AN ASSESSMENT OF INFRASTRUCTURE SERVICES PROVISION AND ITS EFFECTS ON THE GROWTH OF URBAN CENTRES: A CASE STUDY OF KIPKELION, KERICHO DISTRICT.

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DECLARATION:

This thesis is my original work and to the best of my knowledge has not been presented for degree in any other university.

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This thesis has been submitted for examination with my approval as a University supervisor

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DEDICATION:

This thesis is dedicated to my whole family, and particularly my beloved daughter, Vicky, my wife and my mother.

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This study was made possible through the assistance of many people. Much as I would have liked to list them all, I find it impossible to do that due to the fact that I would end up publishing a whole book. I must, however, request them to accept my sincere thanks for their contribution.

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ABSTRACT

Infrastructure services facilitate the efficiency of production in that they provide the means through which the process of development and growth can be undertaken. This applies to both rural and urban areas. As a result of the rapidly growing population especially in urban areas, there is a need to provide infrastructure services, especially roads, electricity, water supply and sanitation facilities in order to enhance production and welfare of a people. The existence of an efficient and reliable infrastructure is crucial to development of trade and interchange of a modern economy. In contrast the lack or the inadequacy of it greatly inhibit the growth of urban centres.

Infrastructure and urban growth have a positive relationship as development of infrastructure enhance the growth of urban centres. The growth and momentum at which it occurs, depend, *inter alia*, on geography and location of activities. Within a nation, the development of a region is directly related to its ease of access to resources and to outside markets. The propensity to interact with the outside market or to access resources depends to some extent on infrastructure services, especially roads. But to facilitate the production of those good and services, other infrastructure facilities such as energy supply (electricity), water and sanitation among others are required. The fact that these infrastructure services are either lacking or inadequate provides the basis for the study, with particular reference to how they have curtailed the growth of Kipkelion.

This study has found out that poor infrastructure provision (roads, water and sanitation services) and lack of efficient supply of energy (electricity) has hampered the growth of Kipkelion. In order to alleviate these problems recommendations are made so as to address them. As far as road network is concerned it is recommended that roads in Kipkelion require to be improved and this include tarmacking of some roads and putting murram on others. Energy supply can be boosted through the provision of electricity not only for domestic, commercial and industrial uses, but also to facilitate efficient pumping of water for the residents. It is also recommended that sanitary facilities are provided to ensure proper waste disposal and a clean environment.

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CHAPTER 1. INTRODUCTION

1-1 Overview

The urbanization process in Kenya is increasing rapidly. As for now, Kenya is still rural in character and this trend will tend to decrease by the year 2025 (Obudho, 1996). The bulk of Kenya's urban population increase is, and will continue to be, due to rural-urban migration and urban population natural increase. This influx of people into urban centres will put added strain on basic services and facilities. At the same time, it may also stagnate the development of the rural areas as the young and educated join the rural-urban migration exodus.

Urbanization refers to an economic transformation whereby a basically agricultural economy is turning into a predominantly non-farm or manufacturing economy. It is a spatial transformation in the distribution of population whereby cities grow in number and size and the relative proportion of the population living in cities increases, and a social transformation whereby a formerly rural society is turning into an urban society whose individual members behave in such a way that they are qualified as 'urbanites'.

Kenya has one of the highest level of urbanization in East Africa, for example in 1985 it was estimated that about 16.7% of the population lived in urban areas as opposed to 14.4% in Uganda and 14.8% in Tanzania. Within a period of 30 years (1985-2015) this share of urban population is likely to double, with Kenya having 37.8%, Uganda 34.7% and Tanzania 36.4%. The current rate of urban population growth and its attendant problems are some of the major issues confronting policy makers today (Obudho, 1996). This calls for urgent measures to provide the basic infrastructure services to enhance the people's welfare and urban growth to meet the urbanites' demand for jobs accessibility, and generally improved living conditions.

In order to limit the above problems in the larger urban centres, the upcoming smaller urban centres should be given priority, especially as concerns the provision of

infrastructure services so as to stimulate local initiative in the creation of job opportunities and economic pursuits. These are geared towards ensuring general growth and development of smaller urban centres and also reducing migration to the larger urban centres. Infrastructure services such as roads, water, and electricity supply enhance efficient exploitation of existing resources in a region and hence stimulate development and growth of that region. Sanitary facilities will be used to dispose of waste generated as a result of increased urban activities.

In addition, as a further remedy to the problem of rural-urban migration, the Kenya Government formulated a policy of inducing a balanced pattern of rural-urban development through the District Focus Strategy for Rural Development. This approach was promoted by the development of small scale enterprises especially in the Rural Trade and Production Centres (RTPCs), which are the focal points of economic activities.

However the realization of this goal is not possible if the provision of infrastructure such as water and sanitation, electricity, and road network is not undertaken. It is from this preamble that this research is based on, that is, trying to study why Kipkelion Urban Centre has experienced little growth since it was founded as a railway station in 1901.

1-2 Research Problem

Kipkelion is one of the oldest urban centres in Kericho District. Its history dates back to the colonial period of rule when it was established as a railway station. Later on it became an administrative centre, a function that it still upholds to date. It is located in Kipkelion Division which covers an area of 321.5 square kilometres. It has a total population of about 29,043 (Kericho District Development Plan, KDDP, 1993-1996). Kipkelion Urban Council oversee the local authority affairs of the area.

Research work carried out in the area indicate that it has a lot of agricultural potential and the major cash crops grown include tea, coffee, pyrethrum, and finger millet. Other crops include maize, potatoes and beans among others. Livestock that are reared include cattle for both milk and meat, goats and sheep. The availability of forest manifest the great potential of the area to provide income generating activities for example timber and saw milling (Kosgey 1986). However, this potential has not been fully exploited mainly due to infrastructure constraints such as poor transport network, especially roads to avail farm produce to the market, lack of electricity supply which can enhance the development of agro-based industries, and inadequate water supply for both industrial and domestic consumption.

In the study area, infrastructure services such as road, electricity, sanitation and water supply *inter alia*, are inadequate or non-existent. The study area is characterized by poor road transport network. The only tarmacked road is a section of the highway from Nairobi to Western Kenya which traverse the division and covers about 15 km. Gravelled and earth roads are the major means of transport and in most cases they are impassable during the wet seasons. In some areas, one has to travel up to 5 km so as to reach the nearest road. This has seriously affected the transportation of both inputs to the farms and produce to the markets.

Similarly the urban centre, or Kipkelion division in general, has no electricity and hence the efficiency of production as a result of reduced costs in energy budgets has not been realized. This has hampered the development of agro-based and other small scale industries to process farm produce and to fabricate farm implements or to repair and maintain machinery.

In addition the study area has inadequate water supply. Out of about 670 households only 17 percent get piped water. The water facility is overutilized and it experience breakdown of the engine and lack of storage tanks (Kosgey, 1986). Similarly, there are

no proper ways of disposing waste, for example domestic refuse is dumped next to residential quarters while dirty water is simply poured on to the surface.

Kericho District Development Plan (KDDP, 1994-1996) identifies the major constraints to development as poor communication networks, lack of electricity, and unreliable water supply, *inter alia*. All these expositions require urgent measures to be pursued in order to reverse the trend. They therefore form the basis of the research problem. The basic research problems thus are: Why has the urban centre under study experienced little growth? Can the provision of infrastructure, namely roads, electricity, water supply and sanitary facilities lead to its growth?

1-3 Research Objectives

The objectives of the study, generally are to examine the reasons as to why the urban centre under study has experienced little growth since it was established; also to assess the nature of infrastructure, that is, road network, energy, water supply and sanitation, and how their poor conditions (for roads), inadequacy (for water), poor waste disposal system or the lack of it (electricity) have affected the growth of Kipkelion. The study also aims to study the role of the same in urban growth.

Specifically, the research aims to critically study the following:

1. To find out the socio-economic activities of Kipkelion,
2. To examine the status of infrastructure (roads, energy, water supply and sanitation) in Kipkelion,
3. To examine the effects of the infrastructure service provision on the urban centre, and;
4. To make policy recommendations to address the above issues so as to enhance the growth of Kipkelion.

1-4 Research Assumptions

1. The development of infrastructure (electricity, roads, water and sanitation) lead to urban growth.
2. Urban growth enhances rural development.

1-5 Scope of the Study

Infrastructure services here basically refers to the road network, water supply and sanitation, and energy problems in the area covered by the Kipkelion urban council boundary. Specifically though, the study is mainly centred on these services in relation to the urban centre. As pertains roads, the study is concerned with the nature and conditions of the roads leading to/from Kipkelion urban centre and how they affect the socio-economic activities in the urban centre.

The water supply is studied so as to determine how it can be improved in order to meet the needs of the area, for both domestic and small scale industrial requirements. Also, means of disposing waste is studied. Similarly the energy sources and needs is also ascertained so that recommendations can be made in order to satisfy the energy requirements of the area, and how it can be used to enhance the growth of commercial, institutional and small scale industrial plants.

1-6 Justification of the Study

Kipkelion urban centre is the headquarters of Kipkelion Division. As compared to the other urban centres in the division it is relatively large with a total area of about 2 km^2 and a population of more than 3,000 people. Other urban centres such as Chepseon has a small population of less than 2,000 while Kedowa's population is also less than 2,000. Furthermore, it is centrally placed (map 3-3) in the division hence its growth will subsequently affect large portions of its hinterland unlike other urban centres within the division which are found in the periphery. In addition, it is one of the oldest urban

centres not only in the division but also in the district, thus its study will reveal some of the problems that such urban centres face.

The urban centre under study has experienced little growth since it was established way back at the beginning of the century. Even though it is surrounded by rich agricultural land, it has not grown to support it, for example to process some of the agricultural products or to manufacture some of the farm implements through the informal sector activities. It therefore provides an interesting topic for study, and more so, it seeks to examine how the urban centre can be developed so as to meet some of the needs of the division it serves.

Also, the government policy on small urban centres has emphasized the need for building infrastructure to assist the private sector to create more employment in small urban centres. The government launched the RTPCs programme which is aimed at concentrating scarce resources for urban infrastructure in areas that have the potential for supporting agriculture and its linked productive activities, including processing, manufacturing and services. The research study is therefore aimed at examining the pressing infrastructure needs that require to be provided so that the policy can be successfully implemented.

In addition, the study was carried out in order to unravel some of the problems that have retarded the development of the region. The study also aimed at filling the gaps in the study that was carried out earlier on which involved rural water supplies (Kosgey, 1986). The author therefore observed that more studies require to be undertaken not only to update existing data but also to make known some of the most pronounced constraints that have hindered the development of the area.

Furthermore other studies in related field have concentrated on large urban centres, while others are based on already developed infrastructure. This research, being

undertaken in a smaller urban centre, may provide some insights into the major constraints facing such urban centres.

1-7 Definition of Terms

1. Infrastructure: According to Fox (1994), infrastructure is defined as those services derived from the set of public works traditionally supported by the public sector to enhance private sector production and to allow for household consumption. It includes services such as roads, mass transportation, water system, sewer system, solid waste management, drainage and flood protection, electric installations and telecommunications. For the purpose of this study infrastructure will specifically refer to roads, water supply and sanitation and electricity supply.

2. Urban Centre: It refers to an urban area with a population of 2,000 and above.

3. Growth: It refers to any change that is positive and hence beneficial to the people of an area. In the context of the study it refers to the enlargement of the urban area, increase in population, generation of the employment opportunities, investments, increase in income and generally an improved welfare of the people.

1-8 Research Methodology

In order to undertake this study, collection of secondary data was first done. Literature on infrastructure services in related fields of study was perused in order to determine their roles in the development of a region. Secondly, comparisons were made between the various types of infrastructure in relation to socio-economic activities of a region.

This was followed by a reconnaissance study which was carried out to determine the extent of the area under study. This was aimed at facilitating the process of sampling since the entire area could not be studied within the given time context. Sampling also utilize less resources and is more accurate than studying every part of the area. Sampling was categorized in terms of institutions within the urban centre, commercial activities such as retail and wholesale, service sectors such as transport, hotel and bar business, metal works and posho mills.

The above involved collection of primary data hence the formulation of questionnaires was carried out. Structured questionnaires were also provided to the urban dwellers to give their own views about the nature of infrastructure under study, how it affects them and how it can be improved. Also, informal discussions with the residents was pursued so as to gather more information about the study area in terms of infrastructure and how urban growth can be enhanced.

The urban centre under study has 673 households. A total of 56 questionnaires were administered. The outline of the questionnaires shows that 16 percent of the urban dwellers were interviewed. Out of these, 20 questionnaires were administered to urban households and another 20 were administered to entrepreneurs. In addition, 5 questionnaires were administered to 5 institutions within the urban centre. Finally, 1 questionnaire was administered to Kipkelion Urban Council.

The institutions that were studied are Kipkelion Health Centre, Taitta Toweett and Mercy Girls Secondary Schools, Soil Conservation Primary School, Agricultural Mechanization Services (AMS Kipkelion), and the Railway Station Transport Terminal in Kipkelion. Also, a total of 10 questionnaires were administered to vehicle owners or vehicle operators. 6 of these were administered to matatu operators, 2 to lorry owners, 1 to a car owner and another one to a tractor owner. These operators were selected on the basis of their routes of operations, with the centre of focus being the urban centre under study. The routes covered include Kipkelion-Chepseon- Kericho, Chepkechei/ Kebeneti- Kipkelion- Kericho, Barsiele- Kipkelion- Kericho, Siret- Kipkelion; and Kedowa/ Tuiyobei- Kipkelion- Kericho.

The questionnaires were used to extract specific information that could not be established from the discussion and observation or to verify certain issues. It entailed issues on:

i. Nature of business enterprise,
ii. Incomes,
iii. Business characteristics,
iv. Infrastructure services, etc.

In addition data from experts in the field concerning the research variables was collected through interview schedules so as to provide a comprehensive insight into the problem area. Such experts included those from the Ministry of Agriculture who provided data on agricultural production and marketing in the area, experts from Ministry of Transport and Communication, Local Authority, and other experts with relevant data to the research study.

Lastly, other techniques used to collect information include direct observation and photography. The researcher collected data on

- nature and conditions of infrastructure services,

- Building structures, etc.

The sample size that was selected is justified on the grounds that the respondents have fairly similar characteristics. The smaller size would therefore reveal the same characteristics of the entire population.

The study made use of the following analytical techniques:

1. Data was first entered and processed using SPSS programme in the computer.
2. Statistical tools including frequencies, means and percentage were then used and the results were presented using frequency tables and figures, among other methods so as to determine the relationship between the variables. The interpretation obtained from the data was then used to make policy recommendations.

1-9 Study Limitations

The study encountered a number of limitations. First, some respondents, especially officials from a certain ministry were very adamant and refused to part with information. This forced the researcher to go to the relevant ministry headquarters to seek authorization to undertake the study. This also resulted in time being wasted. In addition, some respondents could not give any information without being given "something small" and given the fact the researcher had limited financial resources, it was not possible to satisfy their demands.

Secondly, some respondents refused to be photographed hence some information/ data collected cannot be supplemented by photography.

Lastly, in some departments, there are no records of information about some aspects of the study area, for example the historical records about the urban development were not

available. The researcher, therefore, had to collect data from respondents who had lived there since the beginning of this century.

1-10 Organization of the Thesis

Chapter one which is the introduction considers the research problem, study objectives, research assumptions, and methodology, inter alia. Chapter two focuses on the review of literature with a bias on infrastructure, especially roads, energy (electricity), water and sanitation service; and their roles in growth and development of a region.

Chapter three deals with the background information about the study area while chapter four deals with data analysis in relation to the set objectives. Finally, chapter five gives a summary of the findings, recommendations and conclusion.

CHAPTER 2. LITERATURE REVIEW

2-1 Overview

The rates of urbanization in Africa are higher than those in any place else in the world, and the rapid growth of the cities is changing what was not long ago an overwhelming rural region. Between 1960 and 1990, the African urban population grew at an average annual rate of about 6 per cent. At that rate of growth, African cities have been doubling in size in less than 13 years. During the 1980s, the urban population in Kenya grew by more than 8 per cent per year (Goliber, 1994).

Urban growth in Africa stems from three sources: the high rate of natural increase in the cities themselves; the high levels of migration from rural to urban areas; and to a much lesser extent, the reclassification of formerly rural areas to urban due to increases in population size or boundary changes.

It is worth noting here that Africa's urbanization and industrialization are not progressing together; rather rapid urbanization is taking place at a time of industrial stagnation. With an overall poor economic performance and a lack of industrial growth, African countries have not been creating enough modern sector jobs to absorb the growth of the urban labour force, and unemployment is often extremely high. This often create harsh economic realities in the urban areas. Coupled with that, most African countries are unable to provide adequate infrastructure to meet the basic needs of the burgeoning urban population. Most urban governments have difficulty just grasping the implications of a population that doubles in size so quickly. Sanitation, transport, health, education, water, energy, and a multitude of other basic urban amenities are inadequate or lacking (Obudho, 1992).

It is also observable that rapid urbanization has a much pronounced impact on the environment. Most urban residents still depend on fuelwood as their source of energy,

and some of the most severe deforestation is taking place in rings around the cities. African urban centres do not have an adequate infrastructure to dispose of sewage, garbage or other pollutants. Water supplies are especially at risk.

2-2 The Challenge of Urbanization in Africa

Urbanization represents a major redistribution of population in Africa. Among urban centres themselves, this redistribution showed a strong preference for the very large cities and metropolitan areas. Thus the percentage of urban population in Sub-Saharan Africa living in cities of over 500,000 rose rapidly from 6 to 41 between 1960 and 1980, and the number of such centres themselves jumped from 3 to 28 (World Bank, 1989). There was little step-by-step migration from small towns to cities and on to metropolitan centres.

This trend provoked discussions as to how to correct the national urban system in many of these countries. These discussions concentrated on the need to develop countervailing urban centres which can serve as alternative magnets drawing migrants and employment-generating activities away from the primate city.

In Kenya, the government aimed to curtail this movement to the city of Nairobi by trying to provide infrastructure services and facilities that were geared towards facilitating the creation of employment opportunities to meet the demands of the increasing labour force. The Sessional Paper Number 1 of 1986 puts great emphasis on building infrastructure that assists the private sector create more productive employment in their towns and small market centres. Among the basic infrastructure that were to be provided or developed include road network, electricity supply, piped water, and telecommunications and transport services.

In addition social infrastructure such as schools, hospitals/health centres, recreational facilities, and cultural amenities were also to be provided (Mabogunje, 1980). This was

also aimed at giving incentive to the informal sector activities. The informal sector in most African cities embraces fabrication, metalworking, manufacturing, arts and crafts, repairs, trading services and even credit provision.

The measures that were taken in order to avoid excessive population concentration in Nairobi and Mombasa, and also to promote equity have yielded some results. The last census shows that urban growth have been diverted to secondary urban centres. Similarly, the government policy of supporting agriculture and emphasizing the development of secondary urban centres has been acknowledged and has received the support of the international donor community. Consequently, a major share of investment in infrastructure over the past ten years has gone to rural areas and to the development of rural-urban and national transport linkages. The author, however, contends that not all areas have benefited from this policy and they are still constrained by the lack of basic infrastructure such as roads, electricity and adequate water supply.

2-3 The History of Urbanization

2-3.1 Colonial Urbanization

Colonial rule resulted in some important urban centres. These centres were founded as either new colonial settlements to serve as administrative and trading centres or as upgraded pre-colonial centres, while others emerged as national and provisional capitals of their respective countries, regional markets and transport networks. The early European urbanization began with small forts, trading posts and railway stations. Among those established as a railway station is Kipkelion.

