THE ROLE OF INFRASTRUCTURE IN SPATIAL GROWTH OF OL KALOU AND THE INSTITUTIONAL CONSTRAINTS ON THEIR PROVISION

BY

KAGEMA, CHARLES M., B.A. (HONS), NAIROBI.

A THESIS SUBMITTED IN PART FULFILMENT FOR THE DEGREE OF MASTER OF ARTS (PLANNING) IN THE DEPARTMENT OF URBAN AND REGIONAL PLANNING, UNIVERSITY OF NAIROBI.

NAIROBI, AUGUST, 1994.

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

Signed _____

Kagema, Charles Maina, Candidate.

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

Signed _____

Mr. Zachariah Maleche, Supervisor.

August, 1994.

DEDICATION

A Dedication to My Beloved Wife Lucy, and Son, Elvis Kagema, for their Patience and Love.

ACKNOWLEDGMENT

This work could not have been possible without the support of many people. I am therefore very grateful to all who assisted in anyway in its preparation although it is not possible to mention them all individually.

I owe special gratitude to the Town Clerk of Ol Kalou Town Council, Mr. J. Mbugua and his officials who enabled me to obtain information during the process of data collection. Similar gratitude goes to the residents of Ol Kalou town who very willingly helped me understand this work better.

I wish to thank my supervisor Mr. Z. Maleche for his untiring supervision, criticisms and advice which made the entire exercise take shape. Those in the Department of Urban and Regional Planning, University of Nairobi, have greatly proven a valuable asset at all times. In this regard I owe gratitude to the Department Chairman Dr. E. Ndegwa and the entire teaching staff.

Deserving special mention is the Ministry of Lands and Settlements, Department of Physical Planning for sponsoring my education. Similarly, the Green Town

Project of the Ministry of Local Government deserves special thanks for offering financial support to this endeavour. Without their assistance this study could not have been possible.

Finally I wish to thank my sister Alice Wanjiku for bearing the burden of typing this work. To her, I say it is a difficult job well done.

ABSTRACT

Most patterns of urban areas evolve as a result of combined influence of infrastructure such as roads, electricity, water, and others. Thus, besides acting as lubricants in the development process, infrastructure determine the urban form and can be used to guide urban development.

While it is easy to appreciate this important role of infrastructure in planning urban development, it is important to recognise the inadequacy of these facilities and services in most urban areas.

This study investigated these two issues by evaluating the role of infrastructure in the spatial growth of Ol Kalou town. It also investigated the causes of inadequate provision of infrastructure in the town despite their importance. The study focused on the relationship between the physical conditions and the pattern of provision of infrastructure; the influence of the latter on the spatial pattern of the town; and some of the institutional constraints to the adequate provision of infrastructure in the town.

The study revealed that the site conditions in the study area are, to a larger extent, conducive to provision and installation of infrastructure such as water, electricity, roads, and water-borne sewerage system. The pattern of provision is therefore not significantly influenced by the slight variations in the site conditions.

The pattern of provision of infrastructure, mainly roads, water, and electricity has determined the spatial pattern of the town. However, the study established that the town suffers from inadequacy of these facilities and services, thereby down playing their effectiveness in enhancing standards of life and environmental conditions.

The inadequacy of infrastructure was attributed to the institutional constraints, mainly poor financial capacity due to inadequate mobilization of local resources and resource mismanagement in the local authority. Other causes were identified as lack of co-ordination and integration of infrastructure projects during implementation. Quality of infrastructure is also worsened by lack of maintenance which the study attributed to negligence on part of the local authority, leading to commitment of inadequate resources for this

purpose.

Among the recommendations of this study is the general policy which discourages urban development on areas of difficult site conditions, to enhance environmental care and minimise unnecessary costs of installation of infrastructure.

Approaches to provide reliable and sustainable water and sanitation services were also recommended. Measures to restructure the institutional framework such as minimising the excessive control of the local authority by the Central Government were recommended to facilitate effective contribution to development.

This study concluded that provision of infrastructure can be used as a tool to steer urban development to the physically and environmentally conducive areas in the study area and other towns in the country.

TABLE OF CONTENTS

LIST OF MAPS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

CHAPTER ONE

INTRODUCTION

1.0 Introduction:

The development of infrastructure services such as roads, water supply and sewerage works in our urban areas is seen as an integral part of national effort to support rapid socio-economic development of the country. These services and facilities not only act as lubricants in the development process but are also crucial in sustaining the production process.

Hofmeier,(1973) argued that inadequate provision of infrastructure could easily stifle the development of the national economy. Moreover infrastructural services and facilities, besides other factors such as resource-based production facilities, have a role in determining urban growth (UNCHS,1981). It can be argued therefore, that infrastructural facilities can be used as "incentives" or a tool to steer urban development.

However, while it is easy to appreciate this important role of infrastructure in planning urban development, it is also of paramount importance to recognise the unavailability and inadequacy of infrastructure in most of our urban areas. UNCHS,(1986) reported that in most urban centres in developing countries including Kenya, these facilities and services

are either lacking, or inadequate, or in a deplorable state.

This study concerns therefore human settlements sustainability viewed from the context of the role of infrastructure in the spatial growth of towns, and how adequate provision of infrastructure can be achieved through ample institutional framework or set-up.

1.1 Statement of the Problem:

The provision of infrastructure, their location and distribution act as a guiding framework for urban development. Moreover, infrastructure are essential for protecting the environment and promoting the efficient operation of human settlement. However, this significant role of infrastructure has either not been recognised or does not apply in some of our urban centres.

Ol Kalou town which dates back to early colonial time is one of the urban centres which can be described as showing 'Stagnant' urban development. The town has remained small in size despite being located in a high potential area in terms of agricultural productivity and population (Kenya,1989). It has attracted relatively few entrepreneurships, mainly in the service sector and negligible activities in the industrial sector.

The pattern of the town has remained a 'restrictive'

linear pattern along the few existing roads, with a few isolated development. This pattern of development has not been accounted for in terms of the factors or forces behind it. This study therefore aimed at, first assessing physical and environmental factors leading to the current pattern of infrastructure provision, and investigating whether this pattern can be related to the growth pattern of the town. The aim was to identify how provision of infrastructure can be used as a "tool" to achieve sustainable development, by steering growth into suitable areas ensuring that basic needs of the town dwellers are met, and in the long term, that no environmental degradation takes place.

Nevertheless, Ol Kalou like many other Kenyan urban areas "lacks adequate and standardised services and facilities" (Kenya,1989). Essential infrastructure such as adequate and reliable potable water supply; street paving; and cemeteries among others are lacking. One of the factors precipitating this state of affairs is the weak institutional arrangement and the inadequate financial-resource mobilization mechanisms in the management of the town. For instance, the local authority is dependent on external funding for infrastructure projects and especially on the Central Government.

These inter-twined problems of management and resources require immediate remedial measures if the sustainability of the town is to be achieved. This warranted a survey to assess the local institutions' capacity to finance and maintain infrastructure facilities and service, accompanied by an evaluation of the utilization of the potential resource-base with the aim of identifying feasible methods of improvement.

The institutions also affect the maintenance of infrastructure which as a result has become a perennial problem. The passing of maintenance responsibility to the local authority and institutions which were not involved in the planning and implementation of the projects, and also adoption of too sophisticated technologies and standards which require external components and expertise all make proper operation and maintenance of infrastructure impossible.

The institutions involved also have failed to involve community participation in the process of procuring resources for infrastructure. Experience has shown that infrastructure systems are best maintained, least abused and mostly financially successful where the community or the users are involved in identification of the priority infrastructure needs and thus are willing to contribute to the construction costs and pay fee for

usage.

The above therefore necessitated an investigation into whether lack of maintenance of infrastructure can be attributed to inadequate revenue or service charge (cost-recovery).

The influence of infrastructure on the spatial growth of a town can be positive only if co-ordinated provision of infrastructure exist. Co-ordinated provision enhances the overall impact on urban growth. This is explained by the fact that improvement to a single component of infrastructure normally does not achieve the level of development that a combination of components could. This study investigated whether this co-ordination exist in Ol Kalou. It endeavoured to identify the institutional framework within which infrastructure are delivered, with the aim of identifying how it can be improved.

Generally, the study aimed at, first, identifying the relationship between the provision (distribution and location) of infrastructure and the physical characteristics of the area, and then relate this to the spatial pattern of urban growth in Ol Kalou. With the identification of this relationship, the study highlights on the role which can be played by infrastructure in gearing the growth of the town towards a sustainable

system of urban development through adequate and sustainable provision of infrastructure. The latter would be achieved through the proper institutional set-up in procuring resources for development and maintenance of infrastructure, which the study identify.

1.2 Objectives of the study:

The study has the following main objectives:

1. To asses the physical and environmental factors influencing the pattern of infrastructure provision, and how this pattern can be related to the spatial pattern of the Ol Kalou town.
2. To evaluate the utilization of the potential resource-base in Ol Kalou town.
3. To investigate the causes of lack of infrastructure maintenance in Ol Kalou town.
4. To suggest ways of sustaining the growth of Ol Kalou town as an integrated system.

1.3 Assumptions and Hypotheses:

The study used the following assumptions:

1. That the pattern of infrastructure provision is determined by the physical, and environmental conditions of the site; and that
2. This pattern determines the spatial pattern of the

town (i.e. the location of buildings and other economic activities is determined by the location of essential infrastructure.

Two hypotheses were formulated and tested:

1. Ho: There is a significant positive correlation between increase in total annual revenue collected by the Town Council and the increase in population of the town.

   Hi: There is no significant positive correlation between increase in total annual revenue collected by the Town Council and the increase in population of the town.

2. Ho: The maintenance expenditure on infrastructure increases with increase in total service charge revenue collected.

   Hi: The maintenance expenditure on infrastructure does not increase with an increase in total service charge revenue collected.

1.4 The scope and organisation of the study:

The study was based on Ol Kalou town which is a town council consisting of seven wards, with a population of 4,024 persons.

The study gives the historical background of the

town, account for its location and growth in terms of physical and economic aspects.

The main focus of the study was the relationship between provision of infrastructure and urban growth, and the institutional framework and operations through which financial-resources for provision of infrastructure are procured.

The focus on the relationship between provision of infrastructure and urban growth formed the background of the study. On basis of this the role of infrastructure in achieving sustainable growth of the town was appraised, and a further analysis of the institutional constraints on their provision carried out.

Although all the institutions involved in the provision of infrastructure in the study town were examined, a thorough appraisal of the local town council was conducted. This was with regard to its management of resources and infrastructure services.

An examination of all the existing infrastructure was done, but emphasis was on water supply, sanitation and sewerage, urban transport links, and electricity.

The role of the local community in the provision of infrastructure was also examined. The aim was to examine to what extent the local community is involved especially with respect to meeting both capital and maintenance

costs.

The study is divided into seven chapters. Chapter one is an introductory chapter which states the research problem, objectives, hypotheses, scope and the organisation of the study, methodology and the study limitations.

Chapter two contains the review of the related literature. It starts with the literature focusing on global perspective of urbanization and narrows down to urban growth in Kenya. The Government policy on urbanization is also reviewed. Other aspects reviewed include the role of infrastructure in urban growth; institutions involved in procuring resources for provision
of infrastructure; problems involved in the latter; and sustainable urban growth requirements. The chapter closes with a conclusion and the study's theoretical framework.

Chapter three introduces the study area where details of the location, physical characteristics, historical development, urbanization trends and the socio-economic aspects of the town are discussed. How the physical aspects especially the landscape relate to the provision of infrastructure is highlighted.

Chapter four examines in details and with reference to Ol Kalou town, the role of infrastructure. Specific infrastructure are high-lighted and the resultant influence on the urban form described. The summary of this chapter explain the spatial pattern of the study town and links this to the existing environmental conditions.

Chapter five focuses on the institutional framework in the planning and management of infrastructure. Issues addressed include urban management, development planning, control and co-ordination, and resource management. More importantly the financial capacity of the local authority is examined.

Chapter six is the synthesis or the interpretations of the findings. It evaluates the findings, their implications to the future of the town and seeks to elaborate on what can be done. Requirements for sustainable development of the town and the related policy recommendations are given.

Chapter seven summarizes the thesis by highlighting what has been covered in the study: findings, recommendations and conclusions, and finally suggests scope for future research.

1.5 The Study Methodology:

Both primary and secondary data were used in this study. The primary data was collected from the field while secondary data was obtained through library work. In particular the library work mainly helped in establishing the conceptual framework of the study, in provinding background information of the study area and other information that could not be obtained from the field.

Primary data was collected through the field surveys. However, the major component of information in this study was from the primary sources. The following methods of primary date collection were used: administering of questionnaires, discussion and interviews , topographic and landscape surveys and observations.

Since the study area was extensive, stratified sampling method was used to sample the town residents. The main categories of residents identified included non-workers; formal workers; and informal entrepreneurs. A total of 75 residents were interviewed ensuring proportionality according to the above categories. Also the study area was divided into three zones; high, middle and low incomes residential areas to ensure reliable distribution and representation.

To fill the gap of information left by the above methods, other methods were used which included interviews and informal discussions with local officials, randomly selected entrepreneurs, Non-Governmental Organisations, social opinion groups and the general public. Participant observation was also important.

The main tools of data collection therefore were questionnaires, interviews, mapping, cross-sections, charts and maps, and photographs.

Information on the structure of the town were deduced from the past and present structure plans (Development Plans), Part Development Plans (PDPs) and photographs.

The data collected was later analysed, using various techniques. These techniques included time series analysis which indicated the influence of provision of a particular infrastructure on development; Pearson's correlation coefficient used in testing significance of the relation between the increase in the total annual revenue and the increase in population of the town; and graphical methods used to show the relationship between maintenance expenditure and the service/facility charges.

In this case the total service charges revenue is treated as the independent variable and the maintenance expenditure is the dependent variable.

1.6 Limitations of the Study:

A number of limitations hindered the extent to which the study objectives could be fully addressed.

The assessment of the physical and environmental factors was greatly limited by lack of concrete methods of analysing the site conditions such as soils and geology. In trying to asses the influence of a particular infrastructure to location of buildings and other economic activities, conclusions lacked clarity in situations where several types of infrastructure occurred at the same point.

The evaluation of the extent and utilization of the potential resource base was hindered by lack of data. Due to the tender age of the local town council some relevant information on revenue collected in the period before 1988 could only be obtained from the Nyandarua County Council estimates. This estimation and the different sources are likely to have affected the precision. Moreover, the author faced difficulty in obtaining information on revenue because the authorities concerned were reluctant.

The investigation of causes of lack of maintenance of infrastructure faced the problem of lack of data on actual amounts spent each year on specific type of infrastructure. The figures obtained were annual

averages and included non-infrastructure expenses such as vehicle repair.

Finally, because of time constraints and limited financial resources, the study area was limited to Ol Kalou township and not the whole of the town council area. The number of questionnaires used were 75 for households and 10 for institutions. Although this was a representable sample, it was nevertheless not a total coverage as would have been most desirable.

CHAPTER TWO

ROLE OF INFRASTRUCTURE AND INSTITUTIONS IN URBAN DEVELOPMENT

2.0 Global Overview of Urban Growth:

Urban centres, the cradle of human civilization have existed for at least 6000 years. By modern standards, however few ancient urban centres were very large - only the imperial city of the Tang Dynasty in China had a million people (Obudho,1991). But with industrial revolution in Europe urbanization as a process involving large shifts of people from rural to urban settings began. But by 1980, as Obudho,(1991) pointed out, the world urban population stood at 40 percent of the total global population.

According to UNCHS,(1986) estimates, the distribution of this urban population is increasingly becoming skewed towards Less Developed Countries (LDCs). In 1970 the LDCs share of the worlds' urban population was only 49 percent but in 1985 it was already 58 percent and it is expected to increase to 67 percent in the year 2000.

An important feature of urbanization in the LDCs is that the rate of growth of larger urban centres has been greater than that of small urban centres, thus as Mathur, et al,(1985) observed, down playing the role of small centres in regional development.

Africa as a region is not highly urbanized by global standards. However, Stren, et al,(1989) indicated that the trend in that direction has been extremely rapid. Also notable is that the largest cities have generally been growing fastest so that the largest city within the national urban hierarchy become increasingly dominant.

The high rate of urban growth is mainly due to rural-urban migration; the high urban natural increase; the arbitrary expansion of the urban centres boundaries; and the inter ethnic wars (Obudho,1992). Adding to these also are the non-spatial factors that have significant impacts on the form, rate, nature and extent of urban growth. Such factors include industrial, defence, equalization, agricultural and immigration policies.

Thus the engine of urban growth in LDCs, and especially in Africa, is not the urban economic base, but demographic inertia and the perceived lack of economic opportunity in the rural areas. This growth is inevitable, and the issue to the urban planners and other policy makers should be on how this urban growth "can be managed in such a way that it does not occur to the detriment of the rural economy, the surrounding environment, and the urban system itself" (Stren, et al,1989, p. 7).

With this trend most of the urban centres in

developing countries have become victims of a wide variety of problems associated with high rate of urbanization. There has been a conspicuous failure to plan for urban growth, (Obudho,1992) and serious environmental problems, (UNCHS,1989).

Overconcentration has compounded the problems, as many new central institutions have assumed more responsibility than they could handle, (UNCHS,1990). Consequently, the institutional framework managing urban growth has been characterized by hypertrophy at the centre and atrophy at the local level, (Obudho,1992).

2.1 Urban growth in Kenya and the Government policy:

As indicated above, urbanization is a world-wide phenomenon but it constitutes a particular force in developing countries. Ward,(1969) argued that while urbanization which was experienced in the 19th century in Europe and North America was a response to the forces of industrialism, this was hardly the case in developing countries.

According to the 1979 census' estimates the natural growth rate of Kenya's population was 3.8 per cent p.a., making Kenya one of the countries with the highest population growth rate in the world (Kenya,1984). Thus the national population was estimated at 23.5 million in

1989, (Kenya,1989). This high rate of population growth has been attributed to an increasing fertility rate and concurrently declining mortality rate as a result of improved public health and living standards.

This spectacular population dynamism, is however, accompanied by a population structure with a high age-dependency ratio. According to World Resources,(1987), by 1985 the age-dependency ratio had reached 119.0, registering one of the highest age-dependency ratios in the world and even higher than the average for Africa, which was 94.0.

Bubba, et al(1989)observed that a high dependency ratio implies that the population has less to save and invest for development purposes especially diversification of the economy. With 70 per cent of the country's labour force employed in agriculture, and only 17.5 per cent of the land cultivable (Kenya,1986), the high population growth rate has led to increased pressure on land and other natural resources. These factors among others have fuelled urban growth in Kenya (*Ibid*).

Since independence, therefore, the urban population has rapidly expanded. A recent report, (Kenya,1993), indicates that in 1962 there were only 675,000 urban inhabitants in Kenya. By 1989 this figure had grown

about 5.5 times to be 3,736,000 inhabitants. The same pace of 5 per cent per annum in urban population growth which was experienced during the period 1979-89 is expected to take place up to the year 2010, thus giving a figure slightly below 10 million. The corresponding urbanization rate, according to the mentioned report, will be about 30 per cent against 17.5 per cent in 1989.

Urban centres have been increasing at a high rate. Bubba, et al,(1989) indicates that in 1948 there were only 17 urban centres in Kenya with a population of 267,000, but by 1988, their number had increased to 172 with an estimated population of 4 million. The total number of urban places with more than 2,000 inhabitants in 1993 stood at 119, (Kenya,1993); it had more than trebled since 1962.

It is estimated that by the year 2000 almost 30 per cent of Kenya's population will be urbanized. This high rate of urbanization, according to Sessional paper No.1 of 1986, has been attributed to four factors: natural population increase; boundary extension; rural to urban migration; and small centres crossing the 2000 inhabitant threshold to become urban centres (Kenya,1986).

This urbanization rate has negative repercussion for the country. Stren, et al,(1989) pointed out that as urban areas grow in population and in land area at

historically unprecedented rates, basic urban services and infrastructure; housing, water supply, garbage removal, road repair, public transportation health and educational facilities, become inadequate and deteriorate.

The Government faces increasing pressure to provide these services and infrastructure. The Government policy and responses to the urbanization challenges is paramount to the future urban growth.

According to the Sessional Paper No.1 1986, the concern of the Government would not be centred merely on the high rate of urban growth, but also the pattern it takes. This is more so to ensure an urbanization strategy that focuses on decentralizing urban growth. The main objective is to avoid growth of primate cities; where population concentrate, and instead promote growth of secondary towns and small urban centres to foster linkages between agriculture and other sectors of the economy; and to bring renewed economic growth to all regions of the country, (Kenya,1986; Kenya,1989).

To achieve these objectives, the Government initiated a Rural Trade and Production Centres Programme in which small towns were designated rural trade and production centres (RTPCs). These centres were to receive Government's support in provision of

infrastructure, to stimulate job creation, thereby curbing migration to large cities.

But on overall basis very little has been achieved towards this goal. Small towns suffer considerable shortage of infrastructure; local authorities have remained incapable of managing the urban areas; and large cities especially Nairobi continue to lure the rural population. Bubba, et al(1989) attributes this to Government's failure to involve the local authorities and other local institutions in the management of urbanization.

In the 1970s, according to World Bank,(1972), the international response to these services and infrastructure problem was to finance large projects, to improve urban policies, and to press for reforms of colonially-inspired standard of urban planning and construction.

Since the early 1980s , however , the focus of the reform efforts have shifted to the institutional arena (Stren, et al,1989). The emphasis now is on "...improvement in national housing finance systems, urban management and planning, local government revenue generation and budget procedures, and decentralisation of national government authority over cities".(*Ibid*,p. 7).

In 1983, the US Agency for International Development and World Bank embarked on two projects to promote growth of small towns, but with the recognition that the local authorities must bear the major responsibility for urbanization. This required that local governments be organised to perform local development planning and urban management functions, (USAID,1985; World Bank,1983).

The argument is that although approaches to sustainable development of human settlements will vary from country to country, common to all has been the understanding that the starting point is the strengthening of the institutional and managerial capacity at the municipal level, the expansion of local revenue base and the redefinition of relation between central and local government (UNCHS,1989c).

This study examines whether this call is headed in Kenya. It examines the managerial capacity of a town council, the adequacy of it's revenue base and the methods of mobilising resources and the relationship between the town council and other institutions, and also with the central government. In general, this study examines how the Government has responded to the urbanization challenges through local institutions, with a view to identifying the effective arrangement of such

institutions in performing this function to facilitate sustainable urban development.

2.2 The role of infrastructure in urban growth:

The term "infrastructure" has a very flexible definition and as Ahmed,et al,(1992) pointed out, a common definition is essential for understanding and resolving issues related to research and public sector role in development of infrastructure.

2.2.1 Definition:

The term infrastructure was evolved during the second World war by military strategists to indicate wide-ranging elements of war logistics (*Ibid*). Thereafter, economists introduced the term into the literature of development economics to be used interchangeably with "capital overhead" (Youngson,1967).

The term has often been used extremely loosely, though distinctions such as "social infrastructure", "soft infrastructure", "economic infrastructure", "hard infrastructure", and "institutional infrastructure" were made to emphasise a particular aspect of many attributes of "infrastructure" (Ahmed, et al,1992).

For an operational definition several authors have

defined infrastructure as the social overhead capital of a society, (Youngson,1967; Samuelson,1954; Ahmed, et al,1992; UNCHS,1989b). UNCHS,(1989b) noted that infrastructure comprise those elements which are fundamental for all social and economic activities in a modern society, and which cannot be reasonably produced by the private sector. Samuelson,(1954) argued that they produce external economies (technical and pecuniary) and social benefits different from private benefits because they are jointly consumed.

Youngson,(1967) tried to make the definition of infrastructure relatively simple by emphasizing that infrastructure is not a set of things but a set of attributes. For example, it is a source of external economies, and it is provided in large units ahead of demand.

In 1950s and the 1970s a surge of attempts to further specify the content of infrastructure or "overhead capital" occurred. Lewis,(1955) included public utilities, ports, water supplies and electricity in the specification of infrastructure. Higgins,(1959) included transport, public utilities, schools and hospitals. Hirschman,(1958) listed law and order, education, public health, transportation, communication, power, water supply, irrigation and drainage. He

distinguished between a wider concept of social overhead capital, as listed above, and a "hardcore" which he limits to transport and power.

Hirshman,(1958) set out four conditions for distinguishing "social overhead capital" from "directly productive activities": the services provided are to facilitate, or in some sense are basic to, the carrying out of a wide variety of economic activities; they are provided in practically all countries by public agencies or by private agencies subject to public control and are provided free of charge or at rates publicly regulated; they cannot be imported; and the investment required is characterized by large investments.

With increased recognition of the role of agriculture in economic development, some authors added emphasis on agricultural research and extension, rural financial institutions, irrigation and drainage, as part of infrastructure, Nicholls,(1963) revealed. Ahmed, et al.,(1962) argued that depending on the degree of emphasis between agriculture and industry in the development strategy of a country, one could emphasize the elements that matter more for either rural or urban development.

Although the impression created is that infrastructure involves investment projects and programmes that can not be carried out by the private

sector because of the risk associated with capital intensive and long-term investments, reservations are held for the role which can be played by the local community in provision of basic infrastructure particularly innovative ones. Stren,(1989) stressed that private provision of public service is a trend which is on increase in Third World with the emergence of the concept of privatization.

From this short review of literature on definition of infrastructure, it is apparent that the definition is quite flexible. This study however, adopt the concept of "infrastructure" as social overhead capital that include public utilities and meant to facilitate economic activities. Though not necessarily, infrastructure involve large investments, but this should not rule out private sector and community involvement in provision.

2.2.2 The Role of Infrastructure:

The role of infrastructure in any aspect of development can be traced on impact of their creation. However, according to Ahmed, et al(1992) studies on impact of infrastructure are limited, and the available ones can be classified into three broad groups : systematic research based on primary data of specific [illegible], [illegible] are not common; appraisal,

evaluation and assessment of infrastructural projects by international multilateral agencies particularly the World Bank and the bilateral donor agencies, such as USAID, generally but not always, reports hurriedly prepared by groups of professionals; and books, articles and papers based on secondary information, mostly borrowing from the above two.

Economists have used deductive logic to formulate hypotheses on the possible effects of the creation of infrastructure. However, Ahmed, et al(1992) indicated that such economic approaches are simplified and do not say anything about how these effects are realised, nor does it say anything about social development which may occur, such as effects on consumption pattern, family planning and health, besides negative effects which may also occur, for example undesirable environmental effects.

Due to this complexity, most models of development and numerous discrete studies of growth and development give explanations that imply a strategic but hidden role of infrastructure. Von Thunen's 1848 model of agriculture focused on urban-industrial pull and the critical role of transport and communications in that pull (*Ibid*).

The "frontier model" which explains rapid agricultural growth by opening up new land, and the "diffusion model" which formulates the process of technological spread in agriculture, critically depends on a number of physical and institutional infrastructure (Ruttan,1984).

In outlining India's future economic development, Mellor,(1976) placed infrastructure development as one of the top priorities.

Infrastructure also plays a role in influencing the distribution of income and wealth. UNCHS,(1989) noted that very often, the location of infrastructure investment has great significance in this respect, but these effects are normally difficult to specify and even more difficult to assess empirically.

Nevertheless, in general very few literature focuses on the role of infrastructure on the pattern of development, and particularly in urban areas. This gap is attributed to the difficulty in giving empirical assessment, (UNCHS,1989; Ahmed, et al,1992), and in getting a methodology capable of singling out the impact of infrastructure on spatial growth (RT1,1975).

Recent studies in Kisii and Busia indicated that comparative study of aerial photographs of 1955, 1967 and 1976 and the field survey done in 1988 showed that urban

development is highly responsive to infrastructure especially roads and piped water; which acts as stimuli which invites individuals to change their land use from rural to urban, (MOLG & PP,1988a; MOLG & PPL,1988b). As a result the spatial pattern of the town is determined by the location and distribution of infrastructure.

A feasibility study on small towns in Kenya, noted that inadequate physical infrastructure and public utilities of a town act as a constraint for urban economic development and may at least discourage investments, even though the town's hinterland may have significant potential for urban economic growth (Kenya,1993).

Some towns in Kenya have experienced increased investments after their physical infrastructure was improved. Karatina, which attracted more investors after roads and drainage systems were improved with funding by USAID, is an example (*Ibid*). There is no doubt that lack of water supply and inadequate electricity, constrain the development of medium to large size enterprises (in particular those engaged in agro-processing).

Some of the roles of infrastructure especially in urban growth, can be summarised as follows:

(a) Increases (potential) external economies

and thereby favours the growth of existing or creation of certain economic activities.

(b) Infrastructure is a necessary but not sufficient condition for development. New opportunities for economic activities arises as a result of infrastructure, but resources (both capital and human) are required to utilize them.

(c) It has income effects; infrastructure construction and operation creates new jobs and corresponding income and multiplier effects depending on the consumption level and pattern.

(b) It has attraction effects; with improved infrastructure population and economic activities are attracted and thus bring structural changes.

(e) Transport infrastructure plays an important role in the process of development. Inter-regional and inter-urban accessibility facilitates inter-regional trade, thus allowing regional specialisation, inter-regional division of labour and "functional segregation" to emerge.

