in hectares)

	Area	Area	Settlements R.B.	L.B.
Tract 3	574.0	1308.0	H 16,17	-
Tract 4	928.0	381.0	H 11,12,13 14,15	
Tract 6	670.0	-	H 9,10	
Tract 7	237.0		H 19	
	2409.0	1689.0		

Source : Irrigation Dept. 1987.

Phase I covered around 8916 hectares including the old settlement areas of Bandagiriya and Ellegala systems. Phase II proposes to extend the irrigation infrastructure to new lands; tract Nos. 3,4,6 and 7 on the right bank and tracts 3,4 on the left bank which would enable the settlement of 1500 families. In these lands the production of subsidiary food crops combined with livestock, social forestry, agro industries and related socio-civic activities have been emphasized.

In these new areas the estimated population will be around 25,500 on the basis of 5 members for each family

eg. - Phase I 3600 families (settled) X 5
= 18,000
Phase II 1500 families X 5
= 7,500
Total = 25,000

Thus in 1986 after completion of Phase 1, it is estimated that around 18,000 people will be distributed among 16 hamlets. The total population of both the old and new areas is estimated to be around 68,000 from a total of 13,600 families. Most of the settler farmers in these new lands have been selected from landless peasants with an agricultural background and experience from the electorates of Tangalle, Mulkirigala, Beliatta, Ambalantota, and from Matara district*.

3.8 Settlement Pattern

The ground plan of the settlement (See Fig. 3.3) indicates a series of rectangular lots (homesteads), each to be quarter hectare in extent provided with access to a pre planned road layout. The farm (fields) occupy the lower irrigated areas and these are divided into family holdings each three quarter hectares in extent. Farmlands are away from the homesteads but are within 1 kilometer walking distance.

The settlement structure is hierarchical; the smallest is the hamlet followed by the village center and town. There are 11 hamlets settled under Phase I and 17 are proposed to be settled under Phase II.

Each hamlet is planned to provide ground space for the accommodation of 250 families. However, there are difference in the hamlets in this respect (Table 3.7). Each hamlet had a preplanned infrastructure eg. - a retail outlet (co-operative store), primary

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* Valuable documents which give a wealth of details of these settler farmers available at the AGA's office at Debarawewa have been destroyed by terrorist action in 1987.

school, community centre, play ground, cemetery and office of the field officer. But community responses indicate certain individual choices in decision making in regard to the location of retail outlets in more favourable locations in the settlements offering retail services to a limited clientele within walking distance from their homesteads. The village center occupied a high order and there are three such centres; Lunugamvehera, Wirawila and Bogahapalessa, under Phase II it is proposed to establish a few more at Weligatta, Ranakeliya and Kirinda.

The infrastructure developed in these centres includes a secondary school complex with quarters for the staff, co-operative retail store, primary health care centre, sub post office and quarters, agrarian services center and stores, and provision for electricity. In addition to these 'core facilities', the location of a rural hospital at Lunugamvehera and an agrarian services centre at Beralihela have enhanced the status and attraction of these centres.

Table 3.7
Allocated home lands in the hamlets in the Right Bank Settlements (size variations)

Hamlets	No. of allotments in the Hamlet (families)
Hamlet 1 H_1	240
Hamlet 2 H_2	251
Hamlet 3 H_3	192
Hamlet 4 H_4	141
Hamlet 5 H_5	214
Hamlet 6 H_6	284
Hamlet 7 H_7	302
Hamlet 8 H_8	280
Hamlet 9 H_9	173
Hamlet 10 H_{10}	259
Hamlet 11 H_{11}	298

Based on the physical plan of each hamlet obtained from the Irrigation Dept., 1988.

(Note the destruction of 173 homesteads in H_9 area, in contrast to H_{11}, H_8 and H_6 exceeding 275 homesteads and H_7 area with 302 homesteads.)

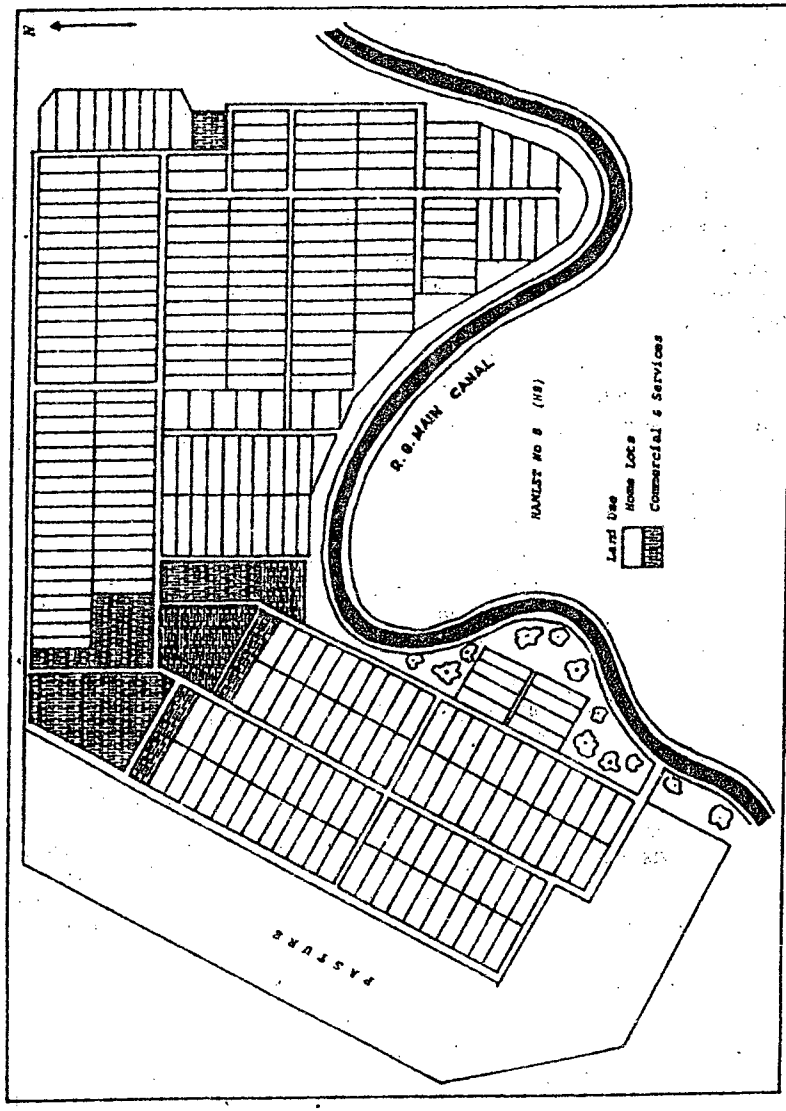


Fig.3.3 Physical Plan of a Hamlet (Based on Hamlet No 8)

Townships in the highest order in the hierarchical system such as Debarawewa, Pannegamuwa and Weerawila show evidence of a growth momentum as 'growth centres' associated with developed functions (See Table 3.8) namely administrative services, eg. offices of AGA, Irrigation dept., bus transport, agrarian services and co-operatives.

Debarawewa owing to its advantages, location and centrality has developed especially more administrative commercial, agro-industrial and residential functions than the other two townships. Pannegamuwa's commercial functions are relatively few but it has a potential particularly in its presently operating weekly 'pola' which attracts a considerable number of buyers and sellers. Pannegamuwa also shows some potential in respect of the growth of retail services and residences.

Small scale agro-industrial enterprises such as saw mills, paddy processing plants, retail outlets, though to some extent were 'footloose' at the earliest phase, tended to prefer at present locations at junctions and fronting the major roads.

3.9 Accessibility

The access to services and trade facilities provided in the settlement indicate their locational efficiency in space and also show what part of the community has easy access to or is otherwise placed in relation to selected specific functions.

Health care, education and trade services have been selected to illustrate this point. In our study area there is no separate health service (patient care service) but it forms a part of and is administered under the Hambantota district service system. The evaluation therefore is thus based on the total system.

Hambantota district is now declared a separate 'Health Region' under the supervision of a Regional Director of Health Services (Regional Directorate, Hambantota, 1988). The district has two Medical Officers of Health (M.O.H.) and three District House Officers (D.H.O). Our study area comes under a D.H.O.'s division.

Table 3.8
Functional Characteristics of Three Centres

Functions	Debarawewa	Pannegamuwa	Weerawila
Post office	5	5	5
Computer house	10		
'Pola'	-	5	
Administrative office			5
House			15
Paddy			10
Irrigation office	15		
AGA office	15		
Grocery stores	13	4	4
Fancy goods	7	5	-
Hotels	7+4	14	2
Beverages	4		
Fruits	6		
Paddy	5	3	
Agro-chemicals	1		
Radio repairs	1		
Textiles	4	3	
Dispensary	3	2	1
Dental surgeon	1		
Barber saloon	5	2	
Laundry	1	1	
Jewellery shop	1		
Shoe seller/repairer	1		
Wood, timber dealer	1		
Grocery	4		
Lottery	1		
Tailor shop	1		
General	1	1	
Flowers/undertakers	2		
Battery charger		1	
Mixed (miscellaneous)		2	

(From Field Survey, 1988)

Hierachically, health service institutions in the Hambantota district are as follows:

Table 3.9

Base hospital	1
District hospitals	3
M O H Divisions	2
Divisional Health officers divisions	3
Peripheral Units	3
Sub divisional health centres	1
Rural hospitals	3
M.H. and C.D.D.	6
C.D.D.	4
School dental clinics	6

In addition to these (western medical care) health delivery system, there are four Ayurvedic centers, and an Ayurvedic hospital at Bellatta with a bed strength of 60 for indoor treatment under the Dept. of Ayurveda.

The base hospital is the largest and is provided with wards for indoor treatment, consultant/specialist services and supporting laboratory and technical services and an out patients treatment service (O.P.D.). The district hospital on the other hand is equipped with modest service facilities confined to general medicine, simple surgery and natal care. The peripheral units and rural hospitals are operationally rather ineffective because these are inadequately manned by qualified doctors either on a full time or visiting basis.

Most of the health institutions have been located in the western part of the district (see fig. 3.4). Only one district hospital and sub-divisional health centre are located in our study area. Thus the entire population has to depend on these two institutions for basic health care services or have to seek superior services at the base hospital at Hambantota. The settlement's health services are also covered by linkages to the district delivery system; eg. - in every hamlet there is a branch dispensary under the overall supervision of a M.O.H. and also a primary health care center located in every village center. Although the sub-divisional health center (SDHC) at Lunugamvehera administers several health facilities (maternity, child care, immunization), the preference and the pull of the sick seemed to be towards the

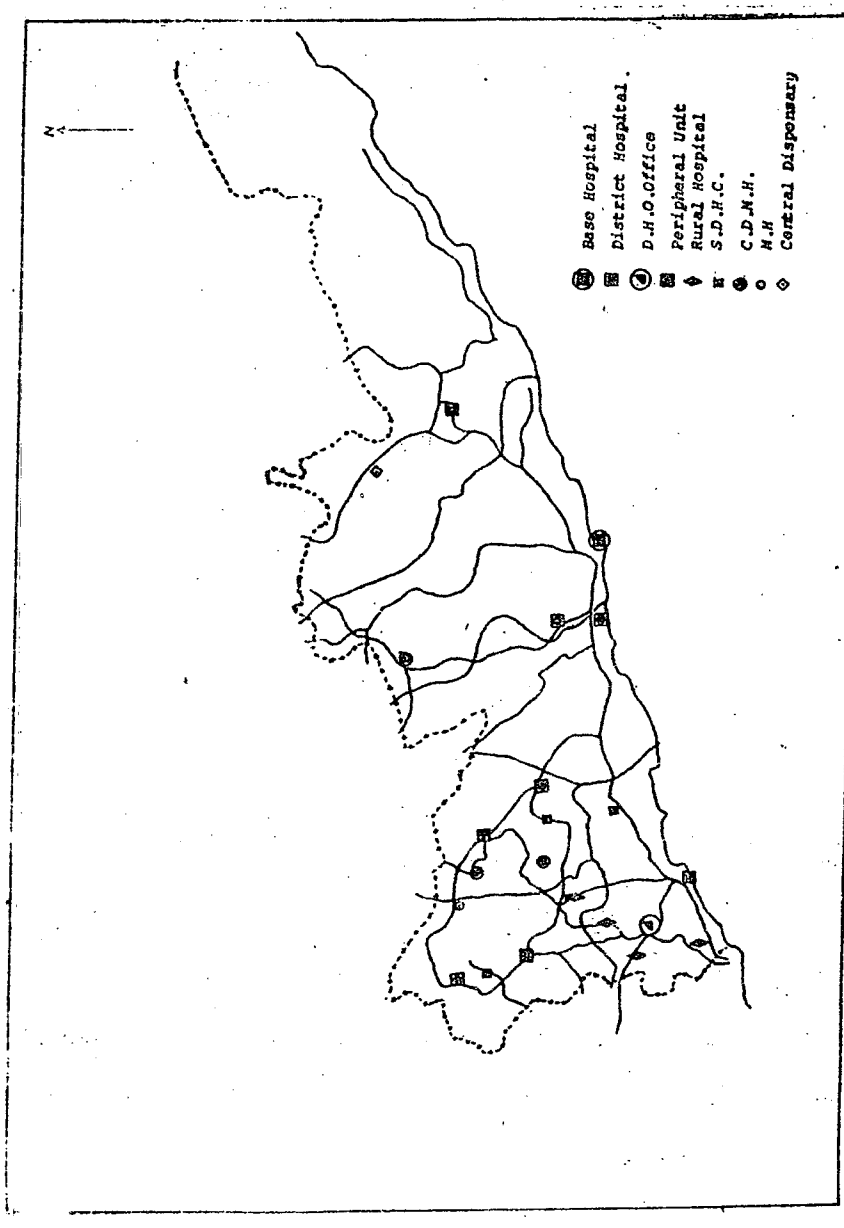


Fig.3.4 Distribution of Hospitals In Hambantota District

Debarawewa hospital despite its several shortcomings such as inadequate qualified staff and support services, poor indoor health care facilities eg. - X'ray, surgical and pathological testing. The patient - bed ratio capacity is 1 : 523 and doctor - patient ratio even higher.