2-3.2 Post Colonial Urbanization

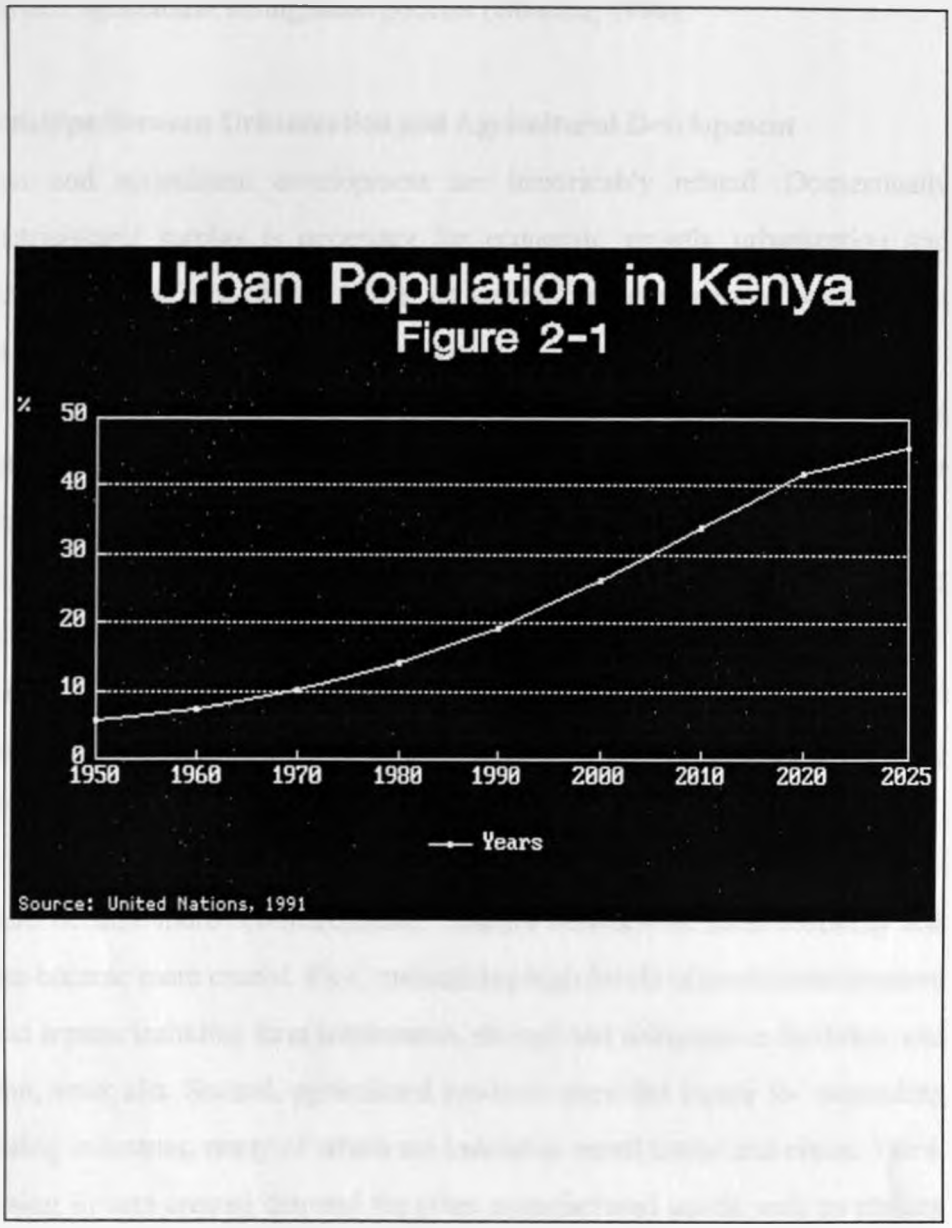
Africa remains essentially on the frontiers of urban explosion and spatial transformations. The ingredients for such transformation are minimal levels of urbanization, low degrees of urban concentration, high and increasing rates of

population and urban growth, uneven distribution of population and resources, increasing efforts of national integration, and highly centralized political systems (O'Connor, 1983).

Despite the generally low levels of urbanization, Africa is experiencing the highest rates of urbanization in the world, averaging 4.6 per cent per annum. The annual average rate of urbanization is not expected to decrease to 3 per cent until after the year 2025. The urban population in Africa increased from 33 million (15 percent) in 1950 to 176 million (32 percent) in 1985, and it is likely to reach 903 million (59 percent) by 2025. The rates of growth of urbanization combined with high population growth rates will ensure a dramatic increase in Africa's urban population. The urban population will increase from 129 million in 1980 to more than 765 million by 2025, at which time over 52 percent will be living in towns and cities (Obudho, 1985).

In Kenya the urban population growth has been increasing since independence. This share of urban population increased from 0.8 percent in 1962 to over 18 percent in 1991. The growth of urban population in Kenya can be seen by looking at the number of urban centres in different size groups over space and time. At the time of the first Kenya population census in 1948 there were 17 urban centres with an aggregate population of 286,000. By 1962, the number of urban centres had doubled to 34 and the urban population had increased to 671,000 people with an annual growth of 6.6 percent per annum. In 1979 there were 90 urban centres and this had increased to 172 in 1989. These centres are expected to increase to over 240 by the year 2000. Figure 2-1 shows the percentage of urban population in Kenya as from 1950 to the year 2025.

This calls for urgent measures to be put in place in order to meet the basic demands/ needs of this rapidly increasing urban population. It is therefore imperative that basic infrastructure such as water supply and sanitation, provision of electric power and improvement of roads, among others, are effected.



The urban population growth rate is, however, likely to decrease slightly in the future. There is a likelihood that other urban centres (apart from Nairobi and Mombasa) will grow faster. The high rate of urbanization poses grave developmental problems for governments and the peoples concerned. The high rate of growth is mainly due to rural-urban migration, high urban natural increase, and to an expansion of urban boundaries. Also, non-spatial factors have significant impacts on the form, rates, nature, and extent

of urban growth, such as non-spatial policies which include fiscal, industrial, defence, equalization and agricultural immigration policies (Obudho, 1990).

2-4 Relationships Between Urbanization and Agricultural Development

Urbanization and agricultural development are inextricably related. Domestically produced agricultural surplus is necessary for economic growth, urbanization and modernization (Coleman and Nixon, 1978). As agriculture became more productive it contributed to economic development in three ways:

1. Its production contribution is to make available to the non- agricultural population increased amounts of food, the demand for which rose with higher levels of urbanization.
2. Its factor contribution was supplying the rest of the economy with labour and capital, both of which tended to expand with greater agricultural production.
3. Its market contribution was the increasing internal demand for services and manufactured goods that accompanied rising incomes and revenues resulting from higher agricultural output (Johnston and Kilby, 1975).

As agriculture became more commercialized, linkages between the rural economy and urban centres became more crucial. First, maintaining high levels of production required manufactured inputs, including farm implements, storage and refrigeration facilities, and transportation, inter alia. Second, agricultural products provided inputs for expanding agro-processing industries, many of which are located in small towns and cities. Third, agro-processing in turn created demand for other manufactured goods such as milling equipment, machine parts, packaging material and transportation equipment (Bairoch, 1988).

These relationships between agriculture and urban manufacturing and commerce slowly extended throughout the urban settlement system, from market towns and small cities to large metropolitan areas. Growing towns and cities absorbed increasing amounts of

surplus agricultural goods by providing markets and distribution networks for a wide range of food and other rural products (Hohenberg and Lees, 1985).

Where the small and medium sized urban areas function effectively, they create demand for products of cottage industries in the surrounding rural areas; provide employment opportunities for both urban and rural residents in a wide range of agricultural processing and trade activities; and function as agricultural supply centres. They form an essential marketing network through which agricultural commodities are collected, exchanged and redistributed and through which the products of urban enterprise are traded in rural areas (Bromley, 1984).

Without a network of towns and cities, agricultural trade in a region is usually restricted to periodic markets in which subsistence farmers exchange goods among themselves. The low level of agricultural production in many African countries is due in part to the fact that market centres are not efficient in transmitting demand from urban to rural areas and the market towns are not accessible from production areas. This has been observed to be the case in the study area and its area of influence.

The commercialization of agriculture is reinforced by the emergence of marketing linkages between rural areas and urban centres. These linkages become more complex as agricultural production and urbanization increased. Farms supply products for processing in urban centres while urban enterprises provide transport and marketing services and various types of repair services to farms.

These observations are considered by the author to be of paramount importance in the development of both rural and urban centres.

2-5 Urban Growth and Rural Stagnation

The influx of large numbers of people into urban centres puts an added strain on basic urban services and facilities. At the same time it also tends to stagnate development in rural areas because the young and the educated leave in the rural-urban migration exodus. This therefore calls for policy formulation to stem this trend. It is advocated that a bottom-up strategy emphasizing territorial integration and inward planning with a system of 'selective spatial closure' should be adopted (Mehretu and Campbell, 1982).

One of the best ways to achieve this development strategy is to concentrate planning in the small and intermediate-sized urban centres (Obudho and Aduwo, 1990). Before these small centres can succeed as "mini" growth centres for the rural centres, there must be a fundamental change in the relationship between the small and intermediate-sized urban centres and their umland. A policy of encouraging development at the metropolitan levels without distributing development planning at small or intermediate-sized urban centres will only magnify rural-urban migration.

The majority of Kenya's, population continue to live in the rural areas which derive their livelihood from various forms of agriculture. The author contends that the development of urban centres in the rural areas will therefore boost agricultural growth.

2-6 Urbanization and Employment

The relationships between urbanization and economic development are seen most clearly in the impact of rural emigration on the growth of urban areas and the resulting need for urban centres to generate employment. Urban centres have to play a major role in absorbing large numbers of rural people who could not derive an adequate livelihood from agriculture. The economic base of many urban centres is dominated by retail and service activities and by agro-processing and agri-business enterprises. This is true to some extent in the study area but agro-processing is non-existent. In Kenya, because of

the rapidly increasing labour force, the manufacturing and service sectors will have to expand at very high rates in order to provide enough jobs.

From the above discussions, it is observable that the growth of enterprises in urban centres depends heavily on increased agricultural production and rural income as well as on the availability of urban infrastructure and efficient inter-urban and rural transport linkages. Urbanization policies should therefore encourage investments in public services, facilities, infrastructure and productive activities in a pattern of decentralized concentration.

2-7 The Role of Infrastructure Services on Urban and Regional Growth

Infrastructure play a significant role in growth and development of an area. Infrastructure investments will have the greatest effect on economic growth when a minimum complement of services, including transportation, electricity, water supply and sanitation facilities, *inter alia* is available. Infrastructure services can be a very effective means of increasing incomes for low income households.

The World Bank report shows that developing countries invest $200 billion a year in new infrastructure. The result has been a dramatic increase in infrastrucuture services- for transport, power, water, sanitation, among others. During fifteen years, the share of households with access to clean water has increased by half, and power production have doubled. Such increases do much to raise productivity and improve living standards.

However, 1 billion people in the developing world still lack access to clean water- and nearly 2 billion lack adequate sanitation. Already, inadequate transport networks are deteriorating rapidly in many countries unreliable power constraints outputs. On top of all this, population growth and urbanization are increasing the demand for infrastructure.

The adequacy of infrastructure helps determine one country's success and another's failure in diversifying production, expanding trade, coping with population growth, reducing poverty, or improving environmental conditions. In frastructure services that help the poor also contribute to environmental sustainability.

The Report further states that inadequate maintenance has been an almost

The development of the small enterprise sector has been highlighted in both the Sessional Paper Number 1 of 1986 and the subsequent development plans as a primary means of strengthening Kenya's economy. The sector includes all enterprises employing between 1-50 workers. It is expected that approximately 31 per cent (587,000) jobs will be created in the small scale and Jua Kali enterprise sector. The Government's support is to provide economic, financial and regulatory policies which reward enterprise and through the provision of adequate infrastructural facilities. It is therefore observable that infrastructural services plays a significant role in the growth of trade.

The Sessional Paper No. 1 of 1986 identify major benefits of small enterprises and they include:

1. Significant contribution to the economy in terms of output of goods and services;
2. Creation of jobs at relatively low capital cost, especially in the fast growing service sector;
3. Development of a pool of skilled and semi-skilled workers who are the base for future industrial expansion;
4. Strengthening forward and backward linkages among socially, economically and geographically diverse sectors of the economy;
5. Creating demand as well as supply, as it has been established that 90 per cent of rural enterprise products are marketed directly to rural households;
6. Contributing to increased participation of indigenous Kenyans on the economic activities of the country;

7. Offering excellent opportunities for entrepreneurial and managerial talent to mature, the critical shortage of which is often a great handicap to economic development;
8. Supporting industrialization policies that promote rural- urban balance;
9. Increasing savings and investments by local Kenyans and encouraging use of local resources, thus leading to more effective use of capital; and,
10. Adapting quickly to market changes.

These benefits, however, have not been observed in the study area because of the poor nature of infrastructure services and its attendant problems. In order to facilitate the achievement of these benefits the government aims to concentrate on creating the infrastructural facilities and the economic environment in which entrepreneurs can emerge, develop and grow. It is the government policy to provide the physical infrastructure and information networks in which small enterprises can operate efficiently, (Sessional Paper No. 2, 1992).

The presence of an established well connected urban settlement system is not only a prerequisite for, but is also a major factor in promoting socio-economic integration. It provides the spatial framework which facilitates mobility of labour and capital, permits greater exploitation of resources, widens locational options and choices, promotes innovation-diffusion, enhances specialization and comparative advantages and increases dependence or inter-dependence within human settlement systems (UNCD, 1988).

Urban system provides the social medium for increased social interactions and resources transfer and promotes specialization and complementarity. The Kenya government has encouraged the development of "growth centres". Some growth centres have been designated as foci of trade, social services and communication which serve the surrounding farm areas. In these towns it is the policy of the government to provide all the infrastructure which can aid the formation of new towns in rural areas. As the towns

become large enough, they will form an urban centre served with public water supply, sewage disposal, electricity, improved access roads, etc. (Obudho, 1988).

Self sustaining economic growth cannot occur without a well-articulated spatial system composed of dispersed and interlinked central places, performing specialized and diversified production, distribution, consumption and exchange functions. Urban centres/ market towns emerged to provide institutionalized markets for surplus agricultural products and supplied goods and services such as farm implements, livestock, etc, which farmers could exchange for their produce or buy with its proceeds. Linkages among dispersed market centres provide the basis for growth and the means by which a large majority of the population participate in and benefit from the development process (Rondinelli et al, 1978).

Warner et al (1975) stipulates that without adequate roads, power supplies, sewers, and trained manpower, small cities, towns and rural places cannot compete for new kinds of economic activities needed to stimulate growth, or at least lessen the outflow of economically active individuals. The presence of these services can be expected to enhance the economic potential of the region by decreasing the outmigration of young residents, increasing opportunities for self-employment and private entrepreneurship, increasing the potential for the in-migration of industry and residents, and increasing the productivity of agricultural activities. The sociopolitical impacts of infrastructure include the enhancement of self-reliance among the residents of the community, the enhancement of co-operation and citizen participation in community activities, and the creation of new leadership in the community.

HABITAT (1984) articulates that human settlement policies and programmes should be recognised as essential elements in promoting overall societal development, especially when they address key basic needs such as infrastructure and community services. It states further that up to 50% of the population in urban areas of the developing countries

have no access to such basic services as potable water, electricity and incomplete urban and transport systems. Therefore, human settlements development, as well as economic development in general, is hampered by the absence of an effective and extensive national transport network.

Demand for urban investment grows at a reasonably steady rate and the public works necessary to meet that demand in many cases have to be offered in blocks. Such is the case with the expansion of water supply, mass transport network and electricity supply, among others. HABITAT gives an example of Mexican cities where the major determinant of growth has been transport improvements.

2-7.1 The Role of Road Transport Network in Urban and Regional Growth

The road transport network in Kenya currently accounts for over 80 percent of the country's total passenger and freight traffic. Although in quantitative terms Kenya has one of the most impressive road networks in East Africa, the deteriorating condition of this network over the last 10 to 15 years due to inadequate maintenance is now one of the most serious constraints to the development of the economy since it leads to high vehicle operating costs, unstable delivery schedules, low investment in the transport sector, all of which seriously affect productivity in all economic sectors. High transport costs are reflected in many aspects of the economy and may lead to high production costs, uncompetitive exports and high costs of imported inputs and capital goods. The rapidly deteriorating road conditions are increasingly rendering the roads incapable of supporting the growth of economic activities (NDP, 1997-2001).

Better transportation services that reduces commuting costs and time, can allow households the opportunity to devote more time to income earning activities. Business production costs rise substantially as firms contend with inadequate infrastructure services. Small and newly starting firms, the source of many new jobs will be the most

disadvantaged, and their inability to succeed can substantially inhibit overall economic performance (Fox, 1994).

The existence of an efficient and reliable transportation system is crucial to development of trade and interchange of a modern economy (Roberts et. al., 1971). Without transportation as a limiting factor, no economic development of a given space is conceivable, however much it may be desired. Lack of effective transport links between different locations or areas means that goods produced in one place are not accessible to other markets. If transport costs are lowered through investments in the system then some firms which operate more efficiently and occupy favourable locations with regard to the transport system will have the opportunity to penetrate into local markets previously protected by the high costs of transport (Blonk, 1979).

The opening of sparsely settled but potentially productive areas has been hampered by the absence of local `feeder' roads from the interregional highways. Roads provide an effective access to a processing plant and through it to the national market. Rural products are brought to national level exchange through the urban hierarchy via a series of collection centres and, where appropriate, processing points; imports are distributed from it by that same hierarchy. The main flows of produce from rural to urban areas supply the urban food markets. With rapid population growth and rising incomes, the urban demand for food has risen rapidly. Transportation therefore plays a crucial role in ensuring smooth transfer.

Transport network facilitates interactions and through these interactions regions of a country and sectors of the economy are integrated into a cohesive national economic and political entity. They also allow regional specialization to emerge, facilitated by the exchanges that may take place. The geographical distribution of economic activity is thus affected by the strength and directions of movements and exchanges. Spread effects are involved where there is a diffusion of developments and innovations from the

national foci to all parts of the country. The development of urban hierarchy and the transportation system associated with it facilitate the spread of goods and services initially provided in and organized from the core (Dickens, 1983).

Transportation has numerous linkages with the socio-economic development of a society. Past experiences have shown that improvement in transportation systems directly lead to the efficient movement of people and goods and at the same time lowers the cost of agricultural production. Transportation is considered an integral part of the production process. It can assist in creating producer surpluses by lowering transport costs of farm inputs and farm produce. Thus improvements in the transport system have the potential to stimulate changes in agricultural yields, cropping patterns, non-agricultural economic activities and quality of life for rural inhabitants.

Ineffective transportation has been identified as one of the many interrelated constraints to development. The purpose of transportation is to serve the user by providing accessibility to land areas and mobility between desired origin/destination points. Therefore, transportation development plans should reinforce and be compatible with the activities of other sectors related to rural development, such as agricultural, water supply, electrification, and agro-based industrial sectors, among others.

Low level of production has been identified as being caused by ineffective marketing linkages between rural areas and urban centres. Nsaku and Ames (1984-85) observe that due to poorly organized marketing systems and badly maintained roads, only a small number of merchants are able to transport food crops from the countryside to the major towns and cities. This small group of merchants, therefore, controls the farm gate price in the rural areas. Such merchants pay lower price for agricultural goods than the going market rate in order to cover their transport costs.

Transportation plays an important role in achieving the goals and objectives of sub-national development. It strengthens systems of settlements and links them with their surrounding areas in such a way as to provide access for rural population to markets, farm supplies, social services and other necessary urban-based facilities. Road development, which is accompanied by complementary investments, can lead to economic growth in the road impact area or make it easy to commute from the area, thereby enabling outside work to be obtained without out-migration (UNCHS/ HABITAT, 1985).

Adequate supply of efficient, safe and affordable transport services is critical to the increased productivity in all sectors of the economy and for sustainable development. Urban transport is still characterized by inadequate supply of transport and high vehicle operating costs, leading to low levels and poor quality of service occasioned by congestion and high fares that are unaffordable by some urban workers, especially those in the low income groups (NDP, 1993-1996).

Transportation contribute to the geographical concentration of activities originating in the advantages of scale production and help the cumulative process by which urban centres grow. The growth of small area is therefore directly determined by its ability to market its products and services outside its boundaries (Kraft, et. al., 1972).