(f) Water supply and sanitation together play a key role in promoting health and environmental conditions, and improve low-income communities in social as well as material sense. This is more so when reinforced with provision of drainage and solid waste

disposal facilities.

(g) Electricity supplies, transport, communications, and others more often regarded as amenities and thus not essential for low-income rural-dwellers, are vital elements of an urban area. They provide the means of operation and running of the economy.

The UNCHS,(1989b) argued that investment in infrastructure implies the allocation of monetary, institutional and human capital to achieve effects which can not always be directly evaluated in monetary terms. It comprises categories of non-monetary benefits and costs as well. Some of the effects may reach into the far future, in particular with respect to environmental and social aspects. This study evaluated the influence of the existing infrastructural facilities on the current spatial pattern of Ol Kalou town and thus the role infrastructure has played in growth of the town.

2.3 Institutional set up in urban development:

In most countries, the responsibility for urban development falls on a number of agencies. At one time in Kenya, it was claimed that there were about thirty-six separate branches of public and private sectors which had a role in the formulation or implementation of urban

planning and development (Kenya,1993).

However, the following have been singled-out as the most important ones: the local authorities, various central Government ministries such as Ministry of Local Government (MLG); Ministry of Planning and National Development (MPND); Ministry of Finance (MF); Ministry of Education (MED); Ministry of Water Development (MWD); Ministry of Health (MH); Ministry of Lands and Settlement (MLS); Ministry of Public Works and Housing (MOWH); Office of the Attorney General (AG) and the Office of the President (OP); and parastatals such as the National Housing Corporation (NHC) and Kenya Industrial Estate (KIE); and public companies such as the Housing Finance Corporation of Kenya (HFCK) (*Ibid*).

Over the years some writers, for example Akivaga, et al(1988), and Bubba, et al(1989) have noted that several governmental agencies have over lapping and competing responsibility in urban development. The latter argued that complex institutional arrangement arise due to involvement of various agencies thus causing administrative problems.

The urban administrative system in Kenya therefore seems inefficient and incapable of responding promptly and effectively to the ever growing needs of the urban

areas. The main causes of this problem are: the subjection to too many Central Government control on part of local authorities; very poor record on revenue collection, corruption and misuse of resources; and internal weaknesses and conflicts which distract the concerned authorities from their responsibility of managing urban areas.

A closer look at the local authorities in Kenya as the main institution responsible for urban management, is warranted.

2.3.1 Local authorities:

Like in most other developing countries, the institutional and legal structure of local government in Kenya is inadequate in managing the rapid urbanization which has confronted the country. It is clear that African countries generally are still "tied to what the colonial system left behind ... and to the extent that such arrangement suited certain sections of the population, nothing had changed" especially with respect to giving "the base more responsibility relative to the highest levels", (Stren,1989 p. 12).

WCED,(1987) argued that this local government structure was designed to deal with predominantly rural and agricultural societies of the colonial time and it

was never intended to cope with rapid urbanization or to manage cities of several million inhabitants.

Harris,(1992) argued that although it is in Africa that we find what is described as "natural democracy ; people working together, sharing resources, discussing what to do with very little hierarchy" and the understanding of the concept of "sustainability; the reuse of resources, recycling of materials", the urban management of cities is "derived largely from model(s) of the north ... which is a model of containment, suppression and waste", (p. 96).

This model of urban government came into Kenya with the advent of the British in the 19th century which also led to development of urban centres. Systems similar to one used in other British colonies were used. It was a model based on the industrial revolution of the nineteenth century Europe "whose towns were characterized by fear of masses, of their diseases, their unpredictability, their power and their numbers. It was meant to tame and control the masses", (Bubba, et al,1989).

Akivaga, et al,(1988) observed that this system was based on racial segregation, resulting into two different local administration structures - one for Africans rural areas and another for the European urban areas.

This dual system of local government operated in Kenya until independence, when the system was unified following the 1961 Sessional Paper No.2 entitled "The Reconstruction of Local Authorities", which laid out the framework of local government in Kenya. The Local Government Act, Cap.265, Laws of Kenya, were passed in 1977, (*Ibid*).

To facilitate the running of the local authorities in Kenya, the Government establishes them as separate legal entities from the Central Government (Kenya,1963). But as agents of the Central Government, the local authorities can only operate within the framework set by the former, and in particular the Ministry of Local Government which plays a supervisory role. This, according to Bubba, et al(1989) is a continuation of the colonial practice of assuming that local authorities are "Separate Legal Entities" but subject to various degree of control from the Central Government.

There is strong centralisation especially in issues pertaining to resources, and most decisions have to be approved by the Central Government (Akivaga, et al,1988; Bubba, et al,1989; The Accountant,April/June 1993). As a result the original concept of local government has lost its meaning and they no longer play their role of

representing the people.

The WCED,(1987) report pointed out that the lack of political access to an adequate financial base is the major weakness of local government in many developing countries, which result in growing centralisation and continuing weakness at both central and local level. Local Governments do not gain the expertise, authority and credibility needed to deal with local problems.

Revelations have been made in connection with the local authorities inability to generate adequate revenue resources to keep pace with service demands. The reasons advanced are that the authorities lack freedom on all matters concerning the nature and level of taxes and fees that can be levied to meet their operational needs; delays in granting approval to their proposal by the Ministry of Local Government; and lack of effective methods of collecting dues, (The Accountant, April/June,1993 p. 21).

Historically the provision of some services to the populace are best done by a local authority because such an authority can operate at the local or grassroots level, where the area residents know their needs and priorities better than anybody else. The local authority therefore is supposed to act in accordance with the needs

and aspirations of the local residents (*Ibid*).

In its report the WCED,(1987) observed that urban development cannot be based on standardised models, imported or indigenous. Development possibilities are particular to each city and must be assessed within the context of its own need. In other words, what works in one town may be totally inappropriate in another. Technical help from central agencies may be needed but a strong local government is required to ensure that the needs, customs, urban forms, social priorities, and environmental conditions of the local area are reflected in local plans for urban development (Ibid).

Greater attention to the policy and operations of the local authorities in Kenya is required. Many authors have perceived the local authorities in Kenya as merely implementing branches of the central-government policies, (Bubba, et al,1989). The UNCHS,(1986) noted that decentralisation is required to bring about "the optimum balance in the distribution of functions between the various levels of government, and to avoid situations in which central-government institutions take direct control of many programmes and activities at the local level, overloading them unnecessarily and inhibiting the sound development of local institutions and their jurisdictions

and surrounding economic regions", (p. 32).

This study examines the extent to which Central Government and its institutions control urban development, with respect to control on financial resources and co-ordination of projects, thereby inhibiting real control and even initiation of sound infrastructural programmes in Ol Kalou. In this context a look at financial sources is important.

2.3.2 Infrastructure Finance Sources:

Generally four sources of funds exist for infrastructure development programmes. They are the Government budget, foreign loans, institutional funding within a country and the beneficiary communities themselves (UNCHS,1986).

A study analysing the sources of revenue for the Nairobi City Council, (Ogero,1981), identified rates, fee and charges, Central Government grants, and service charge as the main sources of revenue. These four categories of sources of revenue are used for purpose of recurrent expenditure.

The above sources can be distinguished from the capital revenue sources which are used to finance large undertakings such as roads construction and water schemes. These include the Local Government Loan

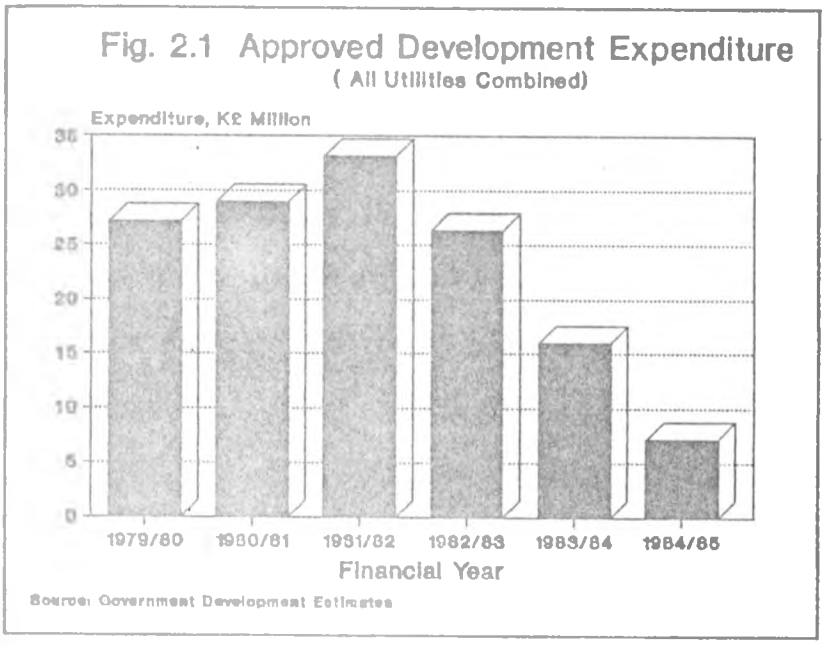
Authority (L.G.L.A), stock issue, Housing Finance Company of Kenya (HFCK), National Housing Corporation (NHC), Kenya Government Loans and external capital (*Ibid*).

External agencies which have been involved in lending to local authorities in Kenya are, for example the World Bank, Commonwealth Development Corporation (C.D.C.), United States Agency for International Development (USAID) and others. Other sources of domestic capital include loans from the Ministry of Local Government, and the Kenya Government Superannuation fund.

A report on housing survey, Kenya,(1983) explained that as the urban population increases, investment requirements in infrastructure utilities also increases "at least proportionately, if not faster, due to rising expectations by urban inhabitants for improved service" (p. 15).

Unfortunately recent trends show a declining level of investment resource commitment per urban resident in the utility sector. Although traditionally the provision of urban facilities and services has been the responsibility of the Central Government (directly or indirectly through local authorities), the approved gross expenditure in urban services declined, for example, from K£.27.15 million in 1979/80 to a mere K£.7.23 million in

1984/85 financial year (*Ibid*). The figure below shows the approved expenditure in urban utilities in the years between 1979 and 1985.



This trend has persisted so that in 1989/90 financial year, the total national current expenditure assistance to local authorities was at K£.0.48 million down from K£.0.75 million in 1986/87 (Kenya,1991).

While these budget cuts have helped the Government achieve its aim of reducing its current budget deficits, this has however led to the postponement of urban projects awaiting funding and increased the backlog of unmet demand for various services.

Mairura,(1993) argued that these budget cuts should

be seen as but a 'blanket' covering a decaying and a deprived level of services in urban areas.

Taxation has been one of the major sources of current revenue for local authorities in Kenya. In particular, land rates has been the major source, accounting for up to 70 per cent of the current revenue in some councils. Figures in Statistical Abstract,(1988) shows that between 1982 and 1987, rates accounted for approximately 40 per cent of all municipal councils revenue (see table below).

Table: 2.1 MAJOR SOURCES OF REVENUE IN MUNICIPAL COUNCILS, 1982 - 1987 K£'000

	1982	1983	1984	1985	1986*	1987*
Current Revenue						
Direct Taxes (Rates**)	21,229	21,262	18,980	23,491	20,544	24,459
Indirect Taxes (Licences,Cesses)	1,708	1,880	982	2,864	1,930	3,044
Income from Property	2,473	1,411	181	459	376	3,000
Current Transfers	2,640	944	652	990	901	828
sale of Goods & Services	23,145	27,184	26,101	24,923	31,938	32,017
Total Current	52,195	52,731	46,896	52,727	55,689	63,348
Capital Revenue						
Loans raised	14,760	17,790	13,224	44,486	25,721	22,031
Grants	–	–	–	–	–	–
Loans Repayment	60	48	80	25	74	55
Total Capital	14,820	17,838	13,304	44,511	25,795	22,086
Total Revenue	66,015	70,569	60,200	97,238	81,484	85,434

* Provisional
** Paid by household and enterprises.
Source: Kenya, Statistical Abstract,1988.

It has been estimated that between 1973 and 1983, fee and charges contributed an average of 17 per cent of the total local authority revenue (Kenya,1984), thus

making this item a major revenue source.

However in the last four or so years, the revenue earned from sale of goods and services (including service charge) has continued to surpass property taxes (rates) as major sources of current revenue for local authorities (Mairura,1993). This is largely due to the introduction of service charge in 1989.

Unfortunately, this revenue that was meant to improve urban services is instead used to meet other general administrative expenses of the councils, thus leaving the utility sector inadequately financed (*Ibid*).

Moreover, various surveys in secondary towns in Kenya have revealed that revenue earned as a result of various municipal services to the residents, e.g. water supply, sewerage and refuse collection, are far much below the expenditure levels in those utilities (DANIDA,1982; Kenya,1993). It is apparent that for a long time to come revenue earned will never cover the expenses incurred. The move in many local authorities today is geared towards either increasing utility charges to at least a level covering the running costs or providing funds from other sources.

The bulk of capital finance has therefore continued to come from foreign donors either as grant or as

bilateral loans (see Table: 2.2).

Table: 2.2 SEWERAGE CAPITAL FINANCE SOURCES (1982 PRICES)

TOWN	TOTAL CAPITAL KSHS. MILLION	FINANCING COMPONENT LGLA	FOREIGN
Busia	22.0	10.2	11.8
Isiolo	19.2	8.7	10.5
Nyahururu	31.1	14.1	17.0
Homa Bay	13.8	5.4	8.4

Source: DANIDA,(1982).

In the recent past the foreign component has tended to cover about 50 per cent of the infrastructure project cost while the rest has had to be financed from local public sources (Mairura,1993). This local component is covered by the loan from of Kenya Government through Local Government Loans Authority (L.G.L.A) to local authorities undertaking major infrastructure projects such as water-borne sewerage system (Bubba, et al,1989).

Compared to foreign sources the L.G.L.A. loan appear to be more expensive (offered at 6.5 per cent rate and are payable over a period of 30 years), since the former seem to give more generous credit terms (Mairura,1993).

Unfortunately, the amount of external assistance has declined in the recent past, and even some areas stopped altogether. This is a big blow to the development of infrastructure services in the country. It appears the local authorities are facing a major problem. Sources of infrastructure finance are declining at a time when the demand is growing fast.

The Government grants which used to be a common source of revenue was scrapped during the 1980s. Table 2.1 shows that between 1982 and 1987 the municipal councils received no grants from the Government.

Some local authorities generate income through commercial activities like rental housing, rental market stalls, and sale of water. If such activities are run economically and efficiently, they could form an important and regular source of revenue. But due to poor management, such activities often run at a loss and have to be written off against the revenue funds (Akivaga, et al,1988).

2.3.3 Identified Problems:

It is clear that the financial problem facing utility services in secondary towns is related to inadequate financing when compared to escalating costs. What factors contribute to this poor financial position in local authorities? Several factors have been identified by various authors.

Ogero,(1981) argued that the major problem is that the revenue are not adequate to meet the full cost of provision of services. A casual survey of secondary towns in Kenya reveal that these centres have a very poor economic structure that is characterised by wide spread

poverty. For example the size of major productive sectors like the manufacturing industry and commerce in these towns is very small. Their population comprise a large proportion of consumers but very low per capital income.

The situation is made worse when one realises that the growth of the productive sector in these towns is far below the rate of growth of the urban population. This means that the potential growth of the revenue base is outpaced by the demand. Indeed it has been noted that the "relative inelasticity of revenue resources with respect to increasing demand for services continued to hinder effective operations of most local authorities in the country" (Economic Survey,1990, p 82).

However, this argument on poor revenue base does not go unchallenged. Linn,(1979) argued that although it is commonly recognized that demand for urban services expands more rapidly than supply, the effect of the urban growth on revenue is less often discussed. Urban growth may well be contributing to the financial resources, but local Government may be failing to draw on these resources, but the potential exist (Bahl, et al,1983). The argument is that as urbanization increases, it drives up property values, income earned, the number and sales of local businesses, and the number of cars and trucks

thereby increasing the taxable capacity of the local government.

But Mairura,(1993) pointed out that moves by local authorities to expand their revenue bases through, for example, increased taxation, have often faced stiff opposition by local residents and the central government which has the veto power. One of the strong reasons advanced against such moves is that local authorities have failed to adequately collect money owed to them from existing sources and therefore have no justification for increasing or broadening taxation. In fact improved revenue collection has been used as a condition for future foreign donor assistance, for instance from the World Bank (Hagger,1973).

Thus it can be argued that the inadequacy of revenue is caused by poor record of collection system, characterized by under staffing and corruption. But it should be noted that some of the large debtors of local authorities in Kenya are Government ministries and other public bodies.

The aspect of subsidizing rent by the local authorities reduces further the potential revenue because they are usually below market rates (Ogero,1981). This problem is common to most of the developing countries, and especially in the 'Anglophone Africa', where, "for

historical and institutional reasons, financial aspects of the towns, were more of a focus for political pressure, a factor which was incompatible with financial integrity and balanced budgets", (Stren, et al,1989). In such countries both the Government and consumer have an attitude that "good water supply and adequate sanitation are a social service, for which charges should be kept to a minimum (UNCHS,1986).

This trend lead to inadequate cost-recovery and as a result, the ability of the infrastructure project to become self-financing is hampered.

The problem of inadequate financing of infrastructure services is also attributed to institutional weaknesses within the administrative and management systems of local authorities. This is illustrated by the fact that although local authorities in Kenya are being encouraged to be financially independent, they still find their hands tied down by the administrative structure which requires reference to the central Government on even very small matters (Mairura,1993).

UNCRD,(1990) noted that local autonomy in resource mobilization is a prerequisite for sustained local-level development. Local authorities should have sufficient financial autonomy with revenue raising power to make

them self-reliant. Kathukya,(1979) revealed that this is not the case in Kenya. He pointed out that local authorities like town councils and urban councils are not authorised to enter into negotiations for loans with commercial banks or other lending institutions, because of what is regarded as poor security risks.

The delay in project implementation has also contributed to high costs of projects which in turn makes finance inadequate. Prolonged periods of project planning, design, approval, tendering, award of contracts and construction have often given rise to increased cost. Mairura,(1993) gave examples of sewerage projects in Busia, Isiolo, Nyahururu and Homa Bay whose implementation was delayed for periods as long as 5 - 10 years, and in this period project costs more than doubled (see table below).

Table 2.3: SEWERAGE CONSTRUCTION COST CHANGES DUE TO DELAYS

	Cost, Kshs. Million			
	1976/77	1982	Financed by	
			LGLA Loans	Foreign Loan
Busia	7.8	22.0	10.2	11.8
Isiolo	7.7	19.2	8.7	10.5
Nyahururu	12.1	31.1	14.1	17.0
Homa Bay	5.0	13.8	5.4	8.4

Source: Mairura,E.O. (1993): "Urban Infrastructure Financing Management in Kenya", unpublished paper, University of Nairobi (p.15).

Over the period between 1976/77 to 1982, the projects'

costs in aggregate increased from initial Kshs.32.7 million to Kshs.86.1 million.

Among the reasons advanced to explain the delays in project implementation includes absence of approved town development plans and unmitigated bottlenecks in the administration of contracts tendering procedures.

Inappropriate urban development planning and design standards have also been identified as factors contributing to the problem of increased costs of infrastructure projects in small towns. Studies by Hagger,(1978) and Mairura,(1988) have revealed that very little or no consideration is made when planning and designing urban structure to the effect of such structure on costs of infrastructure services and the ability of the councils or consumers to meet the cost of the services consumed.

A look at the designated municipal areas of such towns as Meru, Machakos, Limuru, Nanyuki and others shows that they cover huge tracks of land which is still rural, have small scattered developments, often across highly rugged terrain and dissected sites that are difficult and costly to service (Mairura,1993).

It would be unpractical to try and exhaust all factors that explain why our urban centres lack the much required infrastructure services and facilities.

However, when all is said, it should be noted that some factors which condition the level of the local authorities income, such as the income level of the population and demographic composition, cannot be drastically altered by the local authorities action (UNCHS,1989). For instance, it is true that fiscal passivity pervades local governments, and they limit themselves to collecting routine revenue which sometimes barely pay for personnel salaries and a few basic services.

The obvious source of funds, for the much needed infrastructure services and facilities, would be a revolving fund, sustained exclusively by the contributions of the beneficiary communities. This should be at a level adequate to ensure reapplication of investment for expanding, operating and maíntaining the existing facilities.

This study assess the suitability of the site conditions in Ol Kalou to provision of infrastructure. It reveals the capacity of the institutions, especially the Ol Kalou Town Council, in financing infrastructure project. It also assess how best the local community can participate in mobilization of resources, for the purpose of infrastructure development.

2.4 Sustainable urban growth: the requirements:

The World Commission on Environment and Development (WCED) defined sustainable development as a "process in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are made consistent with future as well as present needs" (UNEP,1991 p 8).

While the above notion is held almost worldwide, in the recent years' urban transition; which is confirmed irreversible (UNCHS,1989a) and involves transforming almost half of the world's population into urban dwellers by the year 2000 (UNCHS,1992), urban decay is one of the most immediate disaster, especially for developing countries. It involves the worsening of urban environment as a result of the inability of the city or national government to provide satisfactory services for sanitation, solid-waste disposal, transport and other facilities and amenities.

But this urbanization process is not necessarily a disaster. It presents a profound economic transformation produced by the processes of modernization and demographic shifts (*Ibid*). What is required is the sustainability of this development (urbanization).

One of the basic items that should be appreciated is

that we cannot talk about development sustainability alone, without addressing the short-term problems of day-to-day survival of urban dwellers. The UNCRD, et al,(1990) report see the solution in evolving environmentally-sound methods of resource utilization to facilitate coping with prevailing and future economic difficulties, and more significantly contributing to improvement of quality of life for all, and especially the poor.

A major approach recognised in achieving sustainability is promotion of local initiatives as a means of survival, while at the same time not allowing the potential ravages of development to overexploit the natural environment (*Ibid*).

Infrastructure support and the already cited judicious use of natural resources are two key elements that determine the sustainability of local initiative and therefore development (UNCRD, et al,1990). Local initiatives will considerably contribute to the establishment and maintenance of infrastructure. In many cases it is the excessive role of the government that kill local initiatives.

A recent survey on infrastructural development, (Kenya,1993), revealed that investments for urban

facilities must be geared to the users' affordability. There is no doubt affordability and sustainability of communal facilities are interdependent. It should be noted with earnest, that sustainability is especially a critical issue in connection with facilities which draw heavily on the town's expenditure without generating appreciable revenue.

In view of this the above cited report argued that "charging user fee which are at least cost recovering or even generate a profit for the local authority would hence be justified" (p.4).

Infrastructure will usher sustainable urban growth. They will promote local initiatives, and on the other hand, local initiatives will emerge to capture opportunities that arises from new development such as electricity and roads (MOL&PP.1988a; MOL&PP.1988b).

Financial independence is also a crucial factor. Mairura,(1993) argued that development planning that is dependant on external sources cannot be said to be sustainable development. He suggested that the government should make use of more regulatory and legislative powers that provide incentives and opportunities for private sector contribution in infrastructure financing.

He called for use of appropriate designs and

standards in planning urban development. The argument advanced is that our engineers and planners continue to use standards developed in other countries even when they know that they are not affordable. Related to this is the habit of designating an area for urban development even when the physical, environmental and site conditions are difficult for infrastructure provision.

Sustainability of development in urban areas can be achieved also by shifting the methods employed in resource exploitation from being survival-oriented to future-oriented methods which do not jeopardize long-term sustainability. This requires re-orientation of society education and values (*Ibid*).

The institutional framework within which resources for development are acquired is also vital in sustainability of the development. Viable institutions void of unnecessary complexities, duplication and conflicts are prerequisite to ensure reliable finance and other resources (Ogero,1981; UNCHS,1986; Bubba, et al,1989; Mairura,1993).

2.5 Conclusion and the Theoretical Framework:

In order to provide a meaningful insight into the analysis of the role of infrastructure on growth of the town under study, and also the institutional constraints to the provision of the same, a general framework was articulated. This framework is based on the following factors deduced from the foregoing literature review

The rate of urban growth in Kenya is very high (Kenya,1989) and can be viewed from the global perspective; where urbanization rate is confirmed high and irreversible (UNCHS,1989a). This transition unless managed in time will among other things lead to urban decay; manifested in the unsatisfactory urban services and facilities.

Provision of infrastructure services and facilities can be used as the approach to control urban growth by containing undesirable urban sprawl and enhancing environmental conservation (MOLG&PP,1988a; 1988b). The policy of the Kenya Government is to enhance provision of infrastructure through an urbanization strategy that focuses on decentralising urban growth, and promoting growth of secondary and small towns (Kenya,1986;Kenya,1989). Urban infrastructure would be concentrated in these centres. In this regard, the Government would not only be appreciating, but also

recognising the role which can be played by infrastructure in sustainability of human settlements and development planning (UNCHS,19896; UNCRD, et al,1990).

This role of infrastructural factors in economic development has not been adequately studied especially with regard to the influence on the spatial urban pattern. The few studies which exist show that this role either remains to be fully unfolded or has been unravelled with considerable ambiguity (Ahmed, et al,1992).

The role of the urban management institutions in provision of the infrastructure is significant. This is with regard to acquisition and mobilization of financial resources (Ogero,1981; UNCHS,1986; Bubba, et al,1989; and Mairura,1993). However, complex and unnecessary duplication of responsibilities due to 'inappropriate institutional set-up often lead to chronic inadequate provision of infrastructure and lack of maintenance of the existing ones (*Ibid*).

Local authorities may be failing to draw on local resources, due to failure to involve local community in mobilization of financial resources for development of infrastructure (Bahl, et al,1983) and due to lack of autonomy in resources mobilization (UNCRD,1990;

Mairura,1993).

Moreover, the sustainability of the urban growth based on affordability and local initiatives is suppressed due to institutional bottlenecks and use of inappropriate designs and standards (*Ibid*; Kenya,1993).

In this study the author came up with a conceptual model which illustrates the above stipulated issues in a more generalised manner. This way a guideline to this study was evolved.

2.5.1 Conceptual Model:

The study singled out four main types of infrastructure namely: water supply, sewerage system, roads and electricity. This is because the above are the major infrastructural issues in the study area, and also to facilitate clarity and thorough analysis of their impacts or otherwise.

The establishment of infrastructure depends on the decision of the local institutions. Put in the other way, the types of infrastructure will determine the types of institutions that would exist; for instance water supply will necessitate the presence of a water authority (Ministry of Water Development).

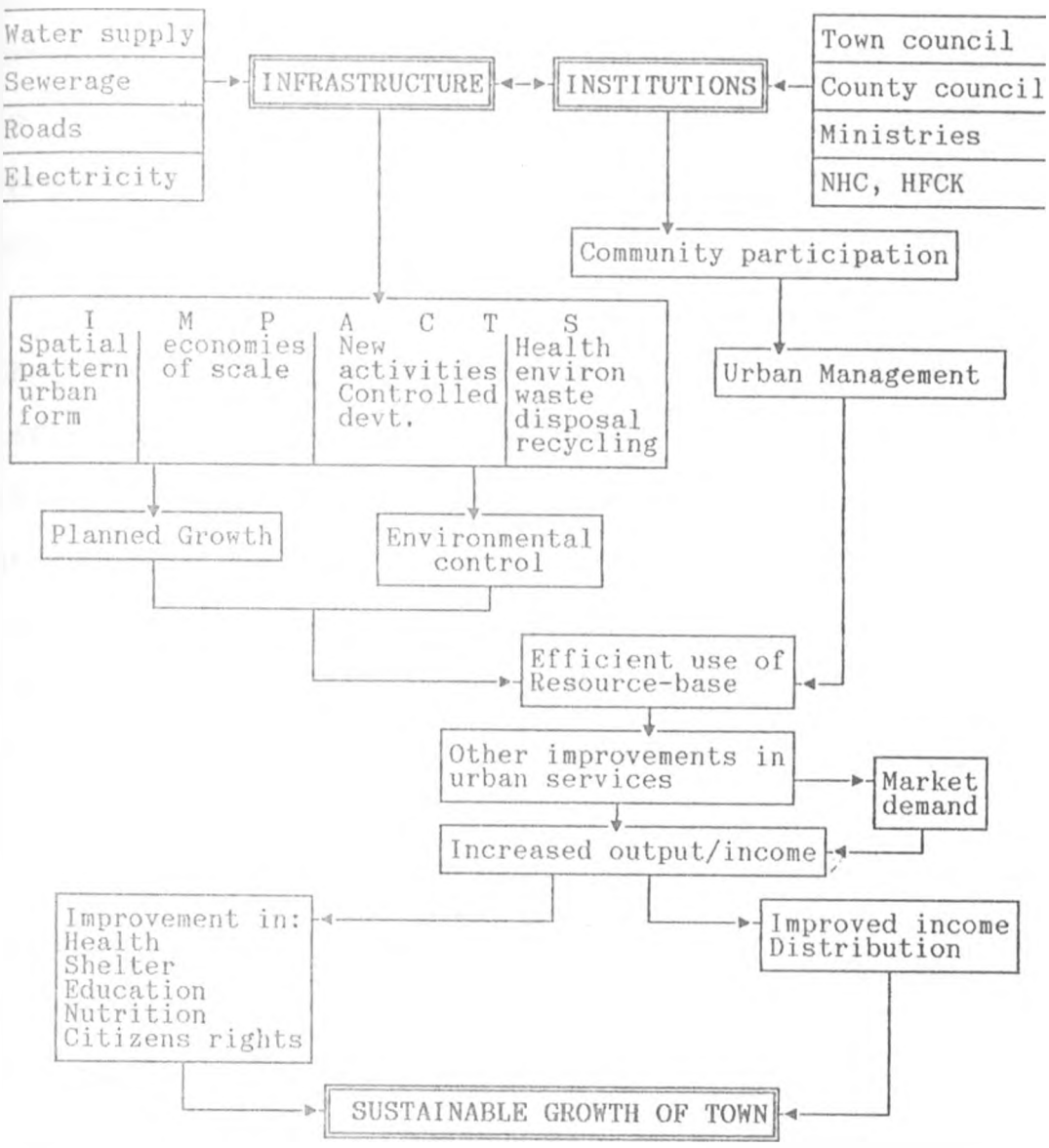
The physical characteristics of the landscape will

dictate the type and distribution pattern of infrastructure facilities in the town as well as the spatial pattern of urban land use activity generally. Provision of infrastructure will lead to physical, social and economic impacts on the growth of the town. In particular, location and distribution of infrastructure and hence urban land use activities, will to a larger extent determine the urban pattern. They would create economies of scale and lead to environmental conservation. This would facilitate desirable growth with environmental control, thus ensuring sound and efficient use of the resource-base.