The access to these institutions may be expressed by the hypothetical average distance derived by the application of the following formula:

$$\bar{D} = \frac{\sum_{i=1}^{n} D_i}{n} \quad \text{----------} \quad (2)$$

Where, $\bar{D}$ = Average distance
D_i = Distance of the ith point from the center
n = Number

An application of this formula brought the following results:

Type of hospital		Distance/Miles ($\bar{D}$)
1. Base hospital (Hambantota)		19
2. District hospital (Tissa)		6.5
3. Primary health care center (village center)		
	Weerawila	2.5
	Lunugamvehera	3.0
	Bogahapalessa	1.0
	Weligatha	1.5
4. Branch dispensary (in every hamlet)		

Accordingly the hypothetical travel distances to each of the health institutions (western system) appear to be within easy access and reach to the population of the project area. Although the facility of a branch dispensary at every hamlet to provide primary health care tends to project a semblance of equivalence as regards to distributive health and welfare services, in practice however these rural health institutions are mere locational entities and their services operate at minimum level of efficiency.

Most people have to travel long distances to the large hospitals for health care services. Even in the district hospitals, the deployment of health man power has not been increased substantially during the last decade.

Table 3.10
Hospital Beds (1978,1986,1987)
(Hambantota District)

Types	1978	1986	1987
Hospital beds	769	1010	1010
No. of 1000 beds	1.98	2.01	2.1
No. of M.o.o.	12	17	19
No. per 1000 population	0.0301	0.036	0.04
No. of AMP/RMP	23	26	23
No. of 1000 population	0.059	0.055	0.048
No. of nurses	63	79	82
No. per 1000 population	0.16	0.17	0.17
No. of Inst. Midwives	38	-	44
No. of field P.H.M.	125	-	131
No. of 1000 population	0.322	-	0.276

Ayurvedic medical services have always buttressed western medical services in the rural areas. Four Ayurvedic dispensaries served this area at Morayaya, Meegahawewa, Kirama and Bandagiriya.

Table 3.11
The KOISP Project Area Hospitals Data (1987)

	No. of beds	No. of patients	Bed occupying rate	Maternity beds	Total OPD
Hospital at Tissa	135	21621	43.83	28	106,615
Lunugamvehera	45	2901	17.65	14	11,173

Secondary sources for hospitals.

The above table provides some basic data regarding the two hospitals in the KOISP.

The health service plan is good in regard to the location of institutions and their service fields. However, in an operational sense it does not function smoothly mainly because of man power problems.

3.10 Education

In respect of the facilities for school education, the Hambantota district is served by 291 government schools which are under the Tangalle educational unit of the Ministry of Education. In addition, there are a few temple and private schools in the district.

The Tangalle educational area is generally divided into eight (8) circuits, namely, Beliatta I and II, Tangalle I and II, Mulkirigala I and II, and Tissa I and II. Tissamaharamaya I is associated with the settlement scheme. This educational circuit administers a variety of schools which reflect different levels in the quality of education. The classification of the schools Ministry of Education is as follows:

Grade 1A = Schools with classes from Grade I or 6 to Grade 12 and with facilities for teaching mathematics, biological and physical science, commerce and arts at the levels of Grades II and 12.

Grade 1B = Schools with the same facilities as in Grade 1A, but without student hostels.

Grade 1C = Schools with classes from Grade I or 6 to Grade 12 but with facilities for teaching commerce and arts subjects only at Grades 11 and 12.

Grade 2 = Schools with classes up to grade 10 only.

Grade 3 = Schools with classes up to grade 5 only.

The Tissamaharama circuit No. I which covers the entire settlement scheme comprises 45 schools in the different categories i.e. Grade 1A = 1; 1C = 3; Grade 2 = 22; Grade 3 = 19.

The distribution of the different categories is shown in figure 3.5. Every hamlet in the settlement area has a primary school which teaches up to 5th grade. The location of schools, in the project area indicated that the settlers have easy access to primary education. However, the level of education in these schools need to be upgraded as there is only one 1A group schoool at Deberawewa and 3 schools of 1C group. Secondary level school education is only available within these few senior schools which are expected to draw their pupils from the junior schools which are facing a problem owing to a shortage of teachers to meet the increasing number of the student population. It may also be necessary to relocate a few senior schools in the settlement area so as to provide easy accessibility to students.

3.11 Other Service Facilities

Existing public services namely postal, telecommunication, water supply and agricultural extension in the area have to be reconsidered in terms of their capacity, strength and their accessibility to the settlers. Undoubtedly these services need to be improved or relocated to provide easy access to new settlers.

With reference to the postal and telecommunication services in Hambantota district there is only one main post office located at Tissamaharamaya and several sub-post offices at Debarawewa, Weerawila, Ranakeliya, Kirinda, Lunugamvehera, Bandagiriya and Boondala. Settlers have to travel to Tissamaharamaya town for higher order postal services as the sub post offices offer limited services, mostly confined to selling stamps, delivery of letters and cashing postal and money orders etc. Most of these post offices cater to the old settlement area. Thus with the increase of population the per capita ratio to the postal services is very high in the new settlement area. It will thus be necessary to (a) reconsider the location of new sub post offices in the new settlement area and (b) upgrading of some of the existing sub post offices.

Although the telecommunication system is not likely to play an important role at the present stage of development there is no direct dialling system in telephone services at the Tissa office. These facilities in the districts are only available in the Tangalle and Ambalantota post offices.

Domestic supplies of water are drawn mainly from wells or/channels and the water is brackish as this area is lacking in a supply of potable water which is a basic requirement and should be given priority when meeting wants of the people. Electricity supply is likely to rank low in the list of priorities. But without electricity, agro-industrial growth will be impeded which is likely to check the development of the service sector.

3.12 Trade

It is proposed that every hamlet and the 1 village center provide primary trade facilities (first order) to the settlers: namely a branch co-operative, rural banks, weekly 'pola' light manufacturing, retail shops, light mechanical repairs, and barber saloon. So far some of these needs have not been supplied at the village centers except for the operation of a few retail privately owned shops and co-operative

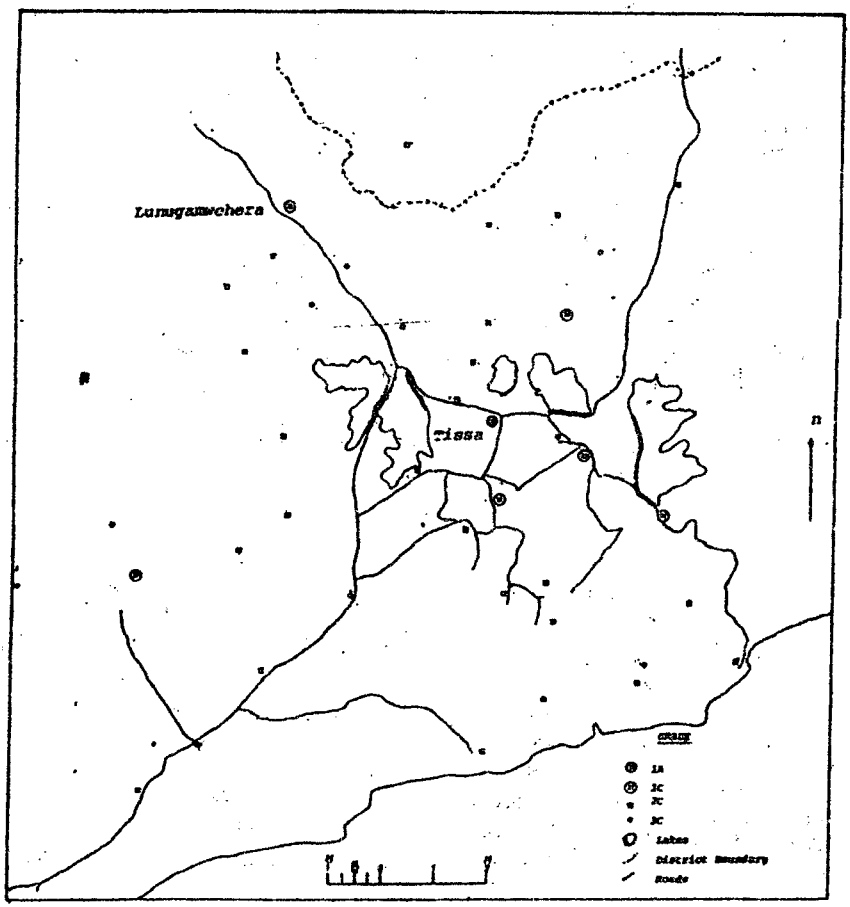


Fig. 3,5 Distribution of Government Schools in the KOISP

stores. The weekly 'polas' at Lunugamvehera, Pannegamuwa and Beralihela draw in the settlers as buyers and sellers but invariably settlers have to travel long distances to purchase their second and third order service goods.

Chapter Four

SETTLER BEHAVIOUR AND CENTRAL PLACES IN THE KOISP

A field survey was carried out to identify the spatial links of the settler with the existing urban and village centers in the settlement area. For this purpose, number of settlers were selected on a systematic random sample, i.e. five households from every hamlet in the new settlement area. A well structured questionnaire to elicit information regarding the purchasing habits of primary, secondary, and tertiary goods and services, and the respective locations that they preferred was administered to these scheduled households. The analytical results of this survey are discussed in the following sections.

4.1 Demographic Characteristics

As indicated in the previous chapter, most of the settlers are from the surrounding areas and the adjoining electoral districts. The sample survey reveals that more than 45% of the settlers are selected from the old settlement areas, namely Tissa, Pannegamuwa, Weerawila, Lunugamvehera and others from Bellatta, Ambalantota, Walasmulla, Dikwella etc. (Table 4.10). Ethnically the majority are Sinhala except in hamlet 8 which is predominantly Muslim.

The following Fig. 4.1 shows the distribution of the family size (62% of the sample indicate that the family size on the average is around 6 members) in the settlement area. However, there are a few households with only one member per unit. In these, the settlers, so far have not brought their families to reside with them while it is also possible that some belong to the category of commuter-farmers.

Table 4.1
Previous Places of the Settler Households

Place Names	%
1. Tissa, Pannegamuwa, Weerawila and Lunugamvehera	46.0
2. Weligatta	2.3
3. Hambantota	1.2
4. Ambalantota, Tangalle, Bellatta, Weeraketiya	14.0
5. Ambilipitiya, Katuwaya, Kudagoda	5.9
6. Walasmulla, Kirama, Dikwella, Urugawa, Makndura	10.6
7. Monaragala	1.2
8. Matara, Mirissa, Akuressa, Udugama	8.2
9. Baddegama	1.2
10. Ahaliyagoda	1.2
11. Balangoda and Haldumulla	8.2
Total	100.00

Source : Field Survey Data

Table 4.2
Educational Level of the Settler Population

Educational Level	%
1 - 5 Grade	45
6 - 9 Grade	28
Grade 10 (pass)	19
11 - 12	6
Other	2

Availability of Service Facilities

The health care services, provide us with a basis to understand functional linkages in the settlement area. The health services scheme categorised into general, maternity, and special cases, and the respective centers for such treatment are shown in the following table 4.3 and their linkage patterns are shown in figures 4.2, 4.3, 4.4, and 4.5.

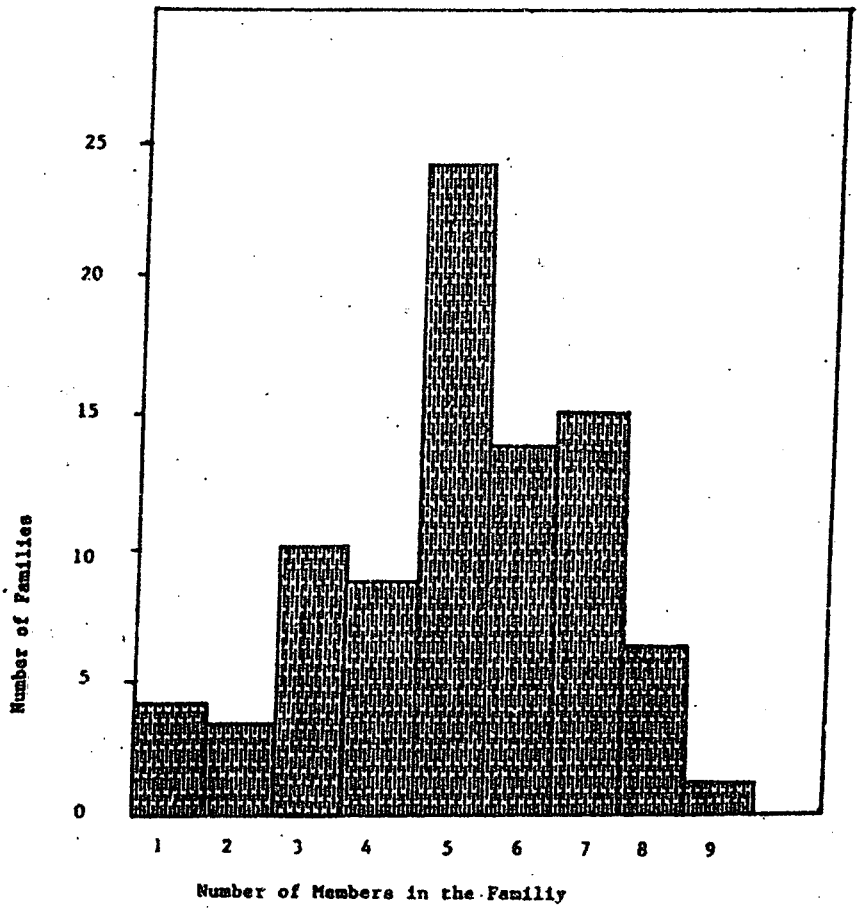


Fig.4.1 Family size of the Settler Households in the KOISP.