Studies carried out on transportation reveal that in overall national development transportation plays a multi-faceted role, that is, facilitating movement of inputs and outputs between and within production of the populace (Kamulali, 1977). Roads, when constructed increase interregional interaction of factors of production, labour, capital and resources. Investors will be attracted to invest into smaller growth poles serving the rural people, thereby bringing industrial facilities nearer to the people (Madungha, 1975).

Transportation network reduce travel time, ensures wide marketing, facilitate commuting, and migration opportunities, allow greater access to non-agricultural employment, improve communications and extend areas of service delivery. Nations investing heavily on road network have substantial gains in agricultural production and capacity (Rondinelli et al, 1978).

2-7.2 The Role of Energy Supply in Urban and Regional Growth

An adequate and reliable supply of energy is not only a basic prerequisite for the development of the industrial, commercial and agricultural sectors, but it is also important for domestic use.

Energy supply, in this case electricity is a vital input in fostering economic activities and sustaining development; also it is vital input sustaining and fostering economic activities and may be seen as a lubricant to economic development (NDP, 1997-2001). Lack of electricity in major urban centres hampers the development of informal sector and other industries (KDDP, 1993-1996). Electricity enhance improvement in working methods, leading to a reduction of production costs. Lack of electricity is a major constraint to business development (Mochache, 1985). Electricity raises income, employment levels and land values, thus making land available for development. It contributes towards raised standards of living through increased efficiency and production method (Mwanzia, 1988).

Kenya's current electricity generation capacity is inadequate, with demand regularly exceeding supply during peak periods. This inadequacy has harmful effects on the productivity of most sectors of the economy and discourages additional investments in the country.

In order to alleviate this problem, five major projects with a combined capacity of 338 MW will be added to the system during the plan period 1997-2001. This include Kipevu

I Diesel Plant, Ol Karia I Geothermal Plant, Sondu- Miriu Hydro Plant, Kipevu II Diesel Plant and Ol Karia II Geothermal Plant.

HABITAT report (1984) indicates that the energy situation may significantly influence settlement policies, as it reinforces existing trends toward denser communities and decentralization of activities to avoid urban overgrowth (in already large urban centres). Energy supply may help regional centres in the production of commodities which need raw materials that have high transport costs. The increase in importance of regional centres may support greater regional economic and political autonomy than at present. Rationalization of location may favour the establishment of hierarchical systems to increase access to urban facilities, reduce transport costs and to benefit from local economic potential and resources.

2-7.3 The Role of Water and Sanitation in Urban and Regional Growth

Infrastructure including water supplies will have to keep abreast of development in order to avoid any potential constraints on the pace of development as well as on the quality of life. The development of water-use is closely linked to the overall economic and social development in a country, its region and communities. The availability of a reliable water supply in adequate amounts is a necessary, but not a sufficient prerequisite for stimulating socio-economic development. Thus, interactions between water and other sectors involve complementary relationships. Availability, quality and cost of water determine where and how growth will take place. Therefore water planning should be regarded as an integrated part of a comprehensive development planning process.

An adequate and reliable supply of clean water in both urban and rural areas is an essential requirement not only for industrial establishments but in all sectors of the economy. In many industrial, agricultural and commercial enterprises, water is an essential direct input. Current estimates of Kenyan water supply indicate that 75 percent

of the country's urban population has access to safe drinking water, while only 50 percent of the rural population has access to potable water from various schemes, including piped water schemes, boreholes, protected springs, pans and dams.

In both urban and rural areas, water supply is generally inadequate for domestic, industrial and commercial uses. Kenya's water supply services are provided primarily through 330 gazetted (public) water sources which account for 80 percent of the served population countrywide. The rest (20 percent) of the population is supplied by non-gazetted schemes.

The public sector, consisting of the Ministry of Land Reclamation Regional and Water Development, the National Water Conservation and Pipeline Corporation and Local Authorities, controlled 52 percent of the total water projects while the Community Water Supplies and Self-Help Schemes and NGOs operated 48 percent of the total. The water supply system in the study area is operated by the Ministry in charge of Water Development.

Water supply is also vital for domestic, commercial and industrial activities. The World Health Organization (WHO) estimated that in 1981, more than 3 billion people in the world did not have enough clean water to meet daily needs. Lack of water poses health problems because it is life sustaining (Mairura, 1988). An adequate water supply plays an important role in the well-being of a community. An adequate water supply should meet two basic requirements of being safe to the consumer and be of adequate quantity to meet the demand. Water supply plays a key role in promoting health and should always be taken into account in human settlements. Water supply, for example to support industrial growth, should be provided and should be adequate (Irwing, 1972, Mochache, 1985). Warner (1975) adds that water supplies gains importance as a location factor for increasing number of new or expanding industries and for those experiencing water-related problems.

In the study area, it was revealed that there is no reliable water supply and the area faces water problems especially during the dry season. This has affected government institutions and hindered the growth of agro-processing and informal sector activities/industries (KDDP, 1997-2001). Research carried out in the study area indicates that the area has one water supply project which manages to serve only 300 urban households while more than a half fetch water from the river. Furthermore, it is overutilized, experience frequent breakdown of engine, has a small size booster station, and lack storage tanks (Kosgey, 1986). This observation concurs with a study undertaken by UNESCO which came with a conclusion that the water system of urban areas of developing countries often break down causing disruption of service to the communities. When a water supply of a town breaks down, its inhabitants will likely fetch water from unimproved sources (UNESCO, 1988).

An adequate water supply and sanitation service constitute basic human needs and hence guarantee complete well-being of man (Mairura, 1988). Infrastructure services like water and sanitation form an integral component of the development package whole. The 1981/90 U.N. Water and Sanitation Decade indicates that nearly a half of the world population of 4 billion people have to be provided with water and sanitation services in order to meet the decade's targets.

Warner (1975) posits that the presence of adequate water and sewer services can be expected to improve overall environmental conditions through better control of water quality, thereby raising the sanitary and aesthetic levels for both the project community and the surrounding area. Improvements in water and sewer facilities are associated with decreased incidence of diseases. He further observes that the installation of water systems lead to improved sanitary conditions, decreased incidence of water borne diseases hence decreased health costs, increased labour productivity, increased economic development, improved school performance (due to reduced absenteeism),

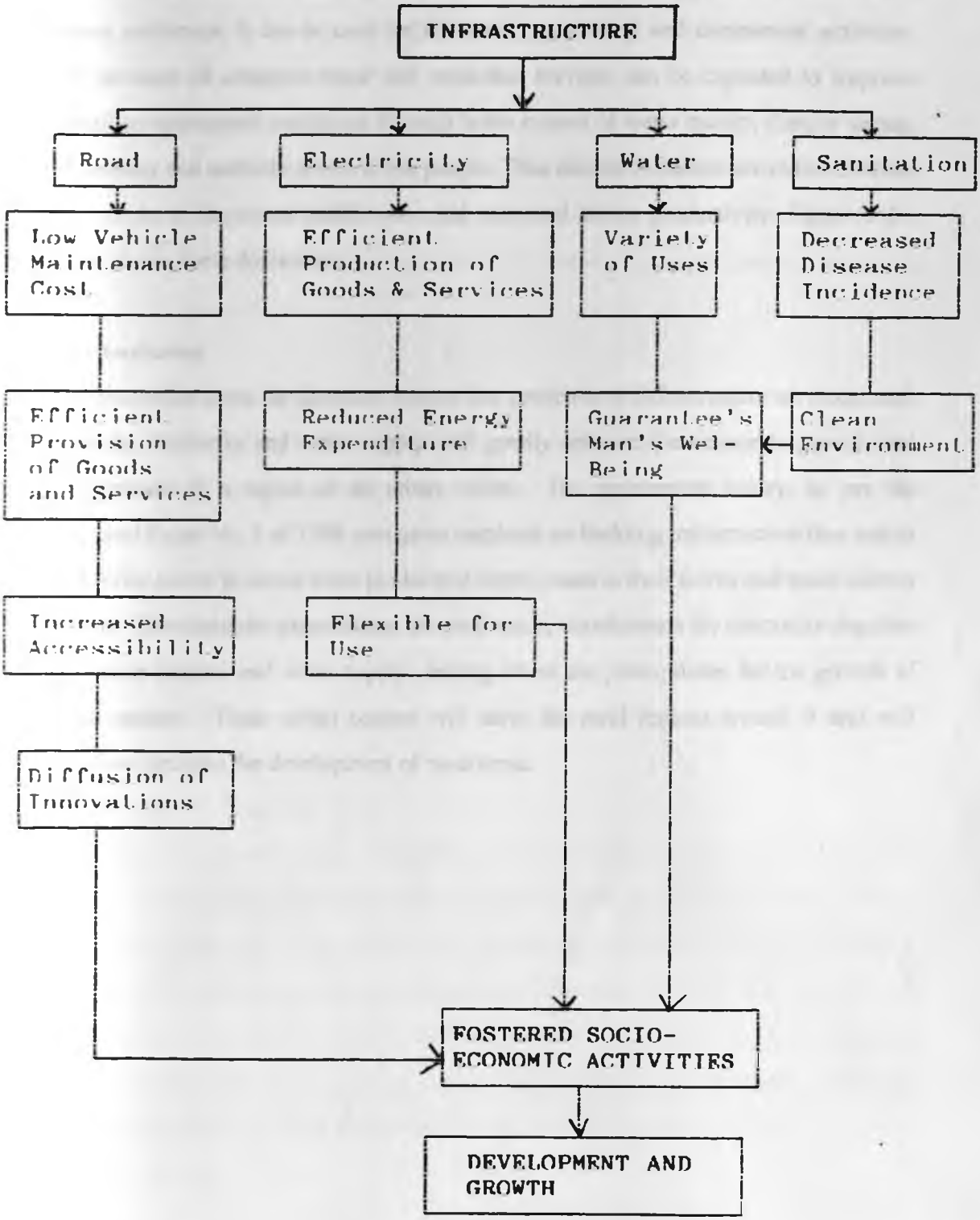
greater convenience regarding food preparation, personal and household cleanliness, and excreta disposal.

2-8 Conceptional Framework

After perusing through literature, the author deduced that infrastructure, particularly roads, electricity, water and sanitation service play a big role in the growth and development of a region. Efficient and adequate provision of infrastructure can foster socio-economic activities in a region and hence improve the welfare of a people. A good road network which is also all-weather can enhance efficient provision of goods and services; can facilitate accessibility to all parts of a region; can lead to reduction of vehicle maintenance costs; and can facilitate diffusion of ideas and innovations from one place to another, among others.

Provision of electric power enhances efficient production of goods and provision of services, and can also lead to the reduction of expenditure on expensive sources of energy such as fossil fuel. In addition, because of its flexibility in the sense that it can be used to undertake various activities, such as lighting and cooking among others, its provision enhances socio-economic pursuits of a people.

Figure 2-2 Conceptional Framework



Source: Author's Formulation.

An adequate and efficient supply of potable water is a necessary pre-requisite for any human settlement. It can be used for industrial, agricultural and commercial activities. The presence of adequate water and sanitation services can be expected to improve overall environmental conditions through better control of water quality, thereby raising the sanitary and aesthetic levels of the people. Thus disease incidence are reduced which also results in decreased health costs and increased labour productivity. Figure 2-2 above shows these deductions.

2-9 Conclusion

It is observable from the literature review that provision of infrastructure services, such as roads, electricity and water supply will greatly enhance the economic growth and development of a region or an urban centre. The government policy, as per the Sessional Paper No. 1 of 1986 puts great emphasis on building infrastructure that assists the private sector to create more productive employment in their towns and small market centres. Development expenditures on rural roads, transformers for electricity supplies in smaller centres, and water supply, among others are prerequisites for the growth of urban centres. These urban centres will serve the rural regions around it and will therefore facilitate the development of rural areas.

CHAPTER 3 BACKGROUND INFORMATION ABOUT THE STUDY AREA

3-1 Introduction

Kipkelion urban centre is found in Kipkelion Division of Kericho District. The district lies within the approximate extent of longitude 35^0 02' and 35^0 40' East and latitude $1^0$61' South, (map 3-1). The entire district of Kericho occupies an area of 2515 square kilometres comprising seven divisions namely: Londiani, Kapkatet, Belgut, Kipkelion, Roret, Fort Ternan, and Ainamoi.

Kipkelion division is found in the north-eastern part of the district and it covers an area of 312.5 km^2 (map 3-2). It has three administrative locations, namely Kipchorian, Chepseon and Kimasian and eleven sub-locations, namely Barsiele, Lesirwa, Kimugul, Chesinende, Macheisok, Lelu, Mtaragon, Leldet, Kapseger, Kipkelion and Chepsir. The urban centre under study is found in Kipkelion sub-location in Kipchorian location (map 3-3).

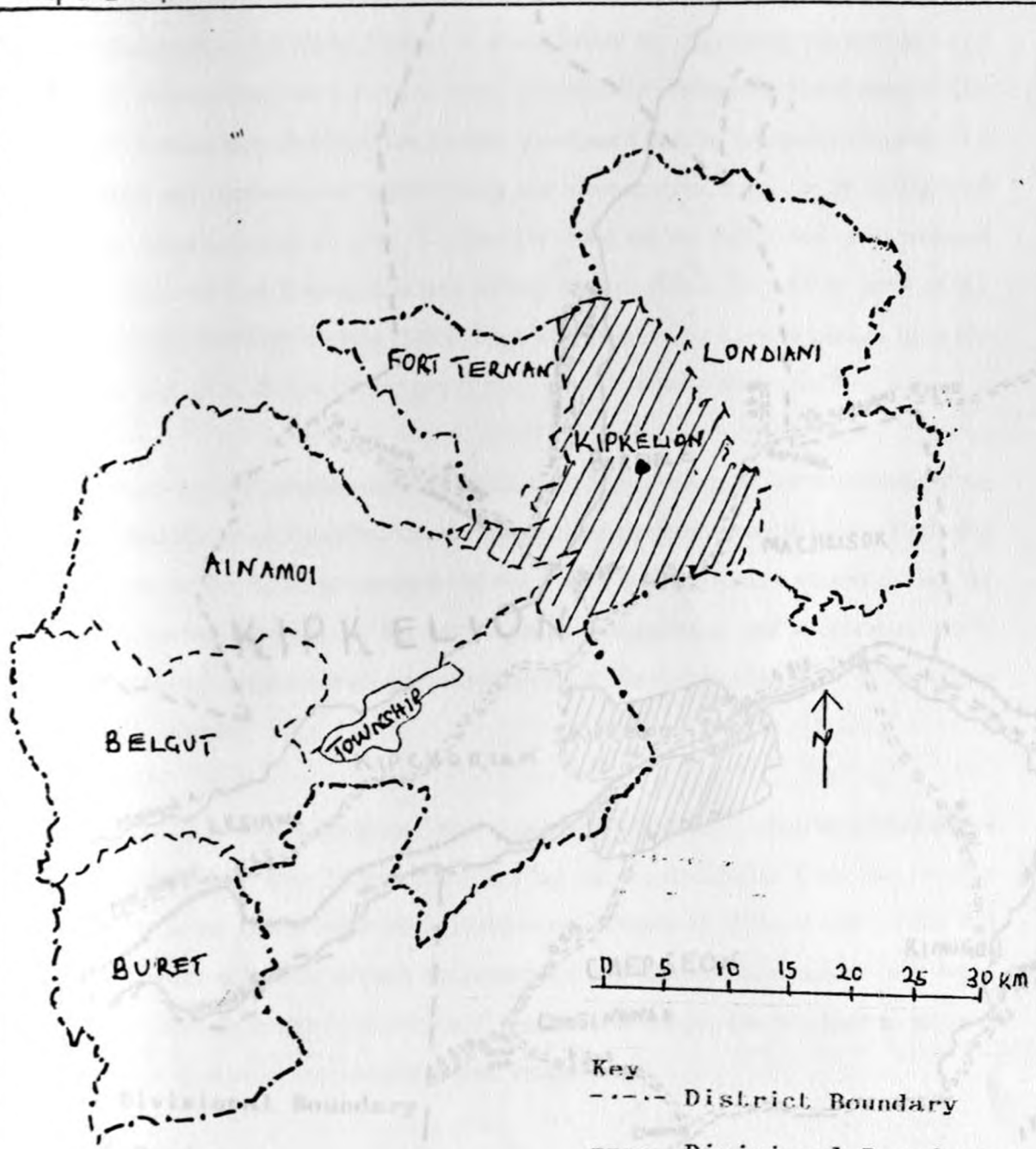
3-2 Bio-Physical Features

3-2.1 Relief and Drainage

The relief of any given area is one of the most important aspect taken into consideration in the development of infrastructure services. The general character of the relief surface and height of the land, the shape and form of hills and valleys, the angles and direction of slopes, river catchment areas and the extent of flat land, the orientation of relief and other physical barriers, the network of drainage system and distribution of lowlands and uplands, will yield useful details about the physiographic background of the environment under study and its effects upon other physical, human, social and economic factors.

Map 3-1: Location of the District

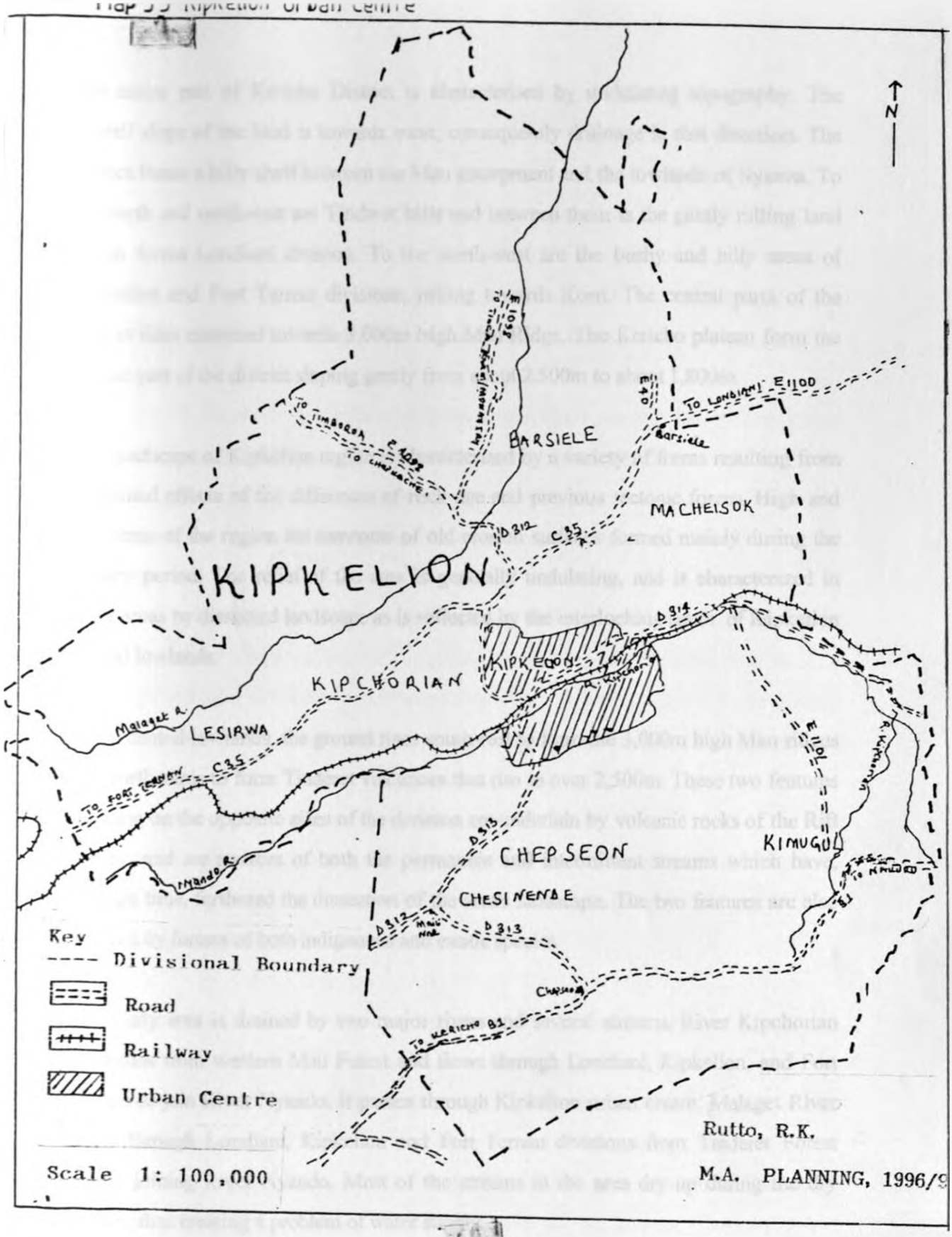
Map 3-2 Kipkelion Division in Kericho District



Rutto, R.K.