The proper arrangement and management of institutions, accompanied by local community participation would bring about sound management, hence efficient use of resource-base.

Efficient use of resource-base will lead to other improvements, increased output and income, enlarged market demand and generally improved urban life and growth which is sustainable. This is explained in the conceptual model below.

Figure 2.2 CONCEPTUAL MODEL:



Source: Researcher, 1993.

In applying the above model, this study identified the various institutions involved in provision of infrastructure in Ol Kalou, with emphasise on the four types of infrastructure singled out. Closer attention was

paid to the role of the local authority particularly with regard to acquisition and mobilization of financial resources for procurement of infrastructure. The aim was to identify whether local resources are drawn on to promote provision of services as demand increases year after year.

The physical and environmental site conditions of the town were assessed to identify the consequent influence on the distribution of infrastructure, and how this has, consequently determined the urban pattern. The study evaluated this urban pattern on basis of whether it facilitated desirable growth and environmental control that ensures sustainable urban growth. Besides conducive sites conditions and availability of capital for provision of infrastructure, sound-management of resources is required. This should incorporate important aspects like maintenance of infrastructure together with co-ordination of such projects. Thus, this theoretical framework guided the study into evaluating this aspect particularly the causes of lack maintenance of infrastructure.

It therefore follows that this theoretical framework and the derived conceptual model are directly related to the methodology adopted in this study. The three outlined objectives of the study focused on the basic

components identified in the framework. These are, the influence of the physical characteristics on provision of infrastructure, and therefore the resultant urban pattern; the role of institutions; and the aspect of infrastructure maintenance. The data collection methods used were designed to facilitate collection of information on these components. Similarly, data analysis which also involved testing of hypotheses, extracted the required information that led to the conclusions, findings and therefore recommendations.

The next chapter introduces the study area with emphasis on location, physical characteristics and socio-economic profile.

CHAPTER THREE

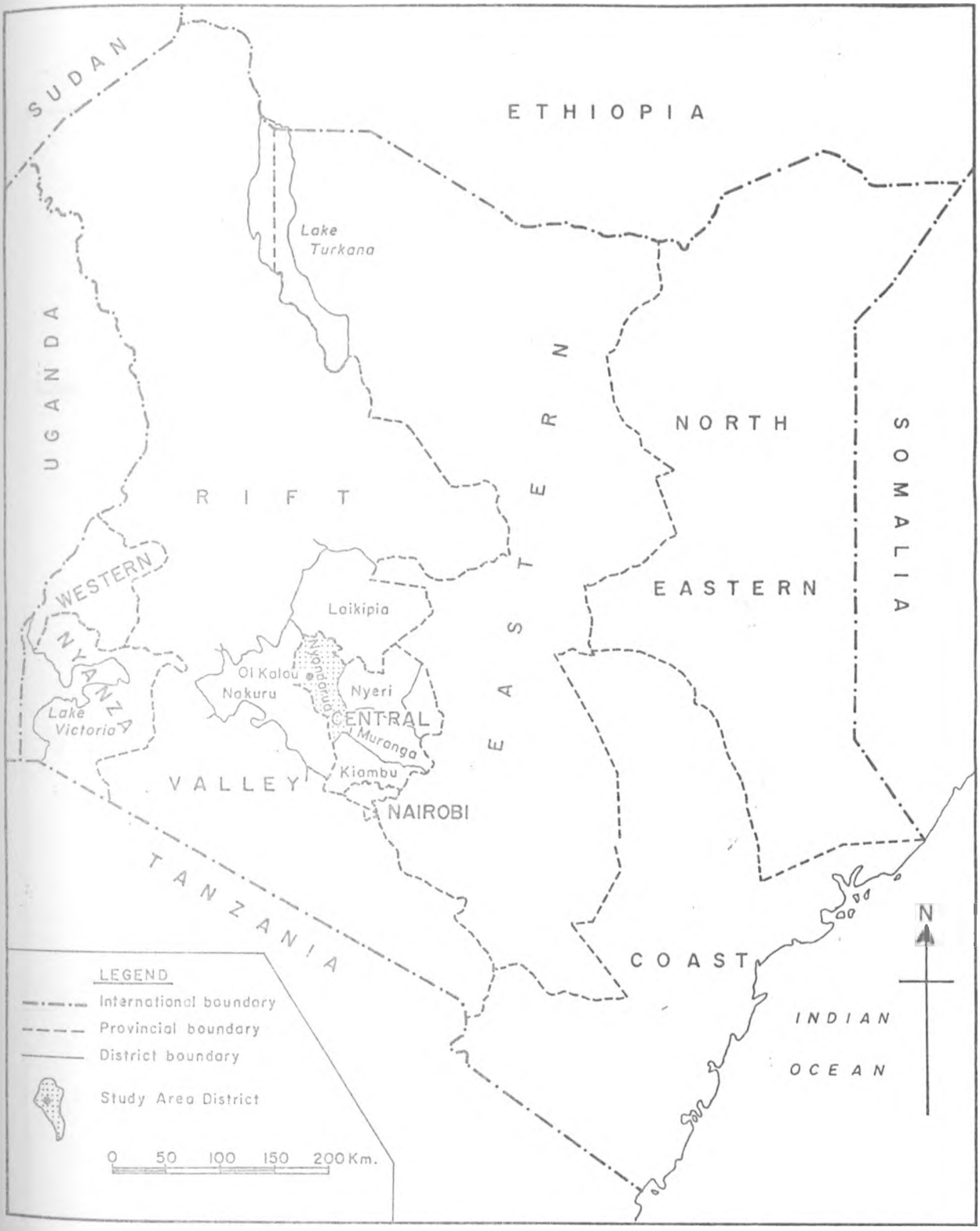
INTRODUCTION TO THE STUDY AREA

3.0 Location:

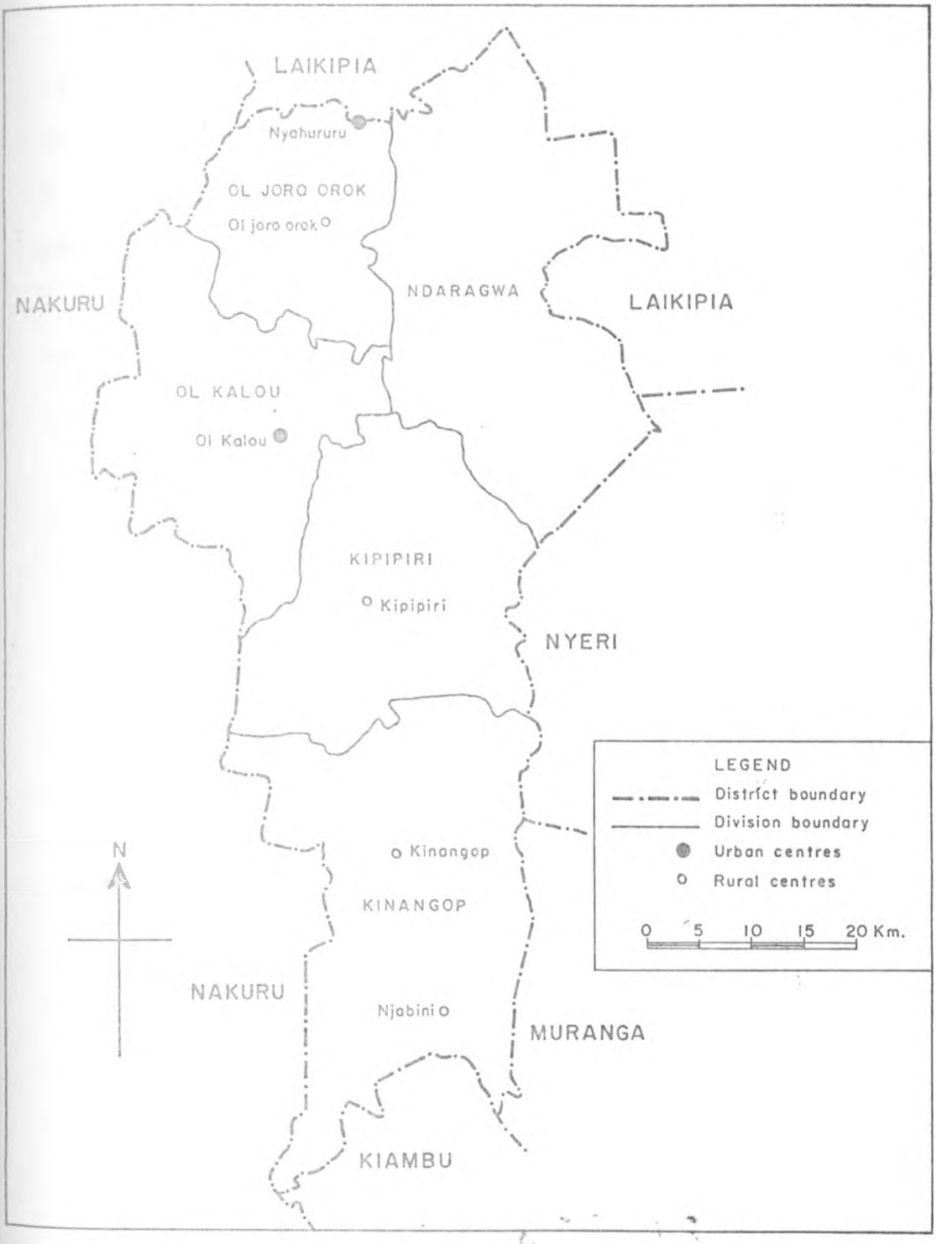
Ol Kalou is a small urban centre in Nyandarua district in Central Province. It is within the geographical rift valley but not in the administrative Rift Valley Province. The town is located approximately between latitudes 0° 20' S and 0° 15' S and longitudes 36° 19' E and 36° 24' E. It is about 160 km north-west of Nairobi, 30 km from Gilgil on the way to Nyahururu on C77 road and 32 km from the latter (Map 1).

An important aspect of this town is that it occupies a comparatively central position in the District. Located in Ol Kalou division, to the south there is the Kipipiri and Kinangop divisions, while to the eastern and northern sides are found Ndaragwa and Ol Joro Orok divisions respectively. To the west there is the Nakuru District (Map 2).

The designated area of Ol Kalou Town Council is 371 km^2 (inclusive of the township area). But only about 37.9 Km^2 (10 per cent) of this is the urbanized and for the purpose of this study taken as the Ol Kalou town (Map 3).



Map 1: Ol Kalou Town – A National context.



Map 2: Ol Kalou Town — Regional Context (Nyandarua District).

3.1 Relief:

As noted earlier the area occupied by Ol Kalou town is in the rift valley physiographic unit; that is it lies on the eastern highlands of the rift valley (indeed up to a time just before independence Nyandarua district was administered as part of the Rift Valley Province). The district itself lies between 1828 m and 2,437 m above sea level, while the approximate altitude of Ol Kalou town is 2,367 m above see level.

Most of Nyandarua district spread over the monotonously flat Kinangop plateau. The plateau has little relief diversity on a large scale. It is an extensive plateau of which to the west lies the formidable Naivasha Escarpment, which forms an administrative as well as an ecological boundary to the district.

Being on this monotonously flat plateau, the terrain of Ol Kalou is generally flat, except for a few ridges and dry river valleys thus forming undulating terrain (Plate 3.1). Specific details show that in the northern part of the town and beyond, the area is almost level. This area with almost zero degrees slope experiences impeded drainage. This is evidenced by the presence of Lake Ol Bolossat to the north and marshy areas drained by the frequent seasonal rivers that flow from the

escarpments both in the east and west.

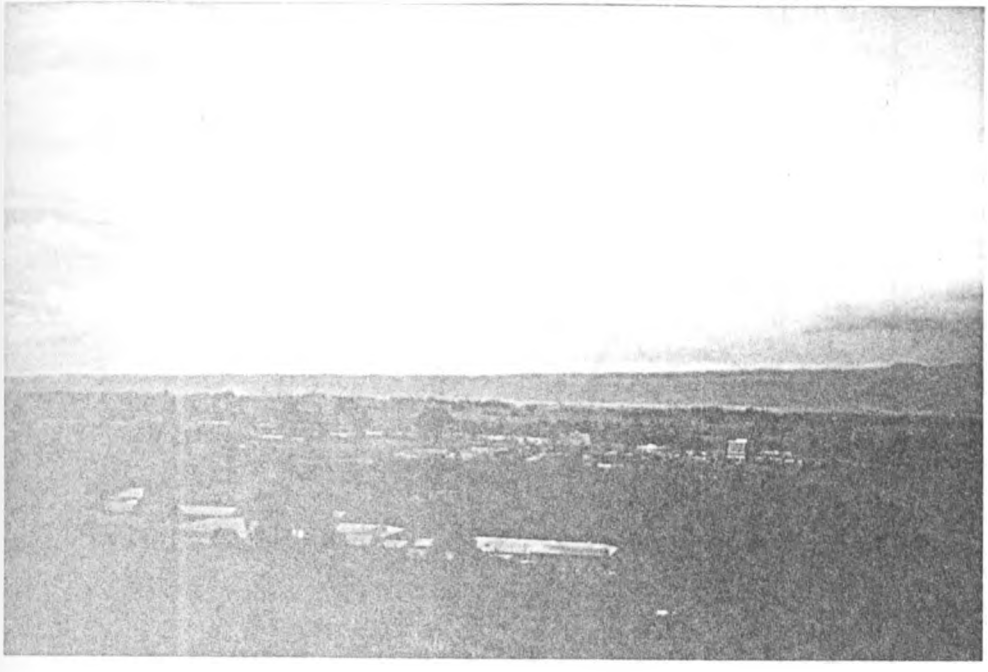


Plate 3.1: Location of Ol Kalou Town on undulating plateau. On the background is the Aberdares Ranges.

A transect or cross-section of the town reveals that the most urbanized part of this urban centre is on an elevated ground relative to the surrounding, between two dry valleys (fig. 3.1). This explains the prevalence of environmental problems particularly soil erosion and others.

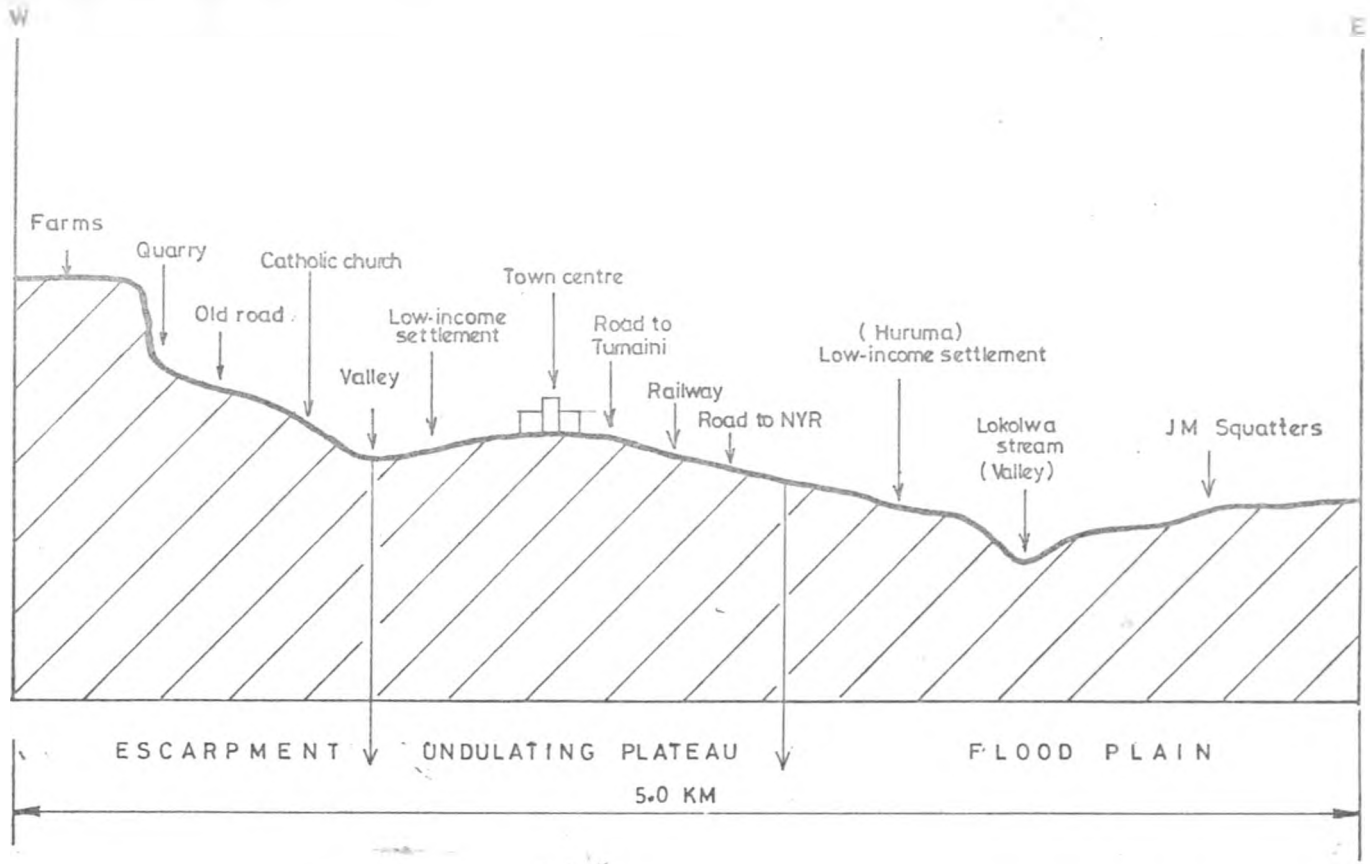


Fig. 3.1 A Sketch Cross-Section of Ol Kalou Town's Landscape.

3.2 Geology:

There is lack of detailed information about the geology of Ol Kalou town. However, a study on Ol Kalou salient scheme (the immediate hinterland of the town), King'ori,(1970), showed that the area is of varied geology. The "Geological Report: Thompson Falls and Nakuru area" revealed the same feature but added that most of the area is dominated by superficial deposits of recent volcanic origin (*Ibid*)

The town itself is on these volcanic deposits, but to the north of the town and south of Lake Ol Bolossat, along and around river valleys are rocks like pumice and tuff that belong to the pliocene period and are relatively old compared to alluvium which are found in the north and around the lake which are of recent deposit.

The town stands on light tuff and sediments of the upper to middle pleistocene era (Thompson,1964). Due to localized occurrence of various tuff and agglomerates it has not been possible to workout the complete stratigraphical succession of volcanic rocks or establish there thickness. But it was approximated to be between 500 and 1000 feet in thickness for the area generally (*Ibid*).

Owing to the location of the town on an area believed to be near or on the vent of the marginal fault of the rift valley, the volcanic rocks in the area are rich in soda and are mildly alkaline. They include phonolite, trachyte, rhyolite, nephelinite and bassalts.

An important aspect of this geological set up is that besides traces of minerals potentials, it accommodates underground water. However, the established thickness of the top layer rocks make extraction relatively expensive

3.3 Soils:

The study area like most of the other parts of Nyandarua district derived its soil from weathering of the volcanic rocks. The weathering has given rise to modular laterite soils, which varies in thickness, from a few inches to about 4 feet (Mwatha,1974).

The whole district has very divers soils; mainly clay-loam, silt-loam, brown loam, reddish brown-loam and dark-red acidic soils.

Ol Kalou town is situated on two main types of soils. Clay loam - which becomes infertile due to leaching and thus recommended for ranching and dairying, is found on the eastern side of the town. Silt loams, which are grey and of frequent hard murram are found on

the western side of the town towards the Naivasha escarpment.

In some small portions, impervious clay occurs and create water-logging conditions especially where this type of soil is reinforced by hard murram.

The latter types of soils are generally recommended for extensive grazing, with cereals and pyrethrum as the crops (Kingori,1975).

3.4 Climate:

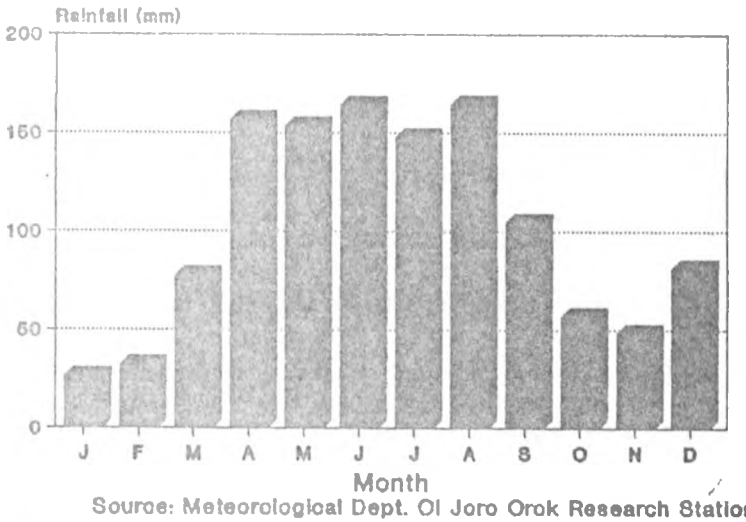
Although the study area is situated almost over the equator (0° latitude), its climate is more or less determined by the altitude and more specifically by the adjacent mountain (Aberdares ranges) relief which has effect not only by trapping the moisture-laden south-west prevailing winds, thus generating orographic rain, but also by lowering the temperature. The resultant climate is totally different from an equatorial climate (Kungu,1975).

However, due to the fact that Ol Kalou lies on the leeward side of the Aberdares, it receives less rainfall relative to areas on the foot of the mountain. The rain decreases rapidly from the east to west, with the annual average diminishing from more than 1,400 mm at the foot of the mountain to 700 mm in the Malewa River Valley

(Kenya,1989) near Ol Kalou town.

Figure 3.2 show average monthly rainfall at Ol Joro Orok station for 5 years. There are two maxima with the highest fall in July-August season. Despite the impression created by the average annual rainfall figures Ol Kalou area is affected by rainfall unreliability.

Fig. 3.2 Average Monthly Rainfall (1988 - 92)



Source: Meteorological Dept. Ol Joro Orok Research Station

King'ori(1975) reported occurrence of micro-climatology in the area, where rain can fall within a small localised area but not the entire division. This aspect causes a lot of inconsistency, at least in recording, and is attributed to the mountain climate of the Aberdares.

However historical record shows that the mean deviations are within acceptable range which can sustain

crops. Data collected at the above named station (20 Km from Ol Kalou) showed that the area had an average annual rainfall of 930.5 mm for thirteen years since 1980.

The average mean temperature in Nyahururu/Ol Joro Orok area (within which Ol Kalou occur) is 23.1° C with a minimum of 21.1° C and a maximum of 24.4° C. The highest temperature recorded is 25.1° C in March while the lowest is 5.0° C in September. Other stations near the mountain have reported lower temperature, for example Geta Forest Station which recorded a mean minimum of negative 1.1° C.

A major climatic problem in the area is the occurrence of low temperature which take place especially during clear nights. This is more intensive in areas on the flanks of Aberdares Ranges, and relatively elevated grounds like the site of Ol Kalou town. When cool air from the moor-land of the Ranges descends onto the lower areas it causes temperature inversion which causes night frost nearly every month of clear nights. The frost is a more serious climatic hazard than drought in the area as it causes crop failure of maize, vegetables and potatoes which are the main foodcrops. Also cases of Pneumonia are reported to have high incidence in the area as a result.

3.5 Drainage:

There is no major river that passes or is very near Ol Kalou town. The surrounding area and the district at large have very few rivers.

To the north of Ol Kalou town most of the rivers are seasonal except Uaso Narok which has its source at the Lake Ol Bolossat and flows northwards to form the Thompson Falls. The seasonal streams flow from the ranges westwards to the marshy areas.

The few other major and permanent rivers are found to the south of Ol Kalou town which is a more rugged (hilly) landscape. Among these is the Malewa river which is approximately 4 km away from Ol Kalou town at the closest point, and flows into Lake Naivasha. One of its tributaries which is now almost a dry river valley, the LoKolwa river valley forms the south east boundary of the township. A small shallow stream which flows in this river valley is heavily utilized by some local residents. Due to encroachment towards this valley by settlement, environmental deterioration through intensive soil erosion is taking place.

Other rivers are Oleolaba, Simba and Gilgil rivers which are in the southwest far from the town.

The influence of the original drainage system of the area is still noticeable especially in the western and

southern sides of the town. Given that the area is in the rift valley physiographic unit, the drainage is typical of the rift valley drainage systems where rivers and their tributaries entrench themselves deep into the volcanic rocks, thus forming minor gorges and giving a "ridge and valley" landscape (Kungu,1975).

Unlike most of the other areas in the district where water availability is ameliorated by streams from the Aberdare Ranges, Ol Kalou town does not get access to any reliable surface water source. Extensive use of underground water is made, hence the inadequate water supply in the town.

3.6 Vegetation:

The study area is currently a completely humanised landscape. Even in the hinterland of the town, cultivation and grazing over the years have eliminated the original vegetation of shrubs and extensive grassland.

The main vegetation found around Ol Kalou town are the Kikuyu grass and the red oat grasses. The former is found virtually in all well drained fertile soils of the district, and serve as an indicator of the agricultural potential of the land. It is estimated to occupy about one fifth of the district and is palatable and nutritious

for grazing livestock.

The Aberdares Ranges in the eastern side of the district have both natural and exotic forests that are of great economic significance. It is also a wildlife habitat.

Due to recent efforts on afforestation one no longer finds extensive open grasslands in the area. Instead there are stands of exotic trees planted within the town and around the surrounding homesteads. These afforestation efforts are also extended into the town area, where the town council with assistance from the department of forest have started afforestation of the soil-erosion prune areas such as along the Lokolwa dry river valley in the southeastern side of the town. Also a forest park has been started beside the railway yard in the central part of the town.

3.7 Ecological Zones:

Ol Kalou is situated on an ecological transitional zone where the three dominant ecological zones in the district meet.

To the northeast of the town all the way to Nyahururu is the highland grassland, with pockets of highland forests and areas of impeded drainage forming marshy land (Lake Ol Bolossat area). The southeastern

side of the town, way through to Kinangop area is the highland grassland zone. The western and southwestern side of the town all the way to Nakuru and Naivasha boundary is the Acacia Themada zone. Thus Ol Kalou is a very central point in terms of this ecological (zones) setting.

These ecological zones are suitable for commercial mixed farming, mainly large scale ranching and dairying, together with sheep rearing. Cereals such as wheat, oats and barley are also suitable for the area, and also pyrethrum and maize, but not as major crops (Morgan,1963).

3.8 Natural resource base:

The development of any town is dependent upon the available resource base, while this development or urbanization affect the resources.

The basic natural resources in the area around Ol Kalou include agricultural land and grasslands, fisheries, forests, wildlife and minerals. However the extent of potentiality and utilization vary significantly.

Because of the high rainfall especially on the Aberdare Ranges, the region supports some of the most luxuriant forests in the country. Among the economically

valuable tree-species are the pencil-cider, Olea Africana and bamboos. Saw milling is a major activity but this is carried out within or near the forest because of transportation problems. A few marketing points for the products (timber yards) and carpentry workshops are found in Ol Kalou town.

The soils in the area are generally fertile. This is because of their volcanic origin, the original dense vegetation cover that provided humus and the high rainfall. This gave rise to great agricultural potential in terms of farming lands, which also are ideal for mechanised farming due to their flatness and extensive grasslands that support grazing.

Although as noted earlier the area has few permanent rivers, fishing is an activity that has of late increased in the district. By 1988 there were about 22 ponds, 11 dams and 2 rivers stocked with fish in Ol Kalou division alone (Kenya,1989). Fish farming activity is very popular with a number of local farmers and information available revealed that mostly commercial fish such as trout are kept.