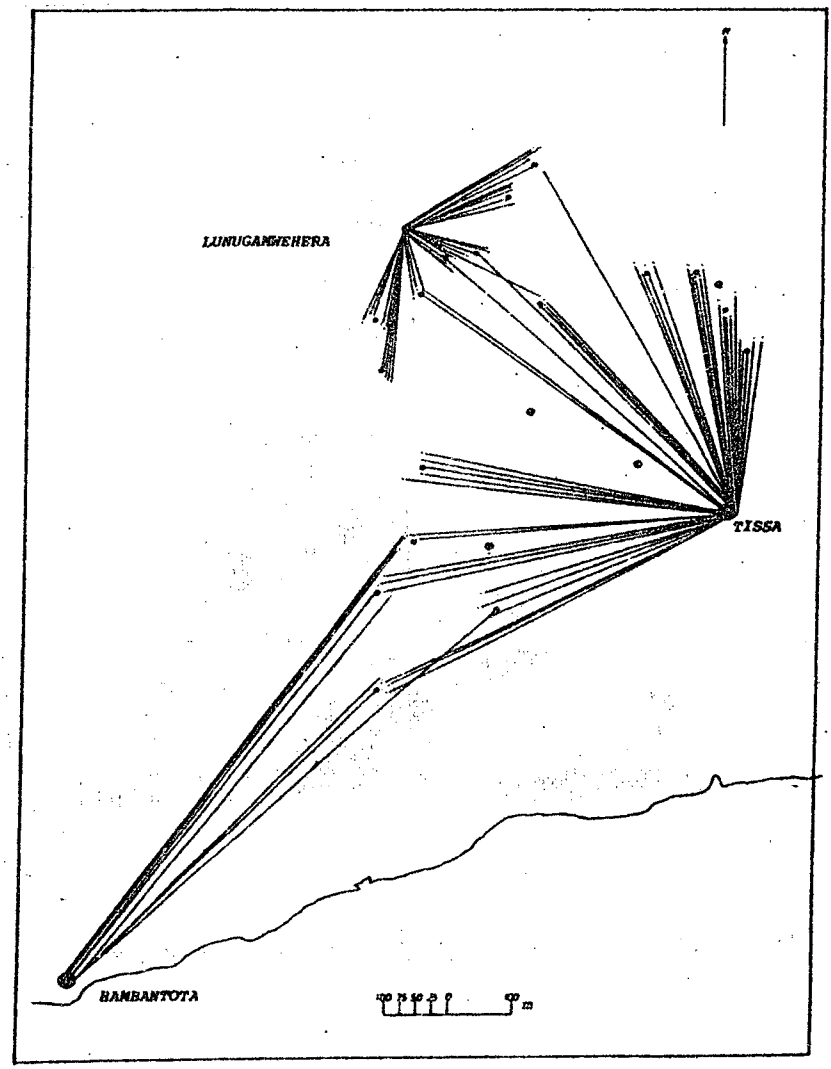


Fig.4.2 Spatial Linkage of Primary Health Care Service: General

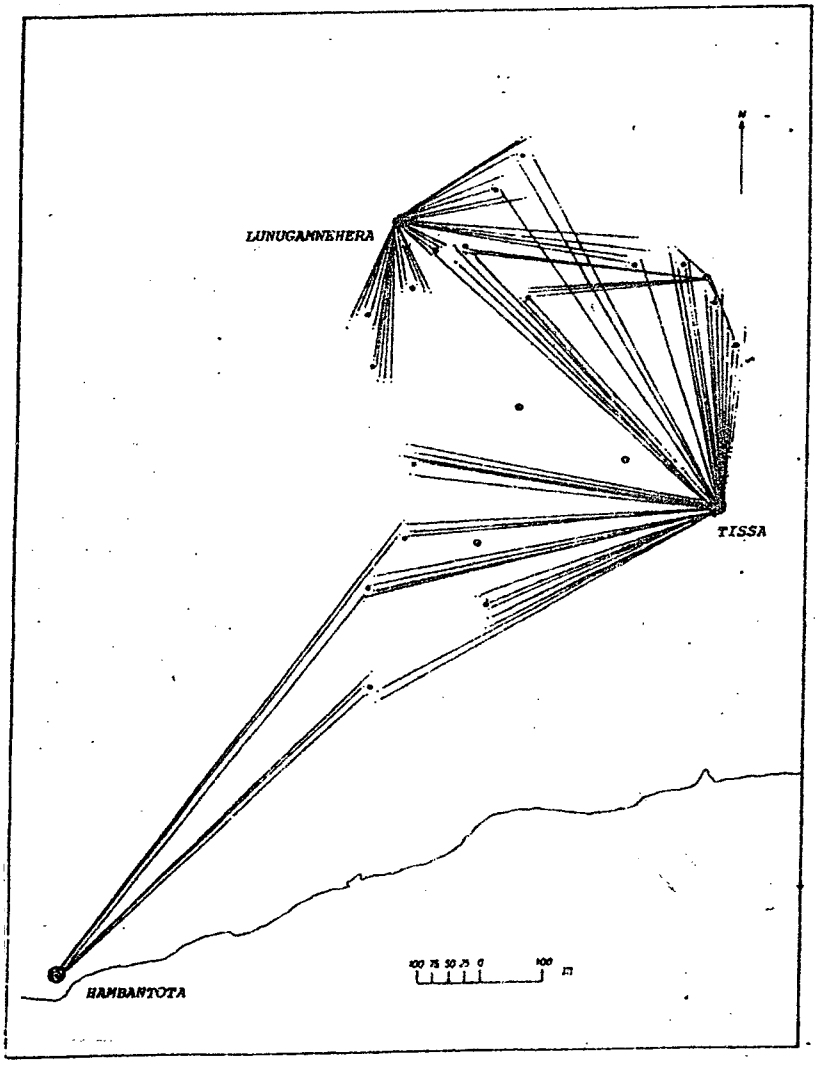


Fig. 4.3 Spatial Linkage of Primary Health Care Service: Maternity

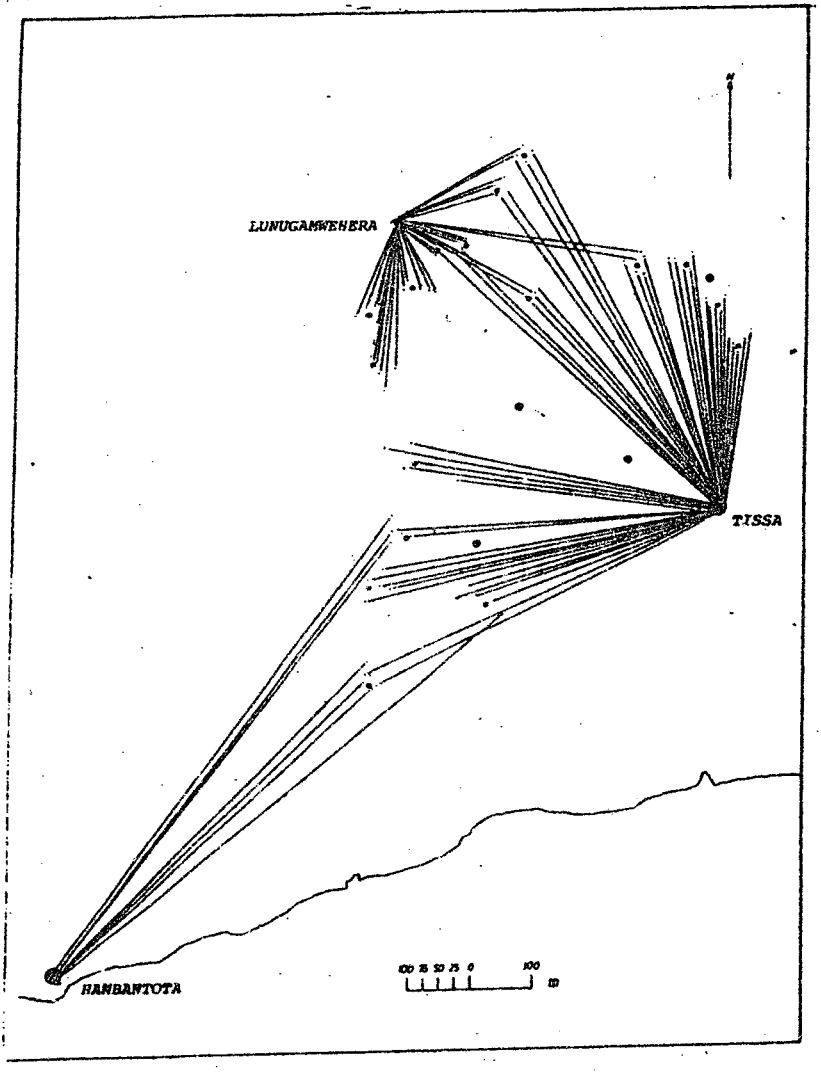


Fig. 4.4 Spatial Linkage of Primary Health Care Service: Epidemic

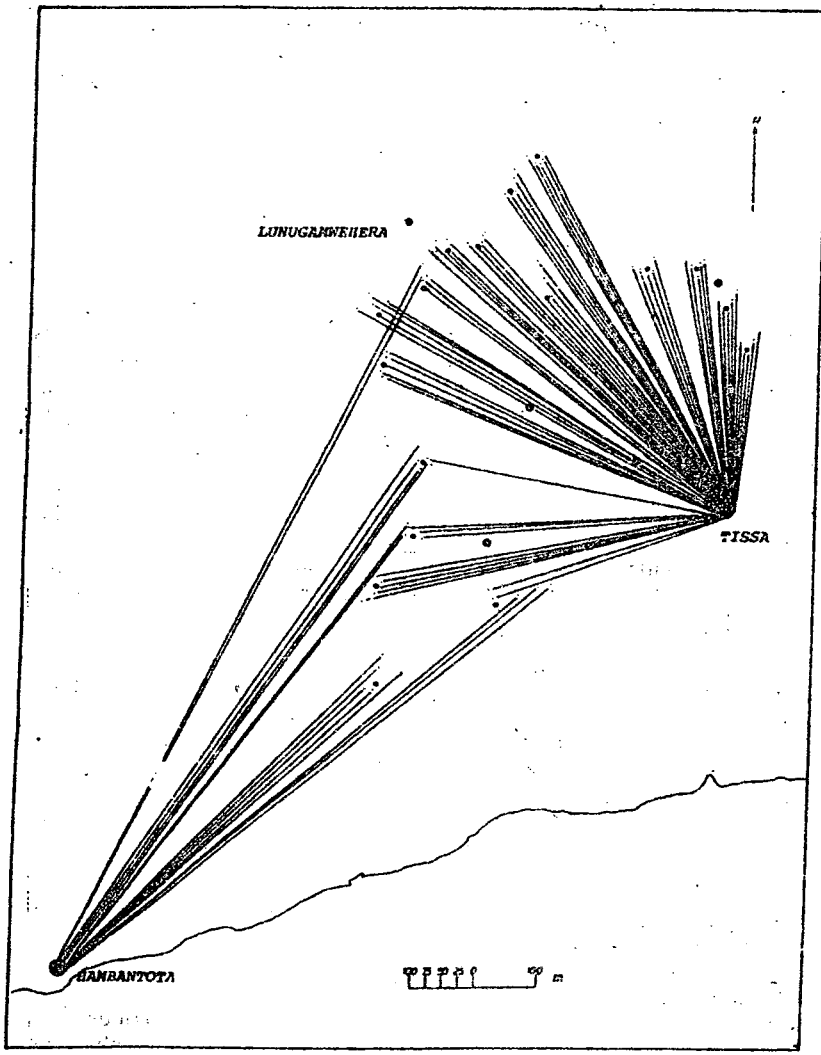


Fig. 4.5 Spatial Linkage of Primary Health Care Service: Special

Table 4.3
Health Service Care Preference

Places / Diseases	Tissa	Lunugamvehera	Beralihela	Hambantota	Matara
General	40	44	2	8	-
Maternity	43	47	2	8	-
Epidemic	31	10	-	8	-
Special	77	-	-	15	8

Source : Filed Survey Data, 1987.

The government hospitals and the dispensaries in the Tissamaharamaya and Lunugamvehera offer medical services for most centers for the treatment of general and maternity cases whereas the hospital at Beralihela offers limited services. Although there is a Base Hospital at Hambantota few in the hamlets seek treatment there because it is comparatively less accessible to the residents in the hamlets. Most people in the new settlement area however travel to Tissamaharamaya and Lunugamvehera hospitals for much of their medical treatment which accounts for high patient attendance in these two hospitals. The service capacity of these hospitals appears at present to be inadequate to fulfil the necessary health services demanded by the settlers.

4.2 Education

The travelling pattern of the school going population is relatively simple because students have an easy access to schools since a primary school is located in every hamlet in the new settlement area. But for secondary education, students have to travel to either the secondary schools at Tissa, Debarawewa, Lunugamvehera and Pannegamuwa or those in Matara and Galle. According to the sample survey, a few students have been enrolled in schools as far away as in Matara and Galle. The Fig. shows the travelling pattern of pupils to gain schooling in the settlement area.

4.3 Postal and Telecommunication Services

For their postal and telecommunication services, most of the settlers utilize the services given at the post offices of Lunugamvehera, Beralihela, and Weerawila. The following table 18 shows the travelling pattern for obtaining postal services in the area.

Very few people travel to the post offices at Debarawewa, Ellagala, Pannegamuwa and Pallemalala. None of the settlers indicated that he has travelled to Tissa post office for these purposes. The relatively simple life style of the farmers has not created a demand for improvements and sophistication in these services.