M.A. PLANNING, 1996/97

Map 3.3 Kipkelion Urban Centre



The major part of Kericho District is characterised by undulating topography. The overall slope of the land is towards west; consequently drainage in that direction. The district forms a hilly shelf between the Mau escarpment and the lowlands of Nyanza. To the north and north-east are Tinderet hills and between them is the gently rolling land which forms Londiani division. To the north-west are the bushy and hilly areas of Kipkelion and Fort Ternan divisions, rolling towards Koru. The central parts of the district rises eastward towards 3,000m high Mau Ridge. The Kericho plateau form the central part of the district sloping gently from about 2,500m to about 1,800m.

The landscape of Kipkelion region is characterized by a variety of forms resulting from combined effects of the difference of rock age and previous tectonic forces. High and low areas of the region are remnants of old erosion surfaces formed mainly during the tertiary period. The relief of the area is generally undulating, and is characterized in other areas by dissected landscape as is reflected by the interlocking spurs of Kipkelion central lowlands.

In the central lowlands, the ground rises south-east to form the 3,000m high Mau ridges and northwards to form Tinderet volcanoes that rise to over 2,500m. These two features standing on the opposite sides of the division are underlain by volcanic rocks of the Rift Valley, and are sources of both the permanent and intermittent streams which have, through time, furthered the dissection of the area's landscape. The two features are also covered by forests of both indigenous and exotic species.

The study area is drained by two major rivers and several streams. River Kipchorian originates from western Mau Forest and flows through Londiani, Kipkelion, and Fort Ternan to join River Nyando. It passes through Kipkelion urban centre. Malaget River flows through Londiani, Kipkelion and Fort Ternan divisions from Tinderet Forest before joining River Nyando. Most of the streams in the area dry up during the dry season, thus creating a problem of water supply.

3-2.2 Geology

Kericho district lies in the Lake Victoria basin and the Rift Valley is represented by volcanic as well as the igneous and metamorphic complexes. The district is predominantly underlain by tertiary lavas (phonlites) and intermediate igneous rock and a small part of the district is dominated by undifferentiated basement system rocks (granites), volcanic ash admixture and other pyroclastic rocks.

Binge (1957) states that the rocks of Kericho District as a whole include the granitoid gneiss of the basement system, highly faulted lavas of the Nyanzian (pre-cambrian), the Kisii series, lower miocene sediments (the Koru beds), and the Londiani rocks which consists mainly of pyroclastics.

The geology of Kipkelion consists of the basement system which covers the north-west of the division. It covers isolated ridges standing conspicuously from the plain west of Songhor continuing northwards past the equator with a notable characteristic of granitic appearance and the frequent occurrence of coarse grained pegmatic veins aligned with the foliation.

Along the valleys near Kipkelion urban centre are found the tertiary sediments which are characterized by isolated exposures and consisting of miocene limestones and bedded tufts resting on gneiss of the sub-miocene peneplain.

Another rock is the tertiary volcanic represented in the Tinderet suite of pyroclastic rocks and nephelites and the Kipkelion-Londiani suite, which consists mainly of pyroclastic rocks with interspersed flows of phonlitic nephlenite and phonolite. The quartenery sediments are found in most areas in the west bordering the Kano plains. These sediments were formed by the deposition of silts and mud under lacustrine conditions prior to the retreat of Lake Victoria in the early pleistocene. These sediments

are also found in the valleys extending eastward in the vicinity of Kipkelion township (Binge, 1957).

3-2.3 Soils

The soil types found in the district is mainly clay and loam soils. They are well-drained, deep, dark, reddish brown, of moderate to high fertility with acid humic top-soil. Loam soil have a similar profile as the clay soils but are shallow partly with lithic contact.

The soils of the study area vary in types, principally due to soil forming factors which include: climate, living organisms, parent material, time and topography (Ojany & Ogendo, 1973). The soil type found in the district is mainly clay-loam soils. They are well drained, deep and, dark reddish brown, of moderate to high fertility with acid humic top soil. There are four types of soils in the area:

(i) Strong brown loam: are predominant in the northern part of the division. It is dark-brown to dark-greyish-brown, humic (5-10% carbon) loam derived from volcanic ash. They occur on dissected topography between 1,500-3,000 (Tinderet volcanoes) and where rainfall rises to over 1,500mm, with PH 5-4. This soil is good for tea growing except where the soil is not well-drained.

(ii) Dark-brown loams: appear in mixed form with the strong brown loams. These soils are black to dark grey in colour with deep and high humic content (5-10% carbon). They occur in gently sloping topography between 1,500 and 2,450m with rainfall over 1,000mm and PH of 7.55 and are also good for tea growing as is exemplified in Tinderet tea estates in the extreme north.

(iii) Reddish-yellow sandy loams (latosolic soils): These soils are predominant in south and south eastern parts of the division. The colour of the soil ranges from very dark-grey to dark-brown with high humic content (3-10% carbon). They occur in a topography between 1,000m-2,500m with rainfall of over 1,000mm, and PH of 5-4.

(iv) Red-triable clays (latosolic) :They occur in the same area as dark-red triable clays (south-west), with dark -reddish brown and a humic content of 1.5-3% carbon. They are derived from both volcanic and basement complex rocks, which favours undulating ridge topography between 500m to 2,000m, with rainfall of 750mm to 1400mm and PH of 5-6.5.

Generally, most of the division's soils are fertile with few limitations to agricultural production and other economic pursuits. The provision of adequate infrastructure services will definitely boost these activities and hence improved people's welfare.

3-3 The Ecological Zones

The district can be divided into four major ecological zones:

3-3.1 Upper Highland (UH)

It is further sub-divided into two. UH1 is suitable for sheep and dairy production while UH2 is suitable for wheat and pyrethrum production. The UH zone is characterized by very long cropping seasons and intermediate rains, and is divided into variable cropping seasons. The first rains normally start around March and the second rains around June/July.

3-3.2 Lower Highland (LH)

This zone is divided into three sub-zones: LH1, LH2, and LH3. LH1 is the tea and dairy zone with permanent cropping possibilities divided into two variable cropping seasons with first rains starting in February and second rains around the end of July. LH2 is the wheat, maize and pyrethrum zone with a very long cropping season with first rains around February. LH3 is the wheat, maize and barley zone. It is characterized by a very long cropping season and intermediate rains divided into two variable cropping seasons, with first rains around March and second rains starting around June/July.

3-3.3 Upper Midland (UM)

It can be divided into four sub-zones. This zone is suitable for tea and coffee growing. In some portions both tea and coffee can be grown, while in others only coffee can be grown. The zone is characterized by a long cropping season. Rains start in July in the coffee and tea zone. In the portion that is marginal for coffee, the rains start in August. Other activities include growing of sunflower, maize and livestock keeping.

3-3.4 Lower Midland (LM)

This zone can be divided into two sub-zones. It is suitable for marginal sugar cane growing with a medium to long cropping season. First rains fall at the end of August. The zone is also suitable for cotton.

3-4 Climate

The climate of the district can be described as a highland sub-tropical with moderate temperatures, low evaporation rates and high rainfall in lower highland areas, while at the upper highland areas, the temperatures are high with high evaporation and low rainfall. The climate here comprises of rainfall, temperature, humidity, winds and sunshine.

3-4.1 Rainfall

Rainfall is well distributed except for the small dry season in January and February. The wettest months are April and May. There is no real break between the short and long rains. The coldest months are usually between February and April, while the hot season starts from December to January.

The general rainfall pattern follows that of altitude and decreases from 2,000mm in the Mau ridges (3,000m) to approximately 1,000m in the central lowlands of Kipkelion. The long rains start from April to September and short rains from October to December.

January, February and sometimes March are dry. There are four distinct rainfall zones that can be recognized:

1. Zone with the highest rainfall amount of over 1,800mm: it covers the Mau forest ridges,
2. The area with 1,400-1,800mm covering the Tinderet forest area.
3. Areas with 1,000-1,400mm covering most parts of Kipkelion uplands;
4. Areas with less than 1,000mm covering the central lowlands towards Fort Ternan in the west.

Rainfall intensity, distribution and reliability is lower than that of other parts of the district though it still provides for the minimum requirements for agriculture. Areas like Chepseon, Chepkechei and Kebeneti have more reliable rain, while Kipkelion experience an unreliable rainfall.

3-4.2 Temperature

The mean annual temperatures in the area are closely related to ground elevation and rainfall distribution. Temperatures in Fort Ternan area along the Kisumu District border are high, reaching 28^{0} c, and this is attributed to low altitudes. Evaporation rate is therefore high. At the high elevations particularly the Mau ridges and Tinderet volcanoes, temperatures are relatively low with 20^{0}c due to high altitude and the presence of constant moisture released by forest covering the areas. Temperatures in the division rise during December to March due to the absence of rain.

3-4.3 Humidity

The relative humidity for the division is moderately low averaging 50%. The low humidity persists westwards towards the low areas along Kisumu District border giving rise to a dry and clear environment. The mean diurnal range of relative humidity is about 13-15%. The areas with high elevation and adjacent to Mau and Tinderet have high humidity slightly above 50%.

3-4.4 Winds and Sunshine

Winds influence climatic conditions and evaporation of water bodies. The winds from the east carries no moisture and it prevails in the dry months of December to March. The area experience adequate sunshine all the year round except for rainy months of May to August when rain prevails over it for much of the days. The adequacy of sunshine in the area provides for conducive climatic conditions for economic activities. Areas which have high rainfall such as Chepsir and Chepkechei have constant water supplies throughout the year as opposed to the rest of the division.

3-5 Vegetation

Its distribution is closely related to factors like environmental conditions (rainfall, temperature, humidity, light intensity and winds), physiographic, endaphic (physical and chemical characteristics of the soil) and biotic factors. The vegetation communities that are distinct include:

(i) The highland forest community (tropical forest) whose pure stand is represented in Mau and Tinderet ridges with an altitude ranging from 1,900m to 2700m and rainfall of upto 2000mm . The species found include polyscias kikuyuensis, macaranga kilinandscharica, olea hochstetteri, casearia battiscombei and fagara (satin wood), (Ojany & Ogendo,1973).

Where rainfall decreases with altitude, especially along the western edge of the south-west Mau, there is a savannah (scattered tree and grassland) zone of acacia, well typified at Londiani, Kedowa and Kipkelion vicinities. Topographically, it corresponds with the outcrop of later lavas, ashes and tufts (Binge, 1957).

(ii) Highland grassland: These are quite dominant in open areas. The highland grasses include: themada triandra (red oat grass), pennisetum schimperi (wire grass),

pennisetum clandestinum (kikuyu grass), and the trifolium semipilosum (the Kenya white clover), (Ojany & Ogendo).

3-6 Human Background

Kipkelion urban centre is found Kipchorian Location. It is the headquarters of Kipkelion Division. It also house the urban council's office. Kipkelion Division covers an area of 321.5 km^2 and has three locations: Kimasian, Chepseon and Kipchorian; and eleven sub-locations. There are six wards.

3-6.1 Demographic Profile

The annual population growth rate in Kericho has decreased from 3.7% in 1979 to 3.05% in 1989 (KDDP, 1994-1996). It was expected that by the end of 1996 the district's population would be 645,000 and out of this, 52.7% (339,915) would be dependents. This portrays a slight decrease from 54% in 1993. The young population (0-14) constituted 50.4% of the total population in 1993 and this was expected to change to 49.1% in 1996. Those of the ages of 59 and above were projected to remain constant at the rate of 3.5%.

Of all the six divisions of Kericho District, Kipkelion has the lowest population due to the existence of settlement schemes. However this population figure is expected to increase as a result of migration of people from other congested regions of the district. In 1979, the population was 19,083; in 1993 it was 26,612 and this was expected to reach 29,043 at the end of 1996. Similarly, the population density of Kipkelion was 59 persons per square kilometre; in 1993 it was 83 per square kilometre, and this was also expected to change to 90 persons per square kilometre at the end of 1996. As per the number of households, there were 4,442 households in 1993. The population distribution in the area corresponds to the rainfall distribution, intensity and reliability, together with soils and temperatures; which are controlled by altitude.

Table 3-1 Population Distribution in Kipkelion Division

KIPKELION	MALES	FEMALES	TOTAL	HOUSEHOLDS	SQ.KM	DENSITY
a) Kipchorian	6166	6331	12497	2473	84	149
Barsiele	1598	1712	3310	577	22	150
Kipkelion	1918	1789	3707	929	17	218
Lesirwa	1581	1714	3295	581	29	114
Macheisok	1069	1116	2185	386	16	137
b) Kimasian	8318	8521	16839	2806	81	208
Lelu	2321	2462	4783	844	29	165
Mtaragon	3852	3892	7744	1238	31	250
Leldet	2145	2167	4312	731	21	205
c) Chepseon	9137	9039	18176	3162	125	145
Chesinende	4650	4670	9320	1686	38	245
Kapseger	1957	1855	3812	640	37	103
Kimugul	1158	1213	2371	374	21	113
TOTAL	23621	23891	47512			

Source: 1989 Kenya Population Census.

Table 3-1 (above) shows the classification of population by sex, number of households, size of the area and population densities per location and sub-location in the entire division:

3-6.2 Educational Institutions

The overall enrolment in educational establishments in the division has trebled over recent years necessitating the increase in the number of schools. The number of primary schools increased from 15 in 1975 to 53 by July, 1985, while that of secondary schools increased has increased from 1 to 7 over the same period, and that of nursery schools increased from 3 to 73. This increase is expected as the number of large farms continue to be sub-divided leading to the movement of more families into the area.

3-6.3 Health Institutions

There are six health institutions categorized as health centres (Kipkelion and St. Francis), dispensaries and two mobile clinics. The average number of outpatients per day is 350, and the in-patients are 70 in number. On the other hand, the dispensaries have an average of 150 out-patients in a day.

3-6.4 Service Centres

Kipkelion division, being a typical rural area has no significant commercial centres which provide for trade and industry for the local population, except for the designated urban centre of Kipkelion, which also serves as the divisional headquarters of the division. By 1985, there were 45 service centres categorized as follows: urban centre (1), rural centres (2), and market centres (42). The majority of these market centres are in individuals' farms.

3-6.5 The Economy

The division has favourable conditions for a variety of economic activities. Concerning these economic activities, Sutton (1973) observes that:

> To the hunting and gathering communities of the past, both the forest and the grasslands with their former herds of game would have proved attractive. For food producing communities of more recent times, the wooded areas with their high rainfall and rich soils make, when cleared, fine agricultural country, while the natural grassland recommend themselves for pasture.

This is a clear manifestation of the area's potential for growth and development.

3-6.5.1 Crop Farming

Crop farming is characterized by the growing of cash crops and food crops. Among the cash crops grown include tea, coffee, finger millet, and potatoes. Tea is grown in areas adjacent to Nandi (Tinderet and Chepkechei) and Mau (Chepsir) hills where there is high rainfall (above 1400mm), cool conditions (16.5°c) and deep well-drained soils. Tea is mostly grown by the small-scale farmers and the total acreage under tea is 502 acres. In the study area, however, the total acreage under tea is 5 hectares with an average yield of 450 kg. per month. It is grown mainly in Chepsir and Kamasian. The processing of tea is done by the K.T.D.A.

The growth of coffee is mostly undertaken in Fort Ternan, Lelu, Kokwet, and Kunyak sub-locations. The crop has the capacity to resist dry seasons than tea. By 1985, the acreage under coffee was 2,741.5 which gave a yield of 544,705.5 kilograms. There are 9 coffee factories in the division. In the study area, the area under coffee is 30 hectares (this figures are yet to be updated since they were recorded in 1995) with an average yields of 1200 kg. per hectare. It is mostly grown in Kamasian location.

Pyrethrum production is found in almost all parts of the division and is grown by many small scale farmers. The average yields are 1200 kg. per hectare. Sugar cane is grown in areas adjacent to Kisumu district, stretching from Songhor through Fort Ternan to Kaitui-Sondu area. In 1985, 3,473 tonnes of sugar cane were harvested.

Maize is grown both as a cash crop and as a food crop. In 1985, the total acreage under maize was 44,350. The average yields per acre is between 20 to 25 bags. Another crop grown is finger millet and is mainly grown in low altitude areas of Fort Ternan, Lelu, Kokwet, and Siret. In 1985, 7,670 acres in the division was planted with finger millet. Potatoes are grown in high altitudes especially in areas such as Chepseon, Chepsir, Chepkechei and Kebeneti areas. In 1985, the total yields of potatoes were 284,520 bags and the total acreage under potatoes was 2,530 acres.

Table 3-2 below shows some of the crops grown and the total acreage within the boundaries of the urban council, that is, the area under study.

3-6.5.2 Livestock Keeping

Livestock farming is another dominant economic activity. Grade cows (friesian, ayrshire, jersey and guernsey),are found in Chepsir, Sitian, Kaplaba, Tinga Farm and Kebeneti. Mixed breeds (zebu and grade cows) are found in Chepseon, Tugunon, Kimugul, Tuiyobei and Nyando. In 1985, there were a total of 44,658 grade cows and 69,198 mixed breeds. The production of milk is quite high for example, in October 1996, a total of 702,460 kg of milk was produced and the average annual milk production is about 6,000,000 kg. per year. Sheep are found in Barsiele, Chepseon, Kebeneti, while goats do well along the valleys in the division.

Table 3-2 Major Crops Grown

Crop	Acreage (Ha)	Yields (Bags)	Areas Grown
Maize/ Beans	8,000	Maize- 280000 Beans- 48,000	All zones
Potatoes	20	1860 bags	Kamasian, Kipchorian, Chepseon
Sorghum	50	500 bags	All Zones
Millet	50	500 bags	All Zones
Vegetables - Tomatoes - Kales - Cabbages - Onions	 100 140 20 5	 15 tons/ ha. 15 tons/ ha. 20 tons/ ha. 10 tons/ ha.	All Zones

Source: Divisional Agricultural Office, 1997.

3-6.5.3 Light Industries

Kipkelion division is predominantly an agricultural area but most of its agricultural products including tea, milk, pyrethrum, wheat, maize, sugar cane, among others, are processed outside the division. There are 9 coffee factories which serve coffee farmers and 5 saw mills.

3-6.5.4 Forestry

Forestry is found in the Nandi and Mau escarpments covering the division and this has given rise to timber and saw milling industry. These activities are found in Chepsir, Kedowa, Chepkechei and Kebeneti. Indigenous and exotic trees are found in Londiani and Tinderet but Mau is predominantly covered by natural forest. The major exotic trees found include indian ash, maciritius thorn, casuarina, cypress, blue gum, mexican green ash, grevillea and black wattle.

The indigenous trees consists of acacias, croton species, nandi flame, red stink wood, fig and cape ash. Wood from these forests are mainly used for timber, building poles, fuelwood, power and telephone poles. They also have the potential for other forest products such as bee-keeping, rubber tree planting, resin harvesting and silk tree rearing. Mau Forest has a great potential as a wildlife park. It covers an area of 90,000 hectares and is the home of elephants, leopards, cheetahs, kudus, antelopes, monkeys, buffaloes and abundant bird life and flora. In fact it was gazetted in 1992 and was expected to start operations in 1993.

3-7 The History of Kipkelion Urban Centre

The urban centre was founded in 1901 as a railway station. This was followed by the construction of business premises, mainly shops, by the Indian coolies. Other buildings came up later and these include the: the old milk cooling plant established in 1920, Brooke Bond stores, the African Highland stores, the Caltex, Shell and Mobil petrol

stations, the Post Office, and the Police station, among others. These were mostly constructed between 1920 and 1940.