The forests on Aberdare Ranges form good natural habitats for both big and small wildlife such as elephants, buffaloes, monkeys and bush babies. These together with the scenic mountain landscape, for example

the Ol Donyo Satlima Peak, and the unique Afro-Alpine vegetation on the mountain constitute great potentialities for tourist industry. This is evident from the presence of Aberdare National Park on this mountain. Unnoticed also is the potential due to presence of various species of birds on Lake Ol Bolossot, which is now drying up due to encroachment by farming activity and changes in weather. Generally these tourism potentials are not being utilized for the economic benefit of the region.

Lastly, there are a few traces of some important mineral rocks, but due to lack of information (research work), it is hard to establish whether they are extractable or not. For example in the area to the western side of the district, i.e. Mawingo and Dundori, diatomite rocks are present. The same are mined at Kariandusi in the neighbouring Nakuru district.

Nevertheless, other rocks such as ignimbrite and welbed tuff which are used as building materials (stones) and phonolite (ballast) are found in areas such as Ol Joro Orok and Ol Kalou (just next to the township) where they are quarried (Plate 3.2).

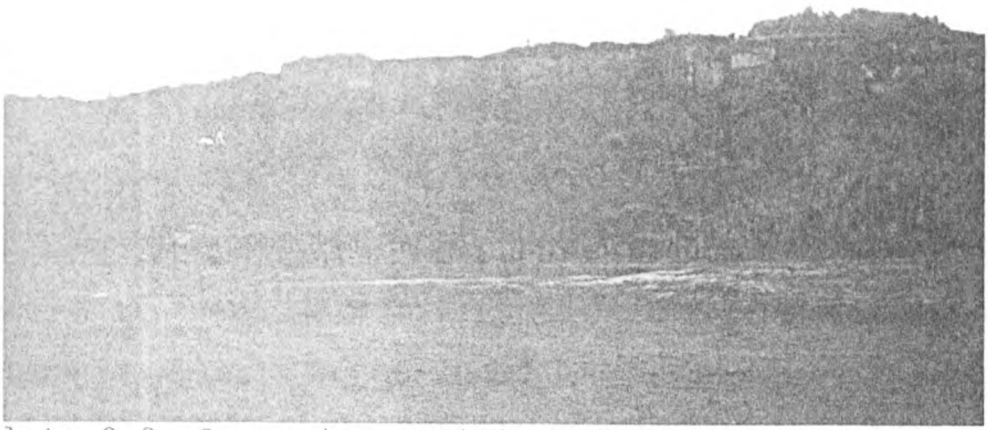


Plate 3.2: Quarrying activity at the western border of the town. This part area now is a derelict land.

3.2 HISTORICAL DEVELOPMENT AND URBANIZATION TRENDS

Ol Kalou is an old town, which dates as far back as 1922 when the railway line arrived. History indicates that the area presently occupied by the town and the surrounding was originally a Maasai pastoral area.

The name Ol Kalou is purely a Maasai name which denotes a short shrub which was prevalent in the area before clearing. However with the coming of Kikuyus who came to work in white settlers' farms, and the beginning of the struggle for independence, the former "borrowed" the name altering it to 'Karau' which denotes a 'warrior' (njamba). This was an important label because during the struggle for independence, the town became a secret meeting place for the Mau Mau freedom fighters.

It was Sir Charles Eliot, the then Commissioner of White settlement, who in his annual report of 1903, recommended the suitability of the area for white settlement (Morgan,1963). Consequently in 1911 all the Maasai were evacuated from the area by the colonial government. The area came under an European land selling company, which sold the land mostly to South African Boers.

This meant a change of use of land because the Maasai way of life was that of pastoral nomadism while that of Europeans settlers was mixed commercial farming.

With the successful farming activities that were realised generally in the White Highlands and in particular, Nyandarua district, the railway line was extended through Ol Kalou to Nyahururu, by then Thompson Falls, in 1922.

Ol Kalou became an important railway station, specifically a collection centre for important goods mainly cattle, sheep, wood and wheat from the town's hinterland. A shop was opened by an Indian and a small hotel which belonged to an African. This marked the beginning of urbanization. Later on the on which this town was located was acquired by European settler, a Mr. Morgan Greenville.

After independence most of the surrounding hinterland of the town was taken up by Ol Kalou Salient, a Government settlement fund trustee set up purposely to re-settle the African 'squatters' who were by now deserted by their European employers. But most of the land to the east of the township was allocated to individual farming communities.

Morgan also in the due course subdivided the township into commercial plots and sold them to his farm workers at a peppercorn fee.

Being a community of poor financial background, the new occupiers of the township were unable to put up

standardised business premises. Wooden structures sprung up mostly without an approved building plan from the local authority in charge, by then the Nyandarua County Council.

Due to influx of people from the hinterland looking for jobs, demand for housing for low income groups increased and the wooden structures sprung up haphazardly even in the part earmarked for the market. This spilled over to the undeveloped lands adjacent to the township whose owners had not occupied.

Morgan handed over Ol Kalou township to the Government officially in 1973 when he surrendered the title deed. But already most of the town was dominated by illegal squatting and unplanned settlements.

Thus in 1982, when the Nyandarua County Council mooted the idea of upgrading the town to an urban council as it had become a busy market, it had first to clean up the illegal and unplanned structures. Most of the squatting families joined the Ol Kalou salient which was subdivided. Unfortunately they could not make a living in the farming sector having been used to illicit liquor brewing and jua kali business. Majority sold their allocated land, or abandoned it altogether and came back to town, making the efforts of getting rid of unplanned settlement in the town unsucessful.

The council later in 1986 had to come up with an idea of settling these people in a 'planned' low-income estate (now known as Huruma estate), with a few infrastructural facilities such as communal VIP toilets and a piped water stand point. Currently this estate is a dominant residential area of Ol Kalou town but one which is in dire need of upgrading through provision of infrastructure.

The central part of the town grew slowly amid the described unplanned settlements. It took a compact form (pattern), but mostly along the few transport lines, thus depicting stagnation. Very few and old permanent business premises continued to be prevalent for a long time, until late 1980s when commercial premises and jua kali industrial stalls started to be put up.

The population of the town grew steadily in the early years, but it stagnated, and even reduced due to transfer of people during the resettlement processes in the various settlement schemes that came up in the district. In 1969 it had a population of 1,934 and in 1979 it had a population of 1,911 (Kenya,1984). However, as from 1979 this population grew very rapidly, at an annual rate of 5.5 per cent compared to that of the district which is about 3.2 per cent per annum (Kenya,1989).

Currently the town is a town council, a status it acquired in October 1987. Ironically, the town was elevated directly from a rural market centre to a town council, purportedly because it had overstayed in the former status under the auspices of the Nyandarua County Council. Also this was move to enable the town earn support and solicit funds for infrastructural facilities from the donor community, beside being a political decision. The town was expected to receive more support from the Government following an official announcement of the intention to shift the administrative headquarters from Nyahururu to Ol Kalou (Kenya,1984).

With the new status, the town acquired several centres or satellite towns namely Rurii, Mukindu, Manyatta, Kieni, Passenga, Mawing, Kiganjo, Kanyiriri, Gichungo, Karugutu, Migaa and Kiambaga, and a total area of 371 km2.

3.2.1 Urban structure and planning:

Ol Kalou town has what can be described as a restrictive linear pattern especially with regard to its central part. The township area constitute 5 main residential areas; an extensive reserve land for railway line and station; the central part and commercial zone; the industrial and workshops zone; and various several

parts occupied by institutions.

The striking aspect of this town is that there is no deliberate zoning. Except for the commercial and industrial zones which are compact, the others tend to be isolated developments, and of recent time.

The residential areas include the site-end-service scheme which was established in 1978 and comprise 140 houses, located to the western side of the centre. The separation zone between the two is the Gilgil-Nyahururu road and railway line. This is the main high-income residential area and next to it on the southern edge is Huduma Estate; council renting houses which are just a few in number. Towards the south-western end of the township is the relatively extensive Huruma low-income groups residential area. This comprise 106 residential plots of which only 52 were by 1993 developed. Another residential estate is found next to the main administration and Government offices zone, which is the town council's staff quarters.

The town centre or the 'central business district' is more or less a kind of mixed development, mainly residential-cum-commercial zone. It comprises shops, offices, banks, restaurants and residential houses behind the shops. The old shopping lines extends along the few tarmacked roads or streets in the town, leaving an open

space in the middle which is the market place (Plate 3.3). Few newly upcoming premises tend to locate not necessary along the transport lines but in close proximity.

Although there are a few industrial (mainly jua kali) workshops in the central part, the area designated for industrial activities is in the northwestern side of the town along the transport lines i.e. Gilgil-Nyahururu road and railway line. This zone has experienced rapid growth in the recent years with most Jua Kali artisans locating here.

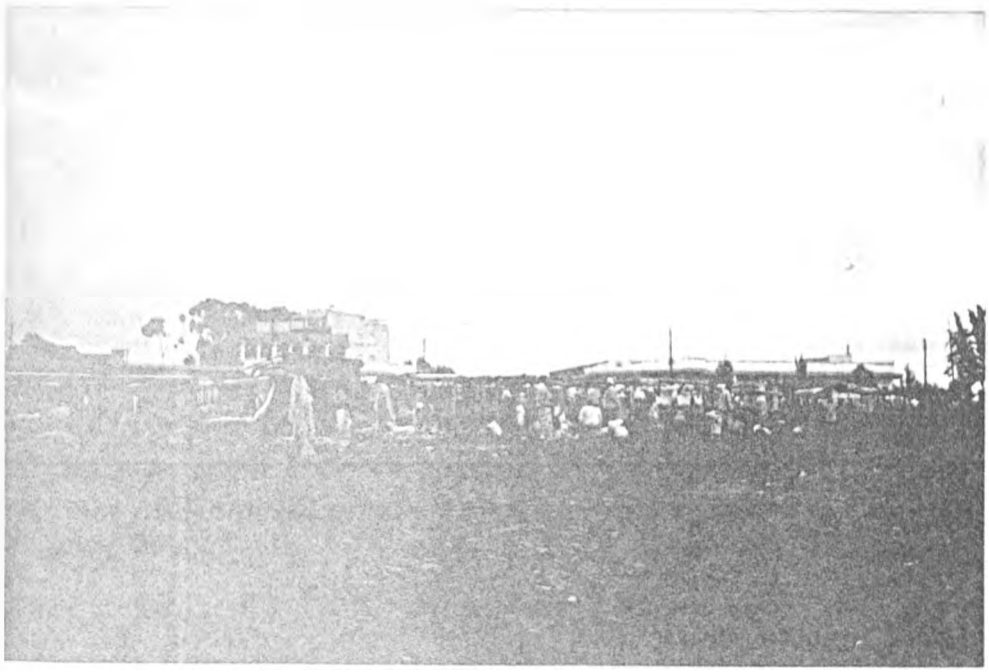
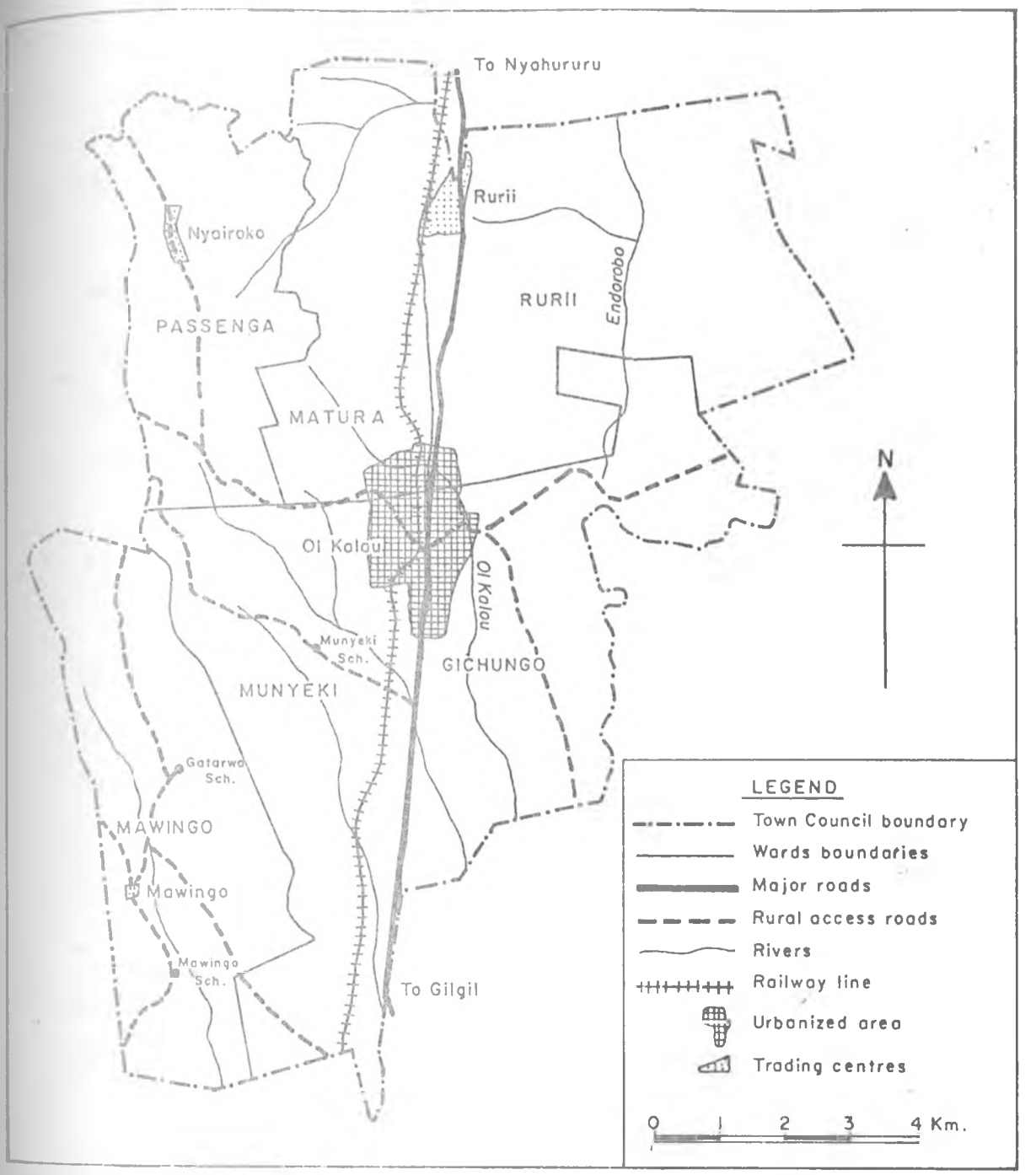


Plate 3.3: Ol Kalou open-air market. Notice the loose-surface ground that become muddy during rainy seasons, and the inadequate, congested wooden-stalls.



Map 3: Extent of Urbanized area and hinterland accessibility — Ol Kalau Town Council.

3.3 SOCIO-ECONOMIC CHARACTERISTICS:

Socio-economic characteristics of the town tend to have a relationship with both present and future infrastructure needs. We thus focus on the major social and economic aspects that have influence on provision of infrastructure and may enlighten on future trends.

3.3.1 Population:

The population of Ol Kalou town have had a kind of inconsistent trend in the early years, but since 1979, it has recorded a substantial growth. In 1969 when the first comprehensive census was carried out, Ol Kalou had a population of 1,934. This population declined and in 1979 the recorded population was 1,911. This was attributed to the transfer of some resident families, mainly squatters to newly opened settlement schemes in the district, between late 1960 and 1980.

Since 1979 the population of the town has grown steadily at an estimated growth rate of about 6 per cent which is two times higher than that of the district. Thus in 1989, the population of the town reached 3,251. The table below gives the estimated population of the town since 1979 to 1993.

Table 3.1: OL'KALOU TOWN POPULATION PROJECTION 1979 - 1993.

YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MALES	1030	1086	1145	1207	1273	1343	1416	1493	1575	1661	1752	1848	1949	2056
FEMALES	985	1039	1096	1156	1219	1286	1356	1430	1508	1590	1677	1769	1866	1968
TOTAL	2015	2125	2241	2363	2492	2629	2772	2923	3083	3251	3429	3617	3815	4024

Source: District Statistical Officer, Nyandarua.

The factors explaining this increase in population is the high birth rate, influx of people looking for jobs and others expecting to acquire land in the district, mainly from the neighbouring districts of Kiambu, Nyeri and Murang'a; and increased sub-division of the council's and individual lands into commercial plots within the township. The survey revealed that 50 per cent of the 75 interviewed residents came to Ol Kalou town from other districts apart from Nyandarua, and majority have lived there for not more than 4 years. This phenomenon of high population growth has had a direct impact on the provision and adequacy of various facilities, for example piped water, electricity, housing etc and others. This influx of people have also affected the value of land and landuse.

This increase in population is also, at least theoretically, expected to have an impact on the town's resource-base (with regard to taxation base). This is one of the concern of this study, specifically the

relationship between the increase in population and revenue collected.

The following table summarizes some characteristics of the town's population.:-

Table 3.2: POPULATION CHARACTERISTICS

Household Size on Average	- 5 persons
Av. Number of households per plot	- 6 Households
Place of Origin	- 50.0 % Nyandarua Dist.
	- 48.6 % Other Districts
Reason for migrating	- 38 % To be employed
	- 11 % To start business
	- 7 % To stay with relative
	- 30 % To own/develop a plot
	- 13 % Other reasons

Source: Field Survey, 1993.

3.3.2 Land tenure and landuses:

Land ownership in Ol Kalou falls under three main categories, namely Government land, leasehold and freehold.

Although the exact amount of land under the above categories were not availed to the author, indications were that the Government land is the biggest in the township. Apart from the area now occupied by the district hospital, the commercial centre, site and service scheme, some institutions and Government offices, much of the Government land is still undeveloped.

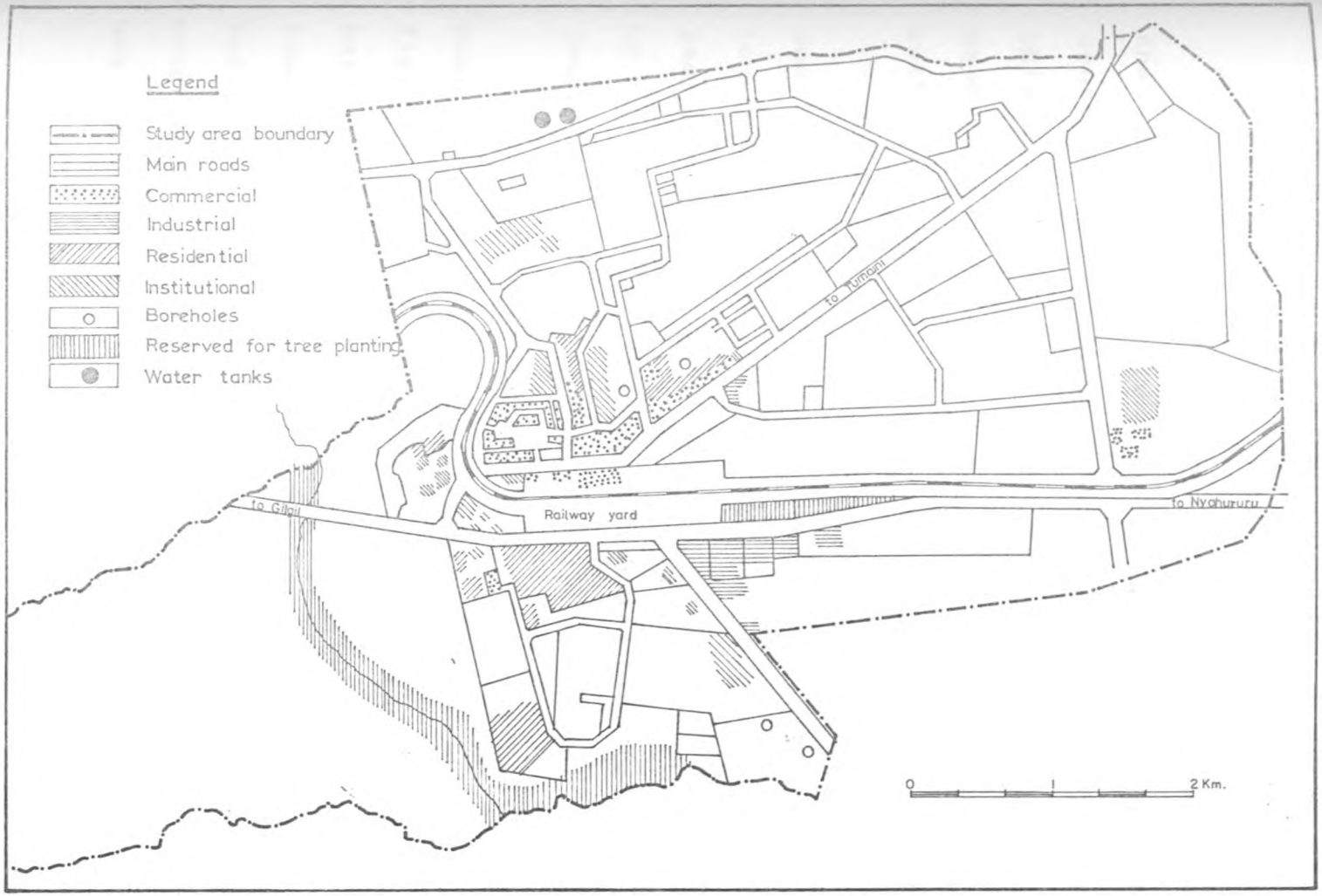
Various institutions, for example the catholic missionary, have acquired land in the township through

leasehold. Much of the land under leasehold, however belongs to private individuals, as it is the case with the freehold.

The Town Council has ample land for development unlike many other towns of its size (LADP,1992). This is attributed to the boundary expansion following the status elevation. Nevertheless, most of this land has not been legally acquired by the council.

The land outside the main commercial centre is under the Settlement Fund Trustees (SFT) whose control and management is under the jurisdiction of individual tenure system.

The land use pattern depicted in Ol Kalou town is not very regular. One can argue that there is haphazard land use pattern especially with regard to the central part which is commercial-cum-residential-cum-administration zone. Nevertheless, the Town Council has set aside land for industrial development in the eastern side of the town which is also traversed by the tarmacked road and the railway line (Map 4).



Map 4 : OL KALOU TOWN – Land use pattern

The western side is dominated by quarry and although the council suggested that it can be improved for construction of buildings in its development plan (*Ibid*), this is a very rugged and difficult terrain that would experience environmental degradation if opened for human settlement development.

Southern part of the town which is also problematic due to water-logging is currently dominated by poor and low-income population settlement referred to as "planned temporary settlement". The rest of this area is occupied by the Council's undeveloped land and private individual lands.

Land values within the township are relatively high compared to the outerzone. Information obtained from the field revealed that land values in the former range between Kshs.180,000 to Kshs.200,000 per 1/4 acre (commercial plot), while in rural hinterland an acre is valued at about Kshs.80,000. Generally it can be concluded that the values decrease as one moves further away from the main central zone of the town.

3.3.3 Employment and Income:

Lack of employment opportunities is a major problem in Ol Kalou. This is attributed to lack of industries and low level of commercial activities. The sources of employment can be broadly categorised into two; the formal sector and the informal sector. In the town's hinterland the source of employment is mainly the agricultural sector. But in the urban area, the main source of formal employment is the civil service, i.e. in ministries, and the teaching profession, and in the various parastatals. The informal sector is in building and construction, and service industry.

Data on employment in the township showed that 58.9 per cent of the residents interviewed are employed in the informal sector; mainly in private activities such as buying and selling of agricultural produce and other service-related activities. Jua Kali artisanship activities are prominent in this sector.

The formal sector, mainly the civil service employs about 38.4 per cent of the total population interviewed, hence the informal sector is the largest employer.

As for income levels, the town can be classified as a low-income town. About 63 per cent of the working population in the town falls in the income range of Kshs. 501 -3500 per annum (see Table below).

Table 3.3: LEVELS OF INCOME PER MONTH

Income Level:	Percentage of Total No. of Persons (sample):
Below Kshs 500	8.8
" 501 - 1500	22.1
" 1501 - 2500	20.6
" 2501 - 3500	20.6
" 3501 - 4500	14.7
" 4501 - 5500	10.3
" 5501 and above	2.9

Source: Field Survey, 1993.

These income levels are slightly below the rural population per capita income in the whole district which is reported to be above Kshs. 3,200 on average, per annum (Kenya,1988; and Kenya,1989). The low income levels are well reflected in the low standards of living of majority of the town's population. Some of the aspects deduced in support of the above claim are summarized in the table below based on the sample.

Table 3.4: Residents Living Conditions:

1. Nature of housing	-	Permanent - 43.2 % - Semi-permanent - 52.7 % - Temporary - 4.1 %
2. No. of households per plot	-	6 household on average
3. Dwelling units per household	-	2 units on average with 41 % having single-unit.
4. No. of occupants per dwelling unit	-	3 persons on average.
5. Main source of water for household	-	Communal water pipe 53.5 % - individual piped water 16.9 % - Other sources (stream ,spring, roofcatchment) 29.6 %

Source: Field Survey, 1993.

The low levels of income are attributed to the already mentioned shortage of high-paying jobs and in particular industrial jobs. Also the dependency on agricultural related activities make the incomes earned in the town fluctuate, with relatively higher incomes being received during harvesting season, especially for the non-wage employment. During this season more sales are realised.

Income distribution is uneven in the town. The survey found out that in the high income residential areas; mainly the Site-and-Service scheme, the average income is approximately Kshs. 3,000 per month, while the average income in low income residential area; mainly Huruma Estate, is Kshs. 500 per month. Most of the residents in the low income settlements depend on non-wage activities and subsistence farming for their living. Some household carry out some form of small scale agricultural activities, including keeping of dairy cattle, on the vast undeveloped local authority's land private lands which are not occupied

The low standards of life can be attributed to the low incomes. Low income areas lack almost all types of infrastructure, and thus the vital role that these would play in improving the standard of life.

3.3.4 Industry and Commerce:

Situated in a rich agricultural area (Jeatzold et al, 1983), the town has the leading economic activities as agricultural supportive undertakings, mainly commercial services, and light industries.

However, the historical background of this town shows that for a long period of time after independence there was less interaction in terms of business between the town and its hinterland, although the town became a railway station back in 1922. Due to this lack of interaction unconventional trade activities such as illicit liquor brewing took place mainly in the extensive squatter settlements. Moreover due to the fact that the town existed under the ownership of an individual who sold commercial plots to farm workers without issuing title deeds, little commercial activities took place. The town is said to have remained in a "moribund state" until 1973 when the title deed was ceded (LADP,1992).

After the cited resettlement programmes for the squatters, the town became a centre for marketing and distribution of farm produce and inputs. The leading produce are milk, beef, wool, wheat, pyrethrum and horticultural products. The town is therefore expected to develop into agro-based industrial and commercial centre.

Currently it has a number of agricultural supportive facilities and services, mainly a tarmac road and railway as the produce outlets; National Cereals and Produce Board (NCPB) store for cereals; Kenya Grain Grower's Co-operative Union (KGGCU) and retail shops for farms inputs; a post office; two commercial banks -Barclays and KCB, and a local farmers' Union Bank for credit facilities; and an open-air market for exchange of goods and services.

There is no major industry in the town although efforts over the years have been stepped up to attract investors. For example the local authority has allocated plots, for example for a Kenya Creamaries Co-operative (K.C.C.) milk cooling plant, which has not been put up. Potential exist for industries processing milk, light consumer goods, bakeries, flour milling and building materials manufacturing.

Jua Kali sector is relatively active in this town. This is the small scale industrial activities such as metal fabrication, carpentry and joinery, posho-milling and tailoring. In 1993 the town had over 120 Jua Kali artisans registered with Ministry of Technical Training and Applied Technology in a bid to solicit Government support in building sheds through Kenya Industrial Estate.

Given that the town has viable financial institutions, postal services, road and railway linkage to the outside, and electricity, the potential for growth of commercial activities is immense. This is even evident from the fact that there is an official proposal to move the district headquarters to this town. Already the District Hospital and Forest Department are located in this town.

However, it is important to note that the implementation of these proposals and also establishment of various industries whose plots are available is long overdue. The delay has a direct relationship with lack of adequate infrastructure and finance. What are the factors behind this? This study sheds light on the institutional constraints on provision of infrastructure.

3.3.5. Infrastructure: An overview

Only a few and inadequate infrastructure have been provided in this town. As a result, an enabling environment for the private and public investment is, as noted above lacking. The local authority attributes this to the massive capital input required and the limited direct revenue generated.

The local town council has therefore directed its efforts to those facilities which are deemed as

development constraints.

(a) Roads:

Apart from the Nairobi-Nyahururu road which traverses the town and a short-strip within the towns centre which are tarmacked, all the other roads within Ol Kalou Town council area of jurisdiction are either murram or earth-roads.

During rainy seasons the roads are almost impassable, especially the feeder roads which link the town to the hinterland. During dry season the roads, even those in the main town centre, pose problems of dust.