Table 4.4
Preference of Centers for Postal and Telecommunication Services

Place	%
Hamlet No. S.L.B.	2.3
Lunugamvehera	28.2
Weerawila	18.8
Pannegamuwa	1.2
Beralihela	31.8
Pallemalala	5.9
Ellegala	5.9
Debarawewa	5.9
	100.0

Source : Field Survey Data.

4.4 Agricultural and Technical Services

In the settlement area, agricultural inputs such as fertilizer, tractor, other equipment and spareparts, seeds, and chemicals have been supplied from Tissa, Weerawila, Beralihela, Pallemalala and Pannegamuwa. Most of the settlers however prefer to travel to Weerawila and Beralihela to obtain such inputs and services (see the following table).

Table 4.5
Preference of Centers for Agricultural Inputs

Place / Item	Tissa	Weerawila	Beralihela	Pallemalala	Pannegamuwa
Fertilizer %	-	45	29	11	11
Tractors & equipments %	2	2	2	-	-
Seeds etc. %	2	57	35	5	-
Chemical %	2	57	35	5	-

Source : Field Survey Data.

The following special features were noticed:

(a) Services were carried out as an exclusive Government Agricultural Extension Services at Weerawila and Beralihela, and
(b) there are a few private dealers in fertilizer and tractor spare parts.

4.5 Purchasing of Commercial Goods

The daily needs of the goods of the settlers are divided into two;

1. Primary goods, and
2. Secondary goods.

Primary goods include;

1. rice, bread, flour and salt,
2. vegetable, and coconut,
3. fish, meat and dry fish,
4. sugar,
5. fuel, kerosene oil and firewood,
6. dhal, green gram, cowpea etc.
7. other dry foods, and
8. aerated waters, biscuits, and sweetmeats etc.

Secondary goods are;

1. textiles, shoes, fancy goods, books and stationery,
2. jewellery etc.,
3. hardware, building materials etc.,
4. furniture,
5. radios, television sets, and electrical goods.

Primary goods;

The purchase of primary goods by households reveals two facts;

Institutions and the dealers of primary goods, and the location and places for the purchase of primary goods.

The following table shows the general pattern in the purchase of primary goods from institutions, boutiques and other retail dealers.

Table 4.6
Primary Goods; Sources of Purchase

Type of commodity dealers	1	2	3	4	5	6	7	8	9
Retail dealers	100	-	-	5	10	38	2	15	8
Co-operative stores	-	-	-	93	78	23	95	67	90
Private retail dealers in the town	-	-	-	2	10	33	3	15	2
Public, fair 'pola'	-	100	100	-	2	6	-	3	-
	100	100	100	100	100	100	100	100	100

Source: Survey Data.

Table 4.7
Places (Commodities)

Commodity Type	1	2	3	4	5	6	7	8	9
Hamlets	100	27.2	27.2	97.4	90.8	70.9	96.7	87.6	95.1
Tissa	-	23	23	-	3.4	6.6	-	3.4	0.8
Lungamvehera	-	15	15	-	3.4	7.3	2.5	6.6	2.5
Weerawila	-	-	-	0.8	1.6	5.0	0.8	0.8	0.8
Pannegamuwa	-	28	28	-	0.8	10.2	-	0.8	-
Ambalantota	-	0.8	-	-	-	-	-	-	-
Hambantota	-	6	6	0.8	-	-	-	0.8	-
Pallemulla	-	-	-	-	-	-	-	0.8	0.8
	100	100	100	100	100	100	100	100	100

Source: Survey Data.

The above table shows that most of the primary commodities are purchased by households from the retail outlets (kade) in the hamlet itself. An 100% purchase of rice, bread, flour and salt is from this

this retail dealer within the hamlet. Most of the settlers had to travel more miles to buy vegetables, fish, dry fish and meat. For instance, 28% persons travel to the 'pola' at Pannegamuwa, 15% to the one at Lunugamvehera and 27% to tissamaharama town. Other commodities like sugar, kerosene oil, chillies, curry powder and dry goods are bought from the co-operative store within the hamlet. The survey also indicates that some of these primary dry food materials are received from the World Food Aid programme. The purchase of primary commodities by the settlers is mostly from the private retail dealers and co-operative shops in the hamlets. The 'pola' (weekly) also plays a major role as a meeting place for buying and selling of primary goods for the people of the new settlement area.

Secondary Goods

Secondary goods, such as clothes, fancy goods, jewellery, building materials, furniture and electrical goods are sold only at the major urban places, ie; Tissamaharamya, Hambantota, Tangalle and to a limited Lunugamvehera. Thus the new settlers are compelled to travel to those urban centres to purchase these commodities when necessary. Figures 4.6, 4.7, 4.8, 4.9 and 4.10 based on spatial linkage show the consumer travel pattern of buying these secondary commodities. More than 50% of the settlers travel to Tissamaharamaya for buying clothes and textiles, whereas 25% travel to Pannegamuwa for the same purpose (See figure 4.6).

Very few people, particularly those in the hamlets in the left bank, travel to Hambantota, Tangalle and Ambalantota. This may be owing to the fact that some of these settlers still maintain their connections with their original home area. Purchasing, of other secondary commodities (such as jewellery, hardware, and furniture) is mostly in Tissa, because (a) a fair number of shops are located in Tissa town; (b) and it is the nearest center for buying these goods (see fig. 4.7, 4.8, 4.9 and 4.10). Thus very few settlers have to travel either to Hambantota or Ambalantota for these purposes.

In addition to these purchasing patterns of the settlement area, the survey also reveals that private vendors of light consumer goods visit homes, door to door. These private vendors generally sell clothes, trinkets and basic household goods offering an opportunity to settlers to obtain these without travelling to nearby urban centers.

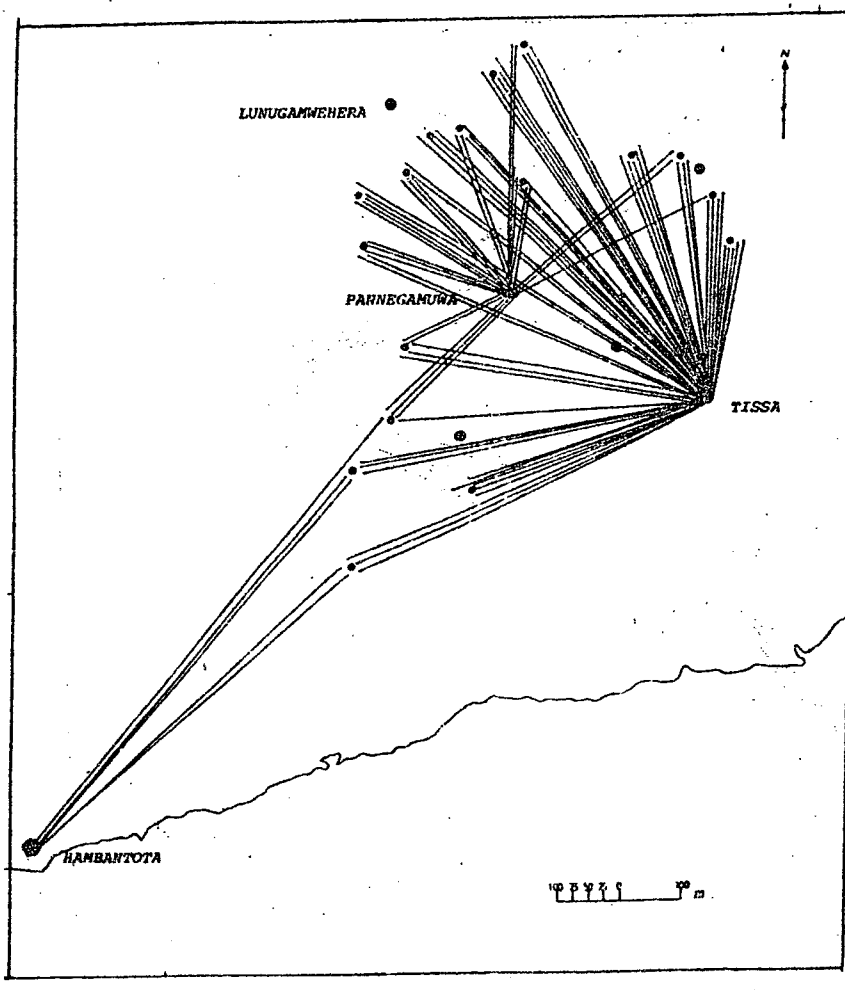


Fig. 4.6 Spatial Linkage of Secondary Commodities (Textile,Shoe,Fancy Goods, Books & Stationery)

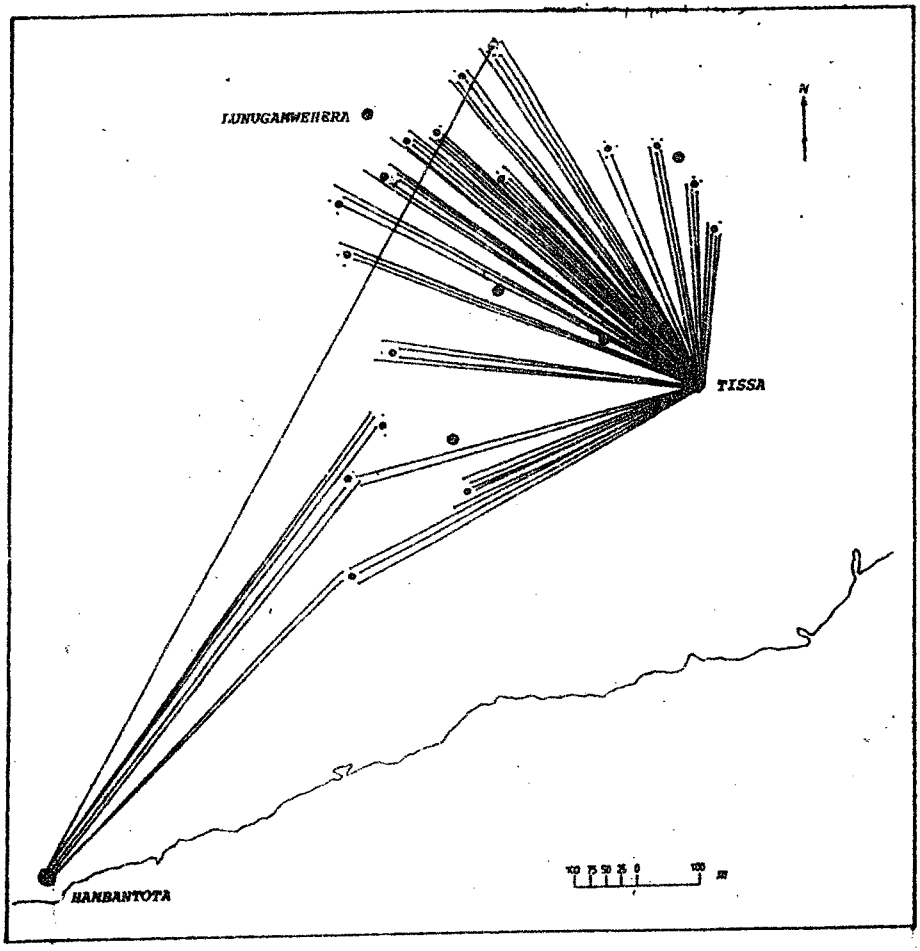


Fig. 4.7 Spatial Linkage of Secondary Commodities: Jewellery

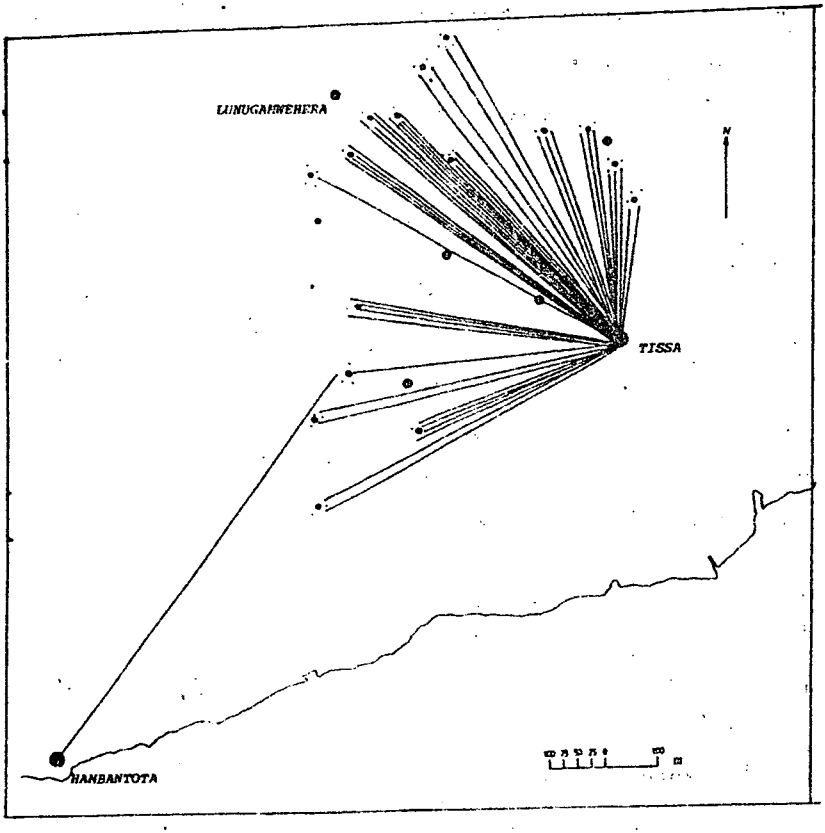


Fig. 4.8 Spatial Linkage of Secondary Commodities: Hardware,Bulding Materials etc.