The Indian businessmen lived on the eastern part of the urban centre commonly referred to as `Ng'ambo', while the Africans, who were mostly workers in railway station, African Highland Produce Board and Brooke Bond stores, inter alia, lived in the western part better known as `Mjini'. The Europeans who were mostly large scale farmers lived in the rural areas and only went to the urban centre for leisure in their club.

Learning institutions, especially schools for the three different races, that is, Blacks, Indians and Europeans were also founded. With time, other buildings came up and these include: the Soil Conservation buildings built in 1948, the National Cereals and Produce Board stores which were established in 1970, the Kenya Farmers Association stores and the Health Centre (which was originally built in within the centre of the urban area between 1949-1950). The present Urban Council's offices was once known as Lumbwa Indian School. Similarly the present Taitta Toweett Secondary school was once a European Club during the colonial period.

Basically, Kipkelion urban centre is divided into two: Mjini and the Ng'ambo. Even though this demarcation still exist, almost all the business enterprises are in the hands of the local people. The Mjini area of the urban centre, as the name portrays, is mainly the home of the relatively poor, but one section of it is the home of the civil servants. Adjacent to this residential quarter is the Police station, the D.Os office, the Chief's office, the Post Office and other administrative units.

CHAPTER 4 INFRASTRUCTURE SERVICES IN KIPKELION

4-1 Introduction

This chapter is basically concerned with the review of the objectives set in relation to the data collected through field survey. The data of each objective is analyzed and after analysis of each of the various sections, a summary of the analysis is given.

The nature of infrastructure service provision and requirements and their consequent effects on the urban centre is presented in order to determine how the urban centre can be made to grow and subsequently to provide the required services not only to the urban dwellers but also to the rural population.

4-2 Socio-Economic Activities in Kipkelion Urban Centre

4-2.1 Residential

The total population of those living within the urban council's boundary is estimated to be 24,183 but those living within the urban centre are slightly more than 3,000. There are about 670 households with an average of five persons per household. However, the population of the urban centre had decreased from 3,712 in 1979 to 2,319 in 1989.

There are three distinct residential zones in the urban centre, namely: the high density residential, medium density residential and low density residential. The low density residential, which are occupied by the high income groups, are found in Ng'ambo, and the eastern part of the urban centre. The medium density residential premises are found scattered in all parts of the urban centre and these include the urban council's houses found adjacent to Mjini and Ng'ambo shopping centres. The urban council has 30 housing units. These houses are occupied mainly by the middle income civil servants. The high density residential zone is predominant in Mjini area of the urban centre.

The majority of the residents live in Mjini part of the urban centre. The houses here are mostly made of timber and iron sheets, with floors made of either mud or plaster (map 4-1 and plate 4-1).

The businessmen and women, who account for 75%, live in the urban centre, mostly in the middle and low income residential quarters.

4-2.2 Educational Institutions

Within the urban centre there are four primary schools, namely Kipchorian, Township, Kamarus and Soil Conservation. All these schools have nursery facilities within. There are two secondary schools: Taitta Toweett and Mercy Girls; and a Technical Training School (found in Mercy Girls Secondary).

The availability of these education facilities, including others not found within the study area, has contributed to higher levels of literacy. It was ascertained from field survey that 75 percent of the respondents have attained secondary education, 20 percent of the respondents have gone to college either to train as teachers or as nurses. Only 5 percent of the respondents had attained university education. It should be noted here, however, that tertiary institutions are not available even though 60% of the respondents employed in the formal sector have attained training in teaching, nursing and book-keeping.

4-2.3 Public Purpose

A number of public purpose institutions exist and these include Veterinary Department Offices (VDO), Divisional Agricultural Offices (DAO), Soil Conservation Offices, the Police Station, the Administration offices, the post office and the Urban Council's offices. Others include the Forest Department, Ministry of Works camp, Central Health Filtering Clinic, the Health Centre and religious institutions.

The presence of the VDO and DAO is a clear manifestation of the region's farming potential since they are both charged with the onus of improving the farming activities in the area.

4-2.3.1 Kipkelion Urban Council

Kipkelion urban council was established in 1992 and it covers an area of 173 square kilometres. Its offices are found in the Ng'ambo part of the urban centre. This office block was once a primary school which was known as Lumbwa Primary school. The urban council has a total of 38 employees- from the chairman of the council to the subordinate staff.

4-2.3.2. Sources of Revenue

The urban council gets its revenue through market fees, produce cess (maize, pyrethrum and coffee), service charges, rents from its residential houses, licensing fee and grants from County Council of Kipsigis. This revenue is collected (where applicable) by the urban council's employees.

The revenue is used for maintenance purposes (roads, sanitation facilities and council's rental houses), service expansion, salaries and capital development. The council faces a number of problems on its collection of revenue. This problems include poor communication to the outer regions, that is, those further away from Kipkelion urban centre, and also insecurity in the sense that the employees are sometimes harassed by the traders or those who are required to pay taxes.

The urban council, due to its infancy, provide roads and sanitation services, and also space for open air market to the population it serves. The urban council has its staff who are specifically concerned with maintenance of facilities. The major maintenance problems include filling of pot holes and unblocking of drainage channels. The road

network is, however, maintained by both the urban council and the Ministry of Public Works, while the other services are maintained by the urban council.

The council charge the users directly for the use of such facilities. Vehicle operators, especially matatus are normally charged between fifteen and twenty shillings per trip, depending on the size and capacity of the vehicle. Similarly, those entrepreneurs who sell their goods in the open air market are charged ten shillings per market day. The urban council's expenditure on infrastructure services is given in table 4-1 below:

4-2.4 Commercial Activities

Among the commercial activities found in the urban centre trading and service provision. They are categorised as shops (retail-19 and wholesale-2), hotels (7), bar (1), bar and restaurant (1), furniture making (2), tailoring (5), butcheries (7), cloth sellers (2), private clinics (2), medical laboratory (1), posho milling (2), seeds' store (1), Kenya Farmers Association store and general metal works (tinsmith) shop. However, about twenty business enterprises were not operational during the time of the field study.

Periodical market is normally held every Monday and various commercial activities such as selling of clothes (plate 4-2) are undertaken.

The entrepreneurs derive their livelihood through commercial activities. The majority of them get between Ksh. 3,001 and 8,000 as their monthly returns. Table 4-2 below illustrate their monthly returns.

Table 4-1 Urban Council's Expenditure on Infrastructure

Facility	Expenditure (Sh.Per Month)
1. Pit Latrines	1,000
2. Road and Drainage	1,500
3. Market & slaughter Slab	2,500
4. Town Cleaning	10,650
Total	15,650

Source: Urban Council Office, January, 1997.

These expenses cannot meet the maintenance requirements of the infrastructure services hence their deplorable nature.

Table 4-2. Respondents' Monthly Income

Income Group	Entrepreneurs	Household	Total	Respondents Percentage
Less than 1,000	2	2	4	10
1,001-3,000	3	2	5	12.5
3,001-5,000	5	4	9	22.5
5,001-8,000	5	10	15	37.5
8,001-10,000	2	-	2	5
Over 10,000	3	-	3	7.5
Missing		2	2	5
Total	20	20	40	100

Source: Field Survey, 1997.

In addition, 80 percent of the respondents get income from other sources as shown in table 4-3 below.

Respondents who accounted for 50% of the total get an average monthly income of more than ksh.5,000, and given the fact that the cost of living is relatively low unlike in big urban centres, they are capable of meeting the cost of infrastructure provision such as electricity and water supply, and the servicing of such infrastructure. In addition, 65% of the respondents rely on more than one source of income and this shows diverse economic activities which require provision of infrastructure to facilitate such economic activities.

Table 4-3 Respondents' Other Sources of Income

Sources of Income	Entrepreneurs Frequency	Household Frequency	Total	Percentage
Farming	14	10	24	60
Civil Service	1	-	1	2.5
Other	1	-	1	2.5
Not Applicable	4	10	14	35
Total	20	20	40	100

NB: Other include carpentry, charcoal.

Source: Field Survey, 1997.

Most of the entrepreneurs (60 percent) get goods from Kericho town, a distance of more than 35 km. away. It was indicated by 70 percent of them indicated that they encounter problems in the delivery of these goods. These problems were stated as high transport costs because of poor roads; and inaccessibility to business premises due also to poor or

impassable roads fronting their premises (plate 4-3). Other problems identified include delays in availing the goods or even services, inadequate capital for further investment because the meagre profits are depleted by high transport charges; and also lack of/ or poor infrastructure such as water supply and sanitation.

4-2.5 Public Utilities

There are three public utilities that are found and they are water supply site, sewage disposal site, slaughter slabs/house and a cemetery.

4-2.5.1 Kipkelion Water Supply System

The provision of piped water to Kipkelion urban centre was started during the colonial period in the 1950s. It was initially aimed at serving the colonialists' interests but as time went by, the water supply system was developed to provide water for the urban residents. There are 2 water supply systems in the urban centre. One of them serves the railway station and was started sometimes after the construction of the railway line. This system uses gravity to supply water to the station and its residential quarters. The intake point on River Kipchorian is located about 3 km. from the urban centre, not far from Tuiyobei Primary School.

The system has two large storage tanks with a total capacity of more than $300m^3$. However, at the time of the study, one of the storage tanks was inoperational. With proper planning this water supply system can meet half of the urban populations' water demands. The only requirements are to repair the tank and install a booster that can pump water to the mains that in turn supply water to the urban residents.

The second water supply system was meant to supply water to the urban centre. With time, as the urban population grew, this system could not meet the water requirements of the area it served. At the same time the water pumps which were initially installed

were of low capacity and could therefore not pump enough water to all the urban residents.

In 1990, The Ministry of Water set out to rehabilitate the water supply system in order to enable it supply water for the urban residents. This rehabilitation was carried out with funds from the Office of the Vice President under the Rural Trade and Production Centres programme. It cost a total of Ksh. 12.6 million. However, the project failed to take off after its completion. One of the reason was that immediately the construction engineers handed over the project to the Ministry of Water, the weir was washed away by the heavy rains of 1994. Reconstruction work did not start until the beginning of this year (1997), and when this study was being carried out, the reconstruction work was being completed.

The other reason why the project had not taken off is due to the fact that there is no electric power supply in the urban centre. The rehabilitation programme was designed to use electric power and has a capacity of discharging $25m^3$/hour. If it was operational it could have met the present water demand of $131m^3$ daily. The use of low capacity pumps powered by diesel fuel has never been efficient to supply the urban centre and its environs with adequate provision of piped water. The project was planned to utilize electric power supply.

During the time when this study was being undertaken only 120 consumers (17%) were being provided with piped water. The supply, however, is quite erratic, depending on the availability of fuel. Water is pumped for a period of between 8-15 hours a day and the capacity is that only $1.5m^3$ of water is pumped per hour. On average $18m^3$ of water is pumped in a day yet the daily water demand is approximately $131m^3$. The water supply system also has 2 distribution tanks and a reservoir with a total capacity of more than $300m^3$. One of this is found at the pumping station and another at Taitta

system also has 2 distribution tanks and a reservoir with a total capacity of more than $300m^3$. One of this is found at the pumping station and another at Taitta

Toweett. The reservoir at Taitta (plate 4-3) has never received any water because of the fact that there is no powerful booster that can enable it to reach there.

4-2.6 Industrial Activities

The absence of a reliable and efficient energy supply has been a major constraint to industrial growth. In reality there are no industrial plants in the urban area except warehouses and mills.

The urban centre has a number of stores and this include the National Cereals and Produce Board (NCPB), the African Highlands Produce Company Limited, and the Brooke Bond stores. The presence of the NCPB stores is a clear manifestation that the area is rich in agricultural production. Some of these land-use activities are shown in map 4-1.

Plate 4-1: Low Income Residential Dwelling

(Note the Methods of Waste Disposal).

Plate 4-2: Entrepreneurs Selling Clothes in Open Market

Plate 4-3: Poor Road Fronting Business Premises

Plate 4-4: Water Reservoir at Taitta Toweett

4-2.7 Transportation

The predominant types of roads found in the study area are mostly class E and D. The only tarmacked road in the division is the class B1, that is the Nairobi-Kisumu/Kisii highway. The classification of the road network in Kipkelion zone is shown in table 4-4. and some of these roads are also shown in map 3-3.

The presence of this road network has given rise to the provision of road transport services such as transportation of goods and matatu business. The average monthly income from business operations accruing to vehicle owners operating matatus and those providing transport services is 29,000, an indication that the business is lucrative. Table 4-5 shows the monthly returns of the respondents.

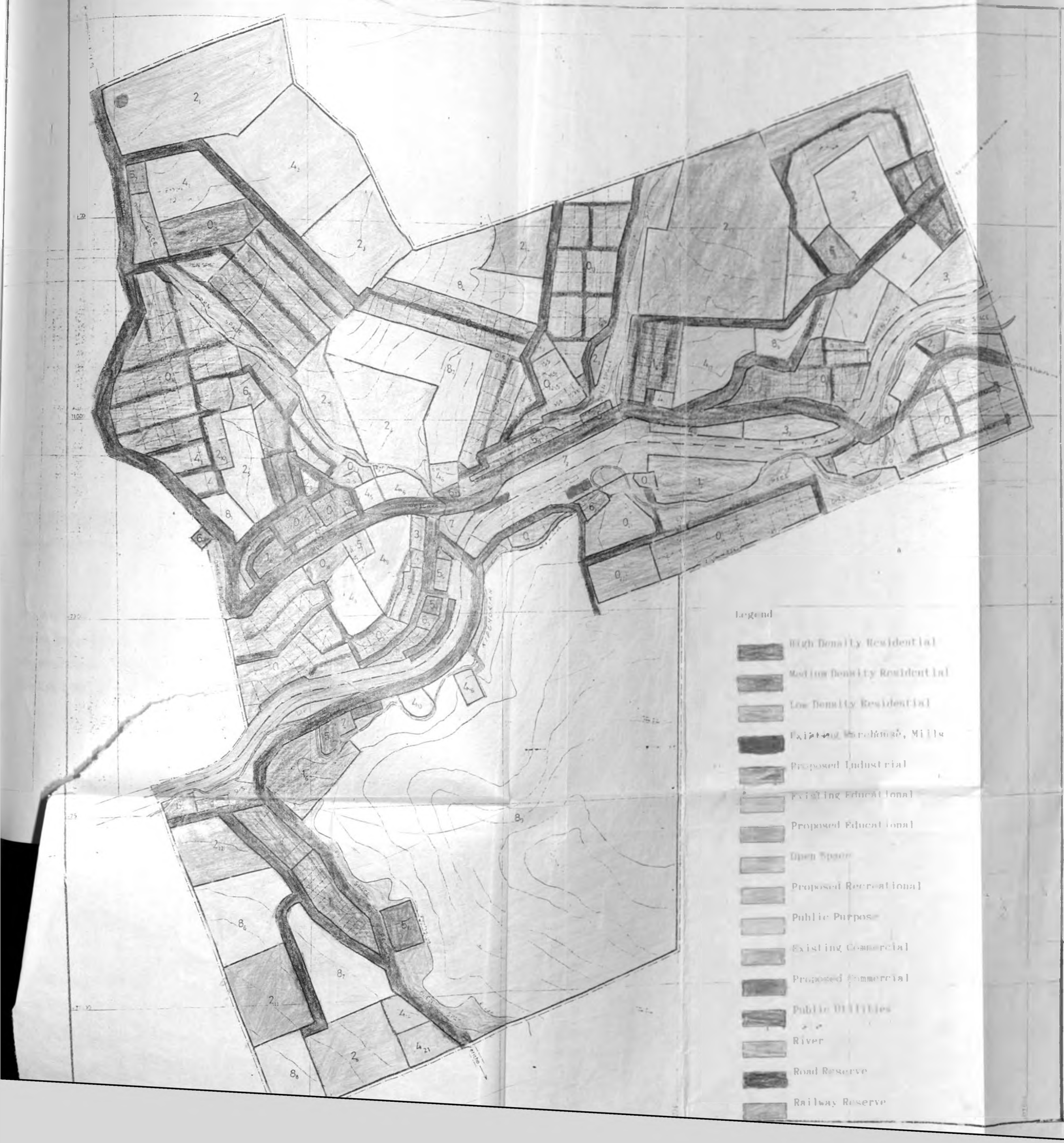
However, these returns are depleted by the high cost of vehicle maintenance. Seven of the respondents indicated that they take their vehicles for repair and maintenance at least once a week. The average maintenance costs incurred by the respondents in January 1997 are shown in the table 4-5 below. The major maintenance problems, apart from routine ones, were mentioned as welding and panel beating, in addition to replacing worn out parts.

The other mode of transportation is the railway line. However its use is of limited value to the residents due to its inflexibility and also the fact that it is rather slow.

All the above landuse activities generate employment opportunities for the urban residents and those from other areas of the country. The analysis of household data indicate that 60 percent of the respondents are employed in the formal sector (that is teachers, clerks and nurses, inter alia), while 20 percent are entrepreneurs. Five percent of the

respondents practice farming and another 5 percent are in the category of others and they include students, those looking for jobs and the casual

Map 4-1: Urban Land Use



Legend

- High Density Residential
- Medium Density Residential
- Low Density Residential
- Existing Warehouse, Mills
- Proposed Industrial
- Existing Educational
- Proposed Educational
- Open Space
- Proposed Recreational
- Public Purpose
- Existing Commercial
- Proposed Commercial
- Public Utilities
- River
- Road Reserve
- Railway Reserve

LEGEND

- [illegible] BOUNDARY
- ZONE BOUNDARY
- EXISTING INDUSTRIAL
- PROPOSED INDUSTRIAL
- 4 ZONE CLASSIFICATION NO
- ZONE REFERENCE NO

LAND USE PROPOSALS

0 — RESIDENTIAL

- 0 EXISTING HIGH DENSITY RESIDENTIAL
- $0_{1.1}$ PROPOSED HIGH DENSITY RESIDENTIAL
- $0_{1.2}$ PROPOSED MEDIUM DENSITY RESIDENTIAL
- $0_{1.3}$ EXISTING MEDIUM DENSITY RESIDENTIAL
- $0_{1.4}$ EXISTING LOW DENSITY RESIDENTIAL
- $0_{1.5}$ PROPOSED LOW DENSITY RESIDENTIAL
- 0_2 EXISTING COUNCIL RENTAL HOUSING
- $0_{2.3}$ EXISTING LOW DENSITY RESIDENTIAL
- $0_{2.4}$ PROPOSED SITE AND SERVICE SCHEME
- $0_{2.5}$ PROPOSED MORTGAGE HOUSING SCHEME

1 — INDUSTRIAL

- 1_1 EXISTING WAREHOUSE MILLS
- $1_{1.2}$ PROPOSED INDUSTRIAL
- 1_3 PROPOSED LIGHT INDUSTRIAL
- 1_4 PROPOSED K P & T C INDUSTRIAL
- 1_5 PROPOSED K C C PROCESSING PLANT
- 1_6 PROPOSED SITE FOR JUA KALI

2 — EDUCATIONAL

- 2_1 EXISTING SECONDARY SCHOOLS
- 2_2 EXISTING GIRLS SECONDARY SCHOOL
- $2_{3.4}$ EXISTING PRIMARY SCHOOLS
- $2_{5.6}$ PROPOSED NURSERY SCHOOLS
- 2_{11} PROPOSED SCHOOL FOR MENTALLY HANDICAPPED(SOCIAL)
- 2_{12} PROPOSED SCHOOL FOR CEDC REHAB CENTRE
- 2_{13} PROPOSED KENYA COLLEGE OF COMMUNICATION AND TECHNOLOGY FOR K P & T C
- 2_{14} PROPOSED PRIVATE SCHOOL
- 2_{15} PROPOSED COMMUNITY CENTRE & TRAINING SCHOOL