Bitumen standard roads are required within the town and also street pavements and walk ways which are prominently lacking. This problem extend even to the main residential areas where sometimes 'it becomes difficult to deliver services such as garbage collection and exhaustion of septic tanks, thus posing health and environmental hazards. Further analysis of the existing situation on the roads and their role in the growth of the town is given in chapter 4.

(b) Water:

The town experiences water shortages with the current conventional water supply falling short of the demand by about 81 per cent. The Ministry of Water

Development which is the sole water undertaker has 3 boreholes which produces about 113.6 cubic metres per day, while the demand is estimated at about 800 cubic metres per day. The per capita consumption is therefore very low.

Rationing is done on a daily basis with most users receiving water twice per week. This include even important institutions such as the hospital.

Generally there is no reliable water source as it was reported that even the existing boreholes indicated decline in production capacity. The supply network is also inadequate with only about 50 per cent getting piped water. Some pipes formerly delivering water were reported to be dry throughout the year.

According to the Town Council, it is not possible for the council to undertake water management in the town because of the unreliability and doubtful sustainability of the existing project. Currently no other agent, public or private is involved in the management of water supply, although over half of the towns residents' water requirements are met through use of dams streams, private boreholes and roofcatchments. The survey showed that the average distance to these other sources of water is 0.6 km. Chapter 4 examines the town's water supply and its influence on the urban pattern in details.

(c) Sewerage:

There is no waterborne, conventional sewerage system. The common method of disposing human waste is pit-latrine (both VIP and ordinary) and septic tanks for the well-to-do residents.

These modes have proved to be unreliable in the long term. An examination of the situation indicated that they are inefficient, hygienically defective and make the town unattractive to visitors and potential investors. It can also be pointed out that this, especially the use of pit-latrines poses danger of polluting underground water which is in use in the town.

The problem of sewerage and sanitation is linked to unreliable water supply. This case is further analysed in chapter 4.

(d) Telephone and postal services:

These are essential in any commercial and administrative centre. In Ol Kalou, the Kenya Post and Telecommunication Corporation has provided a post office and several telephone lines. Significant development has been realised since early 1993 when a temporary telephone exchange plant was installed (Plate 3.4).Use of standardised trunk dialling system (STD) is now possible. However these are not adequate given the increasing population.

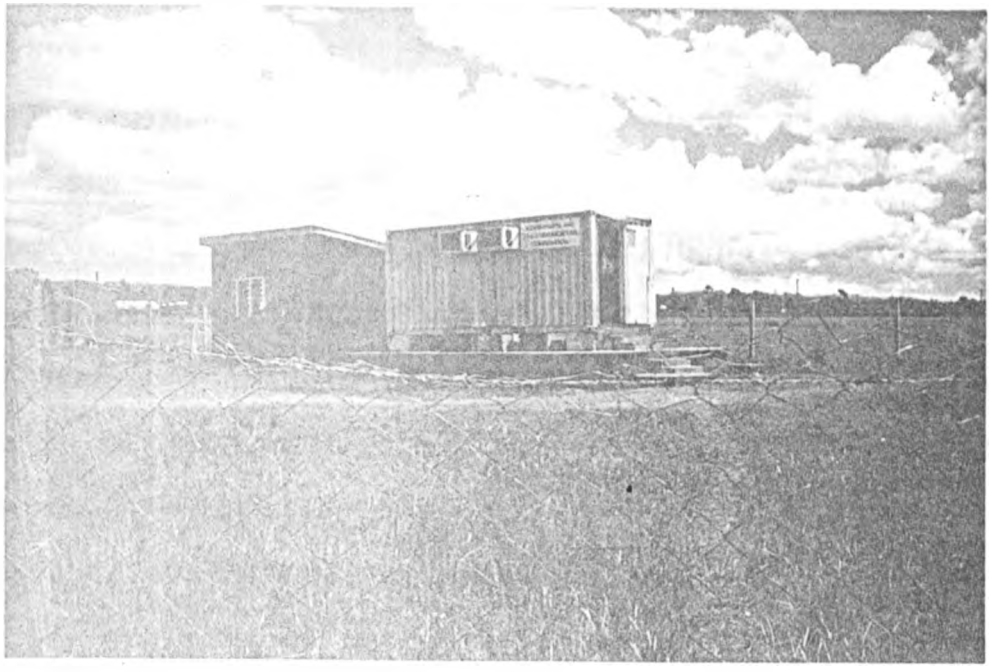


Plate 3.4: A temporary Telephone Exchange Plant.

Except for the central part of the town, the important institutions and the high income residential areas, most of the other parts are not served.

(e) Electricity and Street lighting:

The town is served with electricity from the national grids, but internal distribution network is inadequate. Like provision of telephone services the low income settlements are not served. This is so even in the areas where electricity lines pass through.

Except for the few streetlights provided by the developers on their premises, the town has no streetlight. This can be linked to the problem of

insecurity which also discourage investors and visitors.

3.4 Summary:

The foregoing chapter has introduced and discussed the physical, historical and socio-economic characteristics of the study area which have bearing on the provision of infrastructure in town.

Thus in conclusion it can correctly be stated that Ol Kalou is located in a rich agricultural area with high development potentialities and therefore it can grow into a sizeable sustainable urban centre.

The analysis of the physical aspects indicate that they pose no constraints to development of infrastructure. Establishment of storm water drainage system, for example, would go a long way in curbing environmental degradation through soil erosion and waterlogging. The urban structure, that has been dictated by the physical factors also facilitate low cost of provision of infrastructure such as water, sewerage, electricity and roads. It is only the southern and southwestern parts of the town which are very rugged and therefore forming a constraint to development. The climate is also conducive to settlement, with rainfall and fertile soils assuring food productivity. However the poor state of roads hinders efficient interaction between the town and the hinterland especially during rainy seasons.

Historically, the town seems to have experienced a period of retrogression due to land issues and squatter settlements. Since 1973, however, the town has registered growth both in size and population, and also range of economic activities. But lack of adequate infrastructure remained, and still is the hinderance to industrial development and investments.

Employment and incomes levels have a direct relationship with the standard of life of the people and the availability of infrastructure facilities and services. Low income group access very few infrastructure facilities.

Infrastructure are prominently inadequate and their role in the spatial pattern of the town and therefore enhancement of the sustainability of the town is not very well realised. This study sought to investigate the causes of this inadequacy from the institutional and management point of view.

In the next chapter the study relates the spatial pattern of Ol Kalou town to the provision of water, sewerage systems, roads and electricity.

CHAPTER FOUR

THE ROLE OF INFRASTRUCTURE IN THE GROWTH OF OL KALOU

4.0 Role of Infrastructure: Introduction

Whereas infrastructure plays important roles in urban areas, the relationship between the urban growth pattern and the provision of infrastructure is not clear in many instances. This is so despite the fact that this is a crucial aspect in planning urban development.

This chapter focuses on the role of infrastructure on the growth of Ol Kalou town, particularly the influence caused by infrastructure on the spatial pattern of the town. This examination is done with reference to provision of water, sewerage and sanitation, roads and electricity.

4.1 Water:

Water is an essential requirement for life. The provision of potable water in urban areas is, therefore, a crucial matter and constitute a great challenge to most urban authorities and governments.

In spite of the extensive technological efforts, most of the currently exploitable water resources will soon be outstripped by demand for water (Darr et al,1976). This phenomenon is already a primary

constraint to urban growth.

Moreover, according to Saunders et al,(1976), majority of the people in developing countries do not have access to adequate and safe water supply. "Reasonable access" to water in an urban area as defined by World Health Organization (WHO) includes, apart from the household connection, public fountain or standpost located not farther than 200 metres from a house. A "safe" water supply is defined simply as uncontaminated water. These conditions must be met for an urban area to have an ample water supply.

From the previous chapter it is clear that Ol kalou town currently has no access to a permanent river. But the geological set-up indicate presence of underground water.

4.1.1. Present Water Sources:

The main water sources for Ol Kalou town are boreholes located within the township. This supply was started back in 1972 by the Ministry of Water Development which is the town's sole water undertaker. Prior to this supply water was drawn from nearby seasonal streams and dams.

This main supply constitutes 4 boreholes out of which only 2 are currently operational (Plate 4.1). The

two non-operational boreholes dates back to colonial times and were only rehabilitated by the Ministry of Water Development to set up the current water supply.

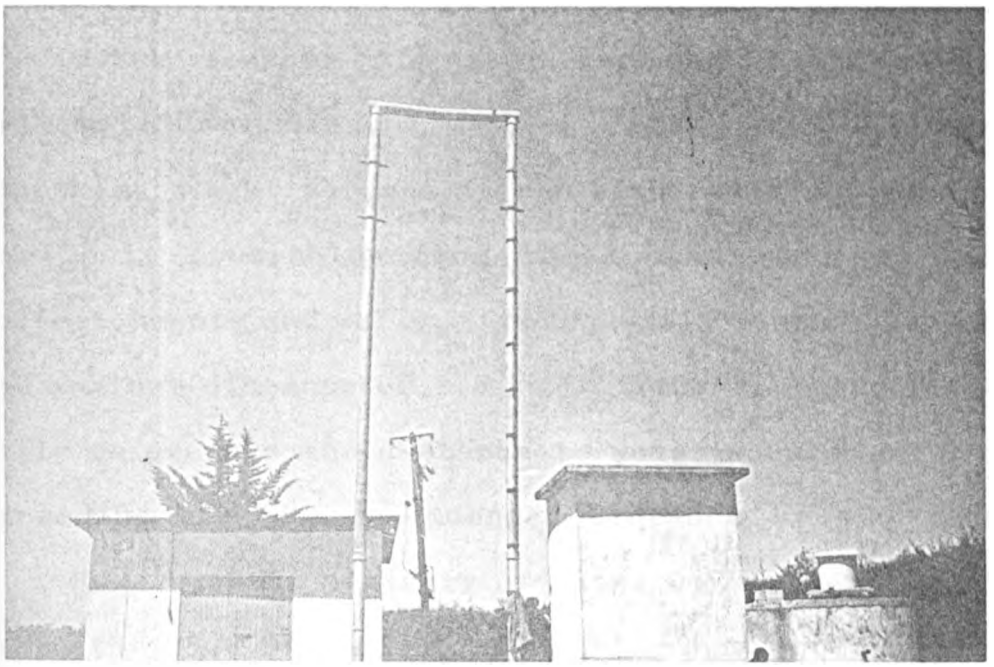


Plate 4.1: One of the 2 Operational Boreholes in Ol Kalou Town.

The boreholes depth range from 100 metres to 110 metres and their discharges are, on average, estimated, at the range of 2 to 6 m^3/hour. The daily water production amounts to 113.6 m^3/day while demand is estimated at about 800 m^3/day. The main consumption areas are the township whose demand is estimated at 500 m^3/day, and the Ol Kalou District Hospital which requires about 300 m^3/day.

Sub-mersive pumps driven by electrical motors are

used to pump water from the boreholes. They pump water to a nearby tank of 5 m^3 capacity. A booster of 14 m^3 per hour capacity is used to pump the water to the rising main.

Other sources of water includes dams, streams, private boreholes, wells and roofcatchments. Approximately 46 percent of the town residents get water for their households from these other sources mainly roofcatchments and wells. Consequently some people cover the maximum distance of 2.5 km to their sources of water, while on average the distance to water sources is 0.6 km exceeding the WHO recommended distance by 400 metres.

However, the Ministry of Water Development supplies water to about 88 percent of the town household which has to be supplemented due to its inadequacy, through the indicated other sources. The supply is highly rationed through supplying different parts of the town in different days. Each part receives water twice per week.

Apart from the District Hospital which receives water almost on daily basis, all the other areas are equally affected by the rationing. However, acute shortages are experienced in the low-income households who have no adequate storage facilities.

The main problem of water supply in the town is the shortage. This is attributed to the decline in

underground water in the old boreholes as indicated by decline in discharge capacities of the two currently non-operational boreholes.

It is also attributed to lack of adequate and efficient water reticulation network which leads to cases of pipe breakages and water losses through leakages. Beside this, water is supplied to a considerably small proportion of the town residents through individual connections. The survey showed that only 46 per cent of the total households have individual connections. Most of these are in the high income residential areas; Site-and-Service Scheme, Huduma and council's staff quarters.

Thirdly, this acute inadequacy of water can be attributed to the increased demand due to population increase in face of unreliable and inadequate water sources. The population of the town has grown at an estimated rate of 5.5 percent per annum since 1979.

Most of this population has distributed itself in areas initially not served by the existing water supply. Examples of these are Huruma Estate and the settlements in the western side of the town, mainly low income settlements.

4.1.2. Water Treatment, Reticulation and Distribution:

The treatment of water in Ol Kalou town is relatively simple. It comprises the raw water channel and the chlorination chamber only. However the underground water is reported to be of good quality and the occasional testing of water by Public Health personnel has always supported this observation.

The treatment method used is satisfactory in so far as it provides clean and safe water. The actual cost of treating water in this case form an insignificant component of the total costs of water provision.

But observation in the field found out that there is a looming danger of water contamination due to the poor sanitation and drainage methods. This is more so given that the town has been growing fast, and these methods are practised uphill in the town in relation to the operational boreholes which are located downhill.

The water reticulation system as shown in the Map 5 consists of the rising main (4 inches pipe). This also acts as the distribution main to which supply pipes are connected directly. The supply pipes are of varying sizes; mainly 2 and 3 inches.

There are 2 reservoirs constructed on the upper side of the town, to which the rising main was meant to take water. However, due to the distribution connections on

the rising main and the inadequate water supply, it is no longer possible to retain water in the reservoirs. The users get water directly before it reaches the reservoirs from where it can flow by gravity, thus making the use of booster pumps extremely important. The system works 24 hours a day, 7 days a week, except when there is power failure, machine servicing or breakdown.

The present distribution network excludes some settlements within the township especially on private land. Also until 1986, Huruma Estate, the main low-income settlement in the town was not served. However currently, virtually all main residential areas are served; at least each has a water stand point used communally.

Rationing of water has become absolutely necessary in the town since 1983. Users receive water twice per week. Thus most of the residents who have no water storage facilities, for example the majority in low-income groups, go without water for a number of days. Consequently, some of the town residents are forced to obtain water from shallow streams, open-wells and springs which are most likely polluted.

Outbreak of cholera and other diseases related to poor quality water were reported. Data from the Medical Office showed that diarrhoeal and skin diseases were

among the major causes of death in the area (as depicted by the out-patients figures, as opposed to the figures for in-patients - Table 4.1 below).

Table: 4.1 SOME MAJOR CAUSES OF MORBIDITY IN OL KALOU DISTRICT HOSPITAL 1992

DIAGNOSIS	NUMBER OF CASES	
	IN-PATIENTS	OUT-PATIENTS
Pneumonia	533	-
Diarrhoeal diseases	-	459
Malaria	410	679
Measles	117	-
Intestinal infections	105	411
Respiratory diseases	95	425
Cellulitis and Abscess	80	-
Diabetes mellitus	55	-
Skin diseases	-	493
Eye infections	-	454
Ear infections	-	497
Rheumatism/joint pains	-	446
Unspecified abortions	145	-
Burns	51	-
Accidents	50	155
Others	-	1,042

Source: Ol Kalou Dist. Hospital, Record's office.

These can be attributed to use of poor quality water and improper sanitation.

Observation also showed that provision of water in stand points which are not properly managed results in water being wasted. These points require to be planned and managed well to minimize water loss and health hazards such as mosquito nuisance.

4.1.3 Water Demand and Supply:

Water demand in urban area depend on factors which include levels of access, adequacy of distribution networks, income levels and standards of living, industrial and institutional development and the price of water. It should also be borne in mind that urban domestic water demand is relatively inelastic.

Ol Kalou town has no major water consuming sectors such as industries and big institutions. Water is mainly consumed for domestic use in the township and the district hospital which is one of the major institutions.

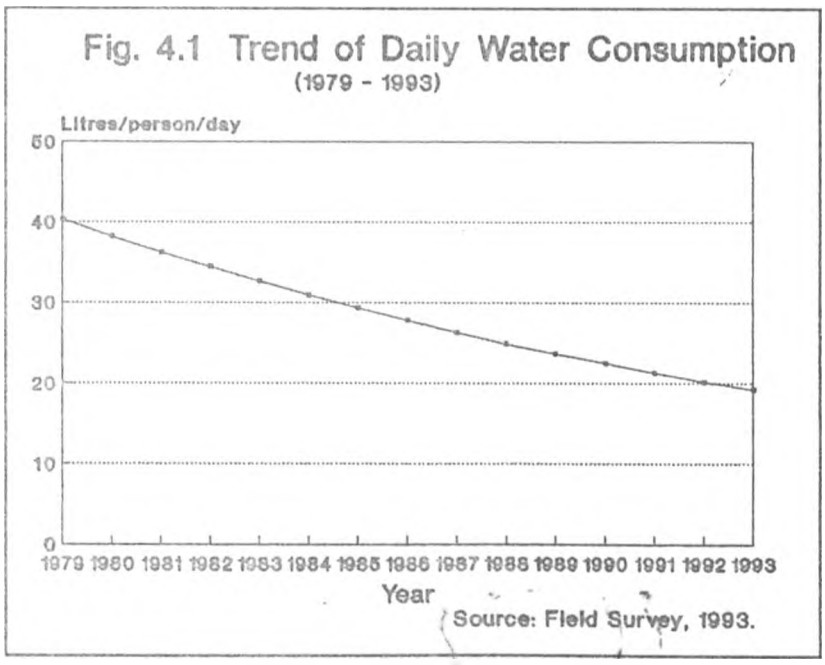
To calculate the past and present water requirements in the town, the per capita demand of 140 litres per day recommended for urban centres (National Water Master Plan, 1980) was used. The actual per capita consumption per day was derived from data obtained from the field.

Thus the 1993 expected or required water demand was estimated at 563 m^3/d for the whole town. The Ministry of Water Development which is the sole water undertaker in the town produced 113.6 m^3/d from the boreholes. Deductions due to delivery losses of 5 percent (loss in treatment works is negligible because it is only chlorination which is done) reduces this amount to 108 m^3/d which is available for all uses in the town.

The average consumption rate per household per day

in the town was found to be 96 litres based on figures collected during the survey. Given the average household size of 5, this gives the actual per capita consumption per day as 19.2 litres per person. Multiplied by the total population of the town - 4024 in 1993 - this gives the amount of water supplied for domestic use as 77 m^3/d.

Given that the water supply project has not been reviewed since its inception in 1972, we can assume that the production capacity has remained more or less constant. The per capita consumption has declined constantly with increase in population so that whereas it was 40.3 litres per person per day in 1979, it reduced to 23.7 litre per person per day in 1989 (see Appendix I, and Figure 4.1).



It is evident from the above analysis that water demand outstrips exceedingly the supply which as a result entails a high degree of water rationing. Currently only about 19 percent of the total demand is met by the supply from the Ministry of Water Development.

4.1.4 Water Supply Network: Relationship with the Urban Growth Pattern:

As indicated earlier the only source of piped water for Ol Kalou town is the water from boreholes manned by the Ministry of Water Development.

Map 5 showing the water supply network indicates that the pipe layout in most cases follows the road network while in other cases it traverses through some undeveloped land. The main water line takes water from the boreholes in the eastern side of the town across the main transport system (road and railway line) which traverses the town.

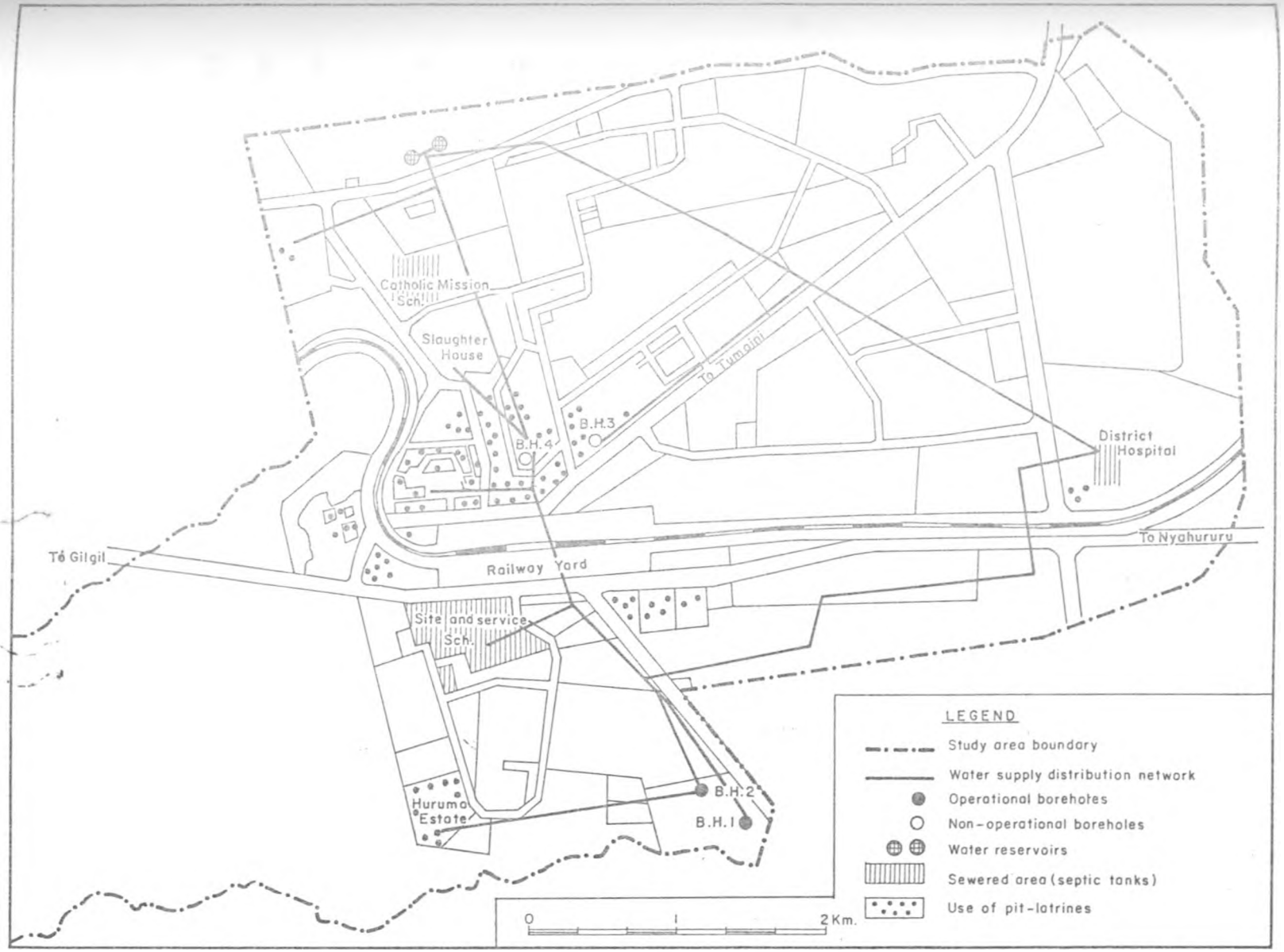
The nature of the landscape or the terrain of Ol Kalou town does not influence the location of the water pipeline. Moreover, use of pressure pumps make it possible to deliver water uphill. For example the water pipeline across the Gilgil-Nyahururu road and the railway reserve, and its continuation which takes water to the reservoirs on the elevated western side of the town is

a good illustration of this lack of influence on laying down of water supply pipes by landscape.

On the other hand, the water supply network shows strong relationship with the distribution of the densely settled and developed areas of the town. This is so especially with regard to connections or distribution lines. The main residential areas such as Site-and-Service Scheme and the central part of the town are served by a relatively elaborate supply network. Also the main and fast growing industrial zone of the town have a water pipeline running through.

Although there is a water line running from the reservoirs in the west to the district hospital in the north, there hasn't occurred any considerable urban development along this zone. This is partly explained by the absence of water from this line due to the inadequate supply.

Similarly a line runs from the boreholes in the east to Huruma Estate but no urban development has been realised in this area. This is explained by the unsuitable land which basically comprise low lying plains susceptible to flooding and waterlogging. Also this land falls under individual private land. Where water network passes and there is no land available for urban development, this relationship doesn't materialise.



Map 5 OL KALOU TOWN – Water supply and Sanitation.

There are, however a number of settlements which have come up in areas not (necessarily) within the available water supply network. A good example of this is the Huruma Estate which had no water supply until 1992 since 1986. In such instances it is water supply that followed 'development' though precisely not always planned development.

An inventory on whether location of housing is influenced by the water supply network showed that 59 percent of the developers tend to locate in close-proximity to the water pipelines, mainly to reduce costs of connections and to ensure access to the supply. The rest indicated that they gave priority to the availability of land on which to build and considered water supply as a secondary factor.

4.2.0 Sewerage and Sanitation:

The town has two main forms of household waste disposal methods, namely, pit-latrines and septic tanks. Specifically the following are the types of toilet facilities found in Ol Kalou town:

(i) Pit-latrines (ordinary) - with no masonry reinforcement and are non-exhaustible.

(ii) Pit-latrines (VIP) - with masonry reinforcements and designed to be exhaustible.

(iii) Water-closet - mainly using communal septic tanks and 2 using individual septic tanks.

The survey revealed that 87 percent of the residents use pit-latrines with majority of these using the ordinary pit-latrines which are not exhaustible.

The sewered areas of the town are the Site-and-Service Scheme, Huduma (council rental houses) and a few private developments in the central part of the town (see Map 5).

The Site-and-Service Scheme and Huduma Estate are served by communal septic tanks; 2 sets of double and 1 single set, located on the eastern side downslope. However, the system was underdesigned and now is overused so that it is associated with frequent breakdown. The septic tanks were ill-designed such that due to overload, the waste spillover the surface and drain to the adjacent gentle plain. This poses a great danger in terms of health hazards because the system operate inefficiently. The sludge and water which spillover or emanates from the soakways could be harmful due to inadequate deposition and decomposition. Moreover, during rainy season, the overspilled wastes and water drain down into Huruma, the squatter 'planned' estate and Lokolwa river valley where one of the streams used as a source of water is found.

The (VIP) pit-latrine are improved pit-latrines

which have both masonry super-structure and substructure, and are designed such that they are exhaustible. This type of waste-disposal method is dominant in the central part of the town and is not a water-borne method. However, due to lack of regular exhaustion the method has led to a deplorable and unhygienic conditions. They are (frequently) characterized by awful odour and in some cases the waste spillover and drain in the open drainage channels haphazardly (Plate 4.2). The local town council owns no exhauster but relies on Nyahururu Municipal Council's facilities 'when they are idle'. Thus this exercise, at most, is done once annually.

This mode of waste disposal is not very desirable especially in the central part of the town. It poses health risk and it is not reliable in the long-term. Importantly, it makes the town unattractive to visitors and investors. It is also suspected to be contributing significantly to the pollution of the underground water which is currently the main source of water for the town. This should be seen as the long-term effects.

The ordinary pit-latrine are dominant in Huruma Estate and to a lesser extent in the central part of the town. The sanitation in the Huruma estate is made worse by the limited number of toilets. Currently there are only four pit latrines located in a central place, giving

a ratio of 1 latrine for every 220 persons. Because of the high number of households sharing the facilities, the life span of each toilet is greatly reduced because filling up takes place within a short period.

Although the council does not encourage construction of pit-latrines by individual household, some have come up which are of substandard structures and mostly unsafe. The plots are small in size, (1600 sq feet), thus giving inadequate space and unsafe distance between the living rooms and such toilet facilities.

The sanitation conditions of this estate are made worse by lack of regular collection and disposal of domestic wastes. Although the estate was planned to allow for adequate roads, vehicular access is hampered by the poor conditions of roads. The council tractor and other vehicles are unable to access the area, and thus refuse collection is curtailed.

The most desirable sanitary facility for a town like Ol Kalou which is having a fast growing population is a water borne sewer reticulation system for the whole town. However it should be appreciated that several pertinent factors hinders such development in the town. These are:

1. Lack of adequate water supply system;
2. Lack of capital; and that
3. Such a system would be expensive and

underutilized given the scattered nature of the settlements and low level of industrial, commercial and institutional establishments. This is more understandable when we consider that for a sewerage system to be really economical, the area requires to have a population density of 50 persons per acre or 124 persons per hectares (not based on average figures). Ol Kalou township has few areas with this density.

4.2.1 Drainage System:

A situation where the sewerage systems are the unconventional non-water borne systems such as pit-latrines, and use of septic tanks, sanitation and health care are related to the drainage system. Depending on its efficiency and appropriateness, the drainage system may enhance quality of environment and goód health or vice versa.

In Ol Kalou storm, and domestic waste water drainage systems are grossly lacking in the whole town. In the case of the sewered area of Site-and-Service Scheme, there is no connection of the domestic waste water to the septic tanks sewerage system. Instead, just like in other areas of the town, the waste water from households drains in shallow surface channels, which have no concrete reinforcement and in most cases, follow the walkways or

roadside. This is the most dangerous abuse of the environment and exposure to health hazards (Plate 4.2).

During the rainy season the problem created is more acute because this waste water mixes with the run-off and spread haphazardly. Soil erosion also takes place in most parts of the town due to lack of storm water drainage channels, especially on slopes. Most of the low-lying plains become waterlogged, including Huruma Estate. Roads to such areas become impassable.