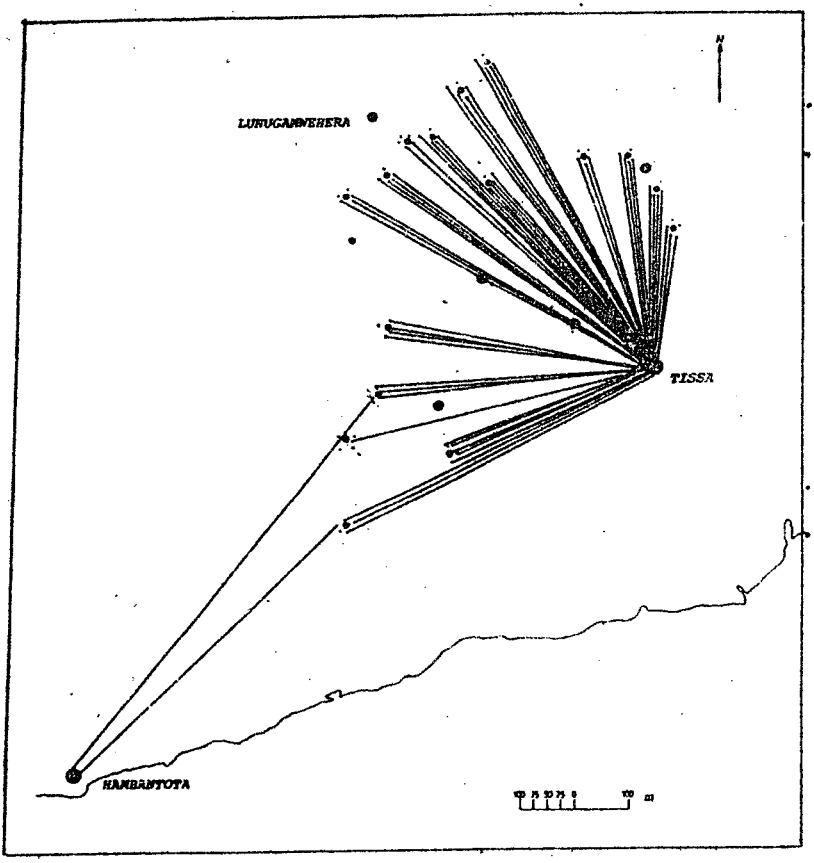


Fig. 4.9 Spatial Linkage of Secondary Commodities: Furniture

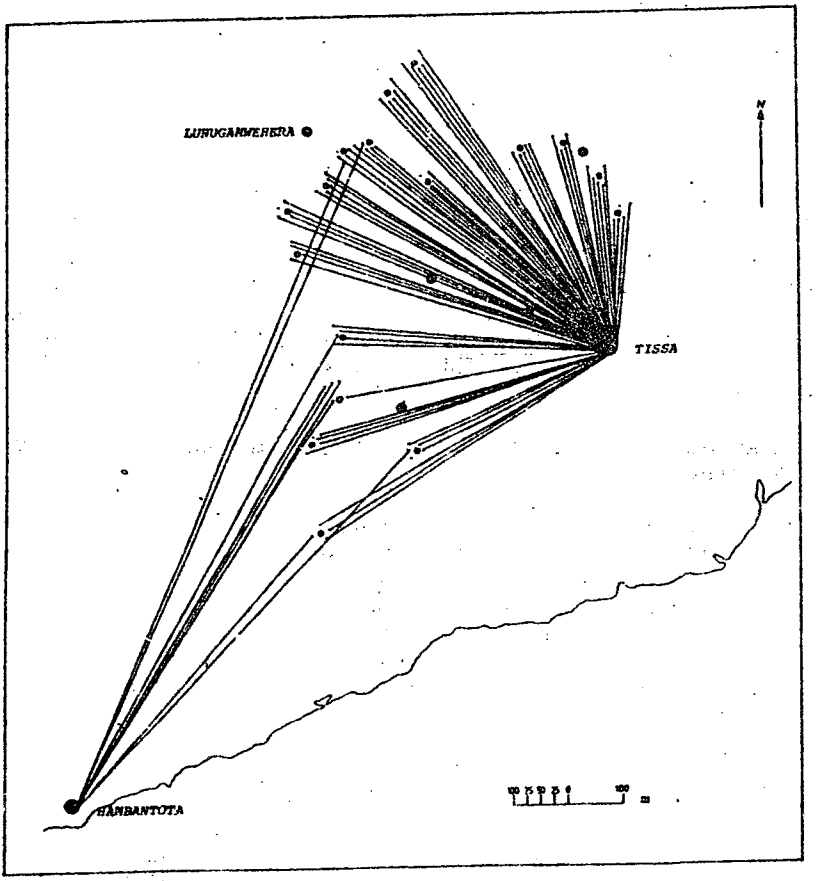


Fig. 4.10 Spatial Linkage of Secondary Commodities:
Radios, TV sets & other electrical goods

A similar opportunity is offered by a system of sales of consumer goods directly to settler households in the scheme through mobile vans. However, these vans mainly replenish the stocks of consumer durables in the small grocery shops run by petty traders both within and outside the towns. Some of these settler consumers are satisfied in regard to their current needs being supplied through this type of delivery system, which thus has considerable repercussions on the commercial development of this area.

It is also observed that settler consumers have other informal arrangements called 'seettu' to obtain money to purchase expensive secondary goods. For example a set of chairs could be obtained through the operation of 'seettu system' among 40 'seettu' members each contributing Rs. 250/-. This is called a 'chair seettu' and is operated on a lottery basis.

4.6 The Settlers' perceptions on the places where goods and services are offered

The perception of the settler consumers during the survey of commerce and trade in the area were examined by suggesting few selected variables, such as :- provision of urban facilities, close proximity to centres, kinship relationships, transport facilities and weekly 'pola'. The settlers were questioned as to which center or town they prefer to travel to buy the goods and obtain services. The centers preferred by the settler - consumers are indicated in the following table 4.8.

Table 4.8
Determining Variables of Consumer Preferences for Places

Given variables	Major city	Close proximity	Kinship relation ship	Other urban facilities	Weekly 'pola'	Transport facilities	Total
Centers	%	%	%	%	%	%	%
Tissa	55	43	7	49	52	47	58.0
Lunugamvehera	3	3	0	3	0	0	2.0
Pannegama	31	30	9	6	30	30	31.0
Ambalantota	8	-	8	8	-	3	0.5
Hambantota	8	3	3	8	8	8	8.5

Source : Survey 1988.

The new settler consumers prefer to travel to Tissamaharamaya and Pannegamuwa town to purchase their household commodities owing to: (a) Tissamaharamaya being the main trading center in this area; (b) The availability of consumer goods there; (c) Pannegamuwa operates a major fair (pola) twice a week; (d) and Tissa is moreover established as a religious centre. However, settler consumers are of the opinion that although Tissamaharamaya, was their preferred centre they had to travel atleast 6-10 miles as an average distance from their homesteads. This meant to them a considerable distance, a long time spent and a fair expenditure on bus transport.

In addition to the above criteria, it was necessary to ascertain which center should be improved as a trade service center in the settlement area itself. The response to this query is as follows;

Table 4.9
Preference shown by Consumers towards the Improvement of Places % of Response

Center	% Response
Lunugamvehera	32
Weerawila	35
Pannegamuwa	5
Beralihela	28

Source : Survey, 1988

Responses received by the settlers were substantial in respect of Weerawila, Lunugamvehera and Beralihela whereas in the underdeveloped townships in the settlement area, such as in Pannegamuwa, which is a 'junction town' however we received a poor response from settlers in regard to its township development despite the fact the agglomeration tendencies at Lunugamvehera, Weerawila and Beralihela have not developed in a manner comparable to those in Pannegamuwa junction town. Despite the relatively slow growth in the proposed townships, settlers expressed the view that they were willing to travel to these proposed townships rather than travel a long distance to Tissa and expected that these proposed centers should be improved. We are of the opinion that their perceptions should be given some weightage in planning public sector investments in these townships to bring out a close integration of the village and town in this frontier zone.

Based on the actual travelling pattern of the settler consumers, a town attractive index can be derived which could guide future investment on town development. The index is generally derived through selected variables as discussed in the preceding sections. A weighted value is given to each variable with reference to actual preferability. The selected townships were Tissa, Weerawila, Lunugamvehera, Pannegamuwa, Beralihela, Hambantota, Pallemalala, Ambalantota and Tangalle.

The values of indices in respect of the centers show the ranking order of town attractiveness. Tissa stands as the most attractive center in the first order to settler consumers, whereas Weerawila and Lunugamvehera follow as second order attractive centers in the settlement area, and Pannegamuwa and Beralihela serve as third order centers. The chief urban centers at district levels like, Hambantota, Ambalantota and Tangalle from the settlers' perspectives are less attractive to them as purchasing or service centers.

Table 4.10

Total Town Attractiveness Indices

Variables / Plans	Primary Health	Secondary Health (special)	Primary Education	Secondary Education	Postal and Telecommunication	Agricultural Service Extension	Tractors, Equipments, Chemicals etc.	Administrative purpose	Primary consumer goods	Secondary consumer goods	Fairs (Weekly Pola)	Banking, Finance Insurance	Transportation & Easy access	Settlers preference	Proposed township	Total score
Tissa	40	60	-	35	15	05	05	90	-	61	10	75	35	58	-	489
Weerawila	6	-	30	-	20	70	65	-	05	-	-	-	15	-	35	246
Lunugamvehera	44	20	25	15	25	-	-	-	35	-	30	-	15	22	32	243
Pannegamuwa	-	-	20	25	5	-	-	-	45	25	50	-	15	30	5	220
Beralihela	2	-	25	20	35	25	30	-	15	-	10	-	15	-	28	205
Hambantota	8	30	-	5	-	-	-	10	-	10	-	25	5	9	-	102
Ambalantota	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	3
Tangalle	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2

Chapter Five

THE FUTURE URBAN DEVELOPMENT IN THE SETTLEMENT AREA

In the development process planned for the irrigated settlement area, priority is given to agricultural development such as cultivation of arable land, increasing the per capita yield, crop diversificaition and dairy farming. But it has been experienced in many Asian countries, such as S. Korea, Thailand, Taiwan and Japan that economic development (along with urban development) has not come about only through agricultural development. The needed economic development is achieved through a dual process of agricultural and industrial growth, mainly through the movement of surplus labour from agriculture to the industrial sector. In recent international debates on regional development, this dual process of development has been increasingly highlighted. Agropolitan development, i.e. agro-base industrialization, has been considered in these debates to be the more preferred economic development choice for countries such as India, Pakistan, Bangladesh and Sri Lanka (Freedmann).

In line with this new emphasis in the international dialogue on regional development this study considers it important to focus on the location of agro-based industries in the Kirindi Oya settlement area to achieve expected regional development. Unless an agro-industrial base is established in the settlement area, at the inception itself, leading to the generation of a healthy intersectoral growth with strong production, consumption, employment, savings and investment linkages between agriculture and industry and intervening services, envisaged economic growth and project initiated regional development aspects may remain unattainable goals (ARTI: 1988 : 110). Hence, it is envisaged that future urban development in the settlement area would be basically determined by the location of agro-base industries by private and public sector investment and through the industry based demand for ancillary services.

5.1 Hypothesis

It is hypothesised that urban development is stimulated through the agglomeration of economies. The availability of resources, energy, labour, market facilities, assembly of goods and components, and services facilities determine the location of industries and ultimately stimulate urban growth in the project area.

5.2 Conditions

Future urban growth in the settlement area is identified with reference to a process of development with agro-industries and a development in the tertiary sector services. The interrelationship of these two sectors (industries + services) is manifested in an overall urban development.

Testing of the above hypothesis is confined initially to five industries that are likely to emerge in the settlement area. The five are broadly agro-based industries in view of the availability of raw material, labour and market facilities in the project area. These industries are;

1. dairy food product industry,
2. assembly of tractor equipments and parts,
3. rice milling industry,
4. fishing industry, and
5. paper and pulp producing industry.

In the service sector, it is expected that the existing service facilities such as health, education, administration, and telecommunication will record related expansion with the emergence of the above industries. In addition, a new group of additional services, such as transportation, justice, recreational, residential, commercial facilities, and water and electricity will follow as the development of industries demand such services.

In the anticipated development process the intersectoral linkages of the different components are shown in the following flow chart, Fig. 5.1. (Please see page 63)

5.3 Analytical Procedure

To analyse future urban growth with reference to the process of dual economic development (industries and services) a qualitative technique 'Monte Carlo Simulation', which is widely employed in the analysis of the processes of economic activities is selected. Initially this technique was adopted by Hagerstrand of Lund University, Sweden in order to analyse the diffusion of innovations through time. Today this technique is widely used in sciences and in social sciences research. This type of model has a particular appeal in that it facilitates temporal-spatial analysis.

The analytical procedure adopted here, explain the probability of the location of secondary and tertiary urban development activities in a selected area in a specific time in the future. Through the inclusion of a random element an attempt is made to represent reality by suggesting that under a given framework of rules the urban functions behave randomly. In summation, it explains the future urban development process in view of the present development pattern.

The simulation method adopted here can be explained as follows;

1st step - determination of locational factors affecting industrial and service activities. The factors selected here are simplified in the space. The factors are given values after an initial empirical investigation.

2nd step - the settlement area map is gridded into cells and each cell is given a selected value based on the method in step 1.

3rd step - demarcation of the possible industrial and urban development grid area by visualizing the total cell value in the area (finding the cell with the minimum value).

4th step - simulating the demarcated area by accumulated probabilities of each cell in the grid. The probabilities of location of urban functions is derived from a table of random numbers.

In the first stage, the location factors for industries and tertiary activities are selected and given weighted values for each variable by clear observation in the field. The variables are as follows;

1. access to raw materials for agro-based industries - (based on distance-decay function ; i.e.
2. road - frontage location,
3. availability of space for urban development - (the pre-determined urban areas and the existing urban field are taken into consideration),
4. distance to the principal city of Tissamaharama - (on a radial base), and
5. availability of electricity, water, etc.