3 — RECREATIONAL

- 3_1 PROPOSED STADIUM
- $3_{2.4}$ PROPOSED COUNCIL TREE NURSERY
- 3_3 PROPOSED BARAZA PARK

4 — PUBLIC PURPOSE

- 4_1 EXISTING HEALTH CENTRE
- 4_2 SOIL CONSERVATION OFFICES & STAFF HOUSING
- 4_3 EXISTING FULL GOSPEL CHURCH
- 4_4 EXISTING AFRICA GOSPEL CHURCH
- 4_5 EXISTING P C E A CHURCH
- 4_6 EXISTING CATHOLIC CHURCH
- 4_7 EXISTING P A G CHURCH
- 4_8 EXISTING POLICE STATION
- 4_9 EXISTING ADMINISTRATION OFFICES
- 4_{10} EXISTING POST OFFICE
- 4_{12} SPECIAL PURPOSE
- 4_{13} EXISTING COUNCIL GUEST HOUSE
- 4_{14} PROPOSED PLACE OF MERCY CHURCH OF AFRICA
- 4_{15} EXISTING A I C CHURCH
- 4_{16} EXISTING URBAN COUNCIL OFFICES
- 4_{17} VETERINARY DEPARTMENT OFFICES & STAFF HOUSING
- 4_{18} FOREST DEPARTMENT TREE NURSERY
- 4_{19} EXISTING C P K CHURCH
- 4_{20} MINISTRY OF WORKS CAMP
- 4_{21} KIPKELION CLINIC

5 — COMMERCIAL

- 5_1 PROPOSED OPEN AIR MARKET
- 5_{2-7} EXISTING COMMERCIAL
- 5_{8-11} PROPOSED COMMERCIAL
- 5_{12-16} PROPOSED TOURIST CLASS HOTEL

6 — PUBLIC UTILITIES

- $6_{1.2}$ EXISTING WATER SUPPLY SITES
- $6_{3.7}$ PROPOSED & EXISTING SEWAGE DISPOSAL SITES
- 6_8 PROPOSED REFUSE DISPOSAL SITE
- 6_9 EXISTING SLAUGHTER SLAB / HOUSE
- 6_{10} EXISTING CEMETERY

7 — TRANSPORTATION

- 7_1 PROPOSED BUS/MATATU PARK
- 7_2 KIPKELION RAILWAY STATION
- $7_{3.6}$ PROPOSED PETROL SERVICE STATION

8 — DEFERRED

- 8_{1-9} DEFERRED

NOTE C H F Denotes CENTRAL HEALTH FILTERING C

KIPKELION

SCALE 1:10,000

RUTTO, R
M.A. PLANNING 19

Table 4-4 Classification of Road Network in Kipkelion

Serial Number	Road Number	Description	Length KM
1	D312	Tinderet Forest-E1098	36.0
2	E1100	B1- Barsiele	19.0
3	D313	D.B. - Kipkelion	10.2
4	E266	Kedowa- Chepsir	15.0
5	C35	Barsiele- Fort Ternan	34.0
6	B1	Kedowa Bridge-Chepsir	15.0
7	E250	C35 Fort Ternan-Kokwet	10.2
8	E251	E250-Nyagacho	10.0
9	E249	C35 Fort Ternan-D.B.	5.0
10	E1098	D312-Chepsir	16.0
11	D35	Chepseon-D312	5.0
12	D314	Kipkelion-Kedowa	14.0
13	E39(59)	Tugunon-Lower Kapseger	7.0
14	E40(68)	1st Monastery-Tinga	4.6
15	E1101	D314 Kipkelion-Kimugul	4.0
TOTAL			205

NB: D.B. District Boundary

Source: Ministry of Public Works Office, Kericho.

labourers (table 4-3). From these occupations, the respondents' income range from an income group of those who earn less than Ksh. 1,000 to the maximum group of those who earn between Ksh. 5,001 and Ksh. 8,000. 10 percent of the respondents earn less than Ksh. 1,000, 10 percent earn between 1,001 and 3,000. 20 percent earn an income of

between 5,001 and 8,000., but 10 percent did not divulge any information on their level of income (table 4-2).

Table 4-5 Vehicle Owners Monthly Returns and Maintenance Costs

Respondents	Monthly returns	Maintenance costs
1	40,000	15,000
2	-	1,000
3	30,000	10,000
4	40,000	2,000
5	80,000	40,000
6	20,000	15,000
7	30,000	5,000
8	15,000	2,000
9	15,000	3,000
10	20,000	10,000

Source: Field Survey, 1997.

In addition, 50 percent responded that they have alternative sources of income through farming and business enterprises, and income from these sources range from Ksh. 1,000 to over Ksh. 100,000.

4-3 The Status of Infrastructure Services in Kipkelion

4-3.1 Water

The main source of water was identified as the river. Of all the 40 respondents, 72.5% confirmed that they get water directly from the river/ stream. Only 27.5 percent get piped water (in reality only 17% of the population get piped water but other residents get piped water from their neighbours). All these sources of water are supplemented by rain harvesting during the wet season. Figure 4-1 below illustrate the respondents' major source of water.

The respondents daily water requirements vary depending on the family size, activities (business), and housing characteristics. Also, the institutions' water requirements vary depending on the number of people they serve and/ or their functions. Tables 4-6 and 4-7) shows the daily water requirements of the respondents and institutions respectively.

Table 4-6. Daily Water Requirements

Daily Water Requirements (Litres)	No of Respondents	Percentage
1- 60	20	50
61- 120	12	30
121- 180	5	12.5
Over 180	3	7.5
Total	40	100

Source: Field Survey, 1997.

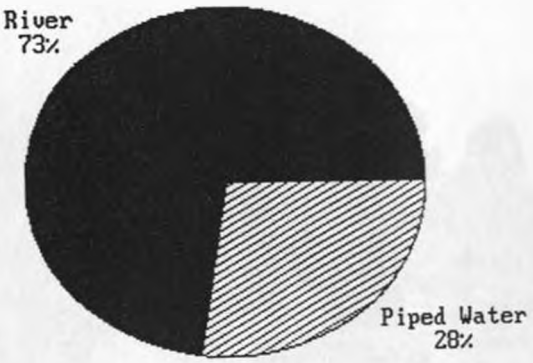
Table 4-7 Daily Water Requirements of the Institutions

Institution	Daily Water Requirements (Litres)	Cost (KSh.)
Taitta Toweett Sec. Sch.	1200	15000P.M
Mercy Girls	800	N/C
Kipkelion Health Centre	200	2000P.M.
AMS	100	N/C
Soil Conservation	-	-
Transport Dept (Railway)	500*	N/A

* The station gets its water through gravity!
P.M Per month
N.C No Costs Given
Source: Field Survey, 1997.

The average daily water requirements is about 75 litres. Human labour (plate 4-5) is the most common mode of taking water to the houses or business enterprises. This was confirmed by 75 percent of the respondents while 15 percent use vehicles ranging from tractors, lorries and pick-ups. This observation relatively concurs with studies carried out early in the area (Kosgey, 1986) in which it was identified that 83.7% of the residents use human labour. However, as concerns the institutions, water is normally ferried either by using tractors or lorries (Mercy Girls Secondary school currently has its own water supply via a borehole. Other institutions don't get piped water even though pipes have been installed, and they either rely on rain water or fetch water directly from the river or streams).

Sources of Water
Figure 4.1



Source: Field Survey, 1997

The average distance to the source of water ranges from nil (those who get water directly from within their residential premises) to 2 km.

Plate 4-5: Women Carrying Water to their Households

All the respondents indicated that they experience problems as concerns water supply and these include the long distance to the source, irregular supply of piped water and pollution of river water which may in turn cause diseases. As far as the institutions are concerned, the problems identified range from the lack of piped water affecting institutions such as Taita Towett, Kipkelion Health Centre, Agricultural Mechanization Services: prevalence of water borne diseases such as typhoid, amoebic dysentery, and

repatitis, inter alia, as a result of water contamination; blocked pipes (which mostly affect the Railway Station Water Supply).

Lack of piped water has really constrained several institutions, especially schools, whereby students (mostly in Taita Towett) are forced to go and fetch water and/ or wash their clothes in the river, a distance of almost 2 kilometres. In addition, the expenses incurred in transporting water to the institutions are quite high and thus deplete the scarce funds that the institutions get (table 4-7).

The solutions that they proposed as remedial measures for water problems include the provision of adequate supply of treated piped water, regular maintenance of the water supply machinery and installation of a new and powerful generator. Also, in relation to the institutions, other remedial measures include construction of storage tanks to store rain water; educating the public on proper ways of waste disposal to limit contamination of river water; and also educating the public on the need to treat or boil water meant for drinking.

4-3.2 Sources of Energy

The major sources of energy that are used by the urban dwellers of Kipkelion are paraffin, charcoal and firewood. The use of gas is limited to a few households. Those who use paraffin for lighting accounted for 97.5 percent of the respondents while only 2.5 percent use solar energy. The various sources of energy for cooking that are used include charcoal, paraffin, firewood and gas. The analysis of field data shows that 50 percent of the respondents use paraffin, 32.5 percent use charcoal, 5 percent use firewood, 2.5 percent use gas, while 10 percent could not establish their main source of energy for cooking since they use charcoal, firewood and/ or paraffin simultaneously .

As far as the institutions are concerned, fossil fuel is commonly used for lighting purposes. Large institutions like Taita Towett and Mercy Girls secondary schools and

AMS use diesel generators while the Railway Terminal use kerosene lamps. The sources of energy used for cooking in the institutions, especially schools are mainly firewood; but charcoal is used on a small scale.

All the respondents said that they experience one or more than one problem in relation to the sources of energy that they use. These problems include high cost of fuel (paraffin, gas and charcoal) as confirmed by 67.5 per cent; pollution of the atmosphere as a result of the use of such fuel which is hazardous to the life of the users (especially charcoal); scarcity, especially of charcoal and long distance to the petrol station (at Kericho which is 38 km. away); deforestation (for charcoal and firewood); and inefficiency (solar energy). Institutions like Taita Towett encounters problems as a result of generator breakdown and its attendant high costs of maintenance.

In order to alleviate these energy problems the respondents suggested a number of solutions and these include the provision of electricity, establishment of a petrol station and reduction of the costs of fuel. 72.5 percent of the respondents said that the provision of electricity should be given the first priority, 22.5 percent proposed the establishment of a petrol station while 15 percent saw the reduction of fuel costs as a solution. In addition, 30 percent of the respondents said that another solution is planting more trees and reassessing the restrictions on tree felling to allow controlled charcoal burning. The institutions' response is that provision of electricity should be undertaken in order to reduce fuel and maintenance (of generators) costs.

The respondents gave the reasons as to why they prefer electricity as being that electricity is relatively cheaper than paraffin or other sources of energy, and once it has been installed it is readily available for use. It is also flexible in that it can be used for lighting and cooking purposes, and also its provision will limit deforestation.

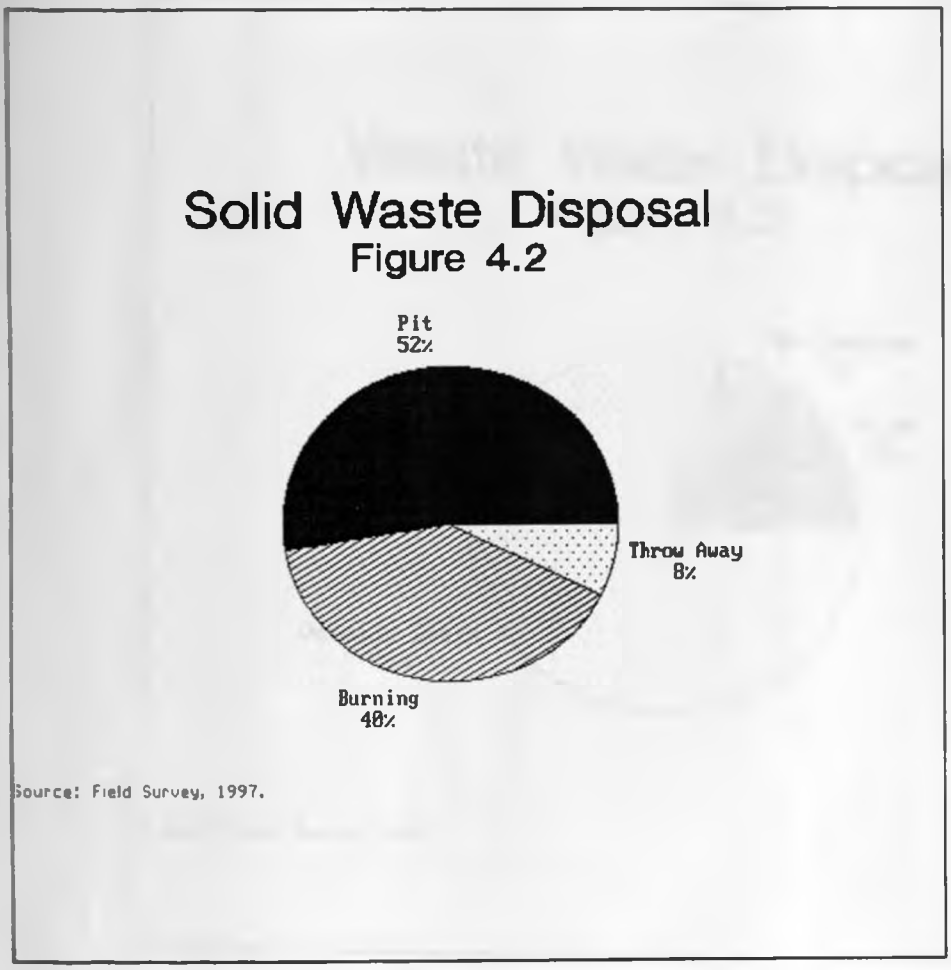
4-3.3 Sanitation/ Waste Disposal

All the respondents, including the heads of institutions, responded that human waste is disposed of in pit latrines. In those institutions that have flush toilets e.g. AMS, their use is constrained by lack of piped water. This situation is not unique to the study area alone. The NDP (1997-2001) points out that out of 142 gazetted urban areas in Kenya, only 30 percent have sewerage systems. This is partly because in many urban areas, the development of water supplies has not been matched by a corresponding increase in facilities for sanitary disposal of waste water, thereby posing serious environmental problems.

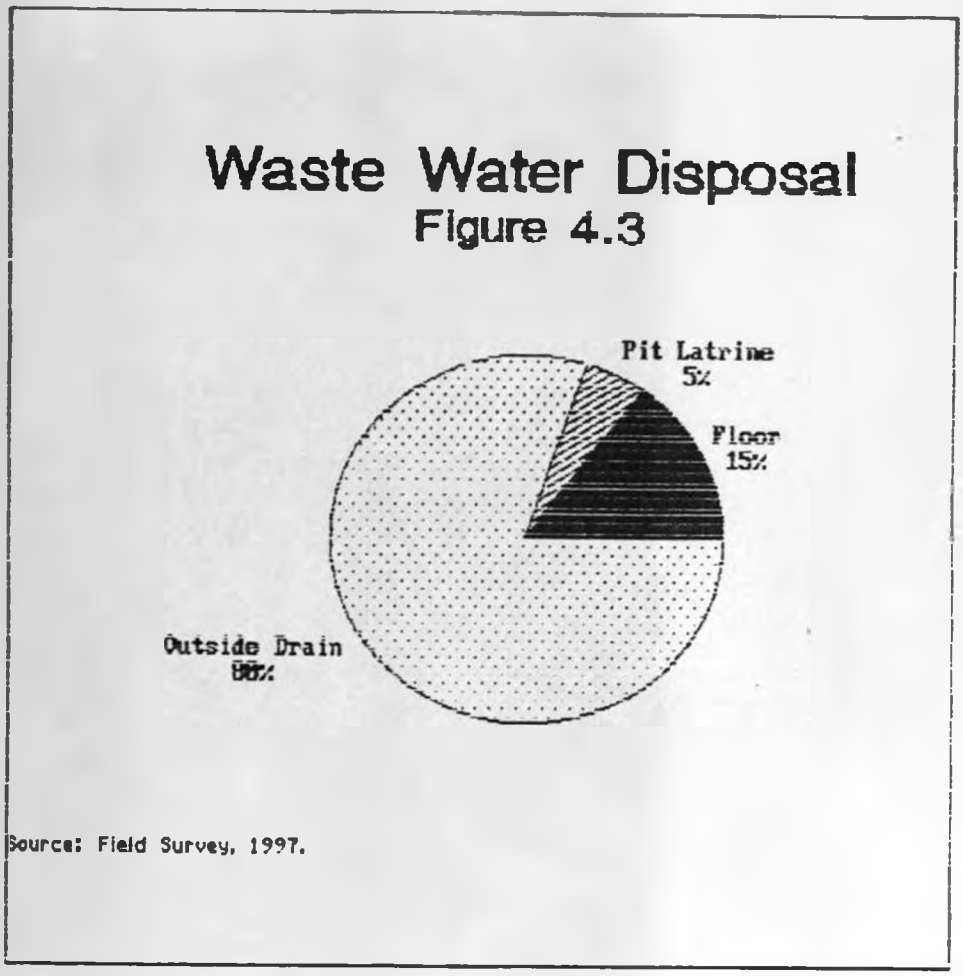
Data obtained in the field shows the solid waste is disposed of through burning, into the pit or just thrown away outside the business premises. Figure 4-2 shows this distribution (institutions are not included).

Waste water is disposed of on the floor, pit latrine or outside drains.
Figure 4-3 shows this distribution (excluding the institutions).

Only 35% of the respondents indicated that the urban council assist them in collecting refuse while 65% said that they receive no assistance. The problems identified as being associated with waste disposal are that the pits (both pit latrines and ordinary pits for disposal of solid waste) normally filled up and given the fact that it is an urban centre, there is limited space for digging up of new pits. Haphazard disposal of waste through throwing away and filling up of pits causes environmental pollution since litter/ garbage ends up being spread everywhere by either wind or rain water. Open drains (plate 4-6) that are rarely drained of waste water provide good breeding places for organisms that can cause diseases such as mosquitoes.



Other problems are the lack of proper site for waste disposal and facilities such as bins, lack of water in flush toilets, and little awareness on proper ways of disposing waste. Even though the urban council has allocated space for the disposal of garbage waste is disposed of on open space in the urban centre (plate 4-7) since the council has no means of transporting garbage to the disposal site.



Concerning the institutions, especially the schools, the problem is magnified in the sense that pit latrines filled up after a short period of time and this will necessitate digging up of newpits. This not only require a lot of space but it also poses a danger to lives because they normally subside after some times. These conditions violate Chapin's (Chapin, 1976) stipulations as concerns the elements of public interests, especially in relation to health and safety. Chapin stipulated that regulatory measures such as health and sanitation among others, provide the principal operating definitions of public interest. Land use activities should therefore place a strong emphasis on constraints to prevent conditions injurious to the physical well-being of the community. Some of the features that are considered as minimal

Plate 4-6: Sullage on Open Drains

requirements in planning for the provision of health and safety include:

1. Protection against accident hazards;
2. Protection against contagion and provisions for maintenance of cleanliness;
3. Protection against environmental pollution; and,
4. Provision of possibilities for reasonable aesthetic satisfaction.

Field studies, however, reveal that these conditions have not been fulfilled hence urgent measures require to be put in place

in order to safeguard the lives of the residents. The solutions to these problems were stated as provision of septic tanks or sewer and adequate supply of piped water, regular drainage and garbage collection; and educating the public about proper ways of disposing waste.

4-3.4 Road Transport

It is the most common mode of transport used in transporting goods and also as a service. All but 1 respondent (97.5%) indicated that they use road transport to avail goods to their business enterprises while all the urban dwellers interviewed indicated that they use it either in travelling or transporting goods. Even the institutions rely on road network in order to meet their transport needs. The reasons why roads are preferred are that they are flexible and readily available as compared to railway which traverses the area but is rarely used by the residents or businessmen. The railway line is inflexible because it follows only one route and hence business premises that are not adjacent to the line are disadvantaged.

Similarly road transport is readily available in the sense that vehicles are relatively available at all times unlike the trains which pass there in an interval of a number of hours; and in addition, one is not assured of getting transport on a train. Also, road transport network is faster and relatively cheaper. 75 percent of the interviewees indicated that road transport is readily available and flexible while 70 percent agreed that it is cheaper and faster.