Thus the drainage system in Ol Kalou has adversely affected the sanitation and the environmental conditions of the settlement.

Plate 4.2: Lack of sufficient Drainage Systems has created health hazards areas in the town.

4.2.2 Influence of the Sewerage System on the Growth of the Town:

The physical landscape of the town does not show any correlation with the existing sewerage systems. The landscape provides a gentle sloping terrain which can accommodate water-borne sewerage reticulation system allowing gravity flow. There is no such a system in the town to take advantage of this landscape.

The survey revealed that developers do not relate sites to the sewerage system as there is none and so far no elaborate or clear plan of such a facility has been made available. Moreover, most developers who have capital put up individual septic tanks as part of the development. However, availability of water has in such cases become paramount.

The study therefore established that 'the sewerage system has not influenced location of buildings in the town. Nevertheless the various modes of sewage disposal in the town have direct impact on the urban growth in terms of hampering development of large scale industrial plants that would require more elaborate sewerage systems. It has also hampered development of high and middle income residential houses such as high-rise flats, thereby causing shortage of housing which is now common in the town.

4.3.0 Roads and Accessibility:

The road network in a town is very important for internal accessibility and flow of goods and services. In Ol Kalou, the road network consist of a stretch of a one kilometre tarmacked road which transect through the central part. Although the state of this road is poor due to lack of maintenance, it forms the backbone of the transport system of this small town. It is joined by a number of feeder roads especially from the western and northwestern sides of the town, which are loose-surfaced, a few of them having murram.

The survey on the present state of roads in the town showed that roads are in very poor conditions especially during rainy seasons. In the dry spell they become dusty. In the main residential areas only the Site-and-Service scheme is actually planned for adequate accessibility. However, due to lack of regular maintenance, the loose-surfaced roads become impassable during the rainy season. Other residential areas lack adequate accessibility.

Consequently, the major mode of travel to places of work in the town is footpaths. The distance covered on average is 0.5 Km. The footpaths are used by about 37 percent of the residents. This observation is further supported by the fact that on average, for each

household, the nearest motorable road is at 0.5 Km away.

One aspect of the transport or road network in the town is that it is hinter-land oriented. Even the local Town Council seem to put emphasis on improvement of rural access roads which serves the farming community within its area of jurisdiction. This is possibly to justify the collection of farms produce cess. It has almost neglected the township network to an extent that it is impossible for vital services such as garbage collection and exhaustion of septic tanks to be delivered to some residential areas.

The council suffers from lack of roads maintenance equipments such as a grader,a roller, a shovel, and a tipper. Presently it borrows these from Ministry of Public Works or Nyandarua County Council. The constraint in this case is lack of finance to purchase the equipments.

4.3.1 Road Network: Relationship with the Growth of the Town:

Before the construction of the current Gilgil-Nyahururu road (tarmacked) which passes through the township, the previous road (murramed) bypassed the town along the western boundary. However there was a branch that accessed the town from that road. The town therefore existed as a small compact and isolated rural centre. By then urban development was restricted in the area presently between the railway line and the valley on the western side of the town.

The construction of the current Gilgil-Nyahururu road opened up urban development on the eastern side across the railway line, an area which was hitherto prominently agricultural private land.

The present road network in the town closely relate with the spatial pattern of the town, with main stretches of the built up areas of the town occurring on the sides of the roads. Examples of this are the stretch of the tarmacked road across the central part of the town, and the loose-surfaced road that surrounds the current open-air wooden stalls market forming a ring pattern. Similar relationship is found on the road towards Tumaini (see Map 6). Even some of the scattered developments in the town occur along the roads.

More important is the linear development that characterize the area along the tarmacked stretch of road through the town centre. This also is the initial point where urban development in Ol Kalou began with one shop and a hotel in the early 1930s (Plate 4.3). Although the railway line came prior to the major roads it did not attract urban development compared to the latter. Incidentally the end of the tarmacked stretch of road also marks the end of urban development towards Tumaini.

More evidence of this relationship between the spatial pattern of the town and the road network is the influence of the main road (Gilgil-Nyahururu) on development of the town. The road has attracted relatively more intensive urban development although not on its both sides due to the presence the of railway reserve on one side.

An analysis of the occurrence of subdivision of Part Development Plans (PDPs) along the eastern side of the road showed that the number per year increased tremendously after the road was constructed. Before the construction of this major road in 1978, there were only 2 PDPs done on this part. But between 1978 and 1988 the number rose to 8, and by 1993 the whole part was subdivided and most development had taken place. The major residential areas in this town occupy an area

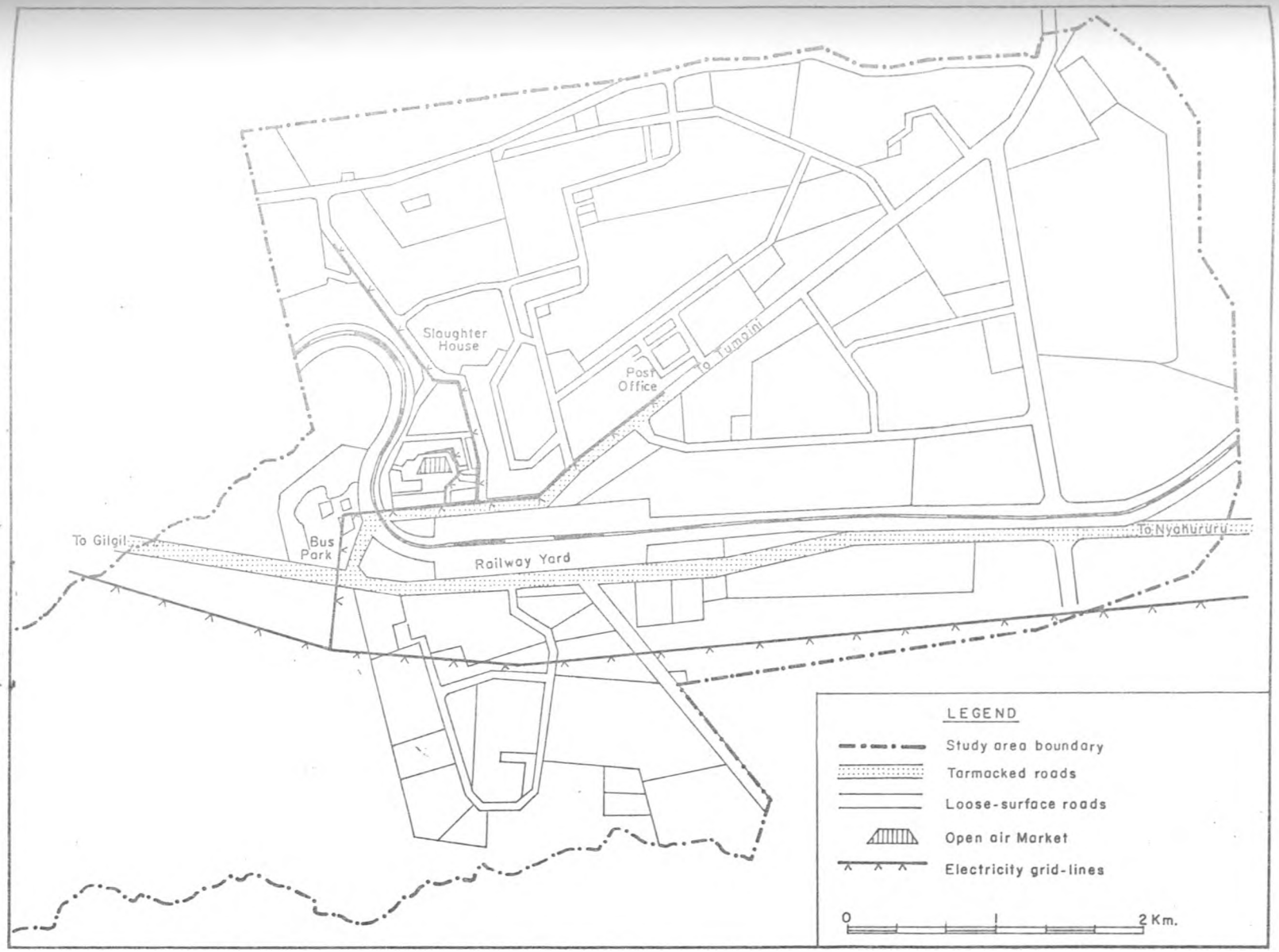
adjacent to this road, while the main designated industrial zone lies along one side of this road.

Thus the following factors can be distinguished in this relationship:

1. There is linear development along the main road towards Nyahururu, and along the tarmacked road across the central part of the town. Buildings intensity decreases with the distance from these roads.

2.There is intensification of development and urban services in areas on or near the major roads. Urban facilities which are located along these roads include town council offices, police station, market, post office, banks, and K.G.G.C.U stores. This shows a strong relationship with the road network. However, location of some essential facilities such as the district hospital and some schools do not show this relationship.

3. There are isolated development that do not portray any relationship with the main road network. This is explained partly by the decisions taken by the town council; for example location of Huruma Estate, and partly by private individuals decisions on freehold or leasehold; for instance the Catholic Mission Centre.



Map 6: OI KALOU TOWN— Existing Roads and Electricity Lines

4.4.0 Electricity:

Ol Kalou town is served with electricity by the Kenya Power & Lighting Company. It benefited from rural electrification programme in the 1970s. Currently major institutions, commercial premises and residential estates are served with electricity. However, only about 18.1 percent of the households interviewed use electricity as the main source of energy, while use of firewood is the dominant source of energy as shown below.

Table: 4.2 HOUSEHOLDS' MAIN SOURCE OF ENERGY

Source:	Household %
Electricity	18.1
Paraffin/gas	31.9
Firewood	50.0
	100.0

Source: Field Survey, 1993.

This shows that despite the availability of the electricity, a good proportion of the town residents do not utilize it. Thus there is under-utilization of this major source of energy. This is can be attributed to lack of industrial establishments which could consume big amounts of energy.

The electricity supply network is limited. Only the major commercial premises and the high income residential

areas, mainly in the central part of the town and the Site-and Service Scheme, are served. Most of the other residential areas, particularly those for the low income groups, do not have electricity. Major institutions such as the district hospital have electricity. Electricity also is important in the town as it is used in pumping water from the boreholes.

4.4.1 How Electricity Has Influenced the Growth of the Town:

Generally, electricity has played a big role in the development of the town and can be associated with the growth of substantial investments.

The extension of electricity supply to this town increased efficiency in the water supplying system. Prior to this, the use of diesel-driven engine caused frequent breakdown and stoppage for servicing. Although these problems still persist, they are less frequent. Electricity also lowered the cost of pumping water. Though the problem of water inadequacy still prevails, availability of adequate supply of electricity guarantees increased production of water if high capacity equipments are installed.

Also the availability of electricity coincided with increase in number of commercial premises, and recently,

construction of storey buildings. This has brought about intensive land use especially within the central area. The town now has a high class hotel, electric-appliances shops, radio and related equipment repairing workshops.

But there is no other sector that shows more profound impacts as a result of supply of electricity than the Jua Kali. Metal fabrications, woodwork, and mechanic engineering, are some of the main industrial activities which have arisen.

Map 6 shows the network of the power-line in the town. It is noticeable that the electricity line follows the main road network. As a result, it is not possible to precisely indicate the relationship between electricity supply network and the spatial pattern of the town due to the combined influence of the two types of infrastructure.

The survey, however, showed that 21.2 per cent of those who developed residential premises related the location of the premises to the location of electricity supply line. The comparable findings for the commercial premises developers was only 36.5 per cent. This indicated the passive relationship between electricity supply distribution and the spatial growth of the town. However it can be argued that this passive relationship is as a result of development which took place before

installation of the electricity lines. Also in most cases the electricity line follows or comes after developments has taken place.

It is also important to note that the high percentage of the households not served with electricity can be attributed to the high proportion of low-income groups in the town. Electricity supplies is considered not essential for low income settlements in developing countries (UNCHS,1981). However, this issue should be seen in terms of prioritization. Electricity should not be seen as an unessential infrastructure in the low income settlements, but rather as an important input in the process of upgrading such settlements.

4.5 Summary:

From the foregoing analysis, the following facts can be deduced regarding the relationship between infrastructure provision and the pattern of the town.

The physical aspects of the area, particulary the landscape (terrain) does not influence the water supply network distribution. This is attributed to two factors: the relatively gentle sloping terrain which allows flow of water to almost each part of the town; and secondly, the use of pumps to facilitate flow of water even to the steep parts.

The water supply network which in most cases follow the road network relates closely with the areas of dense development. Except for areas where land for urban development is not available, existence of water supply network is accompanied by relatively dense urban development. However, unplanned developments tend to be followed by water, much later, and not vice versa,as exemplified by Huruma Estate.

The type of sewerage system in the town exhibit no relationship with the physical landscape. However, due to presence of clay-loam soil which is moderate in drainage, the use of septic tanks is not appropriate though they are in use. Moreover, the predominant use of pit-latrines increases the chances of environmental pollution, especially of underground water.

Due to lack of water-borne sewerage system network in the town its possible influence on the spatial pattern of the town is lacking. However, the existing types of waste disposal methods have adversely affected the general development of the town, especially industrial development.

The physical characteristics of the area especially the underlying rock can support heavy load carrying capacity roads as evidenced by C77 Gilgil-Nyahururu road. The terrain is also conducive to road construction as it

is more or less gentle sloping. But presence of impervious clay soils in some portions necessitate high cost in construction of roads, and some times make the loose-surface roads impassable during rainy seasons. Despite these pertinent physical factors, they have no significant influence on the pattern of road network in the town.

However, the present road network in the town forms the 'skeleton' of the town. It has influenced the spatial pattern of the town thereby creating linear development along the main roads. Intensity of development decreases with increase in distance from these roads. Nevertheless, decisions by the private land owners and also by local authority, have in some instances resulted in making intensive development to occur away from main roads. But in most cases such development are not planned.

The relationship between the electricity supply and the pattern of the town was found to be rather passive. Where electricity supply network seemed to attract intensive urban development, it was accompanied by the roads network. In most cases electricity line followed or came after development had taken place.

There is no doubt, therefore, that infrastructure can act as a guide to urban development. They can, to a

larger extent, determine the spatial pattern of an urban centre and therefore be used as planning tools. But why has this not been the case in most of our urban centres? The next chapter explains this by focusing on the institutional constraints on provision of infrastructure.

Plate 4.3: Linear Urban Development along major a major road.

CHAPTER FIVE

THE INSTITUTIONAL FRAMEWORK IN THE PLANNING AND MANAGEMENT OF INFRASTRUCTURE

5.0 Introduction:

Various factors have affected the delivery of infrastructure to small towns in Kenya. One of these factors is the institutional arrangements which are so complex, thus raising administrative and co-ordination problems which affect the delivery of these facilities and services.

This problem must be seen in the context of the objectives of urban management in small towns which ought to be to plan, develop and to manage delivery of local services to the town population. Thus the issue of having trained, experienced and committed human resources and personnel, the availability of adequate financial resources and the general policy framework of central government under which the local authorities operate are important (Kenya,1993).

Qualified manpower shortage is common among the agencies responsible for infrastructure service. The existing staff in many agencies do not allow imaginative approaches and frequently costly technology has been applied indiscriminately giving rise to development which has little or no relevance to the needs of the majority of the local people (UNCRD,1990).

The local community in many instances has also failed to be involved in planning and implementation of urban development. In several cases there is heavy reliance on external funding for infrastructure projects, but with few or no affective local mechanisms for recovering capital and operation costs. Due to lack of maintenance and adequate operation, most infrastructure projects suffer from poor quality of service and premature replacement is required.

These issues among others are examined in this chapter in the context of Ol Kalou town. The local authority is given greater attention to bring to light its operations and capacity in handling infrastructure and urban development issues.

5.1 The Ol Kalou Town Council:

Ol Kalou Town Council is the body vested with the responsibility of urban management in Ol Kalou urban centre. It was inaugurated in October 1987 after the town gained the status of a town council which also saw its boundaries adjusted to cover a total area of 371 sq Km. As noted in chapter 3, the elevation in status involved jumping from a local centre under the jurisdiction of Nyandarua County Council to a Town Council. Currently, however, the area of the township is

approximately 38 sq Km (see Map 3).

5.1.1. The Internal Organisation:

Like many other town councils in Kenya, the Ol Kalou Town Council consists of two distinct but functionally related sections; the deliberative and governing council, and the executive arm composed of council employed staff. The council is concerned with policy formulation (Bubba et al,1989) and consists of two categories of councillors — the elected and the nominated councillors. The policy formulation involves making policy decisions, by-laws, and other embracive regulations to determine, direct, and control the activities of the council within its routine functioning and in its area of jurisdiction.

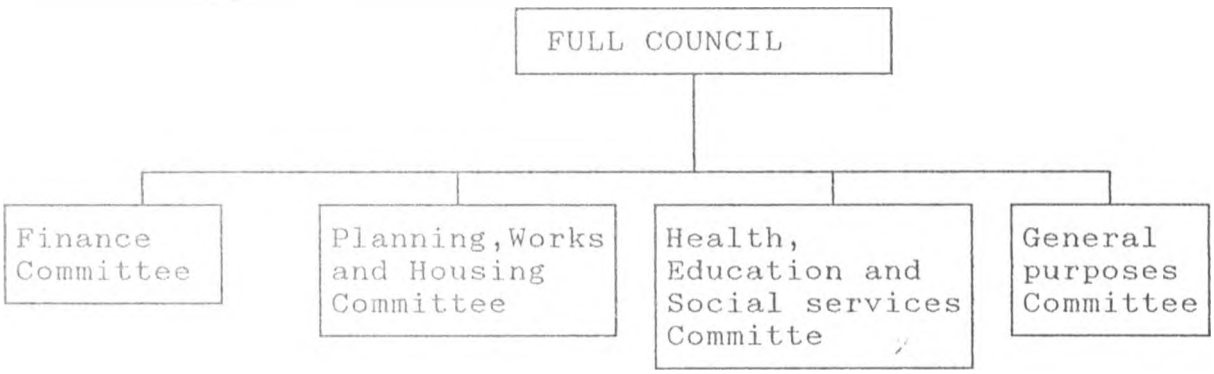
The Town Council is made up of 7 elected councillors representing 7 electoral wards, 2 nominated councillors and the District Commissioner who represents the interests of the Government. Thus this composition still maintains the requirement that at least two thirds of the total councillors (representatives) in the council be elected so "as to bring government to the people" (Bubba et al,1989, p. 10). The presiding officer of the council is the chairman, elected from the councils' membership by the members. Although the tenure of the council is 5 years, the chairman and the deputy hold

office for two years only (*Ibid*).

Because of the wide range of responsibilities, the council is divided into committees, each committee delegating a specific function. These committees' meetings are also attended by chief officers of the relevant departments, and professionals in the public service who act as advisers.

The council has 4 functional committees as illustrated below:

Figure 5.1: COUNCIL'S COMMITTEES

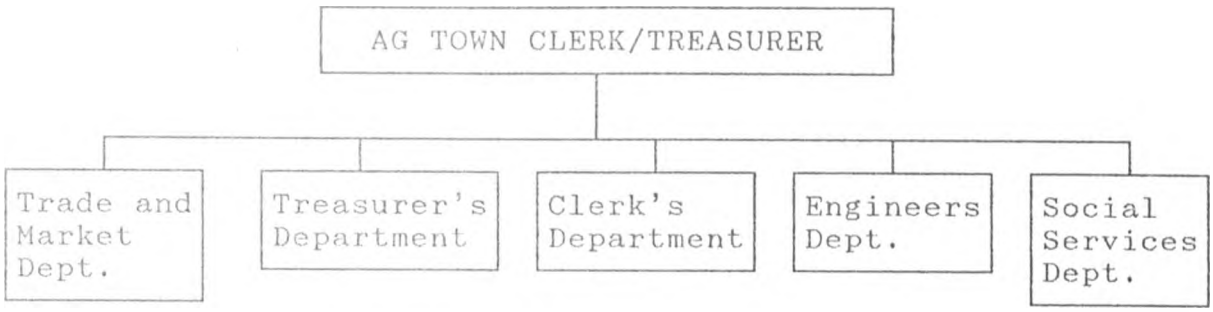


The main function of each committee headed by an elected chairman is to deliberate on special or general issues before the whole council meets to rectify and adopt the decisions. Due to the small size of the council, the various committees are not mutually exclusive. Councillors serve in more than one committee.

The executive arm of the council, whose main function is implementing the councils' decisions, on the

other hand, has four departments (see figure 5.2).

Figure 5.2: THE EXECUTIVE ARM OF THE COUNCIL



It is headed by the Town Clerk. Currently, the town has an acting town clerk who is also the treasurer. He is the chief administrative and executive officer of the council. He also advices the council in its decisions. Owing to the tender age and small size of the authority the establishments has about 60 workers only. This is because the departments are small units.

The information obtained from the field however, indicated that the authority suffers from shortage of personnel. It lacks important employees such as accountants, administrative officer, works superintendent and draughtsmen. In total it lacks 8 essential employees, without considering other technical officers and professionals such as architect, engineer and planner, who the council is not allowed to employ.

5.1.2 The Decision-making Process:

The decision making process involves issues going through various stages. Simply, the town clerk's office receives matters and issues on behalf of the council. These matters are forwarded and discussed between the clerk and the council's chairman. The two decide on which committee to handle the matter.

At the committee stage the matters or issues are thoroughly examined in details and the necessary consultations carried out. The town clerk and other chief officers of the executive arm are represented in the committees as ex-officio members. The committee simply recommends to the council the suitable measures to be taken with regard to a particular matter. The deliberations are referred to the council for approval before implementation.

When a matter is finally adopted (passed) at the full-council meeting where it is tabled as a minute, it is passed over to the town clerk for action. The clerk uses the appropriate department for actual implementation.

When all is done, the action of the local authority should reflect the needs of the local people. In so far as the concept of local government in Kenya is based on the premise of representative democracy, which means that

the area residents know their needs and priorities better than anybody else, the councillor being a representative of a ward is always in touch with the local residents. He is supposed not to lose sight of the people's needs and aspirations.

5.1.3 The Planning Functions:

The local authority is also vested with the responsibility of planning urban development in the town. Owing to the young age of the Ol Kalou Town Council, the authority has done quite little in terms of preparation of development plans although it has all through guided development since its inception. However this should be seen in the context that although the council is responsible for the planning and control of urban development and management of sercvices, it is not a planning authority nor does it have the technical skilled personnel to carry out this. It relies on the technical advice from the central government departments. Prior to its inception, the development planning in the town laid exclusively in the hands of the Department of physical planning, Nyandarua District.

In 1982, the Government introduced the Local Authorities Development Programme (LADP), which was meant to assist the management of capital expenditure within

the local government system (Bubba et al,1989). Each local authority, therefore is required to prepare a 5 year investment plan which incorporates a development strategy which describes the physical,social and economic objectives of the local authority.

Ol Kalou Town Council's LADP 1992-1996, which was in its finalisation stage by the time of this study's fieldwork, is a major break through with regard to the planning function of this local authority. Among other things, the plan spells-out proposed projects which would be the main programmes for the council.

The planning, works and housing committee of the council is the most important unit for making planning decisions, particularly those related to land use. Matters handled by this committee include initiating decisions to cause preparation of either short-term or part development plans, proposing development projects to be undertaken, advising the council and the planners on location and siting of proposed development projects, recommending land-use development applications, initiating land-use development control regulations and by-laws, and giving advice on the implementation of development projects, among others.

The town clerk advises the planning committee on land use policy in general and also co-ordinates and

manages the planning and implementation process in the council. He liaises with the external agencies and persons involved such as physical planners in preparation of plans, and the Commissioner of Lands in acquisition and authorization of use of land. For instance in the preparation of the LADP, external agencies such as Government Training Institute (GTI) Mombasa, District Physical Planner, the USA peace Corp and the Ministry of Local Government were involved.

The clerk's office is also the source of information on availability of land, and population statistics which are required in planning. He administers issuance of title deeds and building regulations. He approves building and site plans and arranges for supervision of construction on the ground. This shows that the clerk's office requires adequate trained personnel.

This information shows that the town council has a very pertinens role to play in the urban development of the town. It not only determines the success or failure of existence of guided development, but also its decisions affect the efficiency of other agencies involved in planning. The various problems identified as affecting planning of the town are discussed in the next chapter.

5.1.4 Sources of Income:

The primary responsibility of any local authority is the provision of services as provided in the Local Government Act Cap 265. To achieve these objectives, the authorities are empowered by the Rating Act, the Local Authorities Service Charge Act 1988, and by their own by laws to levy various taxes, fees and charges (see chapter 2). However because of the variations in local authorities, only some services are mandatory especially in the larger councils such as municipal councils.

Because of the wide range of functions, local authorities require a strong revenue base if they are to perform their functions efficiently and affectively (Bubba et al,1989). Ol Kalou Town Council is one of the small local authorities and a relatively new authority. Before 1988 it existed as a town centre under the Nyandarua County Council.

So far the main sources of revenue for the Council are:

1. Premises Licenses fee;
2. Service Charge;
3. Royalties (on quarrying and farm produce except pyrethrum and milk);
4. Rates on - settlement schemes within the town council area; and plots rates, i.e. gazetted

plots which have valuation roll, and plots the in satellites centres which have no valuation roll;

5. Contribution in lieu of rates from Central Government;
6. Slaughter house charges;
7. Open-air market fee (on market days from sellers);
8. Council Rental Housing (only 30 houses);
9. Charges on plans approval;
10. Conservancy charges; from plot-owners for sweeping and exhaustion of sewage; and
11. Grants from (parent) county council- which has been scrapped since 1993.

The above list shows that the council has failed to boost its revenue through commercial activities like rental of market stalls and sale of water, and rental housing of which it has very few despite the demand. Although service charge is collected, the amount is relatively smaller because of the small proportion of the population engaged in the formal sector. The records showed that the chargeable population include 30 registered legal persons (i.e. organisations) and 772 natural persons. The following table shows revenue collected and expenditure by the council since 1988:

Table: 5.1 COUNCIL'S TOTAL REVENUE AND EXPENDITURE: (1988 - 1993)

Financial Year	Total Revenue (K£)	Total Expenditure (K£)	Surplus/ Deficit
1988/89	104070	110780	- 6710
1989/90	147365	157441	- 10076
1990/91	231990	230998	992
1991/92	270447	266769	3678
1992/93	311258	311212	46

Source: 1. Ol Kalou Town Council,
2. Field Survey, 1993

The above records though giving an increasing trend shows some inconsistencies. Although the council claims to have an inadequate revenue base, and hence the revenue collected, poor record of revenue collection was reported. As a result in some years it operates under deficit as shown above.

The council expenditure consists of administration and maintenance expenses (recurrent expenditure) and very minimal on new development and expansion (capital expenditure). However due to increased cost of various services and increase in urban population demanding these services, its expenditures have increased so that even when there is surplus of income over expenditure it is not substantial.

However, various issues can be raised here. The council does not provide expensive and vital services and facilities such as supply of water, elaborate sewerage system, education facilities other than a number (17) of nursery schools, etc. Secondly, it has a relatively

small (60) and inadequate number of salaried employees. And thirdly its maintenance expenditure is not on a wide range of facilities (see table below). It therefore follows that the revenue base and the revenue collected looks substantial and the council should experience minimal financial problems.

Table 5.2: COUNCIL'S MAINTENANCE EXPENDITURE (ANNUAL AVERAGE - 1988/89 - 1992/93)

Item/Activity	Expenditure Amount (k£)
Road Upgrading	5,000
Slaughter House	1,250
Adm. Office	545
Vehicle	10,000
Nursery School	5,100
Total	21,895

Surce: Ol Kalou Town Council,1993.

Although the town council is not a profit-making entity, it is expected to break even in its activities. Deficit financing is not encouraged and as shown in table: 5.1, the council have avoided this in recent years.

The ability to provide a certain level of services now and sustaining it in future largely depends on prudent resource management and long term strategic planning. This calls for realistic policies and investing of surplus funds in high yielding assets. The council needs, for instance, to open up new areas for settlement, to arrest decay in the town's facilities, to

extend infrastructure, and to rehabilitate existing networks. All this need finance and much of the finance might have to be found within the town, by local taxation, consumer charging, private sector contributions and corruption and waste elimination (UNCHS,1993).

5.2 Other Institutions:

As noted in chapter 2 the responsibility of urban development including infrastructure falls under several agencies (Kenya,1993). In Ol Kalou in particular, a number of organisations were involved in different projects. These agencies are highlighted below together with their functions in urban management of Ol Kalou.

(a) Ministry of Water Development (MOWD)

This Central Government agent plays a crucial role in provision of water to the town. The local town council not being partial or full water undertaker, the MOWD is responsible for entire water supply; both the operations and distribution. It initiated the water supply project by rehabilitating and also sinking boreholes and laid down the distribution pipes network. It is also responsible for billing, water charges collection and general management of water supply in the town. It also gives technical services, planning, and design of the projects, both for water and sewerage

systems.

Two problems arise here because of lack of participation of the local authority in financing and management of water supply. The MOWD supply of water has failed to keep pace with the increase in demand in the town through revitalisation of the project since 1972. This can be attributed to several factors, one of them being lack of information on spatial growth of the town and growth in terms of population size. Incidentally, the town council has this information.