Taking the above variables into consideration each and every cell in the grid is weighted. The points and their derived values are shown in the figure 5.2. The minimum level of points needed to complete the future urban process is determined to be 35 points or more (see fig. 18). Thus their future urban development field is demarcated by adding up each weighted value of each cell, starting from the first cell in the demarcated grid map (see figure 5.3). Each cell has a class interval of values. For instance the weighted value of 1st cell is 60, thus the conceded class interval is 1-60, and the second cell, similarly received 61-121. This process is continued up and the last cell, 5060-5100.

Thus one hundred and four (104) cell probabilities are derived, with probilities in them accumulating from 0 - to 999.99, so that the class interval in each cell is determined by its respective probability (see figure 5.4).

The last step is to identify the random procedure of locating urban development activities on the simulated space. A random numbers selection was employed to identify the future urban process (see figure 5.5).

The probability of future urban growth pattern is shown in figure 5.5. According to this map, a high probability exists that future growth will be an agglomerate of mainly, Debarawewa, Tissamaharama twin towns, Weerawila and Lunugamvehera, respectively. A similar trend is also seen in Kirinda, and at the edge of the boundary in Tissa- Kataragama road. In addition to these growth patterns, the map reveals that there are ribbon type developments along the main entry

roads to Tissamaharama (a) along Tissa- Hambantota main road, (b) Tissa- Wellavaya road, (c) Tissa- Kataragama road, and (d) some development in the Yodakandiya area. The results of the Monte Carlo Simulation reveal a future urban growth pattern somewhat similar to the present urban development structure in the settlement area.

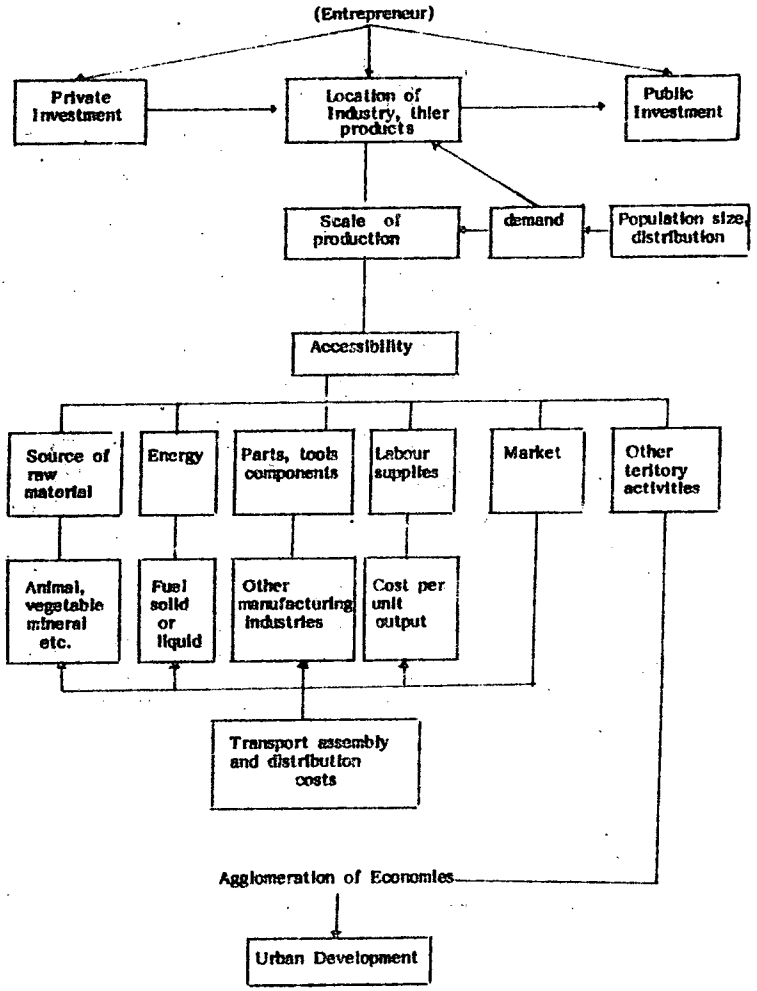


Figure 5.1: Hypothetical Urban Development

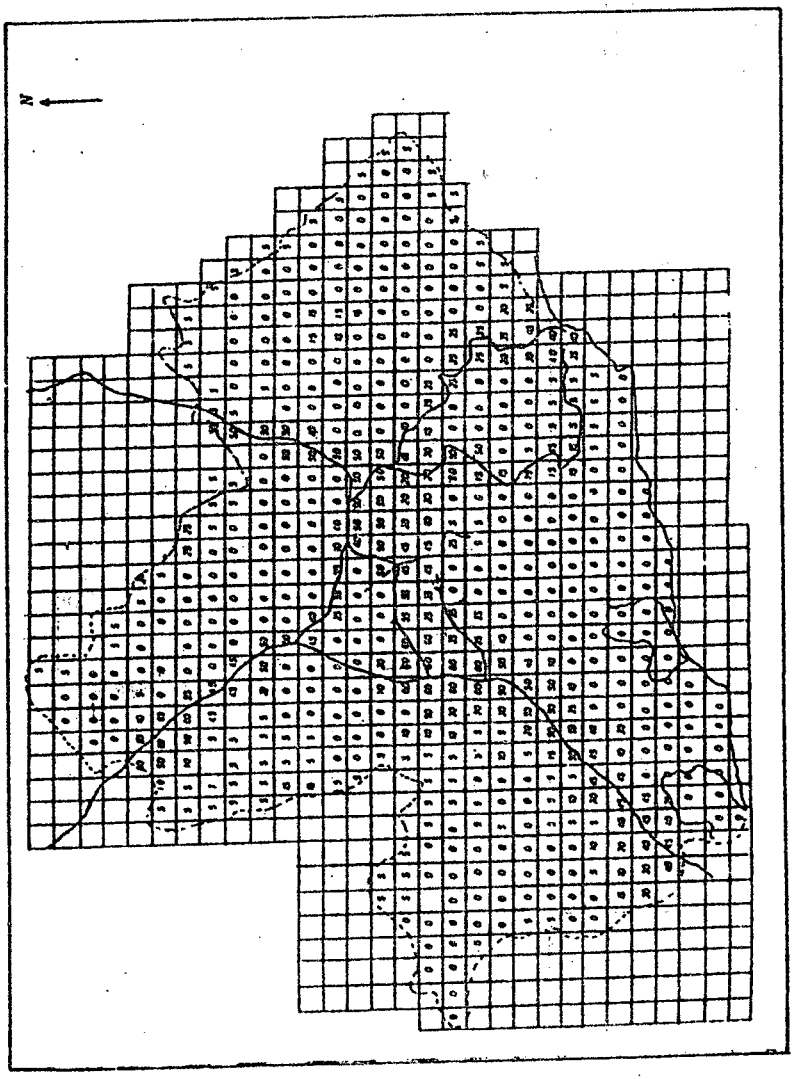


Fig. 5.2 Weighted Values for Location of Industries and Service Activities in the KOISP

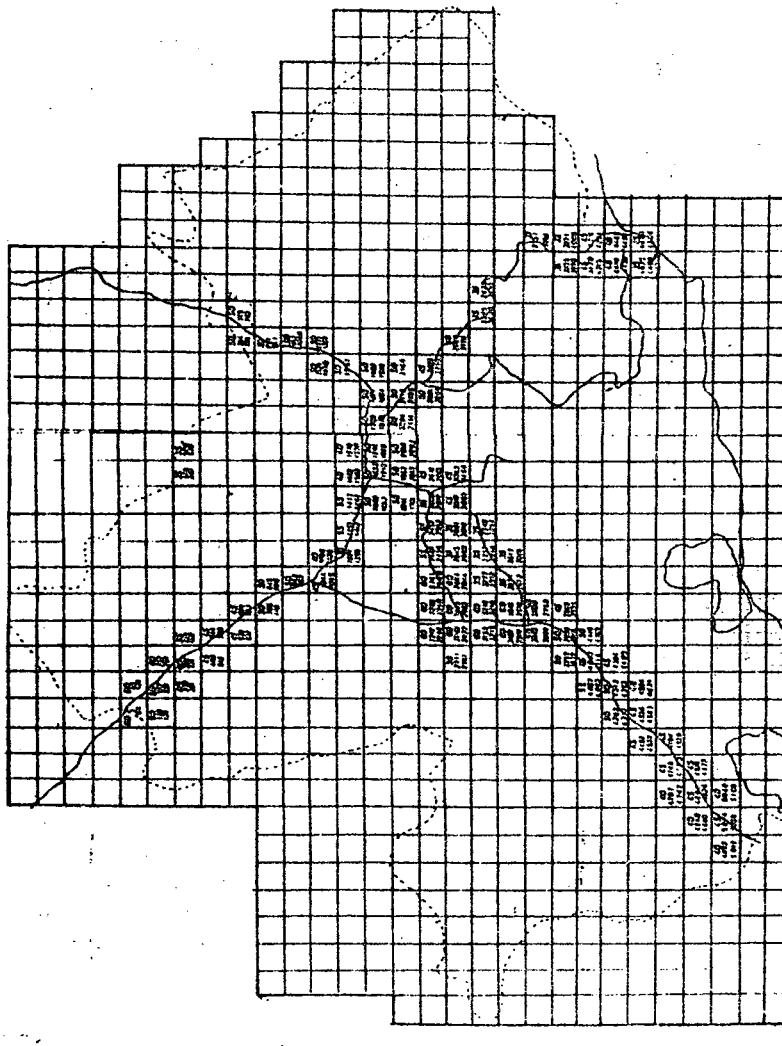


Fig. 5.3 Demarcated Area for Future Urban Development in the KOISP (Based on Monte Carlo Simulation)

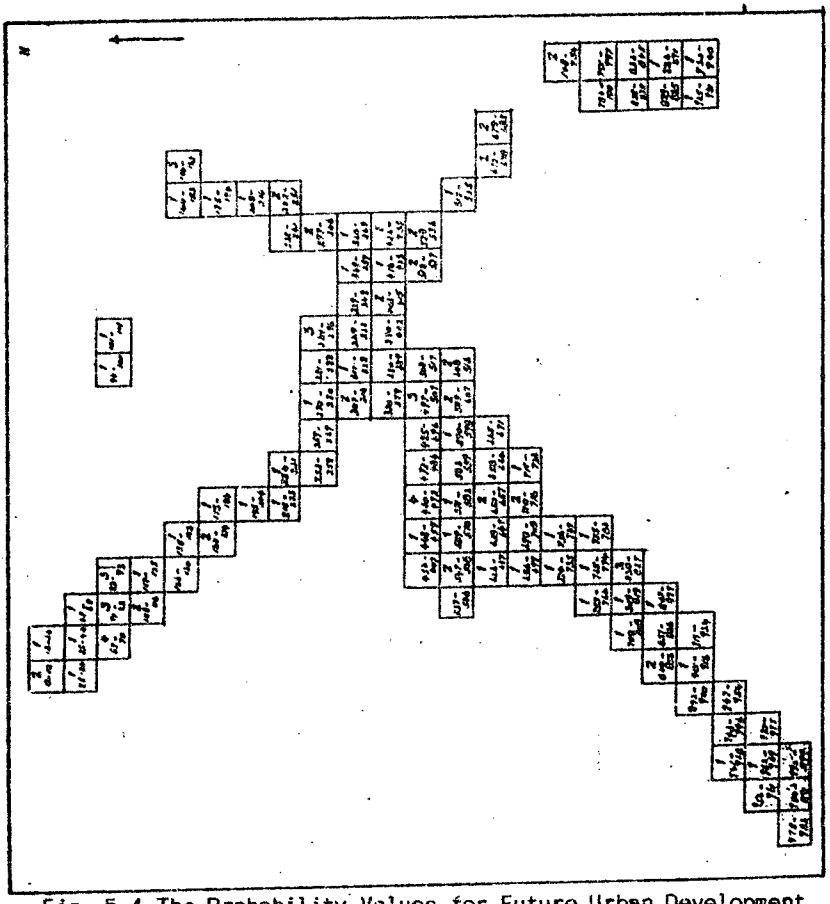


Fig. 5.4 The Probability Values for Future Urban Development in the KOISP (Based on Monte Carlo Simulation Method)