The respondents, who accounted for 90 percent of all the respondents (including the vehicle owners and/ or operators), complained that poor roads that are characterized by pot-holes and rough surface (plates 4-8 and 4-9 respectively) cause discomfort and delays when travelling or transporting goods.

This interferes with the element of convenience as stipulated by Chapin. Convenience here is determined in terms of the relationship between one destination and another. It is measured in miles of walking distance; or in minutes of transportation time. In transportation planning, it is viewed in terms of movement systems and the ease of moving large volumes of people from one destination to another.

The vehicle owners/ operators complained of other problems such as narrow bridges while in others there are no bridges (plate 4-10), narrow roads and lack of drainage channels (in some roads) to facilitate the movement of rain water.

Other roads are impassable during the wet season, for example Chepkechei/ Kebeneti- Kipkelion, and Kipkelion- Barsiele- Londiani. Other problems identified are that because of few vehicles in some roads as a result of poor roads, congestion and high transport costs are the order of the day.

These observations are lent credence by literature. With regard to the nature of Kenyan roads the National Development Plan (1997-2001) states that the road conditions have been deteriorating over the last 10-15 years. This is due to inadequate maintenance caused by inadequate funding. The share of road maintenance expenditure total on roads (both maintenance and development expenditure) fell from 31 percent in fiscal year 1984/ 85 to only 19 percent in fiscal year 1987/ 88.

The solutions to these problems as proposed by 98 percent of the respondents include tarmacking and putting murram on some roads to facilitate the provision of improved services. This should be accompanied by regular maintenance of the same to ensure that the roads are in good conditions. In addition, the roads require to be enlarged and sharp bends straightened, along with constructing wide bridges and drainage systems along the roads to facilitate the

movement of rain water.

The infrastructure service that need to be given the first priority in Kipkelion is road network. This was indicated by 60% of the respondents. The second priority goes to the provision of electricity, and 55 percent of the respondents allude to this. Water supply and sanitation follows with 50 percent of the respondents stating that it should be the third priority. All these priorities were established from the following infrastructure services: road network, electricity, water supply and sanitation, post and telecommunication, drainage, health and education. Table 4-8 below show the types of infrastructure service prioritized and the percentage of respondents in support.

The illustrations below clearly manifest the fact that the major problems faced by the residents of Kipkelion are infrastructure services which are either lacking or poorly/ inadequately provided.

Table 4-8 Infrastructure Services Required in Order of Priority

Infrastructure Service	Priority 1	Priority 2	Priority 3	% of Respondents
Road Network	12	6	2	60
Electricity	3	11	6	55
Water/ Sanitation	5	3	10	50
Total	20	20	18	

Source: Field Survey, 1997.

Plate 4-7: Garbage Thrown on Open Space (The slopy nature of the terrain facilitate waste dispersal by rainwater).

Plate 4-8: Potholes on a Road in Kipkelion

Plate 4-9: Rough Road Surface (Note the presence of rock protrusion and gullies created by rain water).

Plate 4-10: Road Without a Bridge

4-4 The Effects of Infrastructure Services on Kipkelion

4-4.1 Energy Supply/ Lack of Electricity

The respondents (65 percent) expressed the opinion that the use of inefficient energy sources such as charcoal and paraffin, coupled with the lack of electricity, has greatly hampered industrial growth, or the general growth of commercial activities in the urban centre. This has in turn led to little investment which has curtailed the diversification of the economic activities in the urban centre, such as the establishment of metal fabrication sector, agro-processing industries, *inter alia*. This was the observation of 65 percent of the respondents.

The other effect is that business premises close early. Late night customers are therefore not gathered for. The respondents expressed the view that this has in turn culminated in the urban centre experiencing little growth since it was founded. These observations are lent credence by literature. An adequate and reliable supply of energy is not only a basic prerequisite for the development of the industrial, commercial and agricultural sectors, but it is also important for domestic use (NDP, 1997-2001).

In addition, some institutions (especially schools) are greatly constrained by lack of electric power supply and this has not only affected the students' academic progress but has also led to high expenditures being incurred on purchase of fuel to use on generators and subsequent high cost of maintenance of the same.

4-4.2 Water Supply

Only 25 percent of the respondents get piped water while 75 percent get water from the river. The information got from the local water office shows that 17 percent of the urban residents get piped water. The discrepancy is attributed to the fact that some of the respondents fetch water from their neighbours' taps. The effects of this situation have been that the residential dwellings and/or commercial premises or other buildings are

rarely moped or cleaned and with time they become dirty and smelly since the little amount of water fetched from the river is used for the most pressing needs such as washing of utensils or clothes. This interferes with the element of convenience and comfort.

Similarly, given that the mean distance to the river is 1 km., the level of productivity decrease because much time is spent on fetching water. The benefits derived from provision of adequate supply of water are not realized. Such benefits include relief from the labour hauling water to homes of those people previously carrying water for long distances, availability of more and relatively pure water, and the released time becomes available for application to other pursuits.

Other benefits include human health welfare by alleviation of water-borne diseases (bilharzia, dysentery, cholera) and by encouragement of better standards of hygiene (cleaner clothes and utensils), intensified child care and increased time for the husbands for the children, and increased formal and informal participation in leisure, recreation, self-help programmes, etc (Klasse-Bosse, 1969).

In addition there is little investment in the urban centre because adequate water supply is one of the most basic prerequisite for any type of investment. An adequate and reliable supply of clean water is an essential requirement for industrial, agricultural and commercial enterprises (NDP, 1997-2001). The development of water-use is closely linked to the overall economic and social development in a country, its region and communities. Availability, quality and cost of water determine where and how growth will take place.

Another effect of inadequate supply of piped water was identified by 65 percent of the respondents as prevalence of water-borne diseases. River water is not treated and its use has led to the prevalence of disease such as typhoid and cholera. An adequate water

supply plays an important role in the well-being of a community, and should meet two basic requirements of being safe to the consumer and be of adequate quantity to meet the demand. Water supply plays a key role in promoting health and should always be taken into account in human settlements (Irwing, 1972). This, however, is not the situation in the study area.

With regard to institutions, the expenses incurred in transporting water to the institutions are quite high and thus deplete the scarce funds that the institutions get, for example during the dry season, Taita Towett incurs an average of Ksh. 15,000 per month to avail water to the school (table 4.7) while at the same time the students academic work is heavily compromised since they spend some of their time in fetching water for their own needs.

4.4.3 Sanitation

Poor methods of sanitation was seen as a major cause of environmental pollution and hence a health hazard. This is the observation of 85 percent of the respondents. Solid waste is dumped on overfilled pits and are thus spread in the urban centre by winds and rain water (plate 4-7). In addition, sullage stagnates around buildings and apart from providing conducive environment for the breeding of disease causing organisms such as mosquitoes which can cause malarial infection, it also generate a foul smell. This was confirmed by 80 percent of the respondents. Such water also poses a serious risk to children who play in the area and have been observed to drink such water.

Responses from the institutions indicate that as a result of the filling up of pits within a short period of time (2 years in some) a lot of space is used up and given the fact that such institutions have limited space, in the long run much space would have been used for waste disposal. In due course, such pits, even though they are normally filled with soil, have been observed to subside. This not only render such areas dangerous to both

human life and animals, but also makes the area unfit for other activities such as building constructions.

Warner articulates that the presence of adequate water and sewer services can be expected to improve overall environmental conditions through better control of water quality, thereby raising the sanitary and aesthetic levels for both the project community and the surrounding area. Improvements in water and sewer facilities are associated with decreased incidence of diseases. He further observes that the installation of water systems lead to improved sanitary conditions, decreased incidence of water borne diseases hence decreased health costs, increased labour productivity, increased economic development, improved school performance (due to reduced absenteeism), greater community participation due to improved community water shortages, greater convenience regarding food preparation, personal and household cleanliness, and excreta disposal (Warner, 1975).

4.4.4 Roads

The poor conditions of roads has had a lot of effects on transportation of goods and the provision of services. Delays in delivery of goods and provision of services has been one of the major effects of poor road network. This was confirmed by 65 percent of the entrepreneurs interviewed. Others who are mostly affected are the farmers who transport their farm produce, for example milk all the way to Molo Cooling Plant. The transportation of milk is greatly hampered by poor roads and at times the milk gets to the factory late in the day by which time it would have turned sour.

Lack of effective transport links between different locations or areas means that goods produced in one place are not accessible to other markets (Roberts, 1971). This in turn lead to low levels of production because there is no incentive to maximize production, and also because the transport costs increase. Low level of production has been

identified as being caused by ineffective marketing linkages between rural areas and urban centres.

The other effect of poor road network is the high transport cost and high costs of maintenance of vehicles. Whatever profits or returns the owners get is depleted, leaving little money for further investment (table 4-5). 55 percent of the respondents indicated that they incur high costs when transporting goods from where they acquire them from to where their business enterprises are. As a result of this, whatever profits they get is therefore depleted. The respondents, who accounted for 70 percent, indicated that they are normally charged high fares when travelling from one place to the other. For example, the fare charged for a distance of 5 km. is Ksh. 20 on one very rough road (Mologit-Kipkelion road) which means that on average the fare for 1 km. is Ksh.4. However, between Chepseon and Kericho (class B road), a distance of 27 km. the fare is also Ksh. 20, which means that the average fare for 1 km. is less than Ksh. 1 (Ksh. 0.70).

These expositions concur with what is found in literature. The National Development Plan (1997-2001) states that roads in Kenya generally have been deteriorating over the last 10-15 years due to inadequate maintenance. This lead to serious constraints to the development of the economy since it leads to high vehicle operating costs, unstable delivery schedules, low investment in the transport sector, all of which seriously affect productivity in all economic sectors. The rapidly deteriorating road conditions are increasingly rendering the roads incapable of supporting the growth of economic activities.

Literature also indicate that improvement in transportation systems directly lead to the efficient movement of people and goods and at the same time lowers the cost of agricultural production. Transportation can assist in creating producer surpluses by lowering transport costs of farm inputs and farm produce. Thus improvements in the

transport system have the potential to stimulate changes in agricultural yields, cropping patterns, non-agricultural economic activities and quality of life for rural inhabitants.

Poor road network causes ineffective market linkages between rural and urban centres and thus acts as a disincentive to producers since little profits accrue. It has been observed that due to poorly organized marketing systems and badly maintained roads, only a small number of merchants are able to transport food crops from the countryside to the major towns and cities. This small group of merchants, therefore, controls the farm gate price in the rural areas. Such merchants pay lower price for agricultural goods than the going market rate in order to cover their transport costs (Nsaku, 1985).

In addition, the poor conditions of roads has forced vehicle owners, especially matatus, to abandon some of the roads to go and operate on others. Their only operations on particular roads are when they are leaving home or when they are going back home after a day's work. This was observed on a number of roads for example, Tuiyobei-Kipkelion, Barsiele-Kipkelion and Fort Ternan- Kipkelion, inter alia. Most commuters therefore walk for long distances before reaching their destinations. This has caused delays in reaching places of work or other destinations. At the same time, the few vehicles that operate on particular routes (on particular times only) such as Kebeneti-Kipkelion, Siret- Kipkelion, Barsiele-Kipkelion and Tuiyobei- Kipkelion are normally full hence the passengers experience discomfort as a result of congestion.

4-5 Conclusion

All the respondents including the heads of institutions and vehicle owners/ operators expressed the view that the provision of infrastructure, especially tarmacking/ murraming of the roads, provision of electric power, adequate and reliable water supply, and also sanitation services will generate a lot of economic activities such as agro-processing industries, metal fabrication, inter alia. This will in turn lead to the growth of the urban centre. Consequently, they all expressed their willingness to contribute money or labour, among others to facilitate the provision of/ and or the improvement of these services.

CHAPTER FIVE FINDINGS, RECOMMENDATIONS AND CONCLUSION

5-1 Overview

This chapter gives a summary of the findings, recommendations and conclusions with regard to the findings from the field.

Infrastructure services play a very significant role in the growth and development of an area. When a minimum complement of services, such as transport and communication, electricity, water supply and sanitation, among others, are provided economic growth is greatly enhanced. Adequate provision of infrastructure services in an urban centre is of paramount importance especially if some of the basic elements of public interests identified by Chapin (Chapin, 1976) as necessary for land use planning are to be realized. These elements include: health and safety, convenience, efficiency and energy conservation, environmental quality, social equity and social choice.

The presence of an established well connected urban settlement system provides the social framework which facilitates mobility of labour and capital, permits greater exploitation of resources; widens locational options and choices, promotes innovation-diffusion; enhances specialization and comparative advantages and increases dependence or inter-dependence within human settlements (UNCD, 1988). Urban system provides the social medium for increased social interactions and resources transfer and promotes specialization and complementarity.

5-2 Summary of Findings

In order to carry out this study, 4 objectives were set out and they are as follows:

1. To find out the socio-economic activities of Kipkelion;
2. To examine the status of infrastructure (roads, energy, water supply and sanitation) in the urban centre;

3. To examine the effects of infrastructure service provision on the urban centre, and
4. To make policy recommendations for the provision of the above so as to enhance urban growth.

Concerning the first objective, a number of socio-economic activities were identified. There are three distinct residential zones occupied by the urban residents depending on their income levels. The high and middle income residential areas are mainly made of stone blocks, plaster and corrugated iron sheets while those of the low income are mainly made of timber, mud, iron sheets and in some instances, plastered floors.

Educational facilities are also provided and there are 4 primary schools, 2 secondary schools, and a technical training school at Mercy Girls Secondary school.

The public purpose institutions are available and these include Veterinary Department, the Police Station, Soil Conservation Department, Administration offices, Post Office; and Urban Council's offices. Others are the Forest Department, Ministry of Public Works Camp, the health centre and religious institutions.

Commercial activities are the major land use activities in the urban centre and these include retailing, provision of services and household commodities, inter alia. The public utilities land use activities that are found include slaughter slab, water supply site, sewage disposal site and a cemetery. There are no industrial activities except the warehouses and mills. With regard to transportation the major roads found in the study area are mainly class D and class E. There is also a railway line traversing through the urban centre. The presence of this road network has given rise to matatu business.

With regard to the nature of infrastructure it was realized that all the roads leading to/ or from the urban centre are in poor conditions and hence impede traffic flow. These roads

are characterized by potholes, narrow bridges and rough surfaces. Some of these roads are narrow and lack drainage channels while others are impassable during the wet season.

The majority of the residents (72.5%) get water from the river and only 27.5% get piped water which is in most cases unreliable because of the low capacity generator and lack of fuel. Human labour is the most used means of availing water to the residential dwellings while the institutions use vehicles to carry water.

As far as energy sources are concerned, 97.5% of the residents use paraffin for lighting while the institutions use diesel generators. For cooking purposes 50% of the residents use kerosene while 32.5% use charcoal. Others use firewood and gas. The institutions use firewood for cooking, and also charcoal is used in a small scale. Fossil fuel is expensive and is usually got from far while charcoal is scarce.

Waste disposal is undertaken in various ways. Human waste is disposed of in pit latrines; waste water is disposed of by pouring onto the floor, outside drainage or pit latrines. Solid waste is disposed of by burning, throwing away or by being put into pits.

With regard to the effects of infrastructure services as stipulated in the third objective it was observed that poor roads have contributed to losses to farmers, vehicle owners and entrepreneurs alike. The delivery of farm produce, for example milk, to the processing plant in Molo, is normally hampered especially during the wet season and this results in heavy losses since the milk go bad in the process of being transported. Similarly, the vehicle owners incur a lot of expenses in order to maintain their vehicles while travellers/ passengers arrive late at their destinations.

Inadequate and/ or inefficient supply of water has resulted in a lot of man-hours being wasted in fetching water hence the level of productivity decrease. Other effects include

high costs incurred especially by institutions to ferry water. Also, the use of river water especially for drinking purposes without any kind of treatment is hazardous to life such because it may cause diseases such as typhoid and dysentery.

Lack of electricity was observed to be one of the major causes of stagnation of the urban centre. Informal sector activities such as 'Jua Kali' enterprises especially those dealing with metal fabrication cannot effectively and efficiently take place without a steady supply of energy resource especially electric power. Similarly, small scale agro-processing industries have not taken place as a result of this. The most affected are the institutions especially schools which incur a lot of expenses through the use of inefficient generators.

The effects of poor methods of sanitation were identified as a major cause of diseases such as malaria and stomach upsets as a result of stagnant water and water contamination respectively. In addition garbage being put in overfilled pits or being thrown haphazardly is spread all over the urban centre by strong winds or rain water thus making the urban environment dirty.

5-3 Recommendations

5-3.1 Overview

It is evident from the field survey that infrastructure services that have been provided in the study area are either in poor conditions (roads), inadequate (water and sanitation), or inefficient (energy). For the urban centre to grow and meet the needs of the urban residents, and by extension the rural areas, there is an urgent need to provide and/ or improve the infrastructure services, especially roads, water supply and sanitation, and electricity.

The provision of infrastructure is justified on the grounds that the population of the area has been increasing significantly for the last 20 years. In 1969 the urban centre had a

population of 2577 people while the total population of the division was 58,696. In 1978 the urban population was 3869 while the population of the entire division was 88,133. In 1993, the population of the area was 88,471. This, however, does not mean that the population did not grow, but the division was sub-divided into two. It is therefore clear that this increase in population has to be provided with the necessary infrastructure so as to improve its welfare.

5-3.2 Road Network

The existence of an efficient and reliable transportation system is crucial to development of trade and interchange of a modern economy (Roberts et. al., 1971).

Without transportation as a limiting factor, no economic development of a given space is conceivable, however much it may be desired. Lack of effective transport links between different locations or areas means that goods produced in one place are not accessible to other markets. If transport costs are lowered through investments in the system then some firms which operate more efficiently and occupy favourable locations with regard to the transport system will have the opportunity to penetrate into local markets previously protected by the high costs of transport (Blonk, 1979).

The road network in the study area is in poor conditions. It is only the road between Chepseon and Kipkelion (11 km.) that is all weathered since it was once tarmacked. However, three quarters of it is pot-holed and thus impede the smooth flow of traffic. The other roads such as Tinderet Forest- Kipkelion (36 km.) is impassable during the wet season. This also applies to the road between Kipkelion- Barsiele- Londiani. These roads traverse an area with rich agricultural potential. The economic activities found within the area served by this route include the growth of coffee, maize, tea, pyrethrum, finger millet, potatoes and forests. In addition, livestock (both dairy and beef cattle, sheep, goats and chicken) is reared. These economic activities have been curtailed in their growth by poor road network which makes it difficult to avail the produce to their

respective markets outside the area of production. Traffic count shows that on average at least 30 vehicles use the road (Kipkelion-Tinderet) in a day. This figure could rise if the road network was improved.

An improved transportation has numerous linkages with the socio-economic development of a society. It directly lead to the efficient movement of people and goods and at the same time lowers the cost of agricultural production. Transportation is considered an integral part of the production process. Improvement in transport system have the potential to stimulate changes not only in agricultural yields and cropping patterns, but also non-agricultural economic activities such as provision of transport services. Ineffective transportation has been identified as one of many interrelated constraints to development (Nsaku, 1984). This observation holds true in Kipkelion.

The other route is Fort Ternan- Kipkelion route (30 km.) which also traverses a rich agricultural potential zone. Traffic count indicate that fewer vehicles use this route (on average 6 vehicles a day). Most of the vehicle owners prefer to use alternative routes, that is from Koru to Fort Ternan because it is relatively good as compared to the above mentioned route. Low levels of production are therefore encountered since it becomes costly to transport the produce to markets outside the production regions.

The route between Kipkelion and Kedowa (14 km.) pass through another rich agricultural zone. It is clear from the above that the improvement of these roads will not only provide an efficient services to the urban centre but will also go along way in boosting economic activities such as agricultural production especially in the rural areas. It is hereby recommended that:

1. The road adjoining the main highway (Nairobi- Kisii/ Kisumu) from Chepseon to Kipkelion should be recarpeted since it is the major outlet of urban centre under study. At the same time, the two bridges along the route need to be

enlarged to accommodate two-way traffic movement. This will facilitate the transportation of farm produce to other markets in the country.