Secondly, the water charges do not reflect the cost of production due to dependency on Central Government subsidies. As a result the project is not self-sustaining and therefore unsustainable. Besides this, there arise several cases of water charges defaulters who feel that following their paying of service charge, water provision should be the responsibility of the local authority to whom they pay.

(b) Ministry of Local Government (MLG)

Like in other local authorities in Kenya, the MLG is responsible for overseeing the operations, financing and management of the Ol Kalou Town Council. It plays a regulatory role.

Because urban development is multi-sectoral, and implementation of an urban development strategy involves

working with many other ministries, the MLG initiates close relationship with these other ministries in formulating an urban development policy compatible with Kenya's economic development strategy (Kenya 1993); and this is what is reflected in formulation of the 5 year local authority development programmes (LADP). Ol Kalou's LADP(1992) which was in its finalisation stage was prepared through the assistance MLG and others.

Due to this regulatory role of MLG, the local authority loses some degree of autonomy especially regarding finance. For example, the MLG has to give approval to any type of tax on residents; such approvals face delays (Mairura,1993; The Accountant April/June 1993). "Political blessings" have to be sought even in case of awarding contracts and other orders, thus ignoring the local authority's technical advice in preparing proposals, despite their having had first hand knowledge of their goals and revenue resources required to realise them. This requirement for referring such issues to the parent ministry is simply designed for control to guard against misuse of powers. But experience has shown that it is a major handicap in the long-term planning of services.

(c) Ministry of Lands and Settlements (MLG)

The MLS has wide ranging powers with respect to

planning mapping and surveying, allocation and registration of land in the country. In small urban areas especially those found in agricultural dominated areas, such as Ol Kalou, the MLS has a crucial function in ensuring availability of land for urban development and retaining the desired level of agricultural productivity.

Through Department of Lands the MLS allocate Government Land; approve development plans; prepare and register land titles; administer "Trust lands" on behalf of the county council and prepare rating valuation rolls on behalf of the local authority.

Also through the Physical Planning Department, the ministry prepares land use or development plans for the area. This department is very instrumental in providing general town planning services to the local authority as exemplified by its involvement in preparation of the local LADP.

One of the problems that has arisen in this case is directing of urban development towards difficult terrain that is not conducive to environmental enhancement in face of urban development. Ol Kalou town is supposed to expand southwards to the rugged and undulating terrain because land in the north and northwest which is most suitable is under individual ownership. The MLS has

failed to avail to the local authority any modalities of acquiring land in this area.

This study offer option to this by expounding on the role of infrastructure provision in enticing land owners to convert land into urban land use.

(d) Ministry of Public Works and Housing (MOWH)

The MOWH activities have bearing on urban development. It is responsible for planning, designing, construction and maintenance of road network in rural and urban areas. More specifically, the ministry defines standards for planning and construction of roads.

In Ol Kalou, the MOWH works closely with the town council in upgrading the rural access network but little attention has been given to the township road network. This co-operation is vital because the local council is able to borrow some of the road maintenance equipments which it does not have.

More important function of this ministry is laying down of housing policy while through it executive arm, the National Housing Corporation (NHC) the policy is executed. In Ol Kalou the NHC initiated the Site-and-Service residential housing Scheme in 1978 and so far 140 houses have been completed. In this regard, the NHC transmitted government funds to the local authority; provided technical assistance; and developed the housing

estate.

However this involvement was not without problems which have caused far reaching effects. The NHC dominated the management and construction of the scheme to the extent that the local authority had little understanding, say or even supervision role on the project. As a result the sewerage system was under-designed, no environmental measures such as terracing and construction of storm water drainage were done and the work was simply hurriedly done. Currently this residential estate face sanitation and drainage problems discussed in chapter 4, which through the local authority's participation could have been avoided.

The foregoing gives some of the main institutions which are involved in urban development especially infrastructure projects planning and provision. No doubts this list is not complete without the NGOs. But the study established that very few NGOs are involved especially in provision of infrastructure in the area. Moreover, the few identified operate in the immediate rural areas.

For Kenya Water for Health Organisation (KWAHO) is involved in helping the communities in construction of water tanks and VIP latrines in schools; and the Red, cross society of Kenya has started a water project in

Gichungo, one of the satellite centres of Ol Kalou Town Council.

Any mention of institutions involved in procuring provision of services and facilities will be incomplete without a mention of the role the District Development Committee (DDC) plays. Among others the Chairman of the local authority and the town clerk are members of the DDC. All local authority development proposals have to be submitted to the DDC for approval, and the Government requires that the DDC be primarily involved in the initial implementation of development projects such as infrastructure, before the subsequent operation become the responsibility of the local authority (Kenya,1988). Moreover, the DC who is the chairman of the DDC has the power to suspend implementation of the council's resolutions if he suspects of irregularity or if deemed unnecessary. A case at hand is stoppage of construction of a temporary bus park at Ol Kalou in early 1993 by the local DC. This again reflect the excessive external control and interference.

5.3 The Local Community:

In this section, the interest is to examine the role of the local community in urban development and management with regard to provision of infrastructure.

The role of the community in the provision of infrastructure has been widely recognized (UNCHS,1993; Kenya,1993). In the first place the local community need to be involved in identification and prioritization of infrastructure programmes. For instance if a particular community gives priority to a different element of infrastructure, their wishes should be considered before any decision is taken concerning the project in order to avert failure through lack of public acceptance of what might have been provided with the best of intentions (UNCHS,1981).

Secondly, it is widely acknowledged that most infrastructure and upgrading projects fail to achieve self-sustenance and therefore fail because of lack of cost-recovery mechanisms (Macharia et al,1993). This is evident from the fact that most public sector projects have been disappointing in the extreme and there is little prospect of replicating such projects. In contrast, the performance of the NGOs's projects has been exemplary.

The survey showed that the local community have the

will to participate in projects such as water project; health facilities; improvement of roads; drainage systems and other projects meant to upgrade the settlements. Main ways of participation as suggested by the respondents include financial contributions, free communal labour, supervision and participation in management programmes.

It was also revealed that most of the residents were willing to pay more on user charge provided adequate and quality service or facility is provided. As studies have revealed elsewhere, the willingness-to-pay depends on two factors:

1. the derived utility or future income from use of the service or facility, and
2. affordability, which depend on income of the individual or household and the flexibility of payment.

Failure to tap the resources through involvement of the community result in stagnation of projects, lack of or inadequate essential infrastructure facilities. For example the water provision in Ol Kalou in a good example, while lack of adequate essential infrastructure such as sewerage system, good road network, street lighting and pavement, show failure on part of the local authority to tap the local resources through involvement

of the community.

In view of the high rate of failure of many infrastructure projects, it should be accepted that the target population should be involved at all stages of a project, from conception through planning and design to implementation and operation.

Bahl et al,(1993) argued that the recent urban growth (in terms of population size) may well be contributing to the financial resources, but local authorities may be failing to draw on these resources through involvement of the local community. For instance, the high rate of population growth in Ol Kalou town may have produced urbanization processes which drives up property values, income earned, the number of cars and trucks, thereby increasing the taxable capacity of the local authority.

This study therefore examined this aspect by testing the null hypothesis that:

HO: There is a significant positive correlation between the increase in total revenue collected by the Town Council and the increase in population of the town in the period between 1979 and 1993.

Appendix (II) gives data on both the total revenue collected by the local authority since 1979 to 1993, and the population figures for the same period.

The product-moment correlation coefficient or Pearson's Correlation coefficient measure of relationship was worked out using computer.

The r in this case becomes 0.99, which imply a very strong positive or direct correlation or relationship. In order other words 99 per cent change in the dependent variable (total revenue) is explained by change in the independent variable (population).

This study, therefore, adopt the hypothesis that urban growth, especially in terms of population growth contribute to growth in financial resources of a local authority. This supports the earlier observation that Ol Kalou Town Council should be experiencing minimal financial constraints if this assumption holds.

However, the study also revealed that there is a positive correlation between the population growth and increase in the service requirement but provision of the latter has not kept pace with the former resulting in the current lack and inadequacy of virtually all infrastructure. This can be attributed to the lack of proper prioritisation of development programmes. The council committs huge amounts of funds to recurrent expenditure while neglecting capital development programmes such as infrastructure.

It was also revealed that the council loses a good

proportion of its resources because of lack of effective mobilisation and collection machinery. Corruption and misappropriation of funds also contribute to this.

The inability to generate adequate revenue resources to keep pace with service demands should not be blamed solely on the local authority. Although it is supposed to generate resources as an autonomous body, it lacks the freedom required to determine nature and level of taxes and fees that can be levied.

5.4 Co-ordination of Infrastructure Projects:

The issue of co-ordination and integration of approaches to infrastructure provision arises because of its importance. UNCHS,(1986) report showed that for the desired level of community development to be achieved, integrated approach to provision of infrastructure is required.

For instance, the provision of water supply in Ol Kalou which is not accompanied by other essential infrastructure such as sewerage system and improved sanitation condition, has not achieved what could have been achieved by a combination of these facilities. Instead what can be observed in this case is a continuation of the skewed application of investment resources amongst infrastructural services.

Another good example of this trend is the provision of septic tanks sewerage system in the Site-and-Service Scheme without supportive or complimentary facilities such as domestic and storm water drainage system; adequate and reliable transport network, etc. Another typical example is the construction of the slaughter house without a proper waste disposal facility. Consequently its presence now is a health hazard.

Full benefits and improvements can not be achieved without concomitant improvements for example in water supply and sanitation; drainage systems and disposal of solid wastes, etc.

For such co-ordination and integration of improvements through infrastructure projects, co-ordination and co-operation is required between the various agencies concerned with infrastructure ánd other human settlements elements.

5.5 Maintenance of Infrastructure:

The problem of infrastructure maintenance is a perennial problem in most urban centres. Although it is readily clear that it is more economical to regularly maintain a facility than to construct a new one, this fact is often ignored and down-played.

As already noted in chapter 3, infrastructure such

as water supply, road network, sewerage system, recreational facilities, and slaughter house in Ol Kalou are in dire need of improvement due to breakdown, misuse and lack of maintenance. Lack of maintenance can be attributed to several factors, but we single-out the following:

1. The passing of maintenance responsibility to local authority which in the first place was not involved in planning and implementation of the projects. A case at hand is the under-designed sewerage system in the Site-and-Service Scheme which was established by the NHC in 1978.

2. The unsustainability and diversity of technologies adopted by the various agencies involved in provision of infrastructure. For instance the tapping of underground water in Ol Kalou through use of electricity-driven machines and pumps requires expertise for repair, and frequent replacement. In the long run this technology is not sustainable financially.

3. The insufficiency of resources made available for maintenance. This is an important aspect as it results from the decision of the local authority. Closer attention was paid to this issue and an examination of the relationship between service charge revenue and infrastructure maintenance expenditure carried out. This

was done through testing the following null hypothesis:

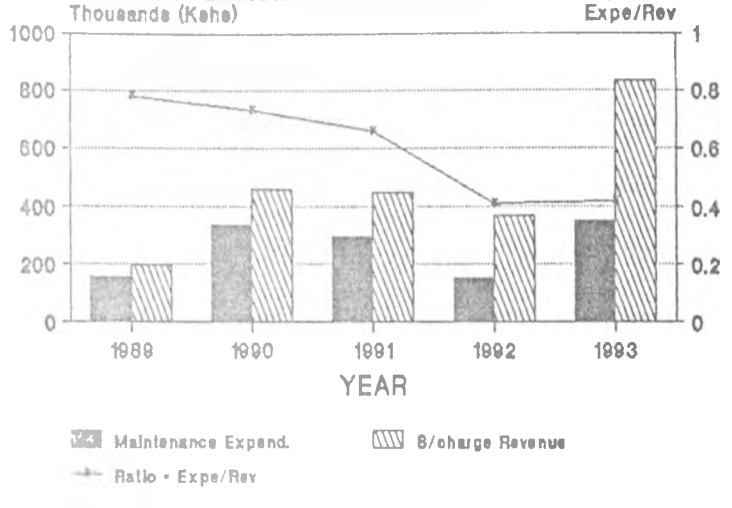
Ho: The maintenance expenditure on infrastructure increases with an increase in the total service charge revenue collected.

The assumption was that the infrastructure maintenance expenditure vary with variation in the total service charge collected by the local authority. The independent variable in this case is the total service charge which determines the maintenance expenditure (see data in Appendix III).

Using graphical methods, a bar graph was used to show how the total amounts of the two variables compare in each year. The ratio between amount used for maintenance and the amount of service charge collected was calculated for each year and plotted on a line graph to show the trend (Figure 5.3).

The graph shows that while the amount of service charge revenue collected has grown from about Kshs 200,000 p.a. in 1989 to over Kshs 800,000 p.a. in 1993, the amount spent on infrastructure maintenance has not equally grown. It grew from slightly below Kshs 200,000 p.a to slightly below Kshs 400,000 p.a. Moreover, ratio between the two has steadily declined since 1989, indicating that the two do not grow proportionally as expected.

FIG. 5.3 RELATIONSHIP BETWEEN MAINTENANCE EXPENDITURE AND TOTAL SERVICE CHARGE REVENUE (1989-93)



Source: Ol Kalou Town Council, Nyandarua County Council, and Author's estimates

In this case, the need to give greater fiscal powers and financial autonomy to local authority should be stressed, as a major priority. Also the agencies involved, including donors must recognize maintenance as a development priority by making provision for infrastructure projects.

5.6 Summary:

This analysis sought to enlighten on issues relating to the institutional contraints involved in the provision and management of infrastructure in the study area.

The local authority as the major institution involved in planning, provision and management of infrastructure suffers from shortage of qualified manpower. Although it is not capable of employing professinals such as engineers and planners, the authority lack essential employees such as draughtsmen and accountants whom it can and is allowed to employ. Moreover, the authority can not effectively plan, administer, and control urban development unless it receives technical services from the Central Government's agencies. Failure in this may lead to inefficiencies.

The resource base of the local authority is vast, but there is evidence that due to some legal technicalities, the authority has not been drawing resources from a wide range of sources. Moreover, it has failed to boost its revenue base through a number of commercial activities. The above combined with the fact that there is misappropriation of funds and inadequate revenue collection machinery, has left the council with inadequate funds despite the rich resource base.

The various institutions involved in development in

the town have tended to have overlapping responsibilities and in most cases issues are left unattended due to such complexities. In other instances, the local authority has not been effective in overseeing the participation of other agencies especially the government ministries. The town also does not benefit from the activities of Non-Governmental Organisations in infrastructure projects.

Community participation in infrastructure has been ignored by all the agencies involved. Although the study established that the community was well aware of their problems and the need to participate in alleviation of these problems, the local projects lacked community participation.

Maintenance of infrastructure is not given priority by the local authority, and the other institutions involved in procuring provision of such facilities and services. They do not make provision for maintenace when planning such projects. The local authority itself has neglected this aspect.

In the next chapter the main issues that arise from the analysis in the previous chapters are addressed in a bid to approach solutions.

CHAPTER SIX

PLANNING FOR SUSTAINABLE INFRASTRUCTURAL PROVISION

6.0 Introduction

The stage is now set to review the research content of the whole work in the light of the research problem and objectives. Thus for logical synthesis, this chapter is divided into sections each addressing the factors that arise from the previous analysis.

The overall aim of the study is to come up with a strategy or improved approach of providing infrastructural services in Ol Kalou and also applicable in other similar settlement.

6.1 Site conditions:

The site conditions of Ol Kalou town are outlined in chapter three under various headings of 'physical characteristics.

The analysis of the relief show that low-income residential areas are located in the relatively difficult terrain consisting of the slopping landscape along the identified dry river valleys. These settlements include the Huruma Estates in the southeast, and the settlements in the western side of the town. This implies that apart from the soil erosion vulnerability, the area poses difficult to the provision of infrastructure services

such as water supply and sanitation services.

The geology of the area indicates that the town lies on very old rocks. The succession of rocks has established a thickness of up to 1000 feet. This has created a firm base for construction. Roads of high carrying capacity as well as buildings can therefore be accommodated.

However, this geological set up, though also guaranteeing existence of underground water, make sinking of boreholes and other excavation works expensive and highly mechanised.

The soils in the area vary. Generally the dominant silt-loam soil is good for construction works and installation of infrastructure, except where due to conditions such as flatness of the terrain and bed-rock nearness to the surface, the soil become waterlogged. The survey, however, established that there are very few such cases. But due to the presence of small portions with occurrence of impervious clay soil, more of waterlogging conditions were identified for example in the area beyond beyond the Site-and-Service Scheme, towards Huruma. Although this part is currently virtually empty with no development, it avails breeding grounds for mosquitoes. It is also the area to which the septic tanks of the adjacent estate drain through soakways and overspilling. In spite of the

fact that this area is not suited to use of septic tanks, indicators of future developments like Part Development Plans (PDPs) show that the area will be availed for development.

The analysis shows that Ol Kalou town is located between two dry river valleys depicting the original drainage system of the area. The flanks of the valleys give rise to sloping landscapes within the town area, which, as mentioned earlier, are susceptible to soil erosion and on which installation of infrastructure and urban development is relatively expensive. An important factor to mention here is the ill-conceived idea by the local Town Council to allow expansion of the town towards the south where though land is available, the terrain is rugged due to the occurrence of the two river valleys. Caution needs to be taken because urban development in this part will lead to environmental degradation through soil erosion. Construction works would also be expensive and provision of infrastructure would be hampered.

The absence of any utilizable river in the area near the town affects the availability of a reliable source of water. However, the Aberdares Ranges water catchment area comprises rivers, springs and streams which can be harnessed. A cost benefit analysis of a project fetching water from these permanent sources, and the current

project based on boreholes should be carried out to ascertain the already perceived usefulness of the former.

The linkage between Ol Kalou town and its rich agricultural hinterland is adversary affected by lack of adequate all-weather roads, in the face of a climatic condition characterised by heavy rainfall. The transportation network therefore needs to be reviewed to solve the problem. The problem area such as the linkage between Tumaini and the town, and the latter and Wanjohi should be given priority. These two areas are best producers of milk and potatoes and therefore need to be linked to the town.

6.2 Infrastructure:

From the analysis in chapter four it is clear that the current supply of water is extremely inadequate. This is attributed to the following factors:

- Lack of a reliable source, and declining discharge capacities of the existing boreholes;
- Use of low capacity pumps compared to the local demands;
- Poor reticulation (distribution) network; and
- Increased demand due to rise in population.

All the above factors need to be addressed. The water crisis in this town require urgent action.

The supply of water is not affected by the physical conditions of the area. This is indicated by lack of any relationship between the laying down of the water pipes and the landscape variations. Nevertheless, the analysis showed that water supply network had influence on the distribution of settlements. The densely settled or developed areas occur near and along the water supply lines. It was also found out that the water network tends to follow the road network and a combination of the two has much influence on the development pattern. The two have led to the linear pattern of the town.

Due to this linear pattern the cost of provision of infrastructure such as water, sewerage, road and electricity would be relatively less. But the negative aspect of this pattern is that it tends to be wasteful of land and causes unnecessary expansion or urban sprawl. Although the above is not yet very clear in Ol Kalou, unless the current pattern of provision of infrastructure is revised to encourage a concentrated development pattern, this proposition will hold in future.

The town has poor sanitation services due to lack of appropriate methods of waste disposal. The dominance of pit-latrines combined with lack of storm and domestic waste water drainage system creates very unhealthy conditions. The use of septic tanks which are ill and

inadequately designed, and use of VIP pit-latrines that are not exhausted regularly make the town unattractive and hygienically unfit. This was identified as an inhibiting factor with regard to investments.

It was thus established that due to lack of proper sewerage system developers do not relate the site of their premises to any form of sewerage system.

Appropriate methods of waste disposal need to be provided to make the town more habitable. However, any recommendations in this regard need to take into account the identified inhibiting factors to the provision of water-borne sewer system. These are lack of adequate water supply, lack of capital, and the consequent under-utilization of such a system due to low population density in the town.

The survey established that the town suffers shortage of good internal road network. The motorable roads in the town are few and the existing ones lack maintenance. The implication of this is that most parts of the town are not accessible especially during rainy season. Consequently, some vital services are not always delivered, and generally urban transport is non-existent though the demand is there. On average most residents travel a distance of 0.5 km to place of work.

The analysis showed, however, that the spatial

pattern of the town relates closely to the road network. The most influential roads, however, are the all-weather roads; the short tarmacked stretch in the town centre and the traversing Gilgil-Nyahururu road. Except for a few isolated developments, the intensity of development reduces with increase in distance from these roads.

But one salient factor must be emphasised here. The influence of roads perhaps is most noticeable because road network is frequently accompanied by the network of water supply, electricity and it tends to avoid rugged terrain, marshy and waterlogged areas. Thus where roads occur the area is also most likely to be suitable for urban development.

The above observation however, does not rule out the identified relationship between roads and urban development pattern. Instead it adds strength to the argument that roads can serve as a useful guiding 'tool' to urban development. The most important finding in this study however is the link between the spatial pattern of the town and that of the provision of infrastructure mainly roads, electricity and water. This implies that the above can be used to achieve the desired spatial pattern of the town which takes into consideration environmental aspects of the area. The need for such a strategy has never before been fully recognized as it is

now when the growth rate of the town in terms of population is above 5 percent per annum. The most suitable land for urban development is under private ownership, and the town is erroneously expected to grow towards the difficult terrain in the south where land is more easily available. This strategy combined with the fact that infrastructure provision serves as an incentive to convert land into urban land use (MLG&PP,1988)becomes more appropriate. But the problem of inadequate provision of infrastructure which is multi-faceted must be identified and tackled first. This is the concern of the next part of this study.

6.3 Institutional constraints and community participation:

Ol Kalou Town Council, the authority charged with responsibility of delivering services to the local residents suffers shortage of essential employees such as works superitendant, administrative officers, accountants and draughtsmen. Added to this, the council lacks the ability and the legal basis to employ qualified personnel such as engineers, and planners to reinforce development control.

The above finding is seen in the light of the fact that the council serves an area of 371 square km. This is

identified as one of the factors weakening the planning functions of the council.

Moreover, the council's financial capacity is adversely affected by lack of adequate machinery to collect revenue, corrupt employees and general mismanagement. Due partly to external control from the central government through MLG and partly to the lack of initiatives, the local council have failed to expand its revenue base and therefore failed to cope with the increasing demand for services and facilities derived from population growth. For instance royalties from farm produce are limited to few produce, and the council has failed to boost its revenue through diversified commercial activities.

The local authority also spends too much of its financial resources on salaries and maintenance of administration facilities such as office and vehicles, and very little on new developments, projects expansion and investments. Hence the inadequacy of infrastructure in the town. This state of affairs is questionable because the analysis showed that the council should experience minimal financial constraints since it has a small workforce, it offers limited range of services and its revenue base is substantial because of the vast rich agricultural hinterland under its jurisdiction. The

problems which must be tackled in this respect include funds embezzlement, inadequate and ineffective revenue collection machinery, and lack of community participation.

The analysis of the participation of other institutions in the infrastructure development programmes revealed a number of pertinent issues.

The provision of water by the Ministry of Water Development, has made the project ineffective and non-self-sustaining. It has failed to revitalise the project to match the change in demand, and to involve the local authority and therefore the community to guarantee the projects' sustainability. The implications of this is that the water supply project never evolved as a project that could cater for prevailing demand, and at the same time become self-sustaining so that eventually the local authority could assume the role of water undertaker by taking over the project.

The regulatory role of the Ministry of Local Government has limited the autonomy of the local authority with regard to financial matters. For instance the authority has no mandate to determine the types of taxation to levy to expand its revenue base.

The Ministry of Lands and Settlement on other hand, has due to lack of first hand knowledge of the local area

misguided allocation of land for urban development. It has facilitated the availability of land for urban development in areas of fragile environment such as rugged terrain in the southern side of the town.

The Ministry of Public Work and Housing through its executive arm, the National Housing Corporation, negated the local authority's role of guiding development. As a result its Site-and-Service housing project failed to incorporate environmental considerations. Also the installed infrastructure were under-designed.

The study also found out that there is little attempts to involve the community in programmes of the provision of infrastructure. Although the survey findings showed that the local community was willing to participate in various projects, none of the development agencies operating in Ol Kalou facilitated this. Instead such efforts by the Non-Governmental Organisations were reported in the small satellite centres within the town council area. For instance in Gichungo the Red Cross Society of Kenya had started a community-based water project. Kenya Water for Health Organisation (KWAHO) was helping communities to construct water tanks and VIP latrines in schools in the rural area.

The above problem cannot be blamed solely on the development agencies. It was found that some town

residents still felt that provision of services such as water and sanitation is a public responsibility. But like other studies have revealed elsewhere, the local low-income community concentrates their limited resources on what they can achieve and not the 'ideals' that may be derived from infrastructural services (Mairura,1988). This then raises the proposition that construction and acquisition of water supply and sanitation services in Ol Kalou and even in many other similar urban settings requires financial and technical skills that are beyond the means of the local residents, who are predominantly low-income groups. Some 'injections' from external development agencies are required. Such programmes should, however, be community-based to ensure full participation of the community and maximum utilization of the locally available resources to cut down on costs. Also this would ensure that they reflect the priorities and aspirations of the beneficiaries.

It was also found out that co-ordination and integration of infrastructural projects is lacking due to lack of co-ordination and co-operation between the various agencies involved. Also the local authority's failure to assume the role of a co-ordinator was noted where external development agencies such as National Housing Corporation carry out a project without involving

the local authority and the community. This, again, has negative implications to the achievement of a desirable efficient infrastructural and urban development systems.

The analysis also revealed that insufficient resources are committed to maintenance of infrastructure. It was found that despite increase in revenue collected, the local authority continued to avail a very insufficient and declining proportion for maintenance. This explains the identified deteriorating conditions of infrastructure such as roads, waste disposal systems, conservancy services, etc.

6.4 Summary of the Findings:

In summary the following are the findings based on the objectives set out in this study:-

1.The assessment of the physical site conditions in Ol Kalou town showed that the pattern of infrastructure provision is not significantly influenced by the physical and environmental factors. However, factors such as rugged terrain due to sloppy grounds; small portions of clay soils; hard bed-rock; and lack of elaborate surface drainage systems have contributed, though not to a larger extent, to difficult and expensive provision of infrastructure in some parts of the town.

On the other hand, the pattern of infrastructure

provision, that is roads, water, and electricity, relate closely to the spatial pattern of the town. One can therefore argue that the pattern of provision of these infrastructure has guided development of the study area.

2. The evaluation of utilization of the potential resource-base showed that the latter is under-utilized. Consequently, although the town has been growing in terms of population size, the local authority's revenue has not been correspondingly increasing. This has cause the lack and inadequacy of various essential infrastructure.

The above can be directly related to lack of community participation in the planning, identification and procurement of infrastructure development programmes.

3. Lack of maintenance of infrastructure is caused by insufficient resource allocation to this aspect. Its importance is not appreciated, so that despite increase in users' contributions, proportionately less and less is committed to this aspect by the local authority.

The stage is now set, based on the above finding, to recommend ways of sustaining the growth of Ol Kalou as an integrated system thereby fulfilling the fourth and overall objective of this study.

6.4 Policy approach:

An overall view based on the above synthesis would directly lead to suggestion that the solution to the problem of inadequate provision of infrastructure rest in an integrated approach to the total urban environment.

This would no doubt be a good policy approach. It would be erroneous to visualise development of infrastructure in isolation; rather it must be perceived within the concept of integration with the rest of the urban system. All the urban forces of the study area must be harnessed to facilitate and accommodate infrastructural development.

Some of the short-comings of the present approach to urban development, which require redress are highlighted below:

- Policy on urban development seem in practice, to encourage development of settlement even before there is evidence of potential, possibilities and feasibility of providing essential infrastructure to the settlement. The designation of urban centres based solely on prevailing socio-economic forces, or political decisions, or historical background do not give room to consideration of physical site conditions, thereby creating future development problems.

- It is an omission in cases where water provision

within an urban setting is made and not accompanied by appropriate sanitation services. The two should be seen to compliment each other in enhancing health conditions.

- Low income and unplanned urban settlement develop on physically and environmentally poor site. Urban land zoning is responsible for this as low-income people are 'allowed' to have temporary development in areas designated as 'deferred' land which is currently unusable.

- Due to excessive central government control of the local authorities, such bodies have limited autonomy on financial matters. This affect the local authorities ability to match services with demand.

- It is often erroneously assumed that local communities has no role to play in identification, prioritisation, planning and implementation of infrastructure projects especially in urban areas. Community participation is, as experience has shown, an important ingredient in achieving sustainable urban systems.

Thus, the problem of inadequate provision of infrastructure should be seen in its widest dimensions of physical conditions problems, institution's constraints, financial limitations, and community income-levels and prioritisation in face of scarce resources.

This calls for reorganisation of the pattern of settlement especially with regard to location of development in relation to physical conditions. Secondly, reorganisation of the institutional framework within which the provision of infrastructure is secured and the planning of urban development done. Community participation should also be emphasised.

These approaches are broadly stated. Disintegration to show what should happen is what comprises the following recommendations.