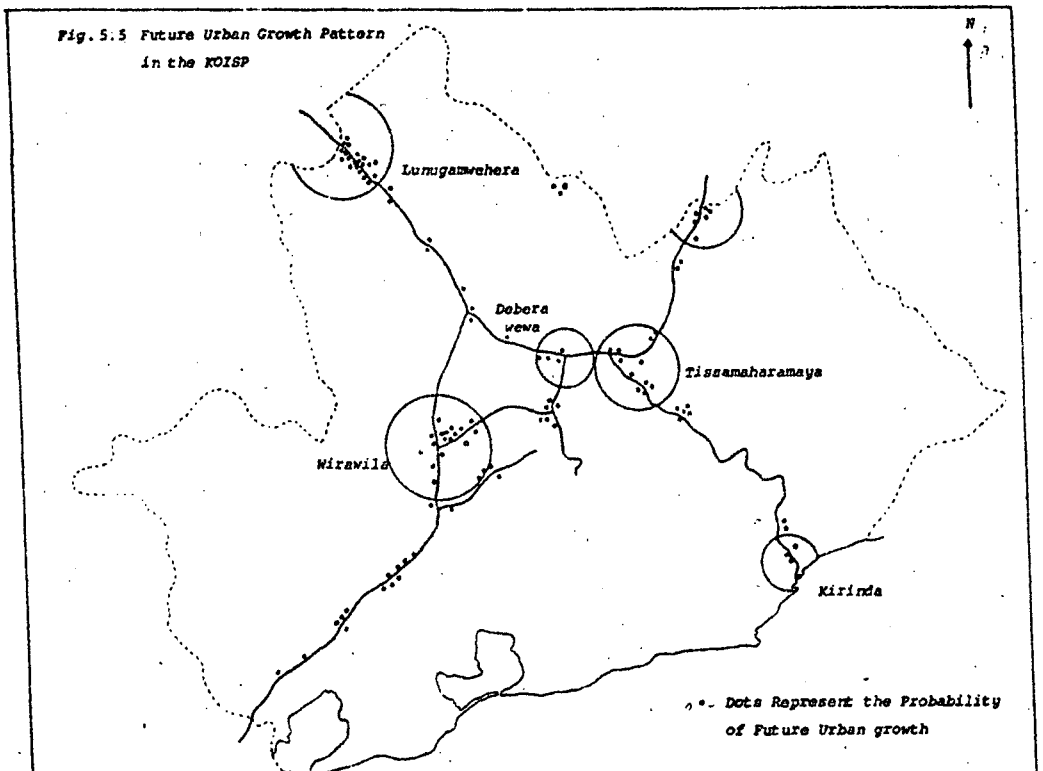
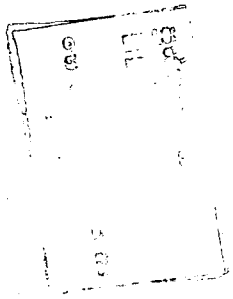
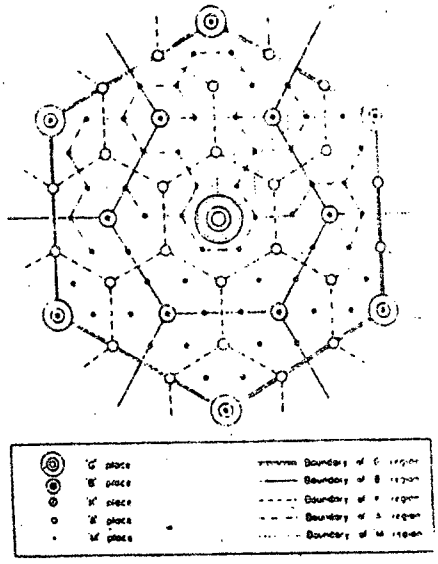


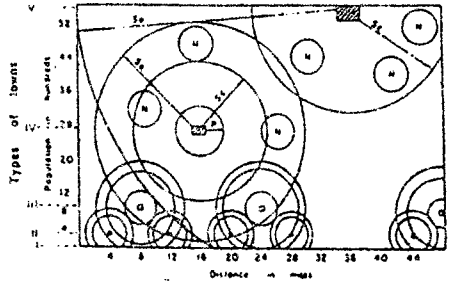
Fig. 5.5 Future Urban Growth Pattern
in the KOISP
N
Lunugamwehera
Debera
wewa
Tissamaharamaya
Wirawila
Kirinda
Dots Represent the Probability
of Future Urban growth



A



B



Market System of Central Places According to Chrystaller

Fig. 6.1 Hypothetical Central Places (Crystaller)

Hypothetical System of Central Places

Source: L.J.King.

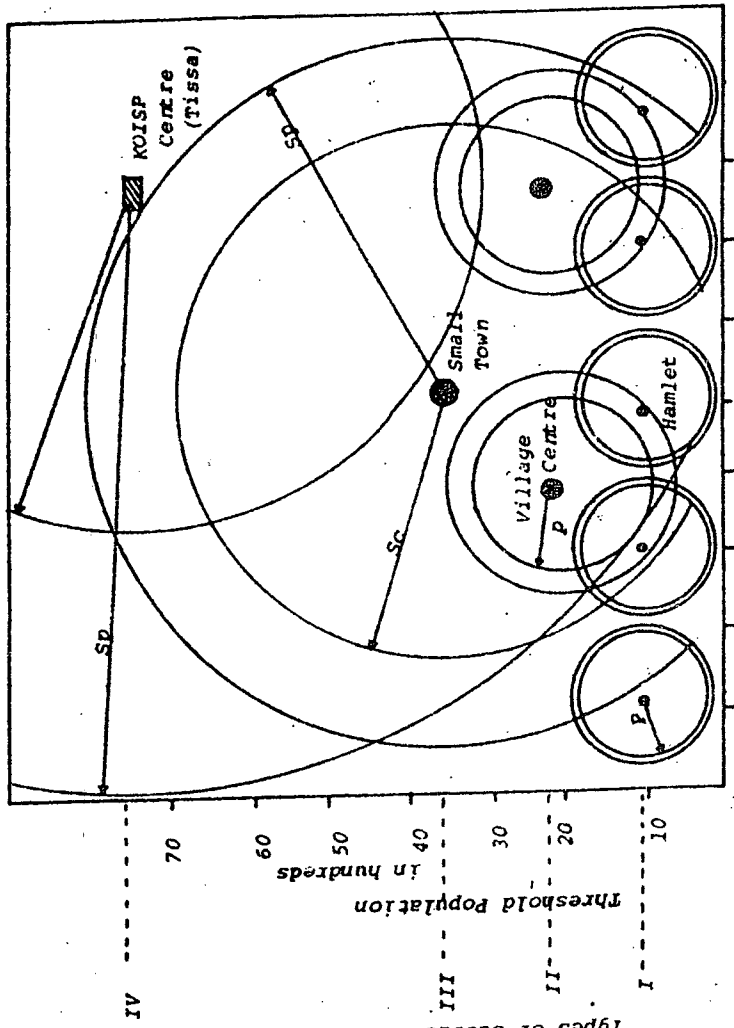


Fig. 6.2 Simplified Central Place System of the KOISP

Chapter Six

AN OVERALL EVALUATION OF URBAN GROWTH IN THE KIRINDI OYA SETTLEMENT SCHEME

In the following overall evaluation of the KOISP two basic questions are posed;

1. can urban growth in the KOISP be considered a direct product of settlement planning, or

2. a phenomenon in the growth process emerging from development effort?

A prominent theory which is widely accepted in human settlement planning is the Central Place Theory. This theory has been utilised in developing countries to identify their spatial development problems (Karl Verlaufer: 1986, 1988). The theory explains the location of towns, their size, and functions in relation to each other.

The underlying assumptions are (a) relatively flat surface, and (b) even distribution of population. Based on the above assumptions a town system is expected to be evolved which assumes a hexagonal grid pattern in such a way that the towns are in a hierarchical arrangement based on Crystaller's model of central places in this hypothetical space as shown in figure 6.1A. In this pattern there is always one center of a higher order surrounded by six lower order centers placed within the hexagonal frame.

This geometrical network system superimposed on the KOISP does not provide a jig-saw fit between the theoretical arrangement and the empirical location of the different types of settlements. While, the KOISP represents a relatively flat agricultural land surface, the planned spatial arrangement of settlements is mainly linear and does not conform to the geometrical grid. The hamlets and the village centers, for example, are located along the two main Right and Left Bank channels.

Although the visual geometrical arrangement of the settlements are somewhat removed from the hexagonal lattices prescribed by the central place theory, there seem to exist some elements of similarity between the hypothesized system of central places and the simplified settlement system of the KOISP. (See figs. 6.1 B and 6.2). For this purpose a few relevant generalisations are presented in respect of the distribution and size of population in the settlement area.

(a) Hamlet

The average number of families in a hamlet is 250 households and the average family size is 5 persons. The resultant population of a hamlet is computed at 250 X 5 = 1250.

(b) Village Center

Since no specific population has been confined to the village centers, the threshold population of such a center is considered as follows :

- approximately 5.7 hamlets form a village center, and
- the total threshold population of a village center is therefore around 1250 X 5.7 = 7125.

(c) Small Town

The threshold population of a small town is equated to its 'town population'. For example, the threshold population of Weerawila small town incorporates two village centers belonging to the Weerawila town catchment area. Thus the population of the two centers, the Weligatta village center and the Weerawila village center, along with the Grama Sevaka (G.S.) Division's population of Weerawila amounts to a threshold population of 21,613 for Weerawila. This is derived as follows:

two village centers = 7125 X 2	= 14250
Weerawila G.S. Division Population	= 7363
Total threshold population of Weerawila	= 21613

(d) Major Town/Regional Center (Tissa)

The threshold population of Tissa town is equated with the population in its catchment which is around 68,000, that is about 10 times larger than the population contained within its city limits.

The above stated hierarchical system is linked to the distribution pattern of primary, secondary and specialized service functions in the settlement area (also see chapter 1.1). In spite of the relatively slow growth of urban functions in the small towns up to now, these centers are however considered as nodes for the growth of secondary urban activities in the developing context. Having considered these two factors, threshold population and urban functions, the distribution of the central place system of the KOISP is provided in figure 6.2.

However, the hierarchial system in the KOISP is confined to the lower order central places in Crystaller's theory which the KOISP settlement planning has recognised in the hierarchical order of hamlets, villages and towns and in terms of relative distances between each other.

In recent decades, the main dialogue on regional planning in developing countries centered around the provision of basic needs and facilities such as shelter, food, and health care to the population of the backward regions. Through such deliberations in regional development a new strategy has emerged which is termed the "agropolitan approach" in popular regional development parlance. Agropolitan approach prescribes a more dispersed and small size form of urban growth than the concentrated 'growth pole' urban development consequent on manufacturing industries.

The basic conditions essential to successful agropolitan development are: (a) selective territorial closure, (b) an equitable distribution of productive wealth, and (c) the equilization of access to factors of production. The agropolitan approach is already adopted officially by some agrarian societies as for instance in Bangladesh (viz., Ulashi project, Jessore District). The main objective of this approach in Bangladesh is to motivate and stabilize rural people so as to get them to participate more effectively in the development process.

In the above context, the KOISP, its objectives and approach to development upholds some of the basic principles of agropolitan development (i.e., agro-based urban development) in providing land, food, water, shelter, health, and other basic facilities to the settlers. The project expects to improve the living standards of its settlers through active intervention by the authorities in the future agro-based development process. To achieve these purposes, the project has already installed some of the infrastructure facilities in the settlement area (in phases I and II, with phase I already completed). For stimulating further growth improvement will be essential in regard to certain prerequisites such as water, electricity and roads.

However, there is as yet no clear indication about the future planning aspects of the settlement area as for instance in respect of social planning and planning the marketing system and so forth except in pre-determined urban locations. Dispersed urban growth, with an attendant dispersal of facilities which satisfy the basic needs of the settler population more comprehensively, and the minimum distance cost to settlers in gaining access to facilities as prescribed by the agropolitan approach have yet to be realized.

Several recommendations are made by this study in the context of urban development in the KOISP.

* In locating services, trade, commerce and industrial facilities in the settlement area the distance-decay function should be reconsidered in line with the central place theory. In essence, such facilities should not be physically located too far away from the population centers.

* One main aspect in improving urban development is to encourage the purchasing habits of threshold populations. It has been experienced that frequent purchasing habits encourage agglomeration of service activities in urban areas. In the KOISP, as it is elsewhere in a context of monocrop agriculture in paddy, the purchasing power among settlers tends to be limited. Much of the 'heavy' purchasing is done within a month's period after each harvest. Purchasing power is lean during other periods of the year and narrows down drastically before a harvest and during the off season. To effect a uniformity and an increase in purchasing abilities a more intensive combination of crop and non-crop agriculture and non-farm enterprise development should be encouraged. The resultant dynamism in economic activities

may yield a more dynamic cash flow throughout the year. The overall purchasing trends in the project area would thereby improve. This in turn would promote the expansion of urban functions.

*Retain the surplus income in the settlement area. One of the major problems in the order settlement projects is the substantial outflow of the surplus income generated by projects through various channels such as merchants and public and private investors and institutions. As a consequence the scope for capital formation within projects is limited affecting incomes and a more broadbased money-backed demand by settlers for goods and services. To avoid a similar occurence in the KOISP, it is important to introduce a set of strategies within a 'regional closure' framework. Such strategies could incorporate incentives such as preferential provision of services and tax holidays for those seeking to invest in the project. The quantum of services and facilities provided by the project to investors could be increased which consequently would also foster commerce in the project. Settlers would ultimately be benefited through additional employment and income avenues thereby created.

The existing marketing system in the project area too could be reorganised in order to increase the bargaining position of settler producers. As a consequence, producer incomes and purchasing abilities may be boosted. At the same time a rise in purchasing power should help to improve the quantity and quality of services provided to the settlers. Overall, a higher urban development than before may be realised. The latter therefore should be seen both as a cause as well as a result of the economic progress which the state envisages from the KOISP.