The recarpeting of this road is justified on the grounds that it is the major outlet to the main highway (Nairobi-Western Kenya) and thus connects the area to the national trunk road system. It therefore forms an effective means of facilitating interactions between the region and the rest of the country. These interactions between regions of a country and sectors of the economy can enhance an integrated and cohesive national economic and even political entity. Such interactions also ensure spread effects in terms of diffusion of development and innovations from the national foci to all parts of the country. This will in turn lead to the growth and development of the area.

Furthermore, recarpeting is also justified on the grounds that it will be less expensive since not all the sections of the road are involved.

2. In order to open up the rural areas for the exploitation of the rich resource potential in terms of land and forest among others, it is also necessary to tarmac (or at least make it all-weather) the road from Londiani through Barsiele to Kipkelion, and to Tinderet Forest. Apart from the agricultural productivity and other resource potential, this road is centrally placed to serve a large area unlike other roads found in the division which are more or less found in the peripheries. It would therefore be more economical to gravel it or at best, tarmacked.

The above recommendations are in line with the government policy which aims to give priority to the maintenance and rehabilitation of existing roads. The government also aim to intensify efforts to provide adequate financial resources for road maintenance as a matter of first priority. In addition, the government has adopted strategies to strengthen the management and the institutional framework for the management of roads. Action

will also be taken to strengthen the technical and policy making capacity of the Ministry of Public Works and Housing and Ministry of Transport and Communication (NDP,1997-2001).

3. The roads from Kipkelion to Fort Ternan, and from Kipkelion to Kedowa require to be improved so that they can become all-weather roads. It is therefore necessary that these roads are murramed.

   This recommendation is possible to achieve given the fact that murram is abundant in the study area in quarries such as Kedowa, inter alia. In addition the local people have been paying cess through the sale of agricultural products, while vehicle owners are charged daily for the use of road network. The Urban Council, with the assistance from the County Council of Kipsigis, can undertake this work. Support from the personnel from the Ministry of Work can be obtained since they are also responsible for the maintenance of roads within the area.

4. In addition, all the minor roads require to be improved to make them passable, especially by vehicles. In other areas, minor roads require to be developed to facilitate accessibility. The government should therefore continue to assist the local people in improving and developing these routes especially with regard to the policy of cost sharing. The most affected areas are Leldet, Lesirwo, Barsiele and Macheisok, among others.

   The policy of cost sharing between the government and the local people has been effective in the construction of minor roads for example between Tuiyobei and Barsiele, among others recently constructed through joint efforts, within the study area. This is the most viable way of constructing roads, especially given

the fact that the local people are willing to contribute money. If the government keeps its side of the bargain the success of this recommendation can be realized.

5 The improvement/ development of these roads should be accompanied by regular maintenance of the same to ensure that they are always in good conditions. The Urban Council should therefore allocate more funds for the improvement/ development of these roads since it taxes farmers and businessmen a lot of money.

5-3.3 Provision of Electricity

An adequate and reliable supply of energy is a prerequisite for the development of the industrial, commercial and agricultural sectors. It is also important for domestic use. Lack of electricity in major urban centres hampers the development of informal sector and other industries.

Electricity enhance improvement in working methods, leading to a reduction of production costs. Lack of electricity is a major constraint to business development. Electricity raises income, employment levels and land values, thus making land available for development. It contributes towards raised standards of living through increased efficiency and production method. These benefits have not been realized in Kipkelion because of the lack of electric power.

Lack of electricity has played a big role in the stagnation of the urban centre and its environs. The development of agro-processing plants, small-scale metal fabrication or other industrial related activities have been curtailed by the lack of efficient source of energy. Institutions business enterprise and households are forced to use sources of energy which are not only inefficient but deplete their financial resources as a result of high costs of maintenance of the machinery used to provide energy.

Plans to develop industrial/processing industries have had to be shelved as a result of lack of electricity. For example, the proposal to build a milk cooling plant has failed to take off, because among other reasons there is no efficient energy source to facilitate the process. In addition, the proposed Kenya College of Communication and Technology and the Kenya Post and Telecommunications Industrial plant (which had actually been implemented) cannot operate efficiently without electric power. In order that the urban centre and its surroundings may develop it is imperative that electric power is supplied.

The above argument goes hand in hand with government policy on power supply. The policy articulate the fact that the government will implement further measures in the power sub-sector with a view to improving the supply of electricity to most of the existing commercial consumers, especially in the urban areas, and also many parts of the rural areas. Towards this end, the Ministry of Energy will accelerate the implementation of the Rural Electrification Programme on the basis of recommendations of the on-going study on the Rural Electrification Master Plan, (NDP, 1997-2001).

5-3.4 Water Supply

An adequate and efficient supply of potable water is a necessary pre- requisite for any human settlement; in short, water is life. In many industrial, agricultural and commercial enterprises, water is an essential direct input. Field survey overtly display the fact that the supply of piped water in the study area is both insufficient and inefficient. In order to remedy this situation the provision of adequate, piped and treated water is of paramount importance.

The water supply system should therefore be improved so as to meet the water demands of the residents. This can be done by providing a booster pump which can supply water from the storage tanks at the railway station to other urban residents. Alternatively, the water supply system rehabilitated by the Ministry of Water should be provided with a higher capacity pump which can supply water to the distribution reservoir at Taitta

Toweett school. Once this has been achieved water can then flow through gravity to the consumers.

The pumping of water, however can be facilitated by the provision of electricity since electric pumps have already been installed. Electrically powered pumps are relatively cheaper to service and maintain unlike those using diesel. Furthermore they are more efficient.

5-3.5 Sanitation

A clean environment is conducive to human habitation. Chances of disease outbreaks are limited but a dirty environment poses a hazard to the lives of the inhabitants. The presence of adequate water and sewer services can be expected to improve overall environmental conditions through better control of water quality, thereby raising the sanitary and aesthetic levels for both the project community and the surrounding area.

Improvements in water and sewer facilities are associated with decreased incidence of diseases. The installation of water systems lead to improved sanitary conditions, decreased incidence of water borne diseases hence decreased health costs, increased labour productivity, increased economic development, improved school performance (due to reduced absenteeism), greater convenience regarding food preparation, personal and household cleanliness, and excreta disposal (Warner 1975).

In order to ensure the realization of these factors it is imperative that proper ways of waste disposal are pursued. Field survey indicates that the issue of waste disposal has not been addressed seriously and if this condition is not arrested now it would become a serious one in the future. It is hereby recommended that the urban council should provide a site where solid waste can be disposed. This should be complemented by the provision of bins where waste can be gathered in before being disposed of, and in addition this waste has to be regularly collected and put in the disposal site. Similarly

drainage system should be regularly cleared of waste so that disease-causing organisms may be eliminated.

Secondly, the provision of septic tanks is quite necessary. Since the area under study is an urban centre the provision of such a facility will definitely solve the problem of limited space because it will not be necessary to dig pit latrines any more. It will also limit the danger posed to the lives as a result of pits subsidizing. This will be carried by the Urban Council since an individual may not be able to handle it single-handedly.

In addition the residents should be educated on proper ways of disposing waste so as to ensure that their environment is clean and is not therefore hazardous to human settlement. This can be done through public barazas or even seminars which should be organized in the study area. This is necessary because garbage that is normally thrown away contain substances such as broken bottles which can cause injuries. At the same time, a dirty environment enhances the chances of diseases being spread. It is therefore necessary to sensitize the residents about the need to keep their environment clean at all times. This can be done through public barazas or even seminars, or by health workers visiting individual households.

5-4 Conclusion

In conclusion, the provision of infrastructure services such as roads, electric power, water and sanitation will definitely boost the growth of Kipkelion and thus the rural areas that it serve because it will facilitate the development of trade and interchange of a modern economy. Infrastructural services enhance the exploitation of existing resources in a region and hence stimulate development and growth of an area.

The presence of an established well connected urban settlement system (with infrastructure services) is not only a prerequisite for, but is also a major factor in promoting socio-economic integration. It provides the spatial framework which

facilitates mobility of labour and capital, permits greater exploitation of resources, widens locational options and choices, promotes innovation-diffusion, enhances specialization and comparative advantages and increases dependence or interdependence within human settlement systems (UNCD, 1988).

Without adequate roads, power supply, water supply and sanitation facilities rural places in general cannot compete for new kinds of economic activities needed to stimulate growth. The policy of Kenyan government is to induce a balanced pattern of rural-urban development and this can only be realized if such infrastructure services are provided. Since the area residents have shown a strong willingness to support the improvement, and/ or provision of these services, their efforts require to be complemented. This is the only way viable that can be utilized to ensure the growth of Kipkelion.

5-5 Areas of Further Research

Since the study was carried out when reconstruction of the water supply system was taking place further research require to be undertaken so as to evaluate its performance. In addition more research should be undertaken to determine the effects of infrastructure, especially roads on farming activities in the area since time could not allow this to be fully carried out.

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APPENDICES

APPENDIX 1 HOUSEHOLD QUESTIONNAIRE

Name of the interviewer .....

Date and time of interview .....

Name of the respondent (optional) .....

Questionnaire No. .....

1. Sex (a) Male (b) Female

2. How old are you in years? .....

3. Marital Status i. Married ii. Unmarried iii. Divorced iv. Widowed v. Separated

4. Household size (a) Males ..... (b) Females .....

5. Education Level;

i. No Education ii. Primary iii. Secondary iv. University v. Other (specify)

6. What is your main occupation? .....

7. What is your monthly income from this occupation?

(a) less than 1,000

(b) 1,001- 3,000

(c) 3,001- 5,000

(d) 5,001- 8,000

(e) 8,001- 10,000

(f) above 10,000

8. What are your other sources of income?

Source	**Gross Monthly Income**

9. How long have you stayed/lived here? .....(years)

INFRASTRUCTURAL SERVICES

10. What are your main sources of water?

(a) river/stream (b) piped

(c) borehole/well (d) other (specify)

11. Give the distance to the source.....

12. Water consumption per day in litres 1. 1-60 2. 61-120

3. 121-180 4. Over 180.

13. What do you use to take water to your house? i. Human labour ii. Cart iii. Vehicle iv. Other (specify).

14. Do you experience any water problems (1) Yes (2) No

15. If yes specify .....

.....

16. How do you think the problem can be solved?

.....

.....

17. What is your main source of energy for lighting?

(a) paraffin lamp (b) solar (c) other (specify)

18. What problems do you experience in (17) above? .....

.....

19. What are the possible solutions to these problems?

.....

.....

20. What is your main source of energy for cooking?

(a) firewood (b) charcoal (c) paraffin (d) gas (e) other (specify).

21. Do you experience any problem with ..... above?

22. If yes, what problems?.....

.....

23. In your view, how can these problems be solved?

.....

24. Do you think the provision of electricity can alleviate some of these problems? (1) Yes (2) No

25. If yes, explain how. .....

.....

26. Where do you dispose of your human waste?

(a) pit latrine (b) open ground/bush.

27. How do you dispose of your solid waste?

(a) pit (b) throw away (c) burning (d) other (specify)

28. Where do you dispose of waste water?

(a) Floor (b) pit latrine (c) outside drain (d) other (specify)

29. Does the council assist in collection of refuse? (1) Yes (2) No

30. If yes, how much do you pay for such services? .....(ksh.)

31. Do you experience any problem as concerns waste disposal?

1. Yes 2. No

32. If yes, state them.....

.....

33. What are the possible solutions to these problems?

.....

34. Do you experience any problem as concern the road transport network? (1) Yes (2) No

35. If yes, what are these problems?.....

.....

36. How could these problems be solved? .....

.....

37. What have been the effects of the following on Kipkelion urban centre?

(a) Lack of electricity .....

.....

(b) Water supply.....

.....

(c) Sanitation .....

.....

(d) Poor roads .....

.....

38. Do you think that the provision of the above will lead to the growth of this urban centre? (a) Yes (b) No.

39. Would you be willing to contribute for their provision?

(a) Yes (b) No

APPENDIX 2 QUESTIONNAIRE FOR ENTREPRENEURS

Name of the Interviewer .....

Date and time of the Interview .....

Name of the Respondent (optional) .....

Questionnaire No .....

A SOCIO-ECONOMIC ASPECTS

1. Type of business (a) retail (b) wholesale (c) bar (d) hotel/restaurant (e) butchery (f) Jua Kali (light manufacturing)(specify) (h) other (specify)

2. Where do you reside in? (a) within the urban centre (b) outside the urban centre (specify)

3. If (b), how far is it? .....(km.)

4. When did you start your business? ..... (year)

5. What are your monthly returns? (a) less than 1,000

(b) 1,001- 3,000

(c) 3,001- 5,000

(d) 5,001- 8,000

(e) 8,001- 10,000

(f) above 10,000

7. What are your other sources of income?

Source	**Gross Monthly Income**

8. Where do you get the goods that you sell or use in your business enterprise? .....

9. Do you experience any problem in their delivery (1) Yes (2) No

10. If yes, what is(are) the problem(s)

.....

11. What other problems do you experience in your daily business activities? .....

.....

B INFRASTRUCTURAL SERVICES

12. Which of the following infrastructural services should be given priority in order to enhance the growth of Kipkelion urban centre in general? Road network... Electricity... Water supply and sanitation ....Post and Telecommunication ... Drainage... Health... Education...(insert numbers according to priority).

13. Which mode of transport do you use to transport the goods that you sell or use in your business activity? (a) road

(b) railway (c) other (specify).

14. If road transport, why do you prefer this mode?

.....

15. What problems do you encounter when using road transport?

.....

16. What are their possible solutions?

.....

17. What are your sources of water? (a)piped (b) river/stream

(c) borehole/well (d) other(specify).

18. How many litres of water do you use in a day? (a) 1-60

(b) 61-120 (c) 121-180 (d) above 180.

19. If the water is piped, how much do you pay per month?..

20. What problems do you experience with water supply?.....

.....

21. What are the causes of these problems? .....

.....

22. In your view, what could be the solution to these problems? .....

23. What are your sources of energy for lighting? (a) Paraffin lamp

(b) solar (c) car battery (d) other (specify)

24. What are your sources of energy for cooking? (a) firewood

(b) charcoal (c) paraffin (d) gas (e) other (specify).

25. What problems do you experience in ..... above? (specify the type and problems). .....

26. What do you think are their possible solution(s)?

.....

27. Where do you dispose of your human waste? 1 Pit latrine

2. Open ground/bush.

28. Ways of disposing solid waste 1 Pit 2.Burning 3.Throw away

4. Other (specify).

29. Where do you dispose of waste water? 1. Floor 2. pit latrine 3. outside drain 4. other (specify).

30. Does the council assist you in refuse collection? 1.Yes 2.No

31. If yes, how much do you pay for such services? .. (ksh)

32. Problems associated with waste disposal .....

.....

33. What have been the effects of these services on your business activities? a) Lack of electricity .....

.....

b) Water supply .....

.....

c) Road.....

.....

(d) Sanitation .....

.....

34. Do you think that the provision of the above will lead to the growth of your business, and hence the growth of this urban centre? 1) Yes 2) No

35. Would you be willing to contribute, e.g. money or labour, for the development and/or improvement of the above services? (1) Yes (2) No.

APPENDIX 3 INTERVIEW SCHEDULE FOR KIPKELION URBAN COUNCIL

1. When was the urban council established? year....

2. Total area under the urban council jurisdiction? ....(km^2)

3. What is the estimated population living within the urban council boundary?.....

4. How many are currently living in the urban centre? .....

5. No. of employees.....

6. What are the sources of revenue for the urban council?

.....

7. How is the revenue collected? .....

.....

8. How is this revenue used? (a) maintenance (b) service expansion (c) salaries (d) other (specify).

9. Do you experience any problem on revenue collection?

(a) Yes (b) No

10. If yes, which problems? .....

.....

11. Which infrastructure services do the council provide

(a) water supply (b) sanitation (c) roads (d) other (specify)

12. Who maintains them? .....

13. If it is the council, how much do you charge the user?

Service/Facility	**Charges**

14. How do you charge them? .....

15. Do you have specific members of staff who maintain these facilities? (a)Yes (b) No.

16. If yes, what is their salary rates per month? .....

17. What are the common maintenance problems?.....

.....

18. Please provide the breakdown for the council's expenditure on infrastructure services.

19. Which of the following infrastructural services should be given priority in order to enhance the growth of this urban centre? Roads.... water and sanitation... Drainage.... Electricity.... Postal and Telecommunication service ..... Health Facilities.... (insert numbers according to priority)

20. Do you think that the provision of the above (19) will lead to the growth of this urban centre? (a) Yes (b) No

21. If yes, specify and explain.....

.....

22. What steps have you taken to address these infrastructural requirements? .....

23. Please provide the following documents:

1. map of the area covered by the urban council,
2. physical development plan/map,
3. Record of the historical background of the centre,
4. Number and types of various land use activities,
5. Figures on revenue sources, tax charges for the last 5 years,
6. The lay out of infrastructure services, i.e. water, roads (including type of surface).

APPENDIX 4 RECORDING SCHEDULE FOR INSTITUTIONS

1 Name/Type of Institution .....

2 No. of people served by the institution.....

3 Year of establishment .....

4 Infrastructural services hampering the growth of the institution. .....

.....

5 Sources of water.....

6 Daily water consumption in litres.....

7 On average, how much do you pay for water per month?

8. Are there any problems associated with water? (1) Yes

(2) No

9. If yes, specify.....

.....

10. What are their possible solutions? .....

.....

11. Sources of energy for cooking

(a) firewood (b) charcoal (c) gas (d) other (specify).

12. Problems associated with ..... above.

13. Possible solutions .....

.....

14 Sources of energy for lighting:

(a) Generator (b) Kerosene lamp (c) Other (specify)

15 Problems associated with ... above.

.....

16 Solutions to energy problems.....

17 Do you experience any transport problem?

(a) Yes (b) No

18 If yes, specify .....

19 What are the possible solutions?.

.....

20. System of disposal for human waste.....

21. Solid waste disposal system .....

22. Do you experience any problem as concerns sanitation?

23. If yes,specify. .....

24 What are the possible solutions?.....

.....

25. What have been the effects of these services on your institution? (a) Water supply .....

.....

b) Energy .....

c) Road .....

.....

(d) Sanitation .....

26. Do you think that the provision of the above services will lead to the growth of your institution? (a) Yes (b) No.

27. Would you be willing to make any contribution for the provision of these services? (a) Yes (b) No

APPENDIX 5 QUESTIONNAIRE FOR VEHICLE OPERATORS/OWNERS

1. Type of vehicle 1£. Matatu 2. Car 3. Van 3. Lorry

5. Other (specify).

2. Where do you live in? .....

3. Distance from Kipkelion urban centre to home. .....

4. When did you start your operations? (year) .....

5. Which routes do you operate in? 1. Kipkelion-Chepseon

2. Chepkechei/Kebeneti-Kipkelion-Kericho 3. Barsiele- Kipkelion-Kericho

4. Siret-Kipkelion 5. Other (specify)

6. Why do you prefer this route? .....

7. What is the nature of your operations? 1. Matatu business 2. Goods transport 3. Other (specify).

8. If (1) how many trips do you make per day? .....

9. How many passengers do you carry per trip? .....

10. How much do you charge a passenger per trip? (specify the distance and the charges). Distance ....km charges.....

11. If (2) what are your charges per trip? Distance....km Charges..... Goods .....(kg.).

12. What are your monthly returns from this business operation?....

13. How often do you take your vehicle for maintenance? 1. Once a week 2. Once in two weeks 3.Once a month 4. Other (specify)

14. What are the major maintenance problems? .....

.....

15. What are the causes of these problems? .....

.....

16. Do you experience any problem as concerns the nature of the road network?

1. Yes 2. No

17. If yes, what problems? .....

.....

18. How have these problems affected your operations?

.....

19. What do you think are the solutions to these problems?

.....

20. Do you pay charges for road maintenance? 1. Yes 2. No

21. If yes, at what rate? .....

22. Are you willing to make further contributions for the improvement of the roads? 1. Yes 2. No.