6.5 Recommendations:

This thesis recommends the following to provide solutions to the problems and issues which have been identified.

1. Encouraging Urban Development on Environmentally Conducive Sites only:

This calls for stern measures to reinforce development control. But provision of infrastructure must be used as a tool to achieve this.

In this case, areas with rugged terrain like Lokolwa river valley and the other dry river valley in the western side of the town must be avoided while providing infrastructure and therefore urban development. Similar policies should be adopted regarding the water-logged

area near Huruma Estate.

More radical changes in policy regarding expansion of the town should be adopted. The town should not grow southwards towards the valleys. Instead more incentives should be availed to the land owners in the north and northwestern sides of the town to convert land into urban land use. These incentives should include;

- Provision of infrastructure such as water, roads, electricity, and sewerage services which serve as incentives to change use of land;
- facilitation of land use changes without undue losses;
- subdivision of land into commercial plots should be allowed;
- provision of elaborate structure plans showing the desired future developments
- the local authority should acquire land for urban development on this part through non-coercive methods such as buying from willing-sellers. To make this more practical, the authority should encourage private investors to buy such land, thus playing the role of a facilitator.

2. Provision of adequate water supply:

It is suggested that the cost of harnessing water from Malewa river which is 4 km away from the town is, at

least in the long term, less than the cost currently incurred in the use of unreliable boreholes to supply water.

The recommendation here is that a low-cost water project should be initiated to tap water from the identified river. The cost could be minimal because gravity flow is possible due to the marked difference in altitude between location of the river and the town. This however requires that the intake point be located at the Aberdares where the river originates.

The current supply network within the town should be modified and be incorporated in this new proposed project. It should be modified, for instance, to allow adequate storage of water. More distribution lines should be added to ensure adequate coverage.

This project should be financed from both external and internal sources. For instance, the local authority can solicit funds from a donor. The Ministry of Water Development should avail some materials and technical assistance, while the local community can generate funds through self-help groups. The project should be designed to become financially self-sufficient, through recovery of cost from users.

3. Provision of appropriate sanitation and sewerage services:

The previous recommendation complements this recommendation. It is argued that with adequate supply of water, water-borne methods of waste disposal can be employed. However, to avoid recommendations that can not be implemented and under-utilization of a water-borne sewerage system the following measures should be adopted:

(i) Use of exhaustible VIP latrines in the low-income residential areas. These should be constructed by individuals.

(ii) The council should purchase an exhauster to empty the above regularly;

(iii) Establishment of a stabilization pond to serve the town centre and the high income residential area (Site-and-Service scheme) as a first phase of a water-borne sewerage system in this town. The local authority should finance this either from its resources or through loan. Effective mechanisms should be put in place to ensure cost-recovery and reinvestment. The appropriate site for the pond (lagoon) should be the vast almost flat area beyond the industrial zone in the northwest part of the town.

(iv) Use of ordinary pit-latrines within the township should be eliminated but use of inexpensive and locally available materials such as building stones from the local quarry should be adopted to construct

exhaustible VIP latrines.

4. Employing qualified and adequate personnel to manage urban Development:

The local authority should be made a stronger and effective institution by employing the lacking but essential personnel such as administrative officers, accountants, works superitendant, and draughtsmen. The authority should trim-down on subordinate staff to facilitate employment of the above. Similarly there should be policy changes to allow capable local authorities to employ or hire professionals such as engineers, planners and architects. But the link with the relevant central government organs should be effective to ensure technical assistance is availed for small local authorities such as the one in Ol Kalou.

5. Strengthening the local authority's financial capacity:

In this case the local authority requires to employ prudent resource management measures. It should provide infrastructure that are revenue earning, self-sustaining or even profit-making to facilitate reinvestment.

It should also have greater authority on revenue raising and collecting powers. The focus, however, should be on sources of potential revenue with the

highest possible yield. In expanding the revenue base, the goal should be fewer, but more acceptable and productive taxes and fees.

The council should employ adequate, qualified and committed personnel who will be well remunerated to eradicate the problem of inefficiency in collection, and corruption which deny it a good proportion of the revenue.

6. Committing adequate resources to infrastructure maintenance:

The local authority and other development agencies should recognise the importance of infrastructure maintenance. The institutions involved in delivery of infrastructure facilities and services, including donors, should make provisions for maintenance of their funded infrastructure projects.

The local authority in particular should provide revenue-earning infrastructure like water, bus-park, market, sewerage etc. which it can maintain. More of user charge should always be committed to maintenance.

7. Ensuring Community Participation in Urban Infrastructure Projects:

To achieve the above, the local authority through its politicians and the leaders at the grassroots level should play the major role of mobilizing the local

people. However, the community should first be sensitized to their needs, rights and ability. In this regard all development agencies involved should contribute towards this.

To win the community confidence and interest, emphasis should initially be put on projects that have immediate and visible impact (benefits accruing to the community). For instance, as the above recommendations have stated, priority needs such as water, sewerage and sanitation, and general upgrading of settlements should be considered. But the community must identify them.

Thus the local community should be involved in:
(i) construction of storm water drains in areas affected by flooding such as Huruma Estate;
(ii) digging of VIP pit-latrines in Huruma Estate; and
(iii) formation of self-help groups to raise fund for initiation of a viable water project. Members of such groups should form a water committee which would liaise with the local authority, donors, and the ministries to co-ordinate the projects.

7. Finally, the following measures should be adopted to minimize the excessive control of the local authority by the Central Government:

(i) the local authority should be given real mandate to determine the level of taxes in a flexible

manner to enable them cope with the ever-increasing demand for services.

(ii) the local authority should be more free to determine how they would interact with various public agencies such as ministries. The relationship should be to work in unison and promote complementary relations.

(iii) there should be established communication channels between local authority, government and non-governmental organisations, so that they share information and ideas for effective development

(iv) the local authority should champion realisation of the local people's desires, aspirations and priorities through true representation to promote good governance.

CHAPTER SEVEN

7.0 SUMMARY AND CONCLUSION

This study set out to assess and investigate a number of issues. The aim was to find out what role infrastructure development have played in urban development in Ol Kalou. The study further investigated the causes of inadequate provision of infrastructure in the town despite their identified role in urban development.

To realise this the study investigated the relationship between the physical conditions and the pattern of provision of infrastructure; the influence the latter have on the spatial pattern of the town; and finally some of the institutional constraints to adequate provision of infrastructure in the town.

The study found out that in Ol Kalou the site conditions are to a larger extent conducive to provision and installation of infrastructure such as water supply network, electricity roads and water-borne sewerage system. The pattern of provision therefore is not significantly dictated by the physical site conditions.

But the pattern of provision of infrastructure, mainly road, water and electricity have significantly determined the spatial pattern of the town, or urban development. However, the town suffers inadequacy and

absolute lack of some facilities and services, thereby down playing the more effective role which these could have played.

The above according to the findings of the study can be attributed to the institutional constraints mainly poor financial capacity of the local authority due to inadequate mobilization of resources, and resource mismanagement. Other causes are lack of co-ordination and integration of infrastructure projects by one body such as the local authority. The conditions of the infrastructure is made worse by lack of maintenance. The study attributes this to negligence of this aspect and therefore commitment of inadequate resources. This was found to be so on part of the local authority.

Among the recommendations of this study are a general policy which discourage urban development on areas of difficult site conditions to enhance environmental care and minimise unnecessary costs of installation of infrastructure. Approaches to provide reliable and sustainable water, and sanitation services were also identified, besides methods of restructuring of the institutional framework to facilitate effective development. Community participation as a strategy is also recommended to ensure sustainable urban infrastructure projects.

It is also the suggestion of the author that since the development problems of the study area are not limited to that area, the recommendations herein are not just specific to the study area, but are general and applicable to similar urban centres elsewhere.

However, this study has not achieved all that it aimed at. Due to various reasons as outlined in the limitations, this study in some areas only shed light to some issues that require further investigations.

For instance the analysis of the physical site and environmental conditions can never be said to be conclusive. Further research is required to analyze the site conditions in relation to various specific types of development.

The recommended water project also require a feasibility study inclusive of the cost-benefit analysis. The sewerage system recommendations need to be further evaluated in terms of their environmental impact. Moreover, the effect of the use of pit-latrines on the underground should be investigated.

To conclude, this thesis argues that infrastructure provision can be used as a tool to steer urban development to the physically and environmentally sound areas. Adding other functions of infrastructure in human settlements one realises that infrastructure have immense

role. But this is always curtailed by the perennial problem of inadequate infrastructure caused by the complex institutional framework in place.

BIBLIOGRAPHY:

Ahmed, R. & Donovan, C., (1992) Issues of Infrastructural Development: A synthesis of the Literature., International Food Policy Research Institute, Washington D.C., Nov.

Akivaga, S.K., Kulundu-Bitonge, W. & Opi, W. W. (1988), Local Authorities in Kenya. Nairobi, Heinamann

Bahl, R., Holland, D. & Linn, J., (1983): Urban Growth and Local Taxes in Less Developed Countries., Papers of the East-West Population Institute, No. 89, Honolulu, Hawaii.

Bubba, N. & Lumba, D. (1989): International Seminar on African Urban Management (Harare Dec.1989) Country Case Study: Kenya Nairobi, Heinamann.

DANIDA, (1982), Sewerage Projects in Smaller Towns in Kenya. An Evaluation of On-going Sewerage Projects in Busia, Homa Bay, Isiolo and Nyahururu.

Darr, P. S. L Feldman and Kamau C. (1976): The Demand for Urban Water, Studies in Applied Regional Science, Vol. 6 Martinus Nijhoff Social Science Division, Leiden, 1976.

Hagger, J., (1978) Finance for Housing Infrastructure (Nairobi: University of Nairobi, - HRDU).

Harris, Nigel, (1992) Cities in the 1990s: The Challenges for Developing Countries, (ed.)., London, UCL Press Limited.

Hirschman, A.O.,(1958): Strategy of Economic Growth Development. New Haven, Conn., USA.: Yale University Press.

Hofmeier, Rolf (1973); Transport and Economic Development in Tanzania (Muchen: Welt forum verlag).

Jaetzold, R. and schmidt, H. (1983): Farm management Hand-book of Kenya, volume II Part B; Natural Conditions and Farm Management Information Central Kenya, M.O.A. and GAT, Nairobi.

Kenya, Republic of (1989): The Sixth National Development Plan, 1989 - 1993, Nairobi, Government Printer.

Kenya, Republic of (1984): Development Plan, 1984-88, Nairobi.: Government Printer.

Kenya, Republic of (1963): The Local Government Regulations, 1963 Legal Notice No. 256, Local Government, Kenya: Government

Printer, 1963, and the Revised Edition 1986.

Kenya, Republic of (1986): Economic Management for Renewed Growth, Sessional Paper No. 1 1986, Ministry of Finance, Planning and National Development, Nairobi, Government Printer.

Kenya, Republic of (1984): Nyandarua District Development Plan MFP, Government Printer, Nairobi.

Kenya, Republic of (1993): Feasibility Study on Infrastructural Measures in Small Towns: Workshop on Development Strategy, GITEC Consult & Kaburu Okelo and Partners, Nairobi.

Kenya, Republic of (1980): Ministry of Water Development, National Master Plan, Stage I, Volume III Present Resources Uses and Future Demands, Sept. 1980, Tippets-Abbet-MacCathy Stratton, Engineers & Architects, Nairobi.

Kenya, Republic of (1989): Nyandarua District Development Plan, MPND, Government Printer, Nairobi.

Kenya, Republic of (1988): Position Paper on Urban Development Issues, Nairobi.: The Ministry of Local Govt. and PP Dept., Nairobi.

Kingori, G.R. (1970): The Agricultural Geography in Ol Kalou Salient,unpublished Dessertation,Dept. of Geography, U.O.N.

Kungu, Moses K. (1975): The Agricultural Economy of Geta Settlement Scheme in Nyandarua District, Unpublished Dessertation, Dept of Geography, U.O.N.

Macharia, M. & Mutero, J.G. (1993): Cost Recovery in Settlement Upgrading Projects: Problems and Prospects., prepared for MLG/GTZ Small town Development Project, Feb. 1993.

Mairura, E.O. (1993): "Urban Infrastructure Financing Management in Kenya", unpublished paper, University of Nairobi.

Minisrty of Local Government, (1992): Ol Kalou Township, Local Authority Development Plan 1992-1996 (prepared Jointly by MOLG, Miss Faye Haselkorn, GTI, District Physical Planner and the Town Council.

Ministry of Local Government & Physical Planning, Kenya, &

Agricultural University, Wageningen, the Netherlands, Suggestions for Development of Kisii/Busia Town: Integration of the Natural Environment in the Local Authorities, Final Reports, - Kisii, Oct. (1988), Busia, Nov. (1988).

Obudho, R.A. (1991): The Role of Megacities in Spatial Planning - paper presented at the Commemorative Programme for the 20th Anniversary of UNCRD, Nagoya, Japan.

Obudho, R.A. (1992): Gearing Urban Development in Africa for Sustainable Growth: The Current Problems and Challenges for the Future, Unpublished paper.

Ogero, B. (1981): Financial Problems of Local Authorities: A Case Study of Nairobi City Council: unpublished M.A. Thesis, Dept. of Land Development, U.N.O.

Morgan, W. T. W. (1963):"The White Highlands of Kenya", in Geographical journal. Vol. 129, (RP. 140-155).

Mwatha, J.K. (1974): Land Use patterns in Karati Settlement Scheme, Nyandarua District, unpublished, Dept. of Geography U.O.N.

RTI, (1975): Socio-economic Impact of Rural Infrastructure Improvements: Development of a General Methodology and Application to Kenya, Research Triangle Institute Proposal No. 21-76-02, Research Triangle Park, North Carolina, 1975.

Saunders, R.J. & Jeremy J. Warford, (1976): Village Water Supply: Economics and Policy in the Developing World, Published for World Bank by Johns Hopkins, University press, Baltimore & London.

Stren, R.E.& White, R.R. (ed.) (1989): African Cities in Crisis, London: Westview Press.

The Accountant April/June (1993): "Reforming Local Government", Pg - 20 , published by the Institute of Certified Public Accounts of Kenya, Nairobi, Kenya.

Thompson, A.O. (1964):"Geography of Kijabe Area" in kenya Atlas.

UNCHS, (1992): Improving the Living Environment for a Sustainable Future., (HABITAT), Nairobi, Kenya.

UNCHS, (1981a): Development of Rural settlements and Growth centres, OP/81/7 (HABITAT), Nairobi, Kenya.

UNCHS, (1989b): Methods for Allocation of Investments in Infrastructure within Integrated Development Planning: An Overview for Development Planners and Administrators, HS/168/89/E (HABITAT), Nairobi, Kenya.

UNCHS, (1993):"Improvements of Municipal Management", a Report of the Executive Director, Fourteenth Session, Nairobi, 26-April-5 May 1993.

UNCHS, (1989a): Urbanization and Sustainable Development in the Third World: An Unrecognized Global Issue., HS/77/89E (HABITAT), Nairobi, Kenya.

UNCHS, (1981): Review of the Provision of Infrastructure in Slums and Squatter Areas and in Rural Settlements, (HABITAT) October, Nairobi, Kenya.

UNCHS, (1986): Delivery of Basic Infrastructure to Low-income Settlements: Issues and Options, HS/10/86/E, (HABITAT), Nairobi, Kenya.

UNCHS,(1989c): Decentralisation Policies and Human Settlements Development, (HABITAT), Nairobi, Kenya.

UNCRD, & University of Zimbabwe, (1990): Sustaining Self-Reliant Local-Level Development in Eastern and Southern: Role of Environmental Management and Infrastructure Support, Report of an International Seminar, Harare, Oct., 1990.

USAID, (1985): Secondary Towns: An Overview of 5 Case Studies., Prepared by Rivkin Associates, Washington D.C.: Agency for International Development, office of Housing and Urban Programmes.

Ward, B. (1969): The Economist, December1969.,

World Commission on Environment and Development (WCED), (1987): Our Common Future., New YORK.: Oxford University Press.

World Bank, (1972): Urbanization.: Sector Working Paper. Washington D.C.: the World Bank.

World Resources Institute, (1987): World Resources 1987., A report by the International Institute for Environment Development and the World Resources Institute, New York.: Basic Book, Inc.

World Bank, (1983): Policies for Efficient and Equitable Growth in Developing Countries. World Bank Staff Working Paper No. 342. Prepared by J.F. Linn. Washington D.C., World Bank, Development Economics Dept.

Youngson, A. J. (1967): Overhead Capital: A Study in Development Economics.: Edinburgh University Press.

APPENDIX I

WATER DEMAND, SUPPLY AND PER CAPITA CONSUMPTION

YEAR	POPULATION	DEMAND (M3)*	ACTUAL SUPPLY (M3)**	WATER FOR DOMESTIC USE (M3)**	ACTUAL PER CAPITA CONSUMPTION (LITRES/DAY)
1979	1911	268	108	77	40.3
1980	2015	282	"	"	38.2
1981	2125	296	"	"	36.2
1982	2241	314	"	"	34.4
1983	2363	331	"	"	32.6
1984	2492	349	"	"	30.9
1985	2629	368	"	"	29.3
1986	2772	388	"	"	27.8
1987	2923	409	"	"	26.3
1988	3098	433	"	"	24.9
1989	3251	455	"	"	23.7
1990	3429	480	"	"	22.5
1991	3617	506	"	"	21.3
1992	3815	534	"	"	20.2
1993	4024	563	"	"	19.2

* Using 140 litre per day per capita, recommended for urban centres (National Water Master Plan, 1980).

** Asuming a constant water supply capacity.

Source: Field Survey, 1993.

APPENDIX II

TOTAL POPULATION AND REVENUE IN OL KALOU 1979 - 1993

YEAR	TOTAL POPULATION	POPN IN '000'	REVENUE IN K£	REV. IN NAT. LOG
1979/80	1,911	1.911	7662	8.94
1981/82	2,015	2.125	9584	9.14
1982/83	2,125	2.125	10356	9.25
1983/84	2,363	2.363	11509	9.46
1984/85	2,492	2.492	12810	10.24
1985/86	2,629	2.629	28044	10.41
1986/87	2,772	2.772	33090	10.92
1987/88	2,923	2.923	55242	11.05
1988/89	3,083	3.083	63098	11.55
1989/90	3,251	3.251	104070	11.90
1990/91	3,429	3.429	147365	12.35
1991/92	3,617	3.617	231990	12.51
1992/93	3,815	3.815	270447	12.65

APPENDIX III

RELATIONSHIP BETWEEN MAINTENANCE EXPENDITURE AND TOTAL SERVICE CHARGE REVENUE (KSHS) 1989-93

YEAR	MAINTENANCE EXPENDITURE	S/CHARGE	RATIO
1989	155,000	198,400	0.78
1990	335,000	459,739	0.73
1991	295,750	449,750	0.66
1992	150,000	369,140	0.41
1993	350,450	832,393	0.42

PART I

RESIDENTS' QUESTIONNAIRE

Date..... Interviewer.....
Plot No.....

A. SOCIO-ECONOMIC ASPECTS

1. Household size.....
2. How long has the household head lived in Ol Kalou ?..... Yrs.
3. If Ol Kalou is not the place of his/her origin which is the place of origin ?
   1. Nyandarua district.....
   2. Any other district (specify) .....
4. What was the reason for migrating to this town ?
   1. To be employed.....
   2. To start business.....
   3. To stay with a relative.....
   4. To own /develop a plot.....
   5. Any other (specify).....

Income

5. In which sector is the household head employed ?
   1. Formal sector.....
   2. Informal sector.....
6. Which category of income (on monthly basis) does he belong ?
   1. Below Kshs. 500 .....
   2. Kshs. 501 - 1500.....
   3. Kshs.1501 - 2500.....
   4. Kshs.2501 - 3500.....
   5. Kshs.3501 - 4500.....
   6. Kshs.4501 - 5500.....
   7. Kshs.5501 and above...

B. INFRASTRUCTURE AND SERVICES:

7. Give the following information about health services:

Name accessible Health centre	Type (private, dispensary, Hospital)	Distance (in Km)	Av. Charges (per visit)
1. 2. 3. 4. 5.			

8. Are the above services adequate ? 1.Yes... 2.No...
9. If no (above), what are the effects of this ?
   .....
   .....
   .....

10. In your opinion, how can the services be improved ?
.....
.....
.....

11. Do you think the charges should be introduced or raised to improve the services ? 1.Yes....2.No....
(i) Give reason(s).....
.....
.....

12. Did the location of the health services centre(s) influence, in any way, the location of the following in this town, and if so, how (i) Busines (activity/premises) ? 1.Yes....2.No.....
How influenced:.....
.....
(ii) Place of work ? 1.Yes....2.No.....
How influenced:.....
.....
(iii) Place of Residence ? 1.Yes....2.No.....

Housing:

13. Housing characteristics:
(i) Number of households in the plot.....
(ii) Dwelling units per household.....
(iii) Number of occupants per dwelling unit.....

14. What is the nature of the housing ?
(i) Permanent (block, quarry stones wall,)
(ii) Semi-permanet (wood,mud & iron-sheet roofed)
(iii) Temporary (mud,wattle, grass e.g. shanties).

15. Was the location of the housing influenced by the location of the following:
(i) water supply 1.Yes.....2.No.....
(ii) sewerage system 1.Yes.....2.No.....
(iii) Electricity 1.Yes.....2.No.....
(iv) Road(s) 1.Yes.....2.No.....
(v) Telephone 1.Yes.....2.No.....
(vi) Postal services 1.Yes.....2.No.....

16. Is the housing supply adequate ? 1.Yes....2.No....
(i) If no, what are the major constraints in the provision ?
.....
.....
.....

Water

17.Information on Sources of water:

Source	Dist.	Qlty.	Cost	Use	Supplier
1.Piped Water (individual)					
2.Piped water (communal)					
3.Bore hole					
4.Dug-well					
5.Natural spring					
6.Roofcatchment					
7.River					
8.others (specify)					

18.What is the supply per day ?..... litres

19.What is the demand per day ?..... litres

20.Is the current supply adeqate for present use ? 1.Yes...2.No...

21.What is the nature of water problem(s) ?

1. Shortages.....
2. Pipe breakages.....
3. Quality.....
4. All the above.....

22.Does the location of the water supply (the distribution network) influence the location of the following in this town ?

(i) Business (activity/premises) 1.Yes....2.No....

How.....

(ii) Place of work 1.Yes....2.No....

(iii) Place of residence 1.Yes....2.No....

23.Are there plans, and by who for expansion of the supply in the future ? 1.Yes....2.No....

(i) If yes, by who ?.....

.....

.....

24.How will the local community (including you) participate in that project?.....

.....

.....

Sanitation

25.What type of toilet facilities do you use ?

1.Bush
2.Pit-latrine
3.Flush-toilet (w.c.)

26.If (3) above, what is the type of sewerage system in use ?

1.Septic tanks (individual)
2. " " (Communal)
3.Trunk-sewer (conventional)
4.None

27. How does the following affect your stay and activities in this town ?

(i) Type of the sewerage system ?.....
.....

(ii) Location of the above ?.....
.....

28. Where do you dispose your household garbage ?.....
.....

29. What problems do you face regarding waste disposal ?.....
.....
.....
.....
.....

30. Do you think the method used affect the environment ?
1.Yes....2.No....

(i)Explain.....
.....
.....

Transport

31. How far is the nearest motorable roads ?.....Km.

32. Is it tamarcked ? 1.Yes...2.No...

33. Comment on the location of the following in relation to location of the nearest tamarcked road in this town:

(i)Business (activity/premises) 1.Next
2.0.5 Km away
3.Over 0.5 Km away

(ii)Place of work 1.Next
2.0.5 Km away
3.Over 0.5 Km away

(iii)Residential area 1.Next
2.0.5 Km away
3.Over 0.5 Km away

34. Comment on the present state of roads in this town ?
.....
.....

35. How do you travel to the following places ?

Destination	Mode (tarmac, pavement, earth footpath)	Means of Transport (walk, Vehicle, cycling)	Distance
1.Place of work 2.Market 3.Hospital 4.Leisure place 5.Nearby centres			

36.Could you suggest whether the roads should be improved ?
1.Yes....2.No....
37.If yes, how would you as a member of the local community participate ?.....

Electricity

38.What is your major source of energy ?
1.Firewood
2.Paraffin/gas
3.Electricity

39.Fill the following table about the above:

Supplier	Uses	Reliability	Expenditure (per month)
1. 2. 3.			

40.With the supply of electricity, what activities are you able to carry out ?

41.Is the supply adequate ? 1.Yes....2.No....

42.Did the location of the electricity supply influence the location of your:

(i) Residential house ? 1.Yes....2.No....

(ii) Business (activity/premises) ?
1.Yes....2.No....

(iii)Explain.....
.....
.....

Communication

43.How far are following from your home ?

(i) Postal services.....

(ii) Telephone.....

44.Does the location of the above facilities/services influence the location of your:

(i)Business 1.Yes....2.No....

(ii)Place of work 1.Yes....2.No....

45.Are the above (Q 43.) facilities/services adequate ?
1.Yes....2.No....

Other Facilities/Services

46.Comment on the following:

Facility /Service	Distance (from house)	Reliability	Expenditure/charge	Provided by:	Maintained by:
Nearest Nursery sch.					
Primary sch.					
Secondary sch.					
Bus Terminus					
Market					
Play ground					
Place of worship					

47.Do you face any problem regarding the above facilities and services ? 1.Yes...2.No...

48.What are the specific problems ?.....
.....
.....
.....

49.How can the above problems be solved ?.....
.....
.....
.....

Perception and participation

50. In your opinion who should provide and/or maintain the following facilities/services in this town ?

Facility/service	Provider/supplier	Reason	Maintenance	Reason
1. Water supply 2. Sewerage 3. Postal services&telephone 4. electricity 5. Roads 6. Pavement 7. Street lights				

51. If the above facilities/services are not adequate, what could be the cause ?.....
.....
.....
.....

52. What should be done to alleviate this ?.....
.....
.....
.....

53. If the above facilities/services are not currently being well-maintained, what could be the reasons ?.....
.....
.....
.....

54. If charges for use of the above facilities/ services were increased or introduced to enable improvement and maintaince, would you be willing to pay ?

1. Yes....2. NO....

(i) Give the reason(s).....
.....
.....

55. How else would you participate in such infrastructural projects in this town, i.e. in

(a) Planning:.....
.....

(b) Implementation:.....
.....

(c) Management:.....
.....

PART II

INSTITUTIONAL QUESTIONNAIRE:

Date.....

Interviewer.....

Respondent's position in theinstitution.....

1.Name of the institution.....

2.Type (e.g. Primary school, church,etc.).....

.....

3.Type(s) of services offered.....

.....

.....

4.Number of the population served.....

5.When was the institution started.....

6.The institution is; (i) private (ii) public

7.Area of land held by the institution.....

8.Any land acquisition constraints ? (i) Yes (ii) No

9. If yes above, is there any attempt to acquire land elsewhere ?
(i)Yes (ii)No

10.Information on water:

(i)Source(s).....

(ii) Distribution (regular or irregular supply).....

(iii) Supply per day.....

(iv) Demand per day.....

(v) Charges.....

(vi) Nature of the problem if any(e.g. shortages,pipes breakages, quality, distribution etc.).....

.....

11. Did the water supply network and/or source influence in any way, the location of this institution ? (i) Yes (ii)No
If yes, Explain.....

.....

12.Electricity:

(i) Source(s).....

(ii) Distribution (regular or irregular supply).....

(iii) Supply per day.....

(iv) Demand per day.....

(v) Charges (per month).....

(vi) Nature of the problem if any (interruption, costs, etc.)..

.....

13.Did the electricity supply network and/or source influence in any way, the location of this institution ? (i) Yes (ii)No
If yes, Explain.....

.....

14.Transport:

(i) How far is the motorable raod(s) ?.....Km.

(ii) Is it tarmarcked ? (i) Yes (ii) No

(iii) Is the existing road links adequate for the accessiblity of the institution ?

15.Did the road network influence in any way, the location of this institution ? (i) Yes (ii)No
If yes, Explain.....

.....

16. Sewerage:

(i) What type of toilet facilities are used in this institution?

1. Pit-latrine
2. Flush-toilet (w.c.)

(ii) If (2) above, what is type of sewerage system is in use ?

1. Septic tanks
2. Trunk-sewer (conventional)
3. None

(iii) Is the sewerage network adeqate ?.....

17. Did the sewerage network influence in any way, the location of this institution ? (i) Yes (ii)No

If yes, Explain.....

.....

18. Who supplies and maintains the following facilities/services in this this institution ?

Facility/service	Provider/supplier	Maintenance by:
1.Water supply		
2.Sewerage		
3.Postal services& telephone		
4.electricity		
5.Roads		
6.Pavement		
7.Street lights		

19. If the above facilities/services are not adequate, what could be the cause ?.....

.....

20. If the above facilities are not currently being well-maintained, what could be the reasons?.....

.....

21. If charges for use of the above facilities/services were increased and/or introduced to enable improvement and maintenance, would the institution be willing to pay ?

(i) Yes (ii) No

Give reasons .....

.....

22. In your opinion what role should the local authority (Town Council) play in provision of infrastructure?

.....

.....