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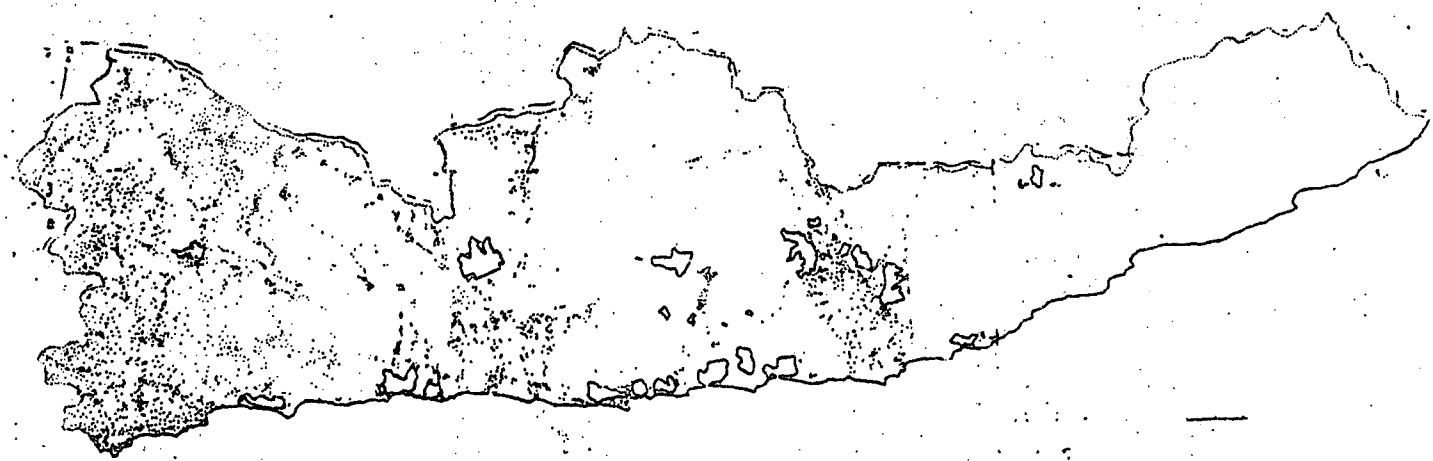
Annex I

POPULATION DISTRIBUTION IN HAMBANTOTA DISTRICT



NO.	FUNCTIONAL TYPES	TOTAL NUMBER	LOCATION COEFFICIENT	AMBALANTOTA		HAMBANTOTA		ANGUNUKOLAPELESSA		KATUWANA		WEERAKETIYA		DEBARAWEWA		PANNEGAMUWA		KIRINDE (TISSA)		WALASMULLA		SURIYAWEWA		HUNGAMA		TANGALLE	
	FUNCTIONS	IN AREA		a*	b*	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
1.	Groceries	437	0.234	70	16.39	38	8.89	17	3.98	13	3.04	14	3.27	13	3.04	4	0.93	2	0.46	36	8.43	14	3.27	9	2.10	37	8.66
2.	Fancy goods	169	0.961	13	7.69	10	9.91	3.55	3	1.77	6	3.55	7	4.14	5	2.95	-	-	18	7.69	12	7.10	10	5.91	18	10.65
3.	Hotels	144	0.694	24	16.66	23	15.94	5	3.47	1	0.694	3	2.08	7	4.86	2	1.38	6	4.16	16	11.11	5	2.08	4	2.77	32	22.22
4.	Tea restaurant	220	0.454	10	4.54	8	3.63	9	4.09	17	7.72	6	2.72	4	1.81	12	10.45	2	0.9	14	6.36	11	5.00	4	1.81	7	3.18
5.	Beverages	27	3.703	6	22.22	4	14.81	1	3.70	-	-	-	-	4	14.81	-	-	-	-	-	-	-	-	1	3.70	1	3.70
6.	Fruits dealers	10	10.22	2	20.0	-	-	-	-	-	-	-	-	1	10.0	-	-	-	-	-	-	-	-	-	-	3	30.0
7.	Vege. dealers	128	0.78	28	21.87	16	12.05	5	3.90	5	3.90	-	-	5	3.90	-	-	-	-	-	-	8	6.25	1	0.78	20	15.6
8.	Beetle & areconut	53	1.886	13	24.52	2	3.77	2	3.77	-	-	-	-	-	-	-	-	-	-	3	5.66	1	1.88	1	1.88	13	24.52
9.	Rice dealers	24	4.166	10	41.66	1	4.166	-	-	-	-	-	-	3	12.5	-	-	-	-	1	4.166	-	-	1	4.166	-	-
10.	Grinding mills	38	2.63	3	7.89	-	-	5	13.15	-	-	2	5.26	2	5.26	1	2.63	-	-	1	2.63	6	15.78	-	-	-	-
11.	Seed purchers	10	10.00	-	-	-	-	-	-	-	-	-	-	-	-	2	20	-	-	-	-	-	-	-	-	-	-
12.	Corre purchers	14	7.14	-	-	-	-	-	-	-	-	2	14.28	-	-	-	-	-	-	3	21.42	-	-	-	-	3	21.42
13.	Hard ware	37	2.70	4	10.81	-	-	-	-	1	2.70	3	8.10	1	2.70	-	-	-	-	8	21.62	3	8.10	-	-	5	13.51
14.	Agro chemicals	27	3.70	5	18.51	-	-	2	7.40	-	-	2	7.40	1	3.70	-	-	-	-	2	7.40	5	18.51	-	-	1	3.70
15.	Watch & Radio repair	43	2.32	4	9.30	1	2.32	3	6.97	-	-	3	6.97	1	2.32	-	-	-	-	3	6.97	4	9.30	1	2.32	2	4.65
16.	Studio	18	5.55	2	11.11	-	-	-	-	-	-	1	5.55	-	-	-	-	-	-	4	22.22	-	-	1	5.55	4	22.22
17.	Tailoring	94	1.063	16	17.02	8	8.51	4	4.25	4	4.25	5	5.31	2	2.12	2	2.12	-	-	7	7.44	7	7.44	3	3.18	10	10.6
18.	Textiles	88	1.13	13	14.77	4	4.54	2	2.26	1	1.13	5	5.68	2	2.26	1	1.13	-	-	12	13.63	3	3.40	2	2.26	6	6.81
19.	Pharmacy (Western)	19	5.26	3	15.78	1	5.26	-	-	1	5.26	1	5.26	-	-	-	-	-	-	3	15.78	1	5.26	-	-	4	21.05
20.	Dispensary (Western)	45	2.22	5	11.11	2	4.44	3	6.66	1	2.22	2	4.44	3	6.66	2	4.44	-	-	1	2.22	2	4.44	1	2.22	4	8.88
21.	Pharmacy (Sinhala)	12	8.33	1	8.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	25.0	-	-	-	-	3	25.0
22.	Dispensary	12	8.33	1	8.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	25.0	3	25.0	1	8.33	-	-
23.	Dental clinic	5	20.00	1	20.0	-	-	-	-	-	-	-	-	1	20.0	-	-	-	-	-	-	-	-	-	-	1	20.0
24.	Liquor dealers	6	16.66	1	16.66	3	50.00	-	-	-	-	-	-	-	-	-	-	-	-	1	16.66	-	-	1	16.66	-	-
25.	Toffee dealer	1	10.0	1	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26.	'Kaludodol' producers & dealers	12	8.33	12	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.	Laundary	29	3.44	2	6.89	-	-	3	10.34	-	-	1	3.44	1	3.44	1	3.44	-	-	3	10.34	3	10.34	2	6.89	2	6.89
28.	Saloon	96	1.04	8	8.33	3	3.12	7	7.29	3	3.12	3	3.12	5	5.20	2	2.08	-	-	4	4.16	8	8.33	3	3.12	7	7.29
29.	Jewellery	23	4.34	6	26.08	3	13.04	1	4.34	-	-	1	4.34	1	4.34	-	-	-	-	4	4.34	1	4.34	-	-	4	17.31
30.	Shoe makers repair	11	7.69	3	23.07	1	7.69	1	7.69	-	-	-	-	1	7.69	-	-	-	-	1	7.69	-	-	-	-	3	23.0
31.	Shoe dealers	21	4.76	4	19.04	5	23.8	1	4.76	1	4.76	-	-	-	-	-	-	-	-	3	14.28	-	-	-	-	5	14.25
32.	Handicraft makers & sellers	33	3.03	-	-	30	90.9	-	-	-	-	-	-	-	-	-	-	-	-	2	6.06	-	-	-	-	-	-
33.	Photo framing	5	20.0	-	-	1	20.0	-	-	-	-	-	-	-	-	-	-	-	-	1	20.0	-	-	-	-	1	20.0
34.	Battery charging	8	12.5	1	12.5	1	12.5	-	-	-	-	1	12.5	-	-	1	12.5	-	-	-	-	1	12.5	-	-	-	-
35.																											
84.	Religion functions	62	1.61	5	8.06	7	11.29	-	-	-	-	-	-	-	-	-	-	10	16.1	-	-	-	-	-	-	8	12.9
			£		1780.69		889.3		352.77		84.73		196.08		192.53		65.74		24.12		565.69		289.4		148.8		1145.81

Notes * a = Total Number of Establishments. b = Centrality values

Source - Field Survey Data 1987/88.

Contd...

	MIDDENIYA		RANNA		YODA KANDIYA		KARA MATTIYA		GELI ATTE		TISSAMA HARAMA		KOTAGO		HEGGAS ARA		YAKAGS MULLA		HAKURU MELA		PALLE MALALA		OKANELA		MELLO PITIYA		GATE HANDA		BARAYA KUMBURA		BARAGAMA	
	a	b	a	b	a	b	a	b	a	b	a	b	e	b	a	b	a	b	e	b	a	b	e	b	a	b	e	b	a	b	a	b
1.	36	7.78	11	2.51	5	1.14	6	1.37	26	5.94	47	10.73	5	1.14	4	0.93	5	1.14	4	0.93	6	1.37	3	0.68	5	1.14	1	0.22	6	1.37	3	0.68
2.	12	7.10	4	2.36	5	2.93	3	1.77	10	5.91	16	9.46	1	0.59	-	-	1	0.59	-	-	1	0.59	1	0.59	-	-	1	0.59	1	0.59	-	-
3.	7	4.86	5	3.47	3	2.02	-	-	11	7.63	18	12.5	1	0.694	-	-	-	-	-	-	-	-	-	-	1	0.694	-	-	1	-	-	-
4.	15	6.81	7	3.18	8	3.63	2	0.90	9	4.09	7	3.18	3	1.36	6	2.72	1	0.454	3	1.36	4	1.81	3	1.36	2	0.90	3	1.36	3	1.36	2	0.90
5.	-	-	-	-	1	3.70	-	-	1	3.70	3	11.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	-	-	-	-	-	-	-	-	1	10.00	3	30.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.	-	-	-	-	6	4.68	2	1.56	10	7.81	17	13.28	-	-	-	-	1	0.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	-	-	1	1.88	-	-	2	3.77	3	5.66	9	16.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.88	-	-	-	-
9.	-	-	-	-	1	4.166	-	-	1	4.166	2	8.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	-	-	3	7.89	1	2.63	-	-	-	-	1	10.54	1	2.63	-	-	-	-	2	5.26	1	2.63	1	2.63	-	-	-	-	1	2.63	-	-
11.	8	8.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.	2	14.28	-	-	-	-	-	-	3	21.42	-	-	-	-	-	-	-	-	-	-	-	-	1	7.14	-	-	-	-	-	-	-	-
13.	4	10.81	-	-	-	-	-	-	3	8.10	5	13.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.	1	3.70	-	-	2	7.40	-	-	-	-	2	7.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	7.40	-	-
15.	4	9.30	1	2.32	-	-	-	-	6	13.95	7	16.27	1	2.32	1	2.32	-	-	-	-	-	-	-	-	-	-	1	2.32	-	-	-	-
16.	1	5.55	-	-	-	-	-	-	2	11.11	3	16.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17.	4	4.25	3	3.18	1	1.063	1	1.063	8	8.51	4	4.25	-	-	-	-	1	1.063	-	-	-	-	-	-	1	1.063	-	-	1	1.063	1	1.063
18.	6	6.31	-	-	-	-	-	-	9	10.27	19	21.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19.	-	-	-	-	-	-	-	-	2	10.52	3	15.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20.	2	4.44	1	2.22	-	-	2	2.22	4	8.88	4	8.88	1	2.22	-	-	-	-	-	-	1	2.22	-	-	1	2.22	-	-	1	2.22	-	-
21.	1	8.33	-	-	-	-	-	-	1	8.33	2	16.66	-	-	-	-	1	8.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22.	-	-	-	-	-	-	-	-	1	8.33	2	16.66	-	-	-	-	1	8.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23.	1	20.0	-	-	-	-	-	-	-	-	1	20.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.	3	10.34	2	6.89	-	-	-	-	1	3.44	3	10.34	1	3.44	1	3.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28.	4	4.16	3	3.12	3	3.12	2	2.08	7	7.29	6	6.25	2	2.08	-	-	-	-	-	-	1	1.04	2.0	2.08	-	-	1	1.04	2	2.08	-	-
29.	2	8.68	-	-	-	-	-	-	1	4.34	2	8.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4.34	-	-
30.	-	-	-	-	-	-	-	-	3	23.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31.	1	4.76	-	-	-	-	-	-	1	4.76	3	14.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32.	-	-	-	-	-	-	-	-	-	-	1	3.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33.	-	-	-	-	-	-	-	-	1	20.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34.	-	-	-	-	-	-	-	-	-	-	1	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	1	-	-	-	-	-	-	-	2	3.65	35	48.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
≦	349.18		109.62		73.22		29.81		574.45		899.7		22.8		9.41		22.00		18.7		39.92		16.98		15.65		18.99		43.93		19.34	

	WITARANDENIYA		DEMIGAHALANDA		MONAGAMA		KOGALLA		KIRIMA		NARAPITIYA		TALAWA		OSBELLA		DEBOKKAWA		NIRIMILA	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
1.	8	1.83	5	1.14	4	0.93	4	0.93	7	1.60	7	1.60	6	1.37	5	1.14	8	1.83	4	0.9
2.	2	1.18	1	0.59	-	-	-	-	2	1.18	-	-	5	2.95	-	-	-	-	-	-
3/	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.4
5.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.370
6.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.	-	-	2	1.56	2	1.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	-	-	-	-	-	-	-	-	2	3.77	-	-	-	-	-	-	-	-	-	-
9.	-	-	5	20.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	1	2.63	2	5.26	-	-	1	2.63	-	-	-	-	-	-	-	-	-	-	-	-
11.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.	-	-	-	-	2	7.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17.	-	-	-	-	-	-	-	-	1	1.063	-	-	-	-	-	-	-	-	-	-
18.	-	-	-	-	-	-	-	-	1	1.13	1	1.13	1	1.13	-	-	-	-	-	-
19.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20.	-	-	-	-	1	2.22	-	-	-	-	-	-	-	-	-	-	-	-	1	2.2
21.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28.	-	-	1	1.04	1	1.04	2	2.08	2	2.08	1	1.04	1	1.04	1	1.04	1	1.04	-	-
29.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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33.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34.	-	-	1	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	11.59		18.5		15.15		8.14		99.67		11.33		32.25		4.81		6.68		78.71	